VARISPEED-676H5
INSTRUCTION MANUAL

INVERTER FOR SYSTEM DRIVES (VS-676H5)

MODEL: CIMR-H5[ ]

200V CLASS 0.4 to 75kW (1.0 to 100kVA)
400V CLASS 0.4 to 300kW (1.0 to 400kVA)

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

REFERENCE

VARISPEED-676H5 DESCRIPTIVE MANUAL FOR CONSTANTS (TOEZ-S676-7.1)

YASKAWA

MANUAL NO. TOE-S676-7B

PREFACE

YASKAWA's VS-676H5 is an inverter for system drives provided with both V/f control and vector control for standard models. This instruction manual describes installation, maintenance and inspection, troubleshooting, and specifications of the VS-676H5. Read this instruction manual thoroughly before operation.

YASKAWA ELECTRIC CORPORATION

General Precautions

- Some drawings in this manual are shown with the protective cover or shields removed, in order to describe detail with more clarity. Make sure all covers and shields are replaced before operating this product.
- This manual may be modified when necessary because of improvement of the product, modification, or changes in specifications.
  Such modifications are denoted by a revised manual No.
- To order a copy of this manual, if your copy has been damaged or lost, contact your YASKAWA representative.
- YASKAWA is not responsible for any modification of the product made by the user, since that will void your guarantee.

NOTES FOR SAFE OPERATION

Read this instruction manual thoroughly before installation, operation, maintenance or inspection of the VS–676H5. In this manual, NOTES FOR SAFE OPERATION are classified as "WARNING" or "CAUTION".

⚠WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to personnel and damage to equipment.
It may also be used to alert against unsafe practices.

Even items described in ⚠ CAUTION may result in a vital accident in some situations. In either case, follow these important notes.

NOTE : These are steps to be taken to insure proper operation.

RECEIVING

⚠ CAUTION

(Ref. page)

- Do not install or operate any inverter which is damaged or has missing parts.
  Failure to observe this caution may result in personal injury or equipment damage. 12

INSTALLATION

⚠ CAUTION

(Ref. page)

- Lift the cabinet by the base. When moving the unit, never lift by the front cover.
  Otherwise, the main unit may be dropped causing damage to the unit. 14
- Mount the inverter on nonflammable material (i.e. metal).
  Failure to observe this caution can result in a fire. 14
- When mounting units in an enclosure, install a fan or other cooling device to keep the intake air temperature below 45°C.
  Overheating may cause a fire or damage to the unit. 14

WIRING

⚠ WARNING

(Ref. page)

- Only commence wiring after verifying that the power supply is turned OFF.
  Failure to observe this warning can result in an electrical shock or a fire. 23
- Wiring should be performed only by qualified personnel.
  Failure to observe this warning can result in an electrical shock or a fire. 23
- When wiring the emergency stop circuit, check the wiring thoroughly before operation.
  Failure to observe this warning can result in personal injury. 23
- Make sure to ground the ground terminal ⏚.
  (Ground resistance
  200V class: 100Ω or less, 400V class: 10Ω or less)
  Failure to observe this warning can result in an electrical shock or a fire. 32

⚠ CAUTION

(Ref. page)

- Verify that the inverter rated voltage coincides with the AC power supply voltage.
  Failure to observe this caution can result in personal injury or a fire. 22
- Do not perform a withstand voltage test of the inverter.
  It may cause semi–conductor elements to be damaged. 22
- To connect a braking resistor, braking resistor unit or braking unit, follow the procedures described in APPENDIX 3.
  Improper connection may cause a fire. 22
- Tighten terminal screws to the specified tightening torque.
  Failure to observe this caution can result in a fire. 22
- Never connect the AC main circuit power supply to output terminals U, V and W.
  The inverter will be damaged and invalidate the guarantee. 32

PREPARATION FOR OPERATION

⚠ CAUTION

(Ref. page)

- Before starting test run, disconnect the coupling that directly connects the motor to the machine, belt or others to allow the motor to be run independently. If the inverter should be operated for the test with the motor connected to the machine, do so only after ensuring the safety.
  Failure to observe this caution can result in personal injury. 49

OPERATION

⚠ WARNING

(Ref. page)

- Only turn ON the input power supply after replacing the front cover. Do not remove the cover while current is flowing.
  Failure to observe this warning can result in an electrical shock. 69
- When the retry function is selected, do not approach the inverter or the load, since it may restart suddenly after being stopped.
  (Construct machine system, so as to assure safety for personnel, even if the inverter should restart.) Failure to observe this warning can result in personal injury. 69
- Since the stop button can be disabled by a function setting, install a separate emergency stop switch.
  Failure to observe this warning can result in personal injury. 69
- If an alarm is reset with the operation signal ON, the inverter restarts automatically. Only reset the alarm after verifying that the operation signal is OFF.
  Failure to observe this warning can result in personal injury. 69

⚠ CAUTION

(Ref. page)

- Never touch the heatsink or discharging resistor since the temperature is very high.
  Failure to observe this caution can result in harmful burns to the body. 69
- Since it is easy to change operation speed from low to high speed, verify the safe working range of the motor and machine before operation.
  Failure to observe this caution can result in personal injury and machine damage. 69
- Install a holding brake separately if necessary.
  Failure to observe this caution can result in personal injury. 69
- Do not check signals during operation.
  The machine or the inverter may be damaged. 69
- All the constants of the inverter have been preset at the factory. Do not change the settings unnecessarily.
  The inverter may be damaged. For supply voltage, follow Para. 4.2. 69

MAINTENANCE AND INSPECTION

⚠ WARNING

(Ref. page)

- Never touch high-voltage terminals in the inverter.
  Failure to observe this warning can result in an electrical shock. 78
- Replace all protective covers before powering up the inverter. To remove the cover, make sure to shut OFF the molded-case circuit breaker.
  Failure to observe this warning can result in an electrical shock. 78
- Perform maintenance or inspection only after verifying that the CHARGE LED goes OFF, after the main circuit power supply is turned OFF.
  The capacitors are still charged and can be dangerous. 78
- Only authorized personnel should be permitted to perform maintenance, inspections or parts replacement.
  [Remove all metal objects (watches, bracelets, etc.) before operation.]
  (Use tools which are insulated against electrical shock.)
  Failure to observe this warning can result in an electrical shock. 78

⚠ CAUTION

(Ref. page)

- The control PC board employs CMOS ICs. Do not touch the CMOS elements.
  They are easily damaged by static electricity. 78
- Do not connect or disconnect wires or connectors while power is applied to the circuit.
  Failure to observe this caution can result in personal injury. 78

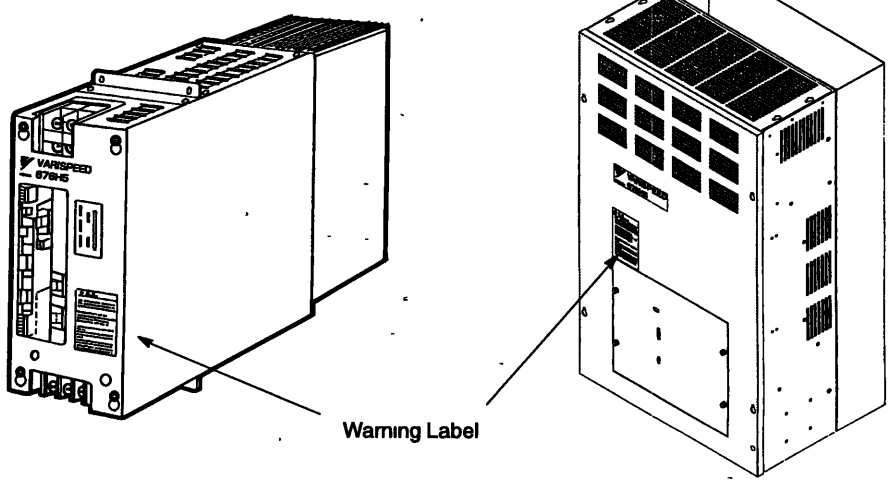
OTHERS

⚠ WARNING

- Never modify the product.
  Failure to observe this warning can result in an electrical shock or personal injury and will invalidate the guarantee.

WARNING LABEL

A warning label is displayed on the front cover of the inverter, as shown below. Follow these instructions when handling the inverter.



Book type: Model CIMR-H5D27P5

Cubic type: Model CIMR-H5D2030

Warning Label

⚠ WARNING

May cause injury or electric shock.

- Please follow the instructions in the manual before installation or operation.
- Disconnect all power before opening front cover of unit. Wait 1 minute until DC Bus capacitors discharge.
- Use proper grounding techniques.

CONTENTS

1 RECEIVING

> **⚠ CAUTION**
>
> • Do not install or operate any inverter which is damaged or has missing parts.
> Failure to observe this caution may result in personal injury or equipment damage.

This chapter describes how to verify the inverter after delivery to the user.

1.1 INSPECTION CHECKPOINTS

(1) Receiving Checkpoints

Table 1 Checkpoints

Checkpoints	Description
Does the inverter model number correspond with the purchase order?	Check the model number on the nameplate on the side of the VS-676H5 (Refer to page 13)
Are any parts damaged?	Visually check the exterior and verify that there was no damage during transport
Is hardware properly seated and securely tightened?	Remove inverter front cover Check all visible hardware with appropriate tools

If any of the above checkpoints are not satisfactory, contact your YASKAWA representative.

(2) Checking the Nameplate Data

(a) Nameplate Data

Example of model CIMR-H5D20P4

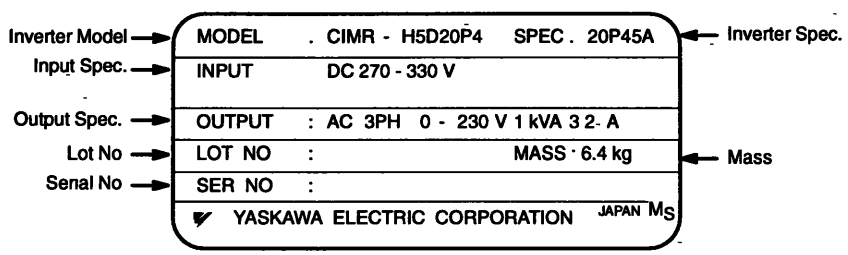


Fig. 1 Nameplate Data

(b) Model Designation

CIMR - H5 D 2 0P4

Inverter

VS - 676H5 Series

Symbol	Specifications
A	Japan use 3-phase input
D	Japan use DC input

Symbol	Voltage
2	3-phase 200 V class (Note: 300 V DC)
4	3-phase 400 V class (Note: 600 V DC)

Symbol	Max. applicable motor output
0P4	0.4 kW
0P7 to 075	0.75 kW to 75 kW

Fig. 2 Model Designation

(c) Specification Designation

2 0P4 5 A*

Revision symbol

Symbol	Voltage
2	3-phase 200 V class (Note: 300 V DC)
4	3-phase 400 V class (Note: 600 V DC)

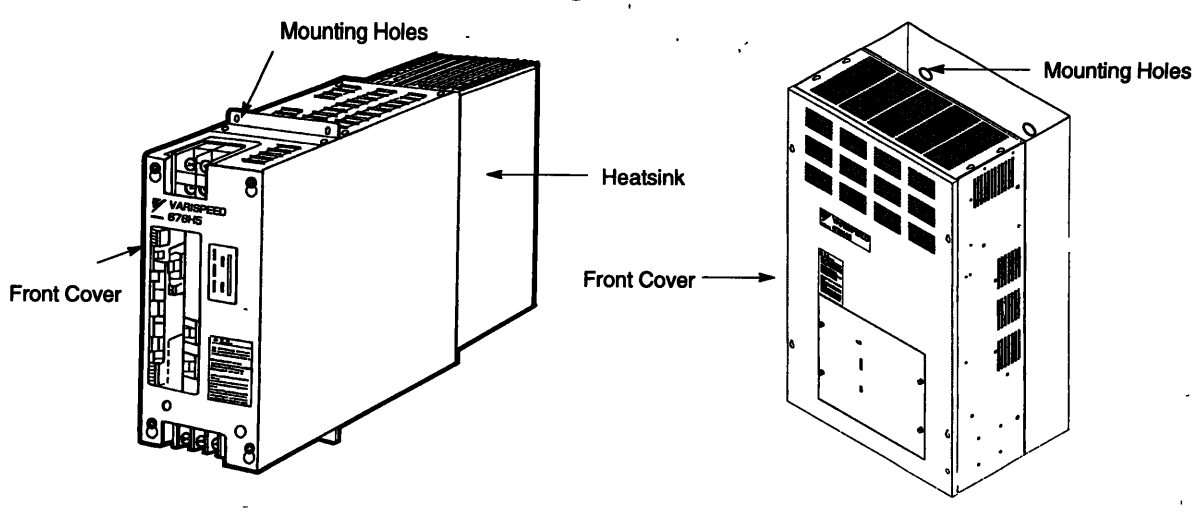
Symbol	Max. applicable motor output
0P4	0.4 kW
0P7 to 075	0.75 kW to 75 kW

Symbol	Enclosure
0	Open chassis type (self-cooling)
5	Open chassis type (force-cooling)

* For special specifications, a spec. sheet No. appears on the nameplate.

Fig. 3 Specification Designation

1.2 IDENTIFYING THE PARTS



Book type: Model CIMR-H5D27P5 (200 V, 7.5 kW) Cubic type: Model CIMR-H5D2030 (200 V, 30 kW)

Fig. 4 Configuration of VS-676H5

2 INSTALLATION

⚠ CAUTION

- Lift the cabinet by the base. When moving the unit, never lift by the front cover. Otherwise, the main unit may be dropped causing damage to the unit.
- Mount the inverter on nonflammable material (i.e. metal). Failure to observe this caution can result in a fire.
- When mounting units in an enclosure, install a fan or other cooling device to keep the intake air temperature below 45°C. Overheating may cause a fire or damage to the unit.

This chapter describes the configuration, location and space when mounting the VS-676H5.

2.1 REMOVING AND REPLACING THE FRONT COVER

(1) Book Type (200V 0.4 to 15kW,400V 0.4 to 18.5kW)

To remove the front cover from the inverter, pull it out in the direction shown by arrow ② while lifting it in the direction shown by arrow ①. After pulling it a little, disconnect the wires from the control card to the base driver card. Follow the procedure in the reverse order when mounting it to the inverter.

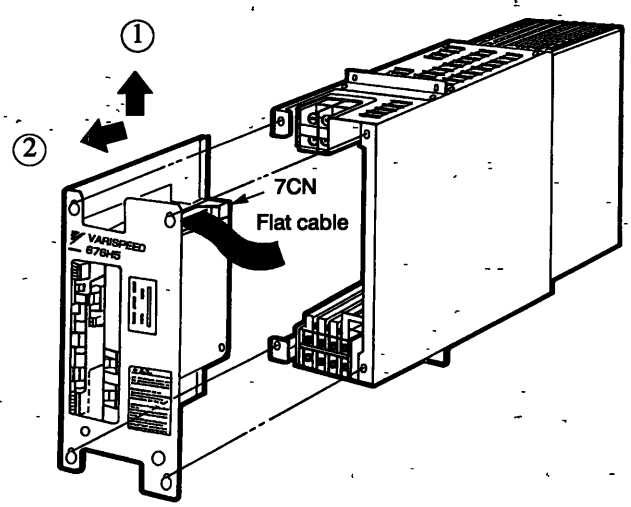


Fig. 5 Removing and Replacing the Front Cover
(Book Type : 200V 0.4 to 15 kW, 400V 0.4 to 18.5kW)

(2) Book Type (200V 8.5 to 22kW, 400V 22 to 45kW)

To remove the front cover from the inverter, pull it out in the direction shown by arrow ② while lifting it in the direction shown by arrow ①.

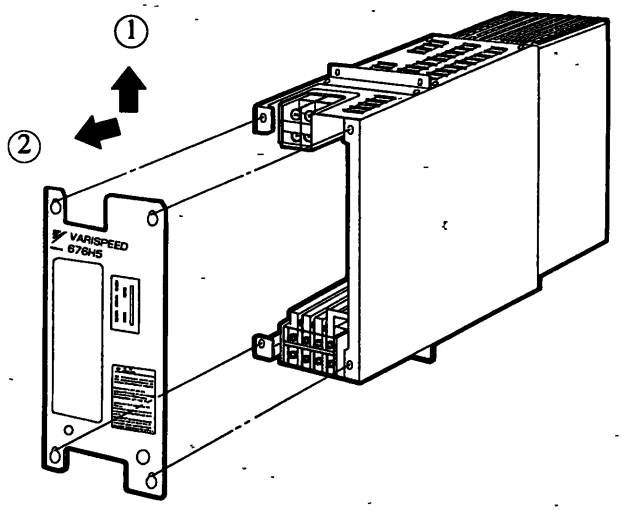


Fig. 6 Removing and Replacing the Front Cover
(Book Type : 200V 8.5 to 22 kW, 400V 22 to 45kW)

(3) Cubic Type

To remove the front cover from the inverter, pull it in the direction shown by arrow ② while lifting it in the direction shown by arrow ①. Follow the procedure in the reverse order when mounting it to the inverter.

The control card and the option cards are accessible by opening the sub cover at the front.

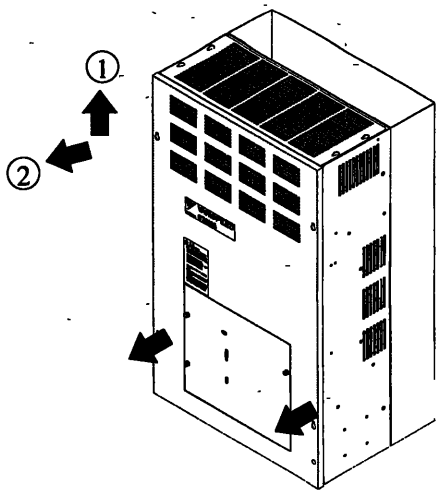


Fig. 7 Removing and Replacing the Front Cover (Cubic Type)

2.2 MOUNTING OPTION CARDS

(1) Insert the option card that fits to connector 2CN, 3CN, or 4CN.

(2) Fit the option card onto the support spacer at (S) .

(3) For the option card that fits onto connector 2CN, attach screw (N) .

(4) To remove option cards, follow steps (1) to (3) in the reverse order.

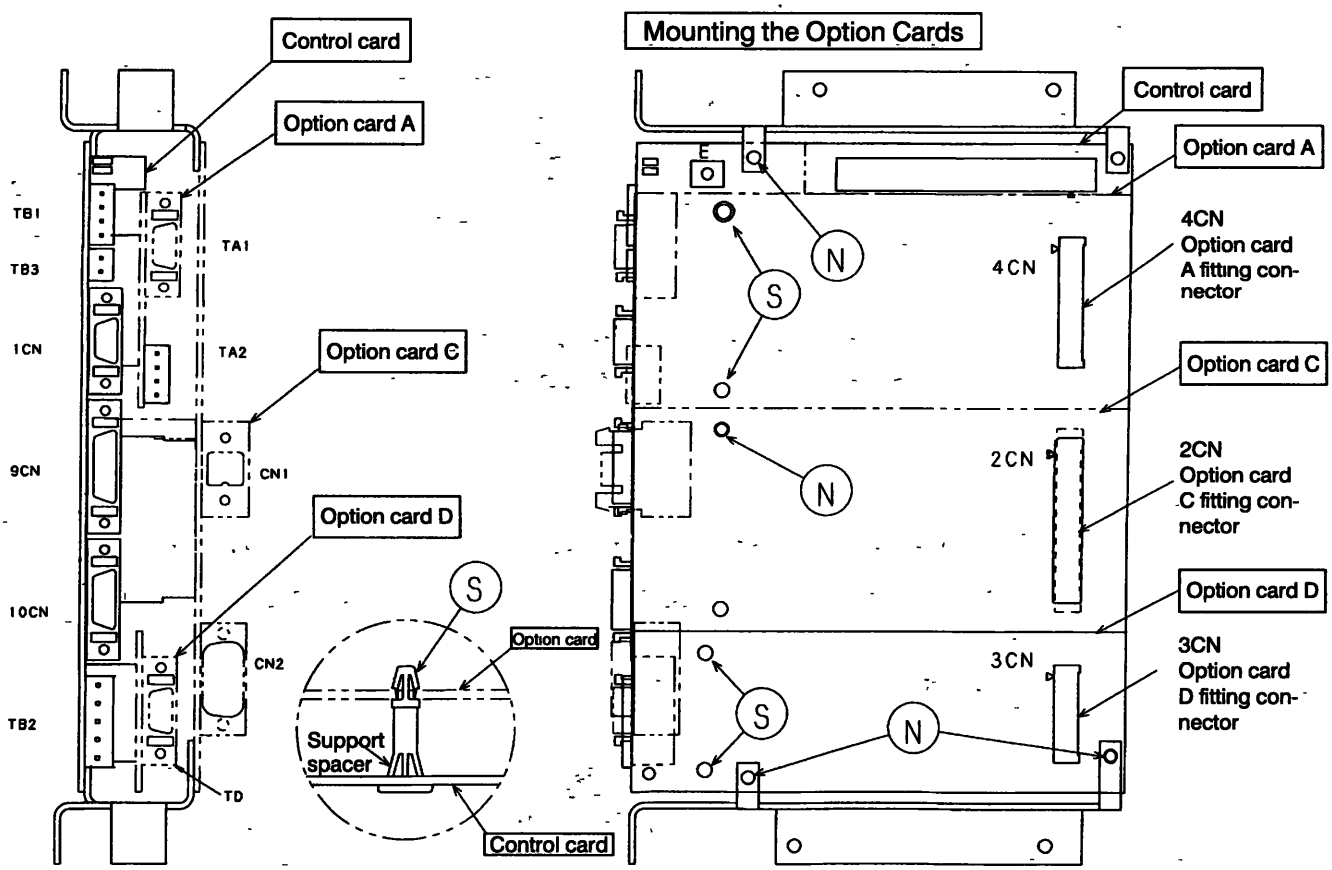


Fig. 8 Mounting Option Cards

NOTE

1. When mounting option cards A and D, make sure that part Ⓢ of support spacer is correctly fitted (support tongues are opened) after mounting the board.
2. When mounting option card C, make sure that screws Ⓝ are securely tightened after mounting the board.
3. Note that some of the connectors are of the same type. Therefore, make sure to mount option cards to the correct connectors each of which is identified by device symbol.

Table 2 Table of Option Cards

Type		Name	Code No.	Function	Position	Remarks
Built-in type (mounted to connector)	Feedback detection option card	PG speed control card PG-A2/H	73600-A017X	- A-phase pulse (single pulse) input - PG frequency range 50 to 32767 Hz - Pulse monitor output +12V, 20 mA (Max)	Mounted to 4CN on the control card (note)	See TOE-C736-40 12
		PG speed control card PG-B2/H	73600-A018X	- For complementary output PG - A- and B-phase pulses for vector control (2-phase pulse) Input - PG frequency range 50 to 32767 Hz - Pulse monitor output +24 V, 30 mA (Max) (open collector output)		See TOE-C736-40 13
		Synchronous input control card SP-A2/H (exclusive for EMS)	73600-A019X	Applicable frequency 0 to approx 100 Hz		See TOE-C736-40 14
	Monitor option card	Analog monitor card AO-12/H	73600-D008X	Outputs analog signals that are used to monitor the operation status (output speed, torque, etc) - Output resolution 11 bits + sign (1/2048) - Output voltage -10 to +10 V (non-insulated) - Output channels: 2-channels	Mounted to 3CN on the control card (note)	See TOE-C736-40 10
		Digital output card DO-08/H	73600-D009X	Outputs the inverter's operation status and fault contents (multi-function output). - Photocoupler output 8 channels (with same common terminal)		See TOE-C736-40 11
	Communication control option card	Inverter kit controller CP-916A	87916-1100X-s0100Y	Board-type controller directly mounted to the inverters. - Program steps: 1k steps - Communication CP-215 (1 port)	Mounted to 2CN on the control card (note)	See: SIE-C873-16 4 SIE-C879-16 1
		CP-216 communication interface card CP-216IF/INV	87216-1100X-s0100Y	Used to connect to the CP-216 transmission line		See SIE-C873-16 1 SIE-C873-16 4

NOTE

1. Only one card can be connected to each connector.
2. The numbers represented by X and Y are changed according to the modifications and version upgrading of the hardware and software.
   X: The number representing modifications made to the hardware
   Y: The number representing modifications made to the software

2.3 CHOOSING A LOCATION TO MOUNT THE INVERTER

To ensure proper performance and long operating life, follow the recommendations below when choosing a location for installing the VS-676H5. Make sure the inverter is protected from the following conditions.

- ☐ Direct sunlight. (Avoid using outdoors.)
- ☐ Corrosive gases or liquids.
- ☐ Oil sprays, splashes
- ☐ Salt spray.
- ☐ Rain, moisture
- ☐ Dust metallic particles in the air.
- ☐ Physical shock, vibration.
- ☐ High hymidity
- ☐ Extreme cold and heat. Allowable ambient temperature range: –10 to +40°C
- ☐ Magnetic noise. (Example: Welding machines, power devices, etc.)
- ☐ Radioactive materials.
- ☐ Combustibles

2.4 CLEARANCES

Install the VS-676H5 vertically and allow sufficient clearances for effective cooling as shown in Fig. 9 and 10.

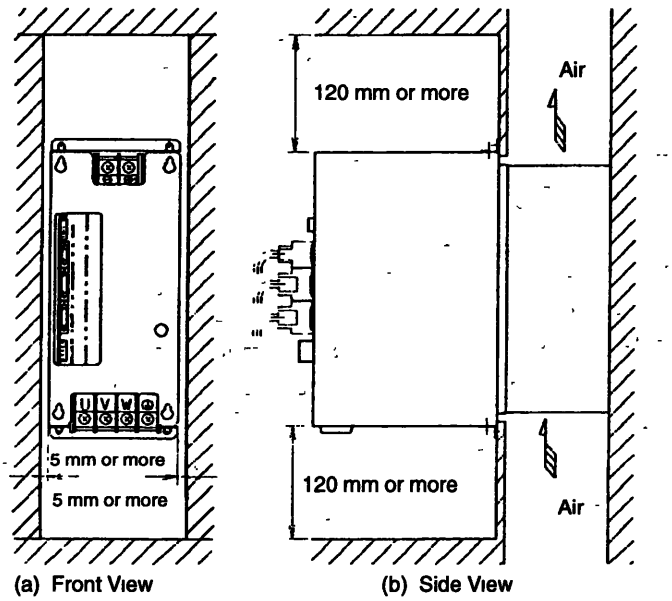


Fig. 9 Clearances (Type of 200 V 22 kW/400 V 45 kW or Less)

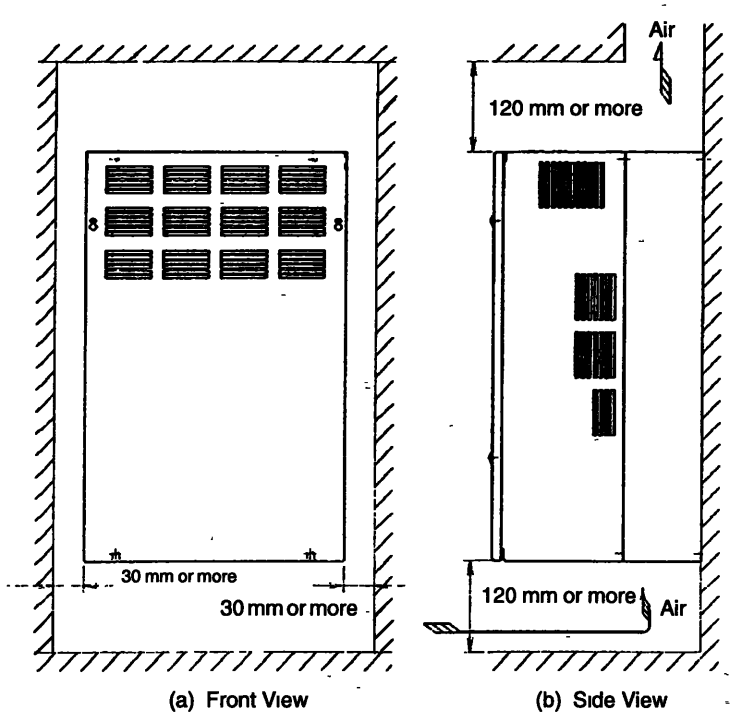


Fig. 10 Clearances (Type of 200 V 30 kW/400 V 55 kW or Larger)

NOTE

1. For the external dimensions and mounting dimensions, refer to APPENDIX 2 "DIMENSIONS".
2. Allowable intake air temperature to the inverter.
   Open chassis type: –10 to +45°C
3. For the types of 200 V, 22 kW or less and those of 400 V, 45 kW or less, cooling air indicated below must be secured since these types do not have a built-in cooling fan.

Table 3 Required Cooling Air

Model Name of VS-676H5 CIMR-□	Wind Velocity of Cooling Air at Heat Sink m/s
H5D20P4	1.5
H5D20P7	
H5D21P5	
H5D22P2	
H5D23P7	
H5D25P5	2.0
H5D27P5	
H5D2011	2.5
H5D2015	
H5D2018	3.5
H5D2022	

Model Name of VS-676H5 CIMR-□	Wind Velocity of Cooling Air at Heat Sink m/s
H5D40P4	1.5
H5D40P7	
H5D41P5	
H5D42P2	
H5D43P7	
H5D45P5	2.0
H5D47P5	
H5D4011	2.5
H5D4015	
H5D4018	3.5
H5D4022	
H5D4030	
H5D4037	
H5D4045	

3 WIRING

⚠ WARNING

- Only commence wiring after verifying that the power supply is turned OFF.
  Failure to observe this warning can result in an electrical shock or a fire.
- Wiring should be performed only by qualified personnel.
  Failure to observe this warning can result in an electrical shock or a fire.
- When wiring the emergency stop circuit, check the wiring thoroughly before operation.
  Failure to observe this warning can result in personal injury.

⚠ CAUTION

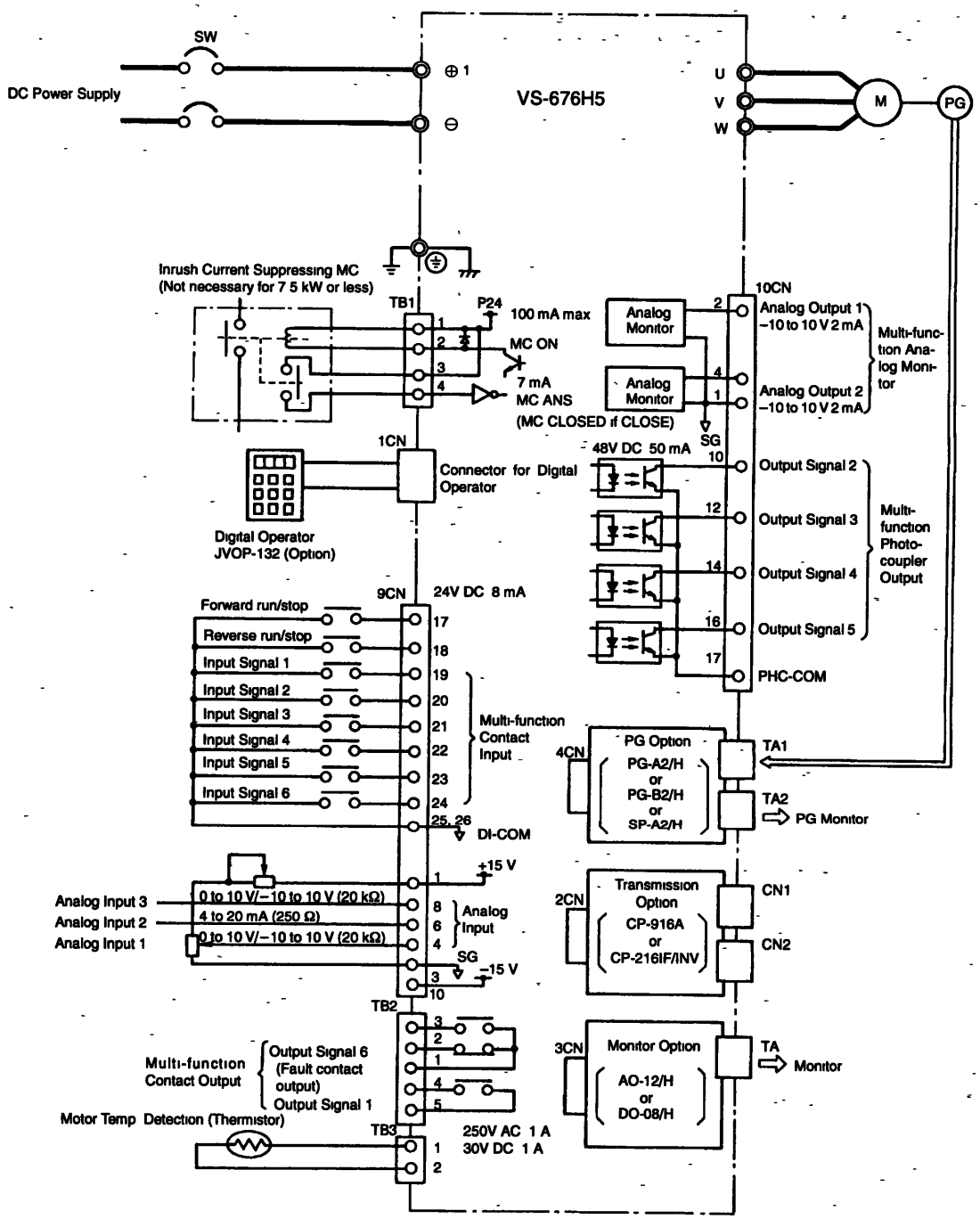
- Verify that the inverter rated voltage coincides with the AC power supply voltage.
  Failure to observe this caution can result in personal injury or a fire.
- Do not perform a withstand voltage test of the inverter.
  It may cause semi-conductor elements to be damaged.
- To connect a braking resistor, braking resistor unit or braking unit, follow the procedures described in APPENDIX 3.
  Improper connection may cause a fire.
- Tighten terminal screws to the specified tightening torque.
  Failure to observe this caution can result in a fire.

This chapter describes the main circuit wiring and the control circuit wiring of the VS-676H5.

3.1 CONNECTION DIAGRAMS

The following are connection diagrams including those of option cards.

(1) Connection diagram of standard inverter



9CN DI-COM: 25, 26 10CN SG: 1, 3, 5
9CN SG: 3, 5, 7, 9, 12, 13 10CN PHC-COM: 17, 18, 19, 20

Fig. 11 Connection Diagram of Standard Inverter
(Model CIMR-H5D2030, 200 V 30 kW)

NOTE

1. Control circuit terminal (connector 9CN-1, 10) of +15V/–15V has a maximum output current capacity of 20 mA.
2. Multi-function analog output should be used for monitoring meters such as a frequency meter and an ammeter and should not be used for feedback control system. It is recommended to use analog monitor card (Model DO-08/H or AO-12/H) for the control system.

(2) Connection Diagram of PG Card Option

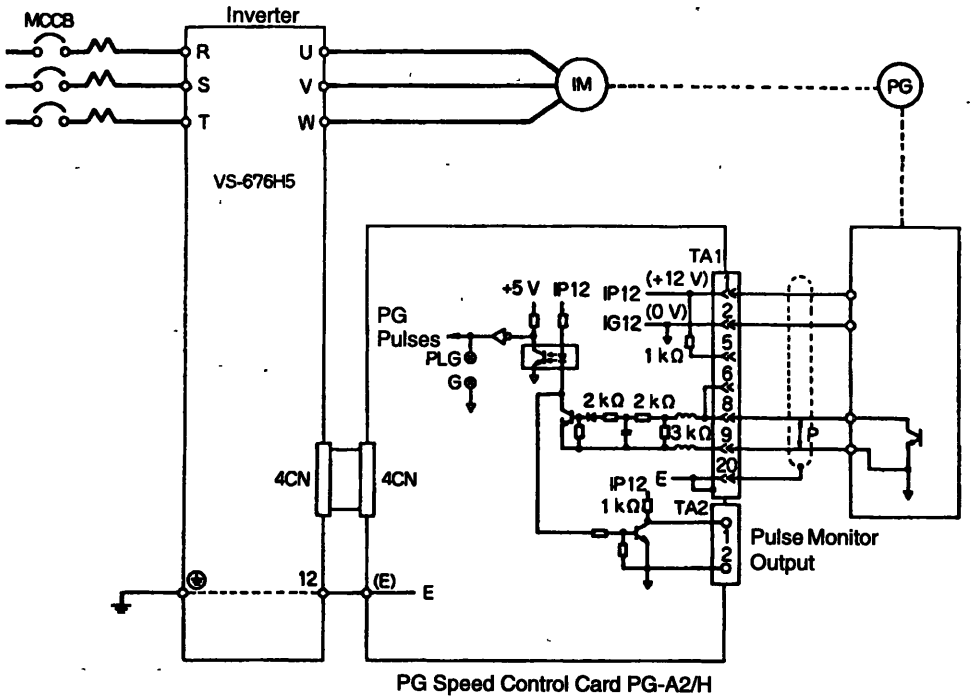
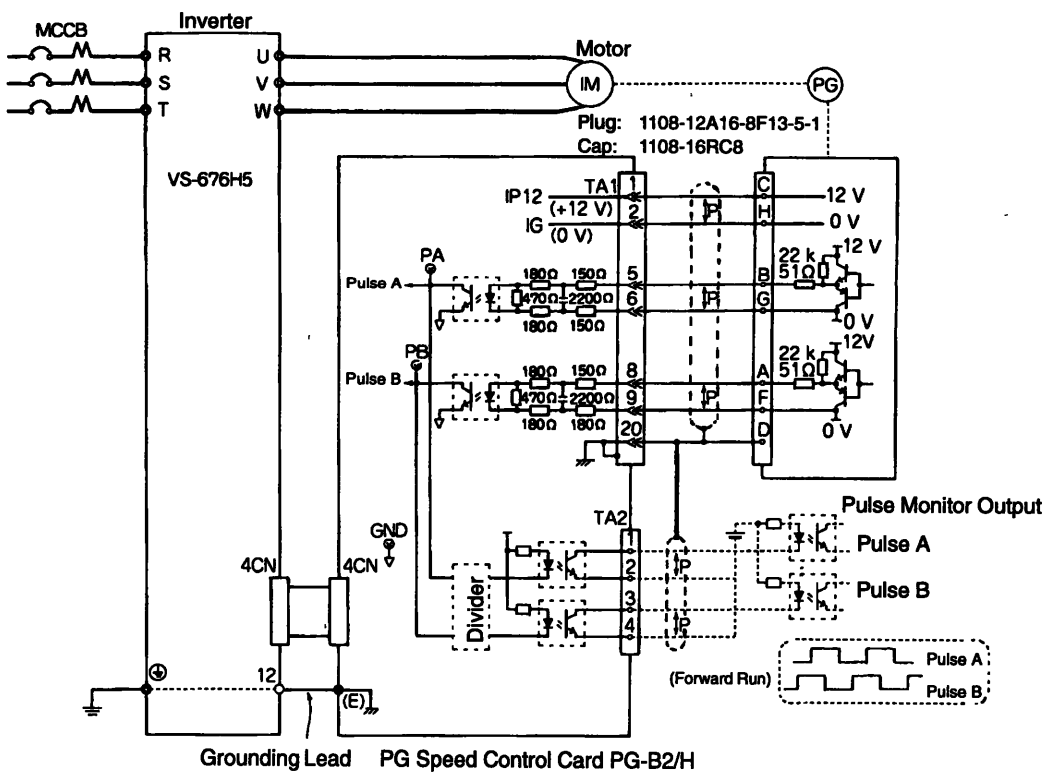


Fig. 12 Connection Diagram of PG-A2/H (Single-Pulse Input)



Note: Terminal symbols of PG are examples assuming Yaskawa's motor is used
PG model: LMA-□□B-S185Y (Complementary output)

Fig. 13 Connection Diagram of PG-B2/H (Double-Pulse Input)

NOTE

Cautions on Wiring

1. Isolate the control signal wires (terminals TA1 and TA2) of the PG speed control cards PG-A2/H and PG-B2/H from the main circuit wires and power cables.
2. For connection with a PG, use shielded wires to prevent malfunctions due to noise. The allowable maximum wiring distance varies depending on the type of cables used for connection.

KPEV-S (0.75 mm^2, three-pair wire):	Max. 50 m
KPEV-S (1.25 mm^2, three-pair wire):	Max. 300 m (junction terminal must be used.)

(3) Connection Diagram of Synchronous Control Option

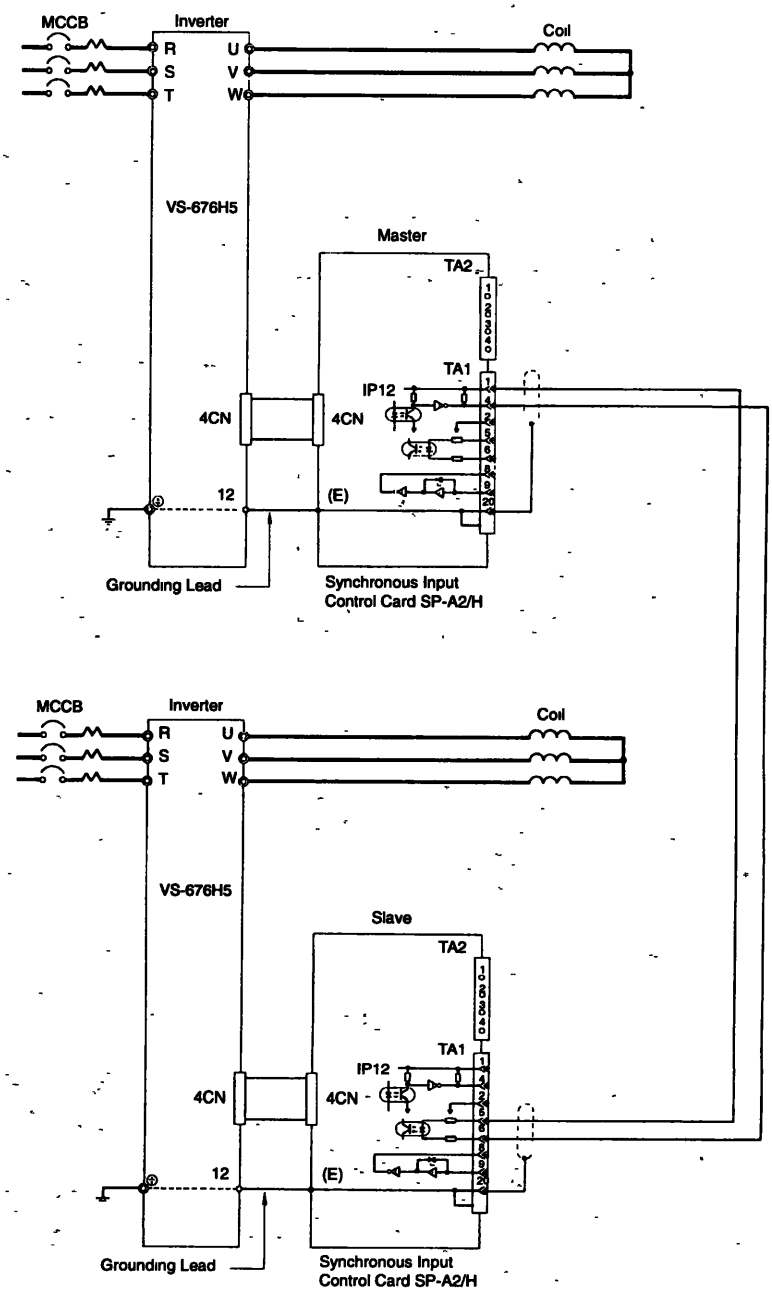


Fig. 14 Connection Diagram of SP-A2/H (Exclusive for EMS Control)

NOTE

Cautions on Wiring

1. Isolate the control signal wires (terminals TA1 and TA2) of the synchronous control card SP-A2/H from the main circuit wires and power cables.
2. For connection within a specified area, use shielded wires to prevent malfunctions due to noise. The wiring distance should be less than 50 m.

(4) Connection Diagram of Analog Output Option

The following diagram shows an example of connection of the inverter, analog monitor card AO-12/H, and a peripheral: outputs of AO-12/H are connected to a frequency meter and an ammeter.

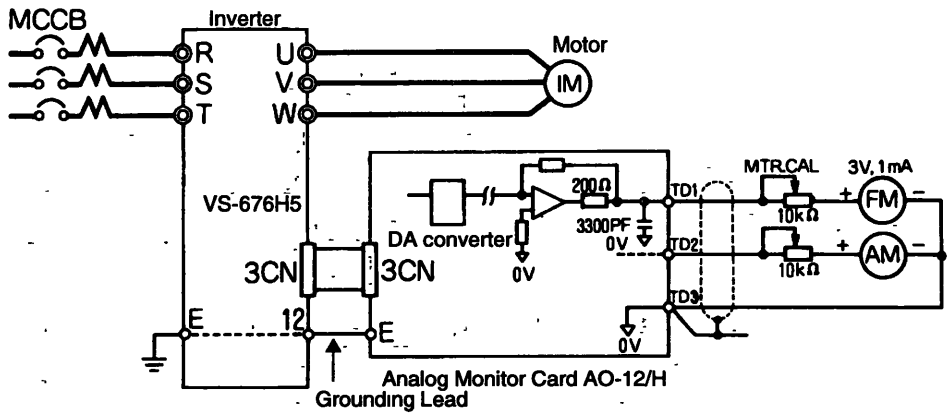


Fig. 15 Connection Diagram of AO-12/H

Cautions on Wiring

1. Isolate the control signal wires (terminals TD1 to TD3) of the analog monitor card AO-12/H from the main circuit wires and power cables.
2. For the connection of control signals, use shielded wires and treat the termination of wires in the manner shown below to prevent malfunctions due to noise. The wiring distance should be less than 50 m.

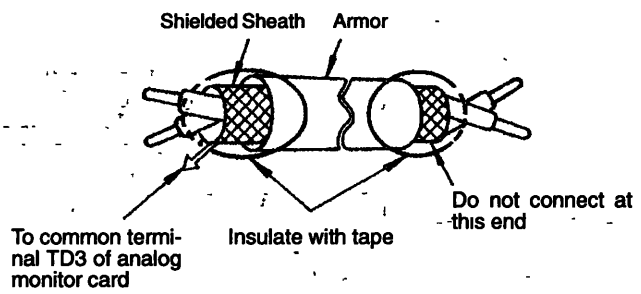


Fig. 16 Termination Treatment of Shielded Wires

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(5) Connection Diagram of Digital Output Option

The following diagram shows an example of connection of the inverter, digital output card DO-08/H, and a peripheral: outputs of DO-08/H are connected to DC relays.

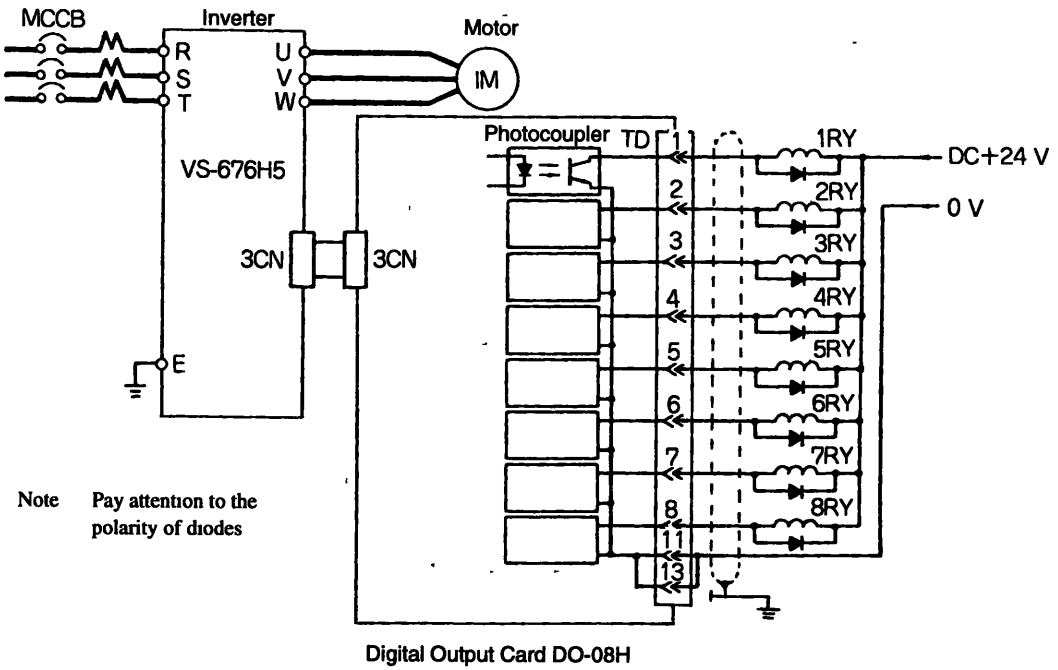


Fig. 17 Connection Diagram of DO-08/H

NOTE

Cautions on Wiring

1. Isolate the wiring connected to terminals TD from the main circuit wires and power cables.
2. For the wiring connected to terminals TD, use shielded wires to prevent malfunctions due to noise. The wiring distance should be less than 50 m.

(6) Connection Diagram of Inverter Kit Controller Option

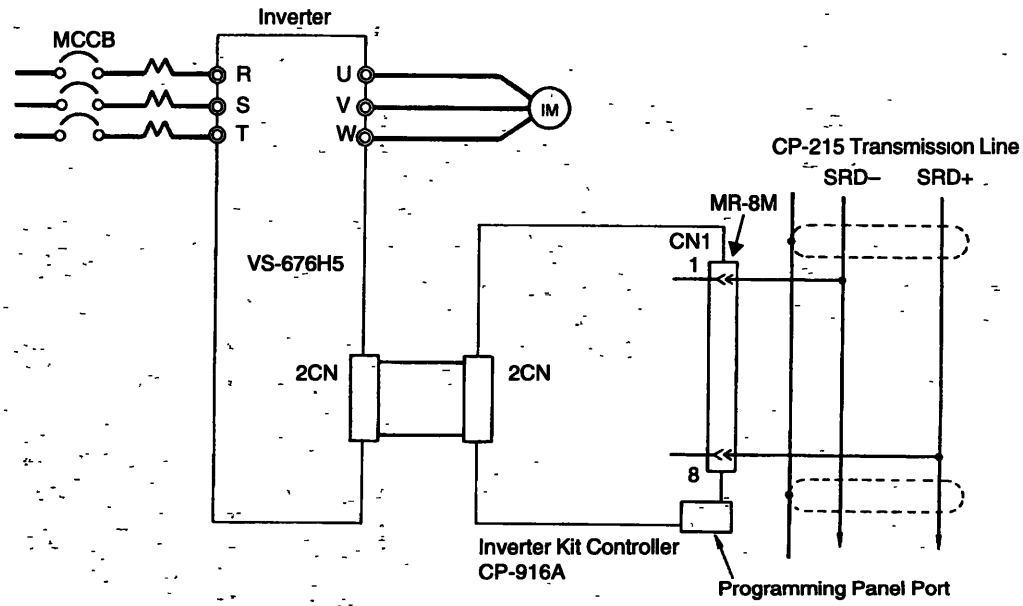


Fig. 18 Connection Diagram of CP-916A

(7) Connection Diagram of Communication Option

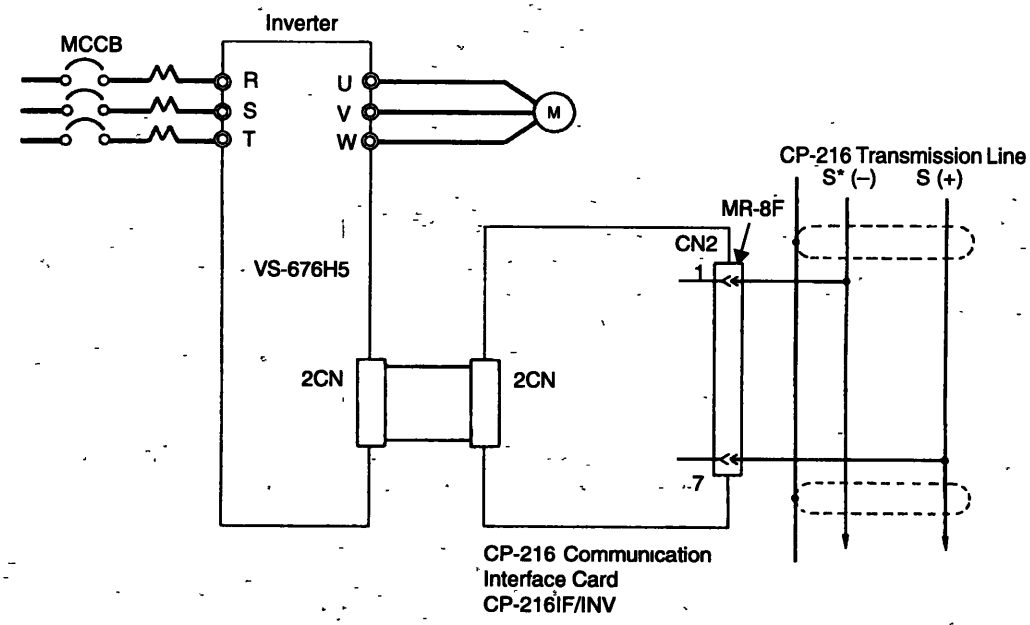


Fig. 19 Connection Diagram of CP-216 IF/INV

NOTE

Isolation of Power Cables in the Panel

The low-voltage line must be isolated from the main line by separating them at least 200 mm from each other. In addition, use the shilded wires for the low-voltage line to protect it from influence of the operation line and other lines run in parallel to it.

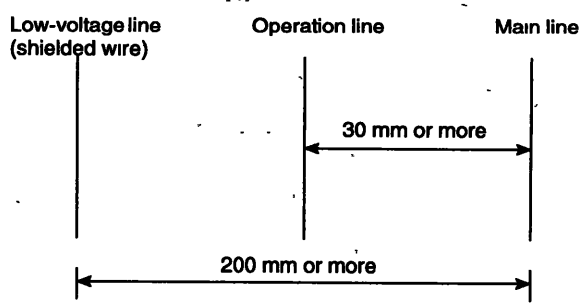


Fig. 20 Isolation of Cables in the Panel and the Minimum Isolating Distance

Connection of Shielded Sheath

Connect the shield wire in the power cable to the earth terminal Es.

For details, refer to "FDS System Installation Manual" (SIE-C873-16.4).

3.2 WIRING THE MAIN CIRCUIT

⚠ WARNING

- Make sure to ground the ground terminal ⏚ .
  (Ground resistance 200 V class: 100 Ω or less, 400 V class: 10Ω or less)
  Failure to observe this warning can result in an electrical shock or a fire.

⚠ CAUTION

- Never connect the AC main circuit power supply to output terminals U, V and W.
  The inverter will be damaged and invalidate the guarantee.

(1) Wiring Precautions for Main Circuit Input

< AC Input >

(a) Installation of Ground Fault Interrupter

When connecting a ground fault interrupter to input terminals R, S, and T, select one that is not affected by high frequency.

Examples: NV series by Mitsubishi Electric Co., Ltd.
(manufactured in or after 1988)
EG, SG series by Fuji Electric Co., Ltd.
(manufactured in or after 1984)

(b) Installation of Magnetic Contactor

When using a braking resistor unit, install a magnetic contactor at the primary side of the inverter to protect the braking resistor unit, and program the sequence to turn off the magnetic contactor upon actuation of the overload relay trip contact. If the inverter malfunctions, the braking resistor unit could be burned out.

(c) Terminal Block Connection Sequence

Input power supply phases can be connected to any terminal regardless of the order of R, S, and T on the terminal block.

(d) Installation of Surge Suppressor

For inductive loads (magnetic contactors, magnetic relays, solenoid valves, solenoids, magnetic brake, etc.) connected near the inverter, connect a surge suppressor at the same time.

(e) Prohibition of Installation of Phase Advancing Capacitor

For the improvement of the power factor, use an AC reactor on the input power supply side. If a phase advancing capacitor or surge suppressor is connected in order to improve the power factor, it may become overheated and damaged by high harmonic components of the inverter. Also, the inverter may malfunction because of overcurrent.

< DC Input >

(a) Installation of DC Power ON/OFF Switch (SW)

With the following types of inverters, inrush current suppressing function is not built into the inverter.

Book type: 200 V, 11 kW to 22 kW
400 V, 11 kW to 45 kW

Therefore, it is necessary to prepare the inrush current suppressing circuit at the output side of the SW if one is installed.

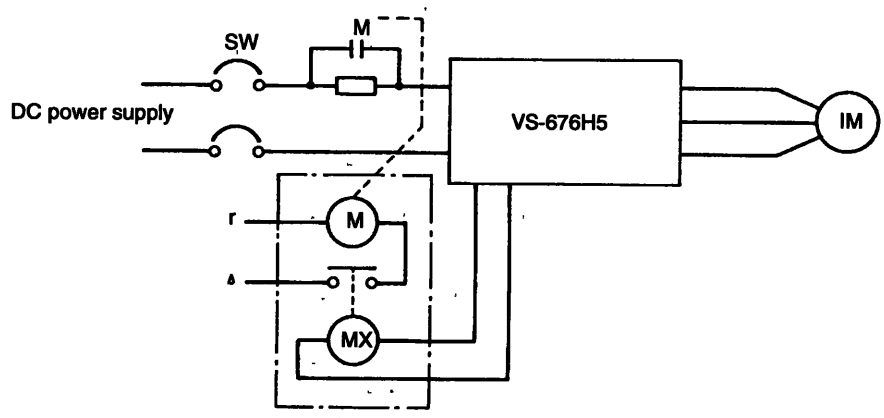


Fig. 21 Example of Installation of Inrush Current Suppressing Circuit

(2) Wiring Precautions for Main Circuit Output

(a) Connection of Terminal Block and Load

Connect output terminals U, V and W to motor lead wires U, V and W. Verify that the motor rotates in the forward direction (CCW: counterclockwise when viewed from the motor load side) with the forward run command. If the motor rotation is incorrect, exchange any two of output terminals U, V or W.

For the vector control with PG, wiring of the PG must also be changed. Refer to 4.4 "CHECKING THE ROTATION DETECTION DIRECTION OF PG".

(b) Strict Prohibition of Connection of Input Power Supply to Output Terminals

Never connect the input power supply to output terminals U, V and W.

(c) Strict Prohibition of Short Circuiting or Grounding of Output Circuit

Never touch the output circuit directly or put the output line in contact with the inverter case. Otherwise, it may cause an electrical shock or grounding. In addition, never short circuit the output line.

(d) Prohibition of Connection of Phase Advancing Capacitor or LC/RC Noise Filter

Never connect a phase advancing capacitor or LC/RC noise filter to the output circuit.

(e) Installation of Magnetic Starter or Contactor

When a magnetic starter or magnetic contactor is connected to the output circuit, the inverter overcurrent protective circuit could operate due to inrush current if the magnetic starter or contactor is opened while the inverter is running.

The sequence must be designed so that the magnetic starter or contactor is opened only during base block state.

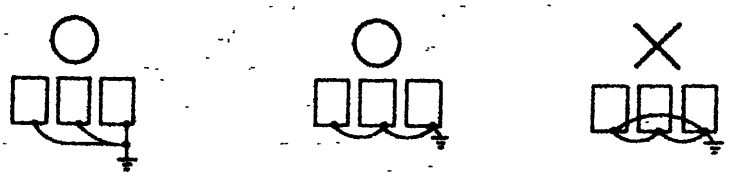
(f) Installation of Thermal Overload Relay

An electronic overload protective function is incorporated into the inverter. It is necessary, however, to connect a thermal overload relay when driving several motors with one inverter or when using a multi-pole motor. If a thermal overload relay is used, its setting must be as indicated below.

At 50 Hz	The same rated current value as that described on the motor nameplate.
At 60 Hz	1.1 times larger than the rated current value described on the motor nameplate.

(3) Grounding

- Ground resistance
  200 V class: 100Ω or less, 400 V class: 10Ω or less.
- Never ground VS-676H5 in common with welding machines, motors, or other large-current electrical equipment. Run all the ground wires in a conduit separate from wires for large-current electrical equipment.
- Use the ground wires described in Tables 7, 8, or 9 and keep the length as short as possible.
- When using several inverter units side by side, ground the units as shown in Fig. 22, (a) or (b). Do not loop the ground wires as shown in (c).



(a) Acceptable (b) Acceptable (c) Not Acceptable

Fig. 22 Grounding of Three Inverter Units

(4) Functions of Main Circuit Terminals

The following table outlines the functions of the main circuit terminals. Wire according to each terminal function.

Table 4 200V Class DC Input Terminal Functions

Model CIMR-H5D ☐☐	20P4 to 2022	2030 to 2075
Max Applicable Motor Output	0.4 to 22 kW	30 to 75 kW
⊖	DC input power supply	
⊕1		
U	Inverter output	
V		
W		
▲	—	Cooling fan power supply
r		
⏚	Ground terminal (Grounding resistance: 100 Ω or less)	

Table 5 400V Class DC Input Terminal Functions

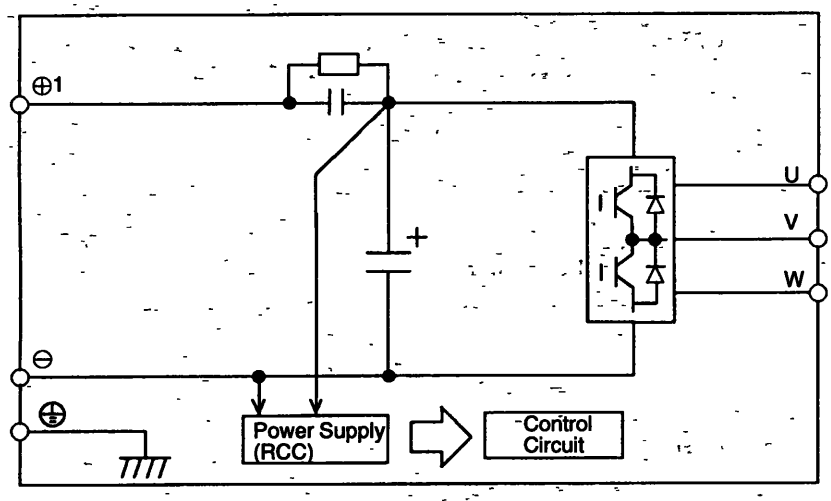
Model CIMR-H5D ☐☐	40P4 to 47P5	4011 to 4015	4018 to 4045	4055 to 4160
Max Applicable Motor Output	0.4 to 7.5 kW	11 to 15 kW	18.5 to 45 kW	55 to 160 kW
⊖	DC input power supply			
⊕1				
U	Inverter output			
V				
W				
r	—			Cooling fan power supply (Control power supply) r - ▲200 : 200 to 230V AC input r - ▲400 : 380 to 460V AC input
▲200				
▲400				
⏚	Ground terminal (Grounding resistance : 10Ω or less)			

Table 6 200/400 V Class AC Input Terminal Functions

Voltage	200 V Class	400 V Class	
Model CIMR-H5A□	2030 to 2075	4055 to 4160	4185 to 4300
Max Applicable Motor Output	30 to 75 kW	55 to 160 kW	185 to 300 kW
R	Main circuit input power supply		
S			
T			
⊖	Braking unit (⊕3 - ⊖) (⊕1 terminal is not provided)		DC power supply (⊕1 - ⊖) Braking unit (⊕3 - ⊖)
⊕1			
⊕3			
U	Inverter output		
V			
W			
▲	Cooling fan power supply	—	
r		Cooling fan power supply (Control power supply) r - ▲200 : 200 to 230V AC input r - ▲400 : 380 to 460V AC input	
▲200	—		
▲400			
⏚	Ground terminal (Grounding resistance 200V class: 100 Ω or less, 400 V class 10 Ω or less)		

(5) Main Circuit Configuration

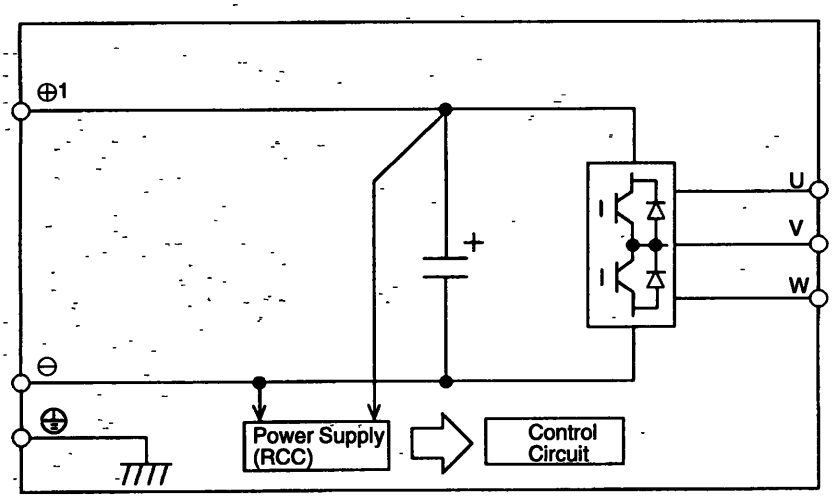
(a) Configuration A (DC input)



- 200 V Class:
  CIMR-H5D20P4 - 27P5
  0.4 to 7.5 kW
- 400 V Class:
  CIMR-H5D40P4 - 47P5
  0.4 to 7.5 kW

Note: C: [Inverter capacity] × 50%

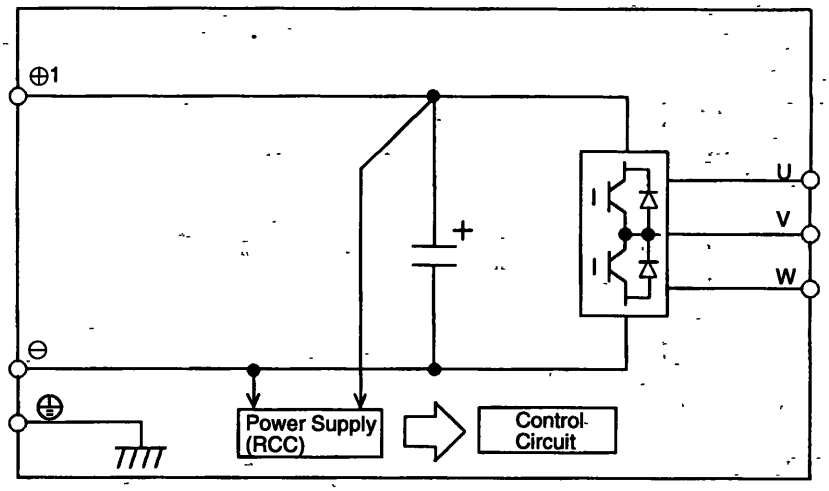
(b) Configuration B (DC input)



- 200 V Class:
  CIMR-H5D2011 - 2015
  11 to 15 kW
- 400 V Class:
  CIMR-H5D4011 - 4015
  11 to 15 kW

Note: C: [Inverter capacity] × 50%

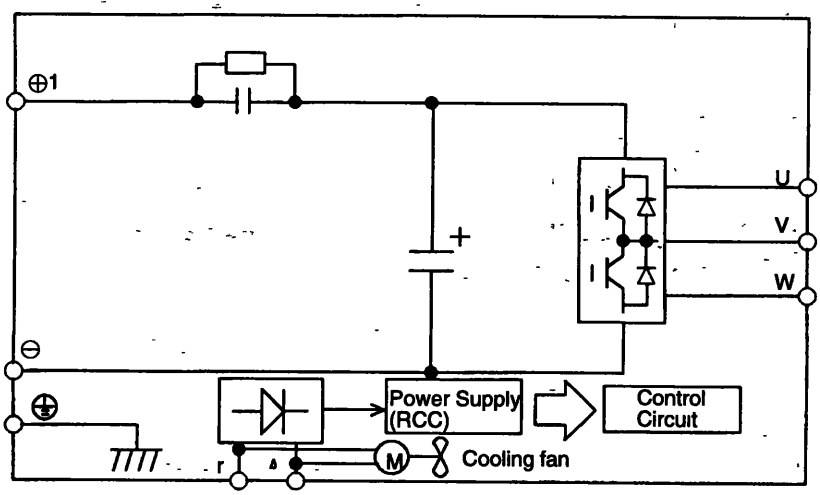
(c) Configuration C (DC input)



- 200 V Class:
  CIMR-H5D2018 - 2022
  18.5 to 22 kW
- 400 V Class:
  CIMR-H5D4018 - 4045
  18.5 to 45 kW

Note: C: [Inverter capacity] × 60%

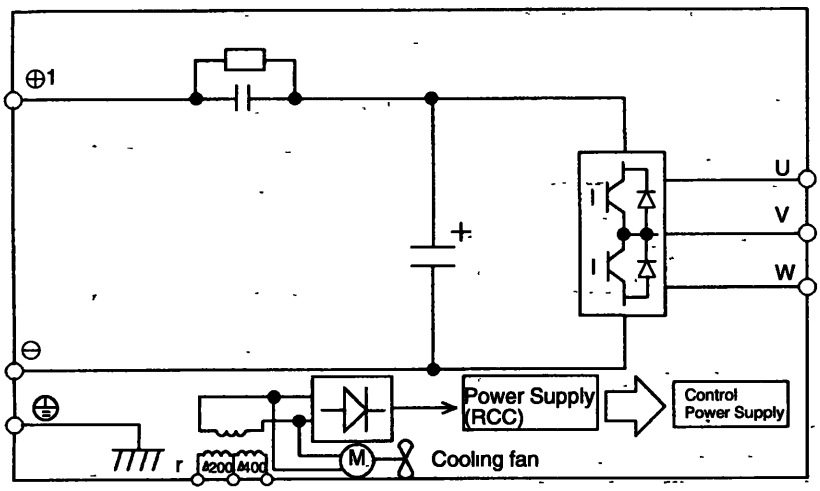
(d) Configuration D (DC input)



- 200 V Class:
  CIMR-H5D2030 - 2075
  30 to 75 kW

Note: C: [Inverter capacity] × 60%

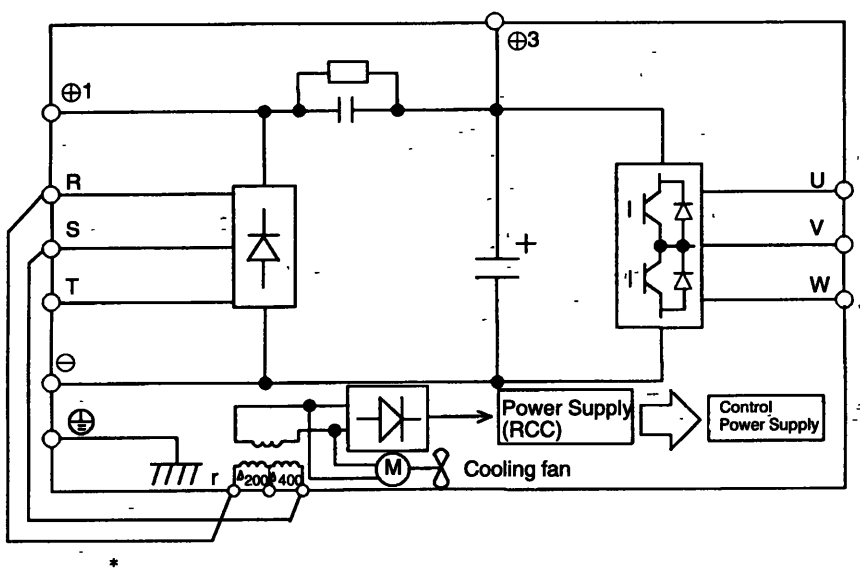
(e) Configuration E (DC input)



- 400 V Class:
  CIMR-H5D4055 - 4160
  55 to 160 kW

Note: C: [Inverter capacity] × 60%

(f) Configuration F (AC/DC input)

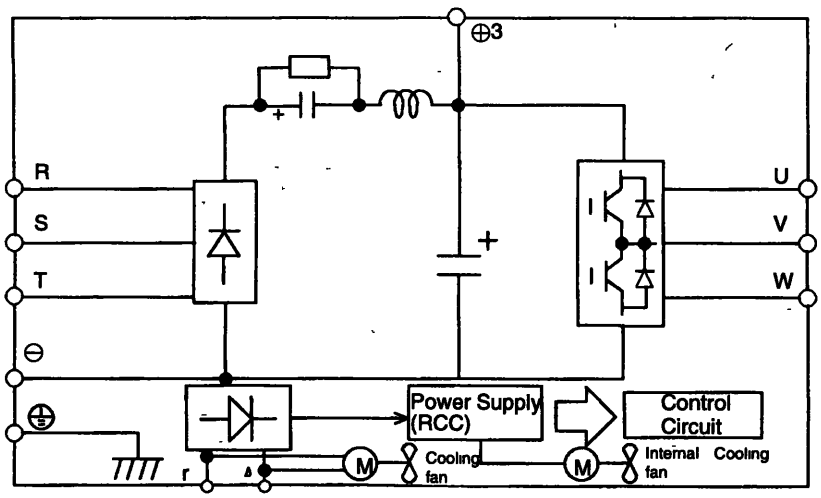


- 400 V Class:
  CIMR-H5A4185 - 4300
  185 to 300 kW

Note: C: [Inverter capacity] × 100%

*When using DC input power supply (terminals⊕1 and⊖), remove the wiring between both terminals R and r, S and ▲400

(g) Configuration g (AC input)



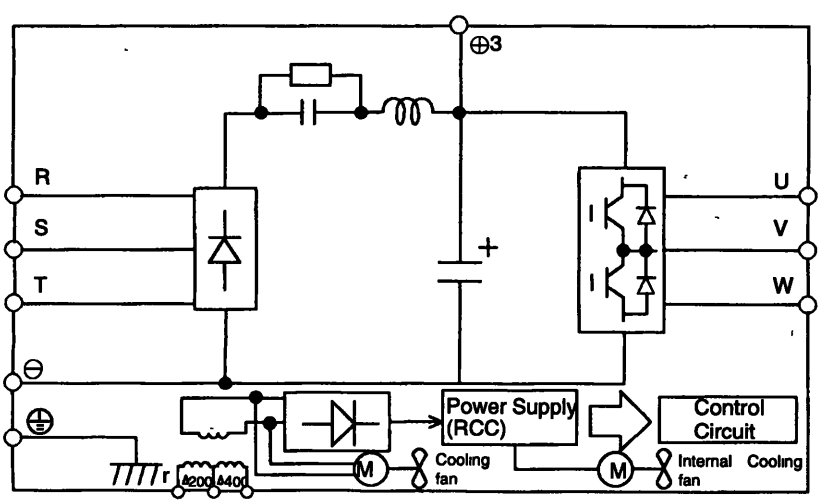
- 200 V Class:

  CIMR-H5A2030 - 2075

  30 to 75 kW

Note: C: [Inverter capacity] × 100%

(h) Configuration h (AC input)



- 400 V Class:

  CIMR-H5A4055 - 4160

  55 to 160 kW

Note: C: [Inverter capacity] × 100%

(6) Parts Required for Wiring

Select wires and solderless terminals to be used for wiring from Tables 7, 8, and 9.

Table 7 Wire Size for 200V Class (DC Input)

Circuit	Model CIMR-□	Terminal Symbol	Terminal Screw	Wire Size*1 mm²	Wire Type
Main	H5D20P4	⊖, ⊕1 U, V, W	M4	2 - 5.5	Power cable. 600V fire-retardant polyflex cable
		⏚			
	H5D20P7	⊖, ⊕1 U, V, W	M4	2 - 5.5	
		⏚			
	H5D21P5	⊖, ⊕1 U, V, W	M4	2 - 5.5	
		⏚			
	H5D22P2	⊖, ⊕1 U, V, W	M4	2 - 5.5	
		⏚			
	H5D23P7	⊖, ⊕1 U, V, W	M4	2 - 5.5	
		⏚			
	H5D25P5	⊖, ⊕1	M6	5.5 - 22	
		⏚ U, V, W	M5	5.5 - 14	
	H5D27P5	⊖, ⊕1	M6	5.5 - 22	
		⏚ U, V, W	M5	5.5 - 14	
	H5D2011	⊖, ⊕1 U, V, W	M8	14 - 38	
		⏚		8	
	H5D2015	⊖, ⊕1 U, V, W	M8	14 - 38	
		⏚		8	
	H5D2018	⊖, ⊕1 U, V, W	M8	30 - 60	
		⏚		14	
	H5D2022	⊖, ⊕1 U, V, W	M8	30 - 60	
		⏚		14	
	H5D2030	⊖, ⊕1 U, V, W	M10	100	
		⏚	M8	22	
		r, ℓ	M4	0.5 - 5.5	
	H5D2037	⊖, ⊕1 U, V, W	M10	100	
		⏚	M8	22	
		r, ℓ	M4	0.5 - 5.5	
	H5D2045	⊖, ⊕1 U, V, W	M10	60 × 2P	
		⏚	M8	22	
		r, ℓ	M4	0.5 - 5.5	
	H5D2055	⊖, ⊕1 U, V, W	M10	60 × 2P	
		⏚	M8	30	
		r, ℓ	M4	0.5 - 5.5	
	H5D2075	⊖, ⊕1 U, V, W	M12	100 × 2P	
		⏚	M8	50	
		r, ℓ	M4	0.5 - 5.5	
Control	Common to all models	TB1 to TB3, 1CN, 9CN to 11CN	–	*2	Twisted shielded wire

*1 Wire size is determined using 110°C temperature-rated copper wire

*2 Specifications of the control card terminals are indicated in page 45

Table 8 Wire Size for 400V Class (DC Input)

Circuit	Model CIMR-□	Terminal Symbol	Terminal Screw	Wire Size*1 mm²	Wire Type
Main	H5D40P4	⊖, ⊕1 U, V, W	M4	2 - 5.5	Power cable 600V fire-retardant polyflex cable
		⏚			
	H5D40P7	⊖, ⊕1 U, V, W	M4	2 - 5.5	
		⏚			
	H5D41P5	⊖, ⊕1 U, V, W	M4	2 - 5.5	
		⏚			
	H5D42P2	⊖, ⊕1 U, V, W	M4	2 - 5.5	
		⏚			
	H5D43P7	⊖, ⊕1 U, V, W	M4	2 - 5.5	
		⏚			
	H5D45P5	⊖, ⊕1 U, V, W	M4	2 - 5.5	
		⏚			
	H5D47P5	⊖, ⊕1 U, V, W	M4	2 – 5.5	
		⏚			
	H5D4011	⊖, ⊕1 U, V, W	M5	5.5 - 14	
		⏚		8	
	H5D4015	⊖, ⊕1 U, V, W	M5	5.5 - 14	
		⏚		8	
	H5D4018	⊖, ⊕1 U, V, W	M6	14 – 22	
		⏚		8	
	H5D4022	⊖, ⊕1 U, V, W	M6	14 – 22	
		⏚		8	
	H5D4030	⊖, ⊕1 U, V, W	M8	38 – 60	
		⏚		8	
	H5D4037	⊖, ⊕1 U, V, W	M8	38 – 60	
		⏚		14	
	H5D4045	⊖, ⊕1 U, V, W	M8	38 – 60	
		⏚		14	
	H5D4055	⊖, ⊕1 U, V, W	M10	100	
		⏚	M8	22	
		r, ▵200, ▵400	M4	0.5 - 5.5	
	H5D4075	⊖, ⊕1 U, V, W	M10	100	
		⏚	M8	22	
		r, ▵200, ▵400	M4	0.5 - 5.5	
	H5D4110	⊖, ⊕1 U, V, W	M10	60 × 2P	
		⏚	M8	30	
		r, ▵200▵400	M4	0.5 - 5.5	
	H5D4160	⊖, ⊕1 U, V, W	M12	100 × 2P	
		⏚	M8	50	
		r, ▵200▵400	M4	0.5 - 5.5	
	H5D4185	R, S, T, ⊖, ⊕1, ⊕3 U, V, W	M16	325 × 2P	
		⏚	M8	50	
		r, ▵200▵400	M4	0.5 - 5.5	
	H5D4220	R, S, T, ⊖, ⊕1, ⊕3 U, V, W	M16	325 × 2P	
		⏚	M8	60	
		r, ▵200▵400	M4	0.5 - 5.5	
	H5D4300	R, S, T, ⊖, ⊕1, ⊕3 U, V, W	M16	325 × 2P	
		⏚	M8	60	
		r, ▵200▵400	M4	0.5 - 5.5	
Control	Common to all models	TB1 to TB3, 1CN, 9CN to 11CN	–	*2	Twisted shielded wire

*1 Wire size is determined using 110°C temperature-rated copper wire

*2 Specifications of the control card terminals are indicated in page 45

Table 9 Wire Size for 200/400V Class (AC Input)

Circuit	Model CIMR-□	Terminal Symbol	Terminal Screw	Wire Size*1 mm²	Wire Type
Main	H5A2030	R, S, T, U, V, W	M10	100	Power cable 600V fire-retardant polyflex cable
		⊖, ⊕3	M8	–	
		⏚	M8	22	
		r, ▵	M4	0.5 - 5.5	
	H5A2037	R, S, T, U, V, W	M10	60 × 2P	
		⊖, ⊕3	M8	–	
		⏚	M8	22	
		r, ▵	M4	0.5 - 5.5	
	H5A2045	R, S, T, U, V, W	M10	60 × 2P	
		⊖, ⊕3	M8	–	
		⏚	M8	22	
		r, ▵	M4	0.5 - 5.5	
	H5A2055	R, S, T, U, V, W	M10	60 × 2P	
		⊖, ⊕3	M8	–	
		⏚	M8	30	
		r, ▵	M4	0.5 - 5.5	
	H5A2075	R, S, T, U, V, W	M12	100 × 2P	
		⊖, ⊕3	M8	–	
		⏚	M8	50	
		r, ▵	M4	0.5 - 5.5	
	H5A4055	R, S, T, U, V, W	M10	100	
		⊖, ⊕3	M8	–	
		⏚	M8	22	
		r, ▵200, ▵ 400	M4	0.5 - 5.5	
	H5A4075	R, S, T, U, V, W	M10	100	
		⊖, ⊕3	M8	–	
		⏚	M8	22	
		r, ▵200, ▵ 400	M4	0.5 - 5.5	
	H5A4110	R, S, T, U, V, W	M10	60 × 2P	
		⊖, ⊕3	M8	–	
		⏚	M8	22	
		r, ▵200, ▵ 400	M4	0.5 - 5.5	
	H5A4160	R, S, T, U, V, W	M12	100 × 2P	
		⊖, ⊕3	M8	–	
		⏚	M8	50	
		r, ▵200, ▵ 400	M4	0.5 - 5.5	
	H5A4185	R, S, T, ⊖, ⊕1, ⊕3 U, V, W	M16	325 × 2P	
		⏚	M8	50	
		r, ▵200, ▵ 400	M4	0.5 - 5.5	
	H5A4220	R, S, T, ⊖, ⊕1, ⊕3 U, V, W	M16	325 × 2P	
		⏚	M8	60	
		r, ▵200, ▵ 400	M4	0.5 - 5.5	
	H5A4300	R, S, T, ⊖, ⊕1, ⊕3 U, V, W	M16	325 × 2P	
		⏚	M8	60	
		r, ▵200, ▵ 400	M4	0.5 - 5.5	
Control	Common to all models	TB1 to TB3, 1CN, 9CN to 11CN	–	*2	Twisted shielded wire

*1 Wire size is determined using 110°C temperature-rated copper wire When connecting a braking unit, select wire size referring to the instructions of braking unit (manual No TOE-C726-2).

*2 Specifications of the control card terminals are indicated in page 45

NOTE

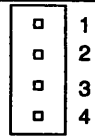
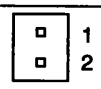
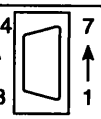
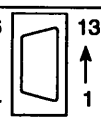
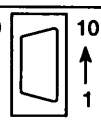
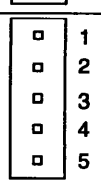
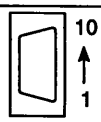
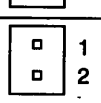
When determining wire size, consider voltage drop. Select a wire size so that voltage drop will be less than 2% of the rated voltage. Voltage drop is calculated by the following equation:

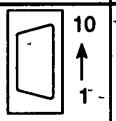
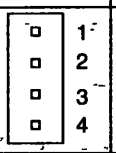
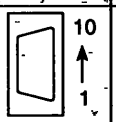
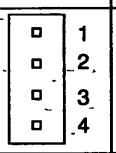
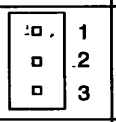
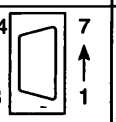
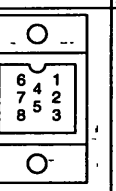
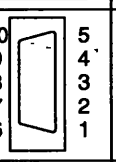
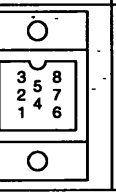
Line voltage drop (V)

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

(7) Control Circuit Terminals

Table 10 Control Circuit Terminals

		Connector No.	Function	Connector Type		Connector Pin Nos.	Applicable Max. Wire Size	Connector Manufacturer
				Inverter Side	Wiring Side			
Control Card		TB1	Inrush current suppression circuit	MC1 5/4G-3.81	MC1 5/4ST-3 81		1 5 mm^2	Phoenix Contact GmbH & Co
		TB3	Motor thermistor	MC1.5/2G-3 81	MC1 5/2ST-3 81		1 5 mm^2	Phoenix Contact GmbH & Co.
		1CN	Digital operator	10214-52A2JL	10114-3000VE 10314-52A0-008 (case)		0 2 mm^2	Sumitomo 3M Ltd.
		9CN	Control signals	10226-52A2JL	10126-3000VE 10326-52A0-008 (case)		0.2 mm^2	Sumitomo 3M Ltd
		10CN	Control signals	10220-52A2JL	10120-3000VE 10320-52A0-008 (case)		0.2 mm^2	Sumitomo 3M Ltd
		TB2	Inverter dry contact	MSTB2 5/5-GF	MSTBT2 5/5-ST		2.5 mm^2	Phoenix Contact GmbH & Co
Option Cards	PG-A2/H	TA1	Control signals	10220-52A2JL	10120-3000VE 10320-52A0-008 (case)		0 2 mm^2	Sumitomo 3M Ltd
		TA2	Control signals	MC1 5/2G-3 81	MC1.5/2ST-3 81		1.5 mm^2	Phoenix Contact GmbH & Co

		Connector No.	Function	Connector Type		Connector Pin Nos.	Applicable Max. Wire Size	Connector Manufacturer
				Inverter Side	Wiring Side			
Option Cards	PG-B2/H	TA1	Control signals	10220-52A2JL	10120-3000VE 10320-52A0-008 (case)		0 2 mm²	Sumitomo 3M Ltd
		TA2	Control signals	MC1.5/4G-3 81	MC1 5/4ST-3 81		1 5 mm²	Phoenix Contact GmbH & Co
	SP-A2/H	TA1	Control signals	10220-52A2JL	10120-3000VE 10320-52A0-008 (case)		0 2 mm²	Sumitomo 3M Ltd
		TA2	Control signals	MC1.5/4G-3 81	MC1 5/4ST-3.81		1 5 mm²	Phoenix Contact GmbH & Co
Option Cards	AO-12/H	TD	Control signals	MC1 5/3G-3 81	MC1 5/3-ST-3 81		1.5 mm²	Phoenix Contact GmbH & Co
	DO-08/H	TD	Control signals	10214-52A2JL	10114-3000VE 10314-52A0-008 (case)		0 2 mm²	Sumitomo 3M Ltd
	CP-916A	CN1	CP-215 transmission	MR-8RFA4 (G)	MR-8M (G) MR-8L (case)		IPEV-S (Cu) 1 25 mm² × 1P	Honda Tsushin Kogyo Co , Ltd
		CN2	PP/digital operator	17LE-13090-27 (D2BC)	17JE-23090-02 (D8B) (with case)		Use a special cable. Code No DUD005010	Daiichi Denshi Kogyo Co., Ltd
	2161F/ INV	CN2	CP-216 transmission	MR-8RMA4 (G)	MR-8F (G) MR-8L (case)		IPEV-S (Cu) 1 25 mm² × 1P	Honda Tsushin Kogyo Co , Ltd

NOTE

Some of the connectors attached with control cards and option cards are of the same type. Therefore, make sure to mount the cards to the correct connectors each of which is identified by device symbol. If connection is wrong, it may cause damage to the inverter.

3.3 WIRING THE CONTROL CIRCUIT

The following table outlines the functions of the control circuit terminals. Wire correctly according to the purpose.

(1) Functions of Control Circuit Terminals

Table 11 Control Circuit Terminals

Terminal Symbol		Signal Name	Terminal Function		Signal Level
9CN	17	Forward run/stop	Forward run when closed, stop when open	Valid if B1-02 = 1 Through mode in other cases	Photocoupler insulation Input 24 VDC 8 mA
	18	Reverse run/stop	Reverse run when closed, stop when open		
	19	Input signal 1	–	Multi-function contact inputs (H1-01 to H1-06)	
	20	Input signal 2	–		
	21	Input signal 3	–		
	22	Input signal 4	–		
	23	Input signal 5	–		
	24	Input signal 6	–		
	25	DI-COM	–		
	1	+15 power supply output	+15 V power supply for analog commands		+15 V (Allowable current. 20 mA max)
	10	–15 power supply output	–15 V power supply for analog commands		–15 V (Allowable current. 20 mA max)
	4	Analog input 1	0 to 10 V/–10 to 10 V	Valid if B1-01 = 1 Through mode in other cases	–10 to 10 V (20 kΩ) 0 to 10 V (20 kΩ)
	6	Analog input 2	0 to 10 V/–10 to 10 V	Through mode only	–10 to 10 V (20 kΩ) 0 to 10 V (20 kΩ)
			4 to 20 mA		4 to 20 mA (250 Ω)
	8	Analog input 3	0 to 10 V/–10 to 10 V		–10 to 10 V (20 kΩ) 0 to 10 V (20 kΩ)
TB2	2	Output signal 1 (fault contact input)	Outputs an error signal if the inverter hardware is defective (TB-1 to TB-3: Closed)	Multi-function contact output (H2-06)	Dry contact Contact capacity: 250VAC 1 A or less 30VDC 1A or less
	3				
	1				
	4	Output signal 6	–	Multi-function contact output (H2-01)	
	5				
10CN	2	Analog output 1	–	Multi-function analog monitor (H4-01 to H4-07)	0 to ±11 V Max ±5% 2 mA or less
	4	Analog output 2	–		
	10	Output signal 2	–	Multi-function PHC output (H2-02 to H2-05)	Open collector output 48 V 50 mA or less
	12	Output signal 3	–		
	14	Output signal 4	–		
	16	Output signal 5	–		
	17	PHC-COM	–		–
TB3	1	Motor thermistor	Detects motor temperature		–
	2				
TB1	1	Interface to the inrush current suppressing circuit installed externally	Closed: Inrush current suppressing circuit contactor ON command		24VDC 100 mA
	2				
	3		Closed Inrush current suppressing circuit contactor ON answer		24VDC 7 mA
	4				

(2) Precautions on Control Circuit Wiring

- Isolate the control circuit wires (connectors: 9CN, 10CN, TB1 to TB3) from the main circuit wires (terminals: R, S, T, U, V, W, ⊖, ⊕1, ⊕3) and other power cables to prevent malfunctions of the inverter due to noises.
- Isolate the wire connected to the control circuit terminal (TB2: contact output) from the wires connected to 9CN, 10CN, TB1, and TB3.
- Use twisted shielded or twisted-pair shielded wires for the control circuit line to prevent malfunctions of the inverter due to noise. The ending of the wires should be insulated as shown below. Wiring distance should be less than 50 m.

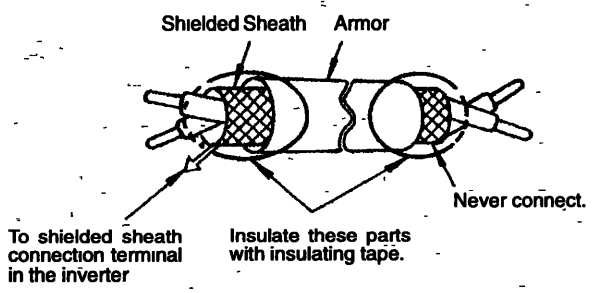


Fig. 23 Shielded Wire Termination

3.4 WIRING INSPECTION

After completing installation and wiring, check the following items. In this check, never test the buzzer in the control circuit.

- ☐ Wiring is proper.
- ☐ Wire clippings or screws are not left in the unit.
- ☐ Screws are securely tightened.
- ☐ Bare wire in the terminal does not in contact with other terminals.

4 PREPARATION FOR OPERATION

> **⚠ CAUTION**
>
> - Before starting test run, disconnect the coupling that directly connects the motor to the machine, belt or others to allow the motor to be run independently.
> If the inverter should be operated for the test with the motor connected to the machine, do so only after ensuring the safety.
> Failure to observe this caution can result in personal injury.

4.1 INSPECTION BEFORE TURNING THE POWER ON

Check the following items after completing installation and wiring.

(1) Wiring is proper.

(2) Wire clippings or screws are not left in the unit that could cause short-circuit.

(3) Screws are securely tightened.

(4) Connected loads are proper.

4.2 SETTING THE LINE VOLTAGE USING JUMPER

This setting is necessary only for the inverters of 55 kW or larger types of 400 V class.

Set the line voltage jumper according to the main circuit power supply as shown in Fig. 24. Insert the jumper at the appropriate location corresponding to the input voltage.

It has been preset at the factory to 440 V.

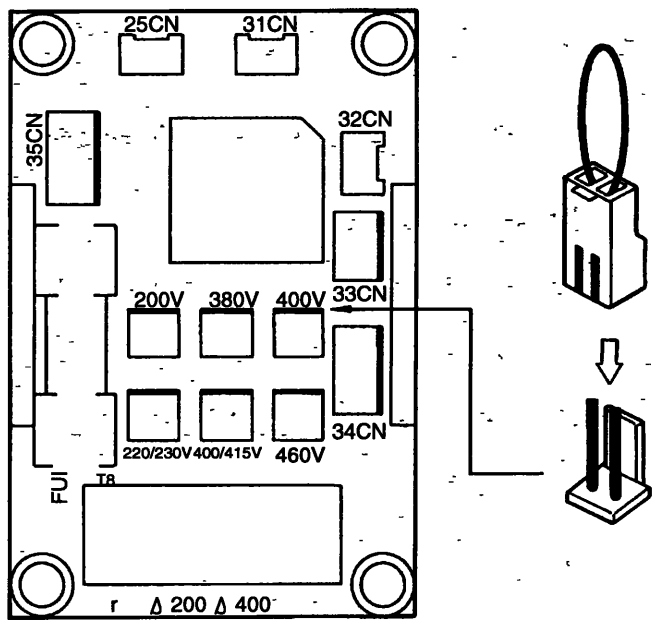


Fig. 24 Line Voltage Jumper

4.3 TURNING ON THE MAIN CIRCUIT POWER

After turning on the main circuit power, verify that there are no abnormalities.

When the power is turned on, the CHARGE indicating lamp lights and then the display unit in the digital operator lights (when a digital operator is connected.).

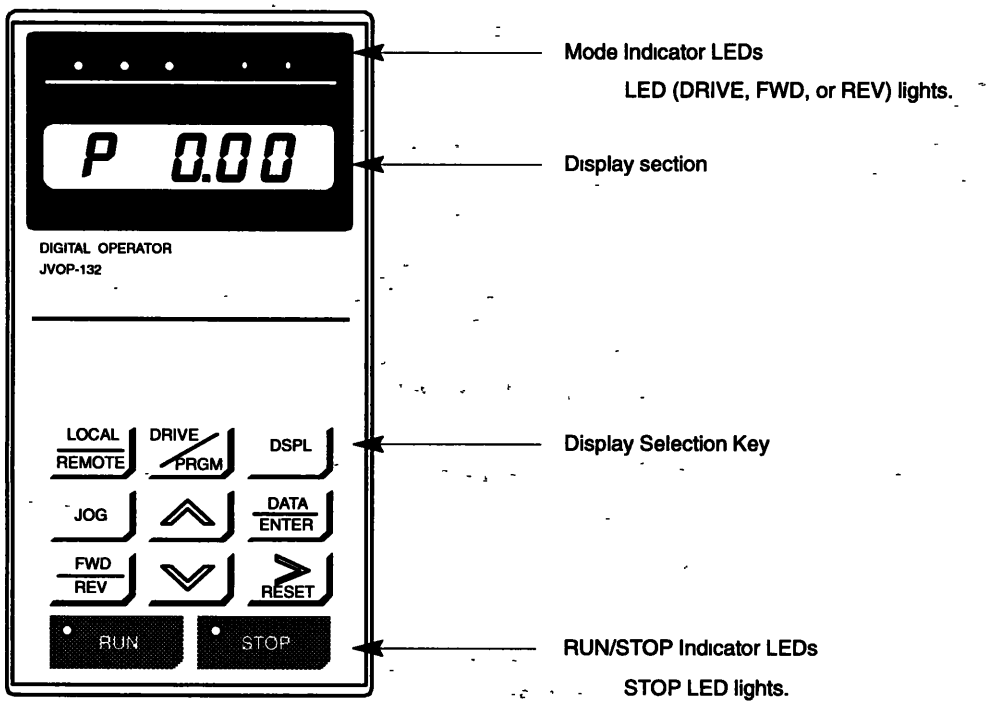


Fig. 25 Digtal Operator

NOTE

If an exclusive-use thermistor is not provided with the motor, **rHn** (thermistor open circuit) is displayed.
In this case, set "0" (without thermistor) for **L9-01** and perform fault reset. This recovers correct display.
When No. 2 motor is selected, set "0" for **L9-04** and perform fault reset.

4.4 CHECKING THE ROTATION DETECTION DIRECTION OF PG

Select motor speed display on the display unit in the digital operator and turn the motor shaft. Make sure that display of motor rotation direction and polarity is correct and also that the motor speed is displayed correctly.

Forward direction: Counterclockwise as viewed from the load side (standard setting). See Fig. 26.

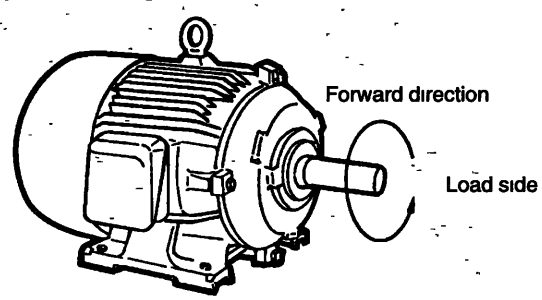


Fig. 26 Motor Rotation Direction

This inspection can be carried out only after making sure that the STOP LED on the digital operator is lit.

Procedure:

① Press the display selection key [DSPL] on the digital operator to change the display mode to motor speed display.

P 000 (%) → 000

(command display) (feedback display)

② Turn the motor counterclockwise as viewed from the load side.

Make sure that the displayed rotation direction is forward and that the displayed motor speed corresponds to the present rotating speed.

Example: 300 (%)

③ Turn the motor clockwise as viewed from the load side.

Make sure that the displayed rotation direction is reverse and that the displayed motor speed corresponds to the present rotating speed.

Example: -300(%)

④ If the display unit does not show the motor rotation direction and motor speed correctly, check the wiring by referring to Para. 3.2 (2) "Connection Diagram of PG Card Option".

4.5 SETTING THE CARRIER FREQUENCY

If magnetic noise of a motor poses problems, it is possible to lower noise level by changing the setting for the upper limit of the carrier frequency at C6-01. Note that this is not possible for all types of inverters. Table 12 shows whether or not noise reduction is possible by changing the setting for the carrier frequency upper limit for the individual inverter types.

Carrier frequency is set at 2 kHz at the factory. The setting range of the carrier frequency upper limit is indicated in Table 12.

Table 12 Setting the Carrier Frequency Upper Limit

Type CIMR-H5 □	Noise Reduction	Setting Range of Carrier Frequency
D20P4 - D2018	Possible	0.4 to 15.0 kHz*
D2022 - D2075, A2030 - A2075	Possible	0.4 to 10.0 kHz*
D40P4 - D4030, D4037 - D4160, A4055 - A4160		
A4185 - A4300	Not possible	0.4 to 2.5 kHz*

*Carrier frequency lower limit is 2.0 kHz during vector control

NOTE

When changing the carrier frequency, contact your Yaskawa representative. The continuous rated current can be output when carrier frequency is set at 2 kHz. To reduce noise level by increasing the carrier frequency, it will be necessary to lower the rated current.

4.6 SETTING THE RATED SPEED

The inverter is set at the factory so that the motor rotates at the rated speed when the speed reference of "100%" is input.

To change the rated speed meeting the machine specifications, set the required speed for constant C9-01 (rated speed adjustment).

Motor speed at 100% speed reference
= Max. speed (E1-04) × Rated speed adjustment (C9-01)

Note: The value of "max speed × rated speed adjustment" must not exceed 1.2 times the rated motor speed

Example: Adjustment for rotating the motor (rated speed: 1750 r/min) at 2100 r/min by inputting speed reference of 100%.
Rated speed adjustment (C9-01): 1.0000 → 1.2000
With No. 2 motor, "E4-01" is used instead of "E1-04".

4.7 SETTING FOR THERMISTOR

Standard motors for inverter have specific thermistor as standard.

If the motor to be used is a general-purpose motor which does not have a thermistor, set "0" for "L9-01 (No. 2 motor: L9-04)".

4.8 SELECTION OF OPERATION MODE

With VS-676H5, two operation modes of LOCAL and REMOTE are provided. Selection of the operation mode is possible by using the [LOCAL/REMOVE] key on the digital operator while the inverter is stopped. The presently selected operation mode can be visually confirmed by the SEQ and REF LEDs on the digital operator.

The operation mode is set to "REMOTE" in the factory, in which the inverter operates by the speed reference set by the option and the run command given by the option. The multi-function inputs of 9CN-19 to 9CN-24 are valid, regardless of the selected operation mode.

- LOCAL: The digital operator is used to set both the speed reference and run command. In the LOCAL mode, neither the SEQ nor the REF LEDs are not lit.
- REMOTE: The speed reference and run command are selected by the constants as indicated in Table 13.

Table 13 Command Selection by Constants in the REMOTE Mode

Constant No.	Name	Description
B1-01	Speed reference selection	0 Master speed reference from the digital operator (D1-01) (REF LED on the digital operator: OFF) 1 : Master speed reference from control circuit terminals 9CN-4 and 9CN-6 (REF LED on the digital operator: ON) 2 : Master speed reference set by MEMOBUS (REF LED on the digital operator. Blinking) 3 : Master speed reference set by the MEMOBUS option (REF LED on the digital operator: Blinking)
B1-02	Run command selection	0 : The motor starts running in response to the run command of the digital operator (SEQ LED on the digital operator: OFF) 1 The motor starts running in response to the run command input from the control circuit terminal 9CN-17. (SEQ LED on the digital operator: ON) 2 The motor starts running in response to the run command input by MEMOBUS. (SEQ LED on the digital operator: Blinking) 3 The motor starts running in response to the run command input from the MEMOBUS option (SEQ LED on the digital operator: Blinking)

4.9 AUTO-TUNING

NOTE

1. Since the motor starts running automatically during auto-tuning, disconnect the motor from the machine so that starting the motor does not create hazardous conditions.
2. In the auto-tuning mode, signals input to the control circuit terminals are all disregarded.
3. At the start of tuning, input the RUN command only after making sure that the motor has been stopped.

(1) Operation Procedure

(a) Confirm the safety.

Confirm the following:

- ☐ The motor is disconnected from the machine.
- ☐ The lock key is removed from the motor shaft.
- ☐ There are no persons or objects near the motor shaft.
- ☐ The brake has been released (for the motor with the braking unit).
- ☐ Inspection and setting have been made according to the instructions stated in Paras. 4.1 and 4.2.

(b) Turn the power to the inverter ON.

Confirm the following:

- ☐ There are no abnormalities.
- ☐ Rotation direction of the PG (for the inverter with the PG).

(c) Select the program mode.

Select the program mode by the [DRIVE/PRGM] key. When the program mode is selected, the DRIVE LED is turned off.

(d) Input the values indicated on the nameplate or motor constants.

- Auto-tuning by inputting the values indicated on the nameplate
  Input the nameplate values to the T2 constants.

Constant No.	Input Data	Setting Range	Description
T2-01	Motor base voltage	0.0 to 255.0 V	Input the value indicated on the nameplate
T2-02	Motor rated current	0.00 to 2000.0 A	Input the value indicated on the nameplate Input the base side value 7.5 kW or smaller types: 0.01 A units
T2-03	Motor base frequency	0.00 to 400.00 Hz	Input the value indicated on the nameplate
T2-04	Motor base speed	0 to 24000 r/min	Input the value indicated on the nameplate
T2-05	Number of poles	2 to 48	Input the value indicated on the nameplate
T2-06	Motor insulation class	0 to 4	Input the number corresponding to the value indicated on the nameplate Insulation class A (100°C) 0 E (120°C) 1 B (130°C) 2 F (155°C) 3 H (180°C) 4
T2-07	PG constants	0 to 10000	

- Auto-tuning by inputting the motor constants to the E constants
  Input the data directly to the E constants.

(e) Input the motor selection and tuning mode selection.

- Input the data to the T1 constants

Constant No.	Input Data	Setting Range	Description
T1-01	Motor selection	1/2	1: No. 1 motor 2: No. 2 motor
T1-02	Tuning mode	0 to 4	0: Normal operation mode 1: Tuning by inputting nameplate value (digital operator) 2: Tuning by inputting motor constants (digital operator) 3: Tuning by inputting nameplate value (master controller) 4 Tuning by inputting motor constants (master controller)

Notes
1 No. 2 motor setting is valid for PROM No. 1030 and after. With previous model inverters, selection of No. 2 motor is not permitted. With No. 2 motor, auto-tuning is possible only in the "open loop vector control" if the PG card is not installed. (PROM No. can be monitored by U1-14.)
2 Auto-tuning is disabled if a fault occurs. (Return to 0.)

(f) Select the drive mode.

Select the drive mode by pressing the [DRIVE/PRGM] key. When the drive mode is selected, the DRIVE LED is turned ON.

The following is displayed.

CAL□■ □: Selected motor No. ■: Tuning mode

(g) Execute the auto-tuning.

Press the [RUN] key.

The following begins flashing and tuning starts.

CAL□■

(h) End of tuning

Ending normally: End is displayed.

Ending abnormally: Er-XX is displayed (see Table 14).

Warning: If the load exceeds 20% during tuning, warning message of "End20" is displayed.

(2) Error Processing in Auto-tuning

- Fault (major, minor) which could occur during normal operation is detected during auto-tuning.
- If a fault occurs including minor fault, the motor stops after coasting (base block) and auto-tuning is interrupted regardless of the fault stop mode.
- During auto-tuning, errors indicated in Table 14 are also detected in addition to the faults which could occur in normal operation.
  The motor stops after coasting (base block) and auto-tuning is interrupted if any of these errors is detected. The error messages are not logged in the fault history.
- It is possible to forcibly interrupt auto-tuning by pressing the [STOP] key. When the [STOP] key is pressed, the motor stops after coasting (base block).
  The stop command given from the master controller has the same effect as the input of the [STOP] key.
- When the auto-tuning is interrupted, the value set for T1-02 is automatically returned to "0" and the setting for all constants (including T□-0□) is automatically returned to the setting made before the start of auto-tuning.
- If an error has occurred during coasting and regaining speed or during deceleration to stop at the end of tuning, error display is given in the display unit of the digital operator. In this case, the auto-tuning is not interrupted and the results of tuning are valid.

Table 14 Auto-tuning Error Messages

Error Message	Contents	Description
Er-01	Motor data error (only in the nameplate value input mode)	The initial values calculated by the input data are outside the setting range
Er-02	Acceleration error	The set speed is not reached within the time of "acceleration time + 10 seconds"
Er-03	Motor rotation direction error (only in the control with PG)	During acceleration, torque reference is 100% or larger and the signs of speed reference and detected speed value do not agree with each other = Incorrect connection of PG (A- and B-phase) or inverter output (U-, V-, and W-phase)
Er-04	Motor speed error	With PG During acceleration, torque reference is 100% or larger and the signs of speed reference and detected speed value agree with each other = Motor overload, setting error of number of PG pulses Without PG During acceleration, torque reference is 100% or larger = Motor overload
Er-05	Line resistance error	· Voltage command exceeds 100% · Feedback current is less than 1% of motor rated current even when the voltage reference exceeds 50% · Result of tuning is negative (Feeder resistance value is excessive) · Tuning has not been completed within 5 minutes
Er-06	No-load current error	These errors are detected according to the setting for the constants. · The result of tuning is outside the setting range of a constant In the case of upper limit over of iron-core saturation coefficient 1 and 2, it is processed as limit over and it does not cause an error · Tuning has not been completed within 1 minute for the individual tuning and constants
Er-07	Iron-core saturation coefficient 1 error	
Er-08	Iron-core saturation coefficient 2 error	
Er-09	Rated slip error	
Er-10	Stop command input	The stop command is input by the pressing of the [STOP] key, etc

(3) Processing after the Completion of Tuning

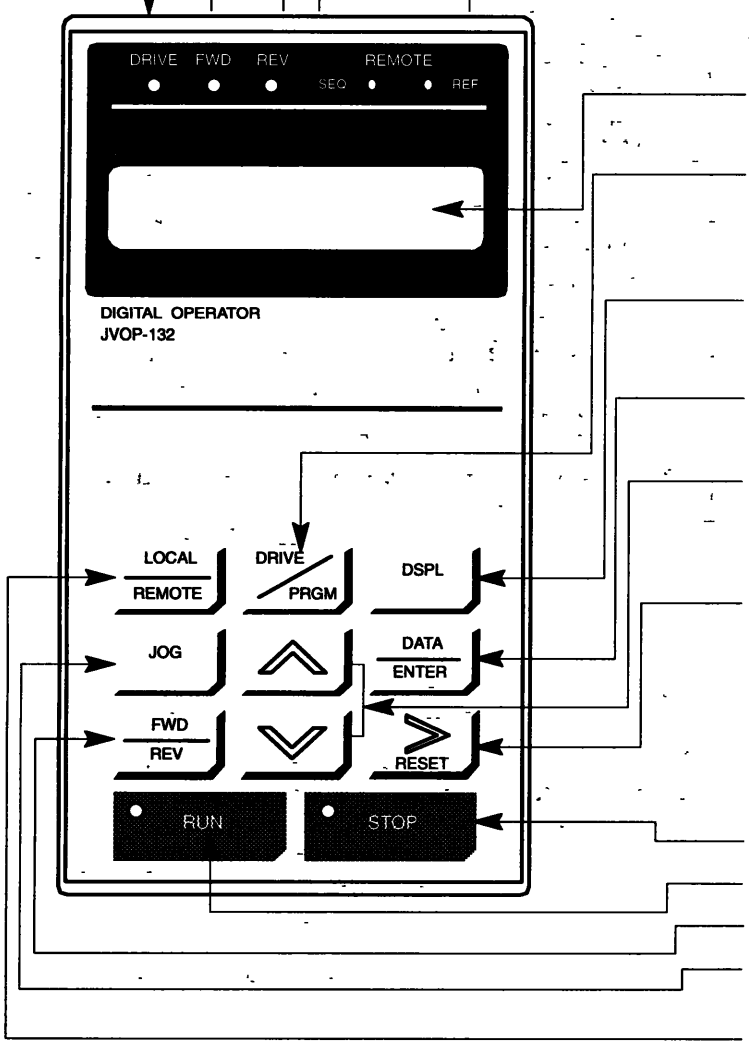
- According to the selection of No. 1/No. 2 motor, the results of tuning are entered into the constants. The constants other than the tuning results such as accel./decel. time and ASR gain are automatically returned to the previously set values.
- After the completion of entire processing of auto-tuning, the setting for T1-02 is returned to "0" and "End" display is given for 3 seconds.
- If load exceeds 20% during tuning, the warning message indicated in Table 14 is given.

Table 15 Auto-tuning Warning Messages

Warning Message	Contents	Description
End20	Overload during tuning	During tuning, torque reference has exceeded 20%

5 SETTING OPERATION CONDITIONS

5.1 DIGITAL OPERATOR KEY DESCRIPTION



Mode Indicator LEDs

All LEDs blink if an error occurs in the drive mode

Drive Mode Display

Lights when the drive mode is selected - OFF when the program mode is selected

Rotating Direction Display

FWD Lights when forward run command is input
REV Lights when reverse run command is input

Remote Mode

Operation mode using the signals input from the control circuit terminals or option cards

SEQ Lights when the remote mode is selected for the run command
REF Lights when the remote mode is selected for the speed reference

Display

Displays set values of each function or monitoring values such as speed and output current (5 characters)

Mode Selection Key

Selects the drive mode and the program mode alternately Selection of a mode is possible even during operation When the drive mode is selected, the DRIVE LED lights

Display Selection Key

Selects the data to be displayed in predetermined sequence Display sequence is explained in Para 5 3 "DRIVE MODE"

Read/Write Key

Displays the set values of the constants. Pressing this key again after setting a value enters it

Numeric Value Change Keys

Changes set values or constant numbers
∧ : Increment key
∨ : Decrement key

Digit Selection Key

Selects the digit of a set value to be changed The selected digit blinks This key is also used as the reset key if a fault is displayed

Operation Command Keys

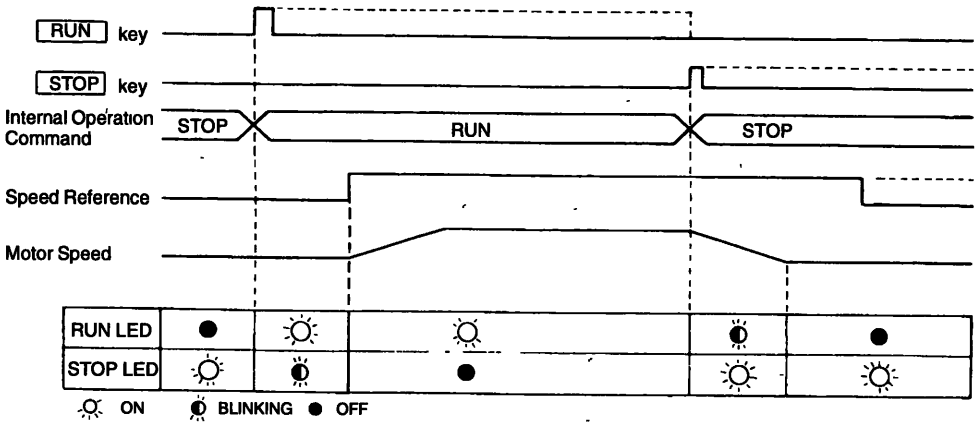
Used to operate the inverter by the digital operator They are valid only in the drive mode

* STOP : Red LED lights when STOP is pressed
* RUN : Red LED lights when RUN is pressed
FWD/REV Selects forward or reverse run
JOG Jog run is possible while JOG key is held pressed

Operation Mode Selection Key

Selects the REMOTE and LOCAL (digital operator) mode alternately

* RUN or STOP LED changes in accordance with the following operations.



Note : The RUN and STOP LED light, blink, and go OFF according to the run status.

Fig. 27 Digital Operator Key Description

5.2 DIGITAL OPERATOR MODE SELECTION

The digital operator of the VS-676H5 has the two operation modes, drive mode and program mode.

Mode selection is made by the mode selection key. Even during operation, it is possible to change the mode. The inverter keeps operating even if the mode is changed to the program mode during running to set or display the constant values. There are constants for which setting is not allowed during running. For these constants, refer to Appendix 6, "TABLE OF CONSTANTS".

When the run command is input while the inverter is at a stop with the program mode selected, the inverter does not start operating.

Drive mode: Inverter operation is possible. Displays monitor values, fault trace or fault log.

Program mode: Sets/reads constants.

5.3 DRIVE MODE

The inverter can operate in this mode. Run data display and fault display are possible.

Each time the display selection key is pressed, the item to be monitored is changed. At an occurrence of a fault, the digital operator enters the fault display mode automatically. The display mode returns to the one selected previously by pressing the [RESET] key.

Table 16 Typical Operation in Drive Mode

Description	Key Operation	Digital Operator Display
Power ON*1		
Speed Reference*2	DSPL	P000.00
Motor Speed	DSPL	0.00
Output Current	DSPL	0.00A
Output Voltage*3	DSPL	0.0u
U Constants*4	DSPL	U1-01 *5

*1 · The first item to be displayed after power ON can be selected from speed reference, motor speed, output current, and output voltage by setting an appropriate value for O1-02.

*2 · A speed reference can be set by using the numerical value change keys and digit selection key.

*3 Instead of the output voltage, required U1 constant can be displayed by setting the appropriate value corresponding to the U constant to be displayed for O1-01.

*4 · Select the U constant to be displayed by using the numerical value change keys and digit selection key

*5 : The U constant selected previously is displayed

(1) Changing the Speed Reference Value

(Operation Example)
Changing the speed reference value from 0.00% to 100.00% in the LOCAL and drive modes.

Table 17 Changing the Speed Reference Value

Description	Key Operation	Digital Operator Display	Remarks
• To display the speed reference value	DSPL	P 0.0.0	
• To change the value to "100.00%"	∨ ∧ RESET	P 1 0.0.0	The value to be set blinks
• To write the set value	DATA/ENTER	P 1 0 0.0	Display stops blinking for 2 seconds
		P 1 0 0.0	Display starts blinking again

(2) Monitor Display

(Operation Example)
Monitoring DC bus voltage (U1-07) during speed reference display.

Table 18 Typical Monitor Display Operation

Description	Key Operation	Digital Operator Display	Remarks
• During the display of speed reference		P 1 0.0.0	
• To display the U constant	DSPL	U 1-0 1	The U constant selected previously is displayed
• To select U1-07	∨ ∧ RESET	U 1-0 7	
• To display monitored value	DATA/ENTER	Pn3 10	
• To return to U1-07 display	DSPL	U 1-0 7	
• To return to speed reference display	DSPL	P 1 0.0.0	

5.4 SETTING THE INVERTER OPERATION ENVIRONMENT

Access level to set/read constants and control mode (V/f control, vector control) can be set as indicated below. Make sure to set the environment setting constants before using the VS-676H5.

The following table shows the major environment setting constants.

Table 19 Environment Setting Constants

Constant No.	Name	Description
A1-01	Access level (can be changed during run)	0 For monitoring (To set/read A1-01 and read U constants for quick-start level) 2 QUICK-START (To set/read the constants necessary for simplified operation) 3 BASIC (To set/read the basic constants) 4 ADVANCED (To set/read the application constants)
A1-02	Control mode selection	0 V/f control 1 V/f control with PG feedback 2 Open loop vector 3 Flux vector 4 EMS control
A1-03	Initialization	2220 Constants initialization
A1-04	Password 1 (for inputting)	Input password 1
A1-05	Password 2 (for setting)	Input password 2 (set/read is possible only in the MEMOBUS)

NOTE

If password 1 ≠ password 2, setting is disabled for A1-01 to A1-03. For these constants, only reading is permitted and the environment setting constants are locked.

(1) Changing the Control Mode

(Operation Example)
Changing the operation mode from the open loop vector to the V/f control

Table 20 Typical Control Mode Change Operation

Description	Key Operation	Digital Operator Display	Remarks
• During the display of speed reference		P 100.0	
• To change the mode to the program mode	DRIVE/PRGM		The constant number selected previously is displayed
• To select A1-02	∨ ∧	A 1-02	
• To display the set value	DATA/ENTER	02	
• To change the control mode	∨ ∧ >/RESET	01	
• To write the set value	DATA/ENTER		
		End	Display for 0 5 sec
		01	Returns to the display before writing
• To return to the display of constant number	DSPL	A 1-02	
• To return the mode to the drive mode	DRIVE/PRGM	P 100.0	

5.5 SETTING AND READING CONSTANTS (PROGRAM MODE)

The constants of the VS-676H5 are composed of group symbol, function number and serial umber of each function. Use numeric value change keys to change the group and function display and select one by the [DATA/ENTER] key. For details of the constants, refer to Appendix 6, "TABLE OF CONSTANTS".

Constant No.

□ □ - 1 5

- Serial No. for each function
- Function No.
- Group symbol
  - U: Monitor constants (only reading is enabled.)
  - A: Environment setting constants
  - B: Application-related constants
  - C: Adjustment constants
  - D: Speed reference related constants
  - E: Motor related constants
  - F: Option related constants
  - H: Control circuit terminal related constants
  - L: Protection related constants
  - O: Digital operator related constants
  - T: Auto-tuning related constants (not stored)

(Operation Example 1)
Changing the deceleration time (C1-02) from 10.0 seconds to 20.0 seconds during the display of speed reference when QUICK-START is selected (A1-01 = 2).

Table 21 Typical Constant Data Change Operation (QUICK-START Selected)

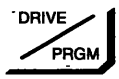
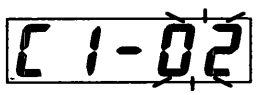
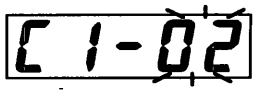
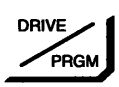
Description	Key Operation	Digital Operator Display	Remarks
• During the display of speed reference		P 10.0.0	
• To change the mode to the program mode	DRIVE / PRGM		The constant number selected previously is displayed
• To select C1-02	∨ ∧	C 1-02	
• To display the present setting	DATA / ENTER	00 10.0	
• To change the set value	∨ ∧ RESET	0020.0	
• To write the set value	DATA / ENTER	End	Display for 0.5 sec
		0020.0	
• To return to the display of constant number	DSPL	C 1-02	Returns to the display before writing
• To return the mode to the drive mode	DRIVE / PRGM	P 10.0.0	

NOTE

When the QUICK-START is selected, to select the constant number of U constants, use the [RESET] key to select the digit to be changed and select the constant number by pressing the numeric value change keys.

(Operation Example 2)
Changing the deceleration time (C1-02) from 10.0 seconds to 20.0 seconds during the display of speed reference when BASIC or ADVANCED is selected.

Table 22 Typical Constant Data Change Operation (BASIC or ADVANCED Selected)

Description	Key Operation	Digital Operator Display	Remarks
• During the display of speed reference			
• To change the mode to the program mode			The constant number selected previously is displayed
• To select C1-02			
• To display the present setting			
• To change the set value			
• To write the set value			Display for 0 5 sec
			Returns to the display before writing
• To return to the display of constant number			
• To return the mode to the drive mode			

6 OPERATION

⚠ WARNING

- Only turn ON the input power supply after replacing the front cover. Do not remove the cover while current is flowing.
  Failure to observe this warning can result in an electrical shock.
- When the retry function (L5-02) is selected, do not approach the inverter or the load, since it may restart suddenly after being stopped.
  (Construct machine system, so as to assure safety for personnel, even if the inverter should restart.)
  Failure to observe this warning can result in personal injury.
- Since the stop button can be disabled by a function setting, install a separate emergency stop switch.
  Failure to observe this warning can result in personal injury.
- If an alarm is reset with the operation signal ON, the inverter restarts automatically. Only reset the alarm after verifying that the operation signal is OFF.
  Failure to observe this warning can result in personal injury.

⚠ CAUTION

- Never touch the heatsink or discharging resistor since the temperature is very high.
  Failure to observe this caution can result in harmful burns to the body.
- Since it is easy to change operation speed from low to high speed, verify the safe working range of the motor and machine before operation.
  Failure to observe this caution can result in personal injury and machine damage.
- Install a holding brake separately if necessary.
  Failure to observe this caution can result in personal injury.
- Do not change signals during operation.
  The machine or the inverter may be damaged.
- All the constants of the inverter have been preset at the factory. Do not change the settings unnecessarily.
  The inverter may be damaged. For supply voltage, follow Para. 4.3.

This chapter describes the basic operation procedures of the VS-676H5.

6.1 TEST RUN

(1) Digital Operator Display at Power-up

When the system is ready for operation, turn ON the power supply. Verify that the inverter powers up properly. If any problems are found, turn OFF the power supply immediately. The digital operator display illuminates as shown below when turning the power supply ON.

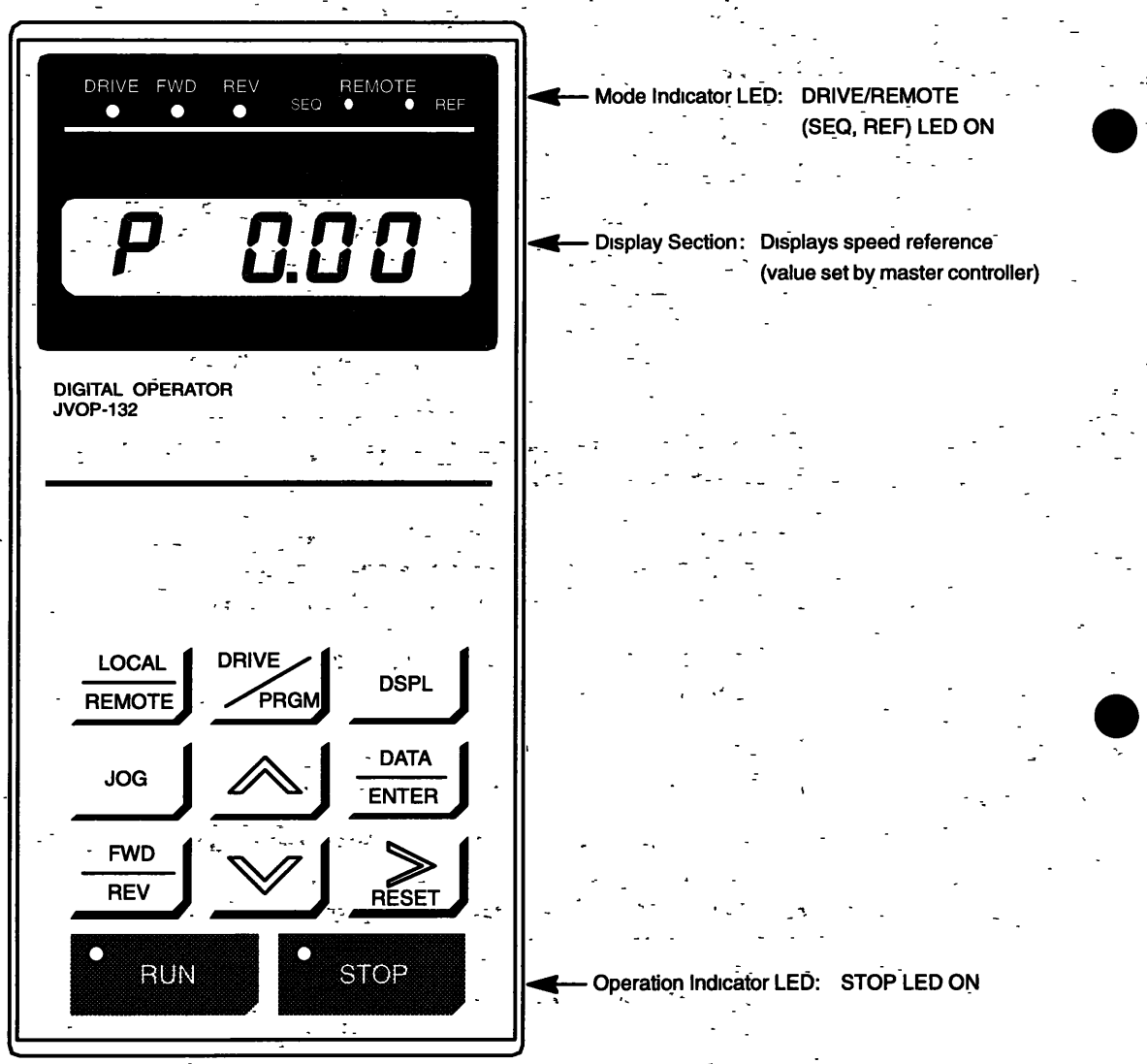


Fig. 28 Digital Operator Display at Power-up

(2) Operation Check Points

Check the following items during operation.

- ☐ Motor rotates smoothly.
- ☐ Motor rotates in the correct direction.
- ☐ Motor does not have abnormal vibration or noise.
- ☐ Acceleration and deceleration are smooth.
- ☐ The current matching the load flows.
- ☐ Status indicator LEDs and digital operator display are correct.

(3) Example of Basic Operation

(a) Operation by Digital Operator

The diagram below shows a typical operation pattern using the digital operator.

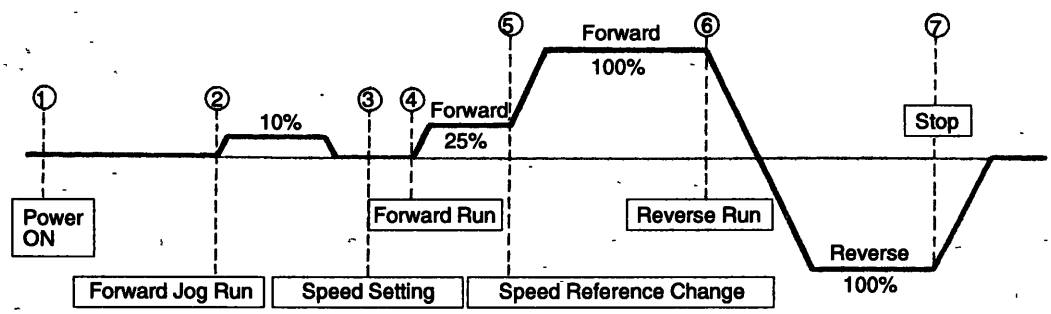


Fig. 29 Operation Sequence by Digital Operator

Table 23 Typical Operation by Digital Operator

Description	Key Sequence	Digital Operator Display
① Power ON ↓ · Displays speed reference value.		P 0.00
Operation Condition Setting · Select LOCAL mode.	LOCAL / REMOTE	REMOTE LED OFF (SEQ, REF) FWD LED lights.
② Forward Jog Run (10%) · JOG run procedure (Runs while depressing JOG key.)	JOG	P 10.00
③ Speed Setting · Change reference value.		P 0.00 Digit to be changed blinks.
	Change the value by pressing ∨ ∧ RESET	P 25.00
· Write-in set value.	DATA / ENTER	P 25.00 (Stops blinking for 2 sec.)
· Select motor speed monitor display.	DSPL	0.00
④ Forward Run · Forward run (25%)	RUN	25.00 RUN LED lights. RUN

Table 23 Typical Operation by Digital Operator (Cont'd)

Description	Key Sequence	Digital Operator Display
⑤ Speed Reference Value Change (25% → 100%) · Select frequency reference value display.	DSPL	P25.00
· Change set value.	Change the value by pressing RESET ≫ ∨ ∧	P 100.0 Digit to be changed blinks.
· Write-in set value.	DATA ENTER	P 100.0 (Stops blinking for 2 sec.)
· Select motor speed monitor display.	DSPL	25.00 ↓ 100.0
⑥ Reverse Run · Switch to reverse run.	FWD REV	- 100.0 REV LED lights.
⑦ Stop · Decelerates to a stop.	STOP	0.00 STOP LED lights. (RUN LED blinks during deceleration.) STOP

(b) Operation by Control Circuit Terminal Signal

The diagram below shows a typical operation pattern using the control circuit terminal signals.

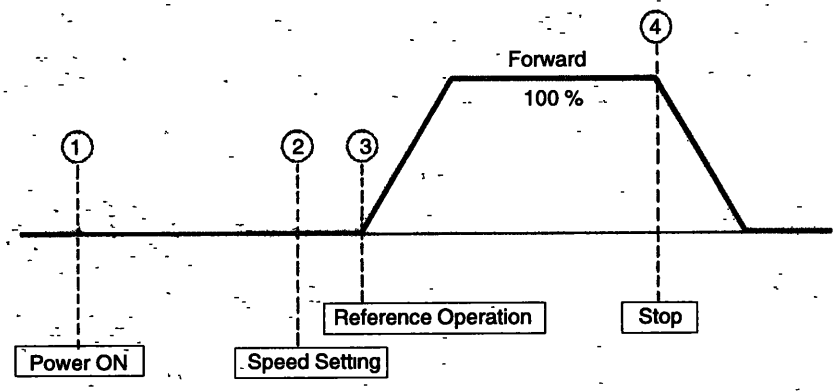
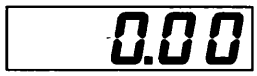


Fig. 30 Operation Sequence by Control Circuit Terminal Signal

Table 24 Typical Operation by Control Circuit Terminal Signal

Description	Key Sequence	Digital Operator Display
① Power ON		
Program mode selection	DRIVE / PRGM	
Setting speed reference from the control circuit terminal Setting "B1-01 = 1"	∨ ∧	b1-01
	DATA ENTER	03
	∨ ∧ RESET	01
	DATA ENTER	End
		01
	DSPL	b1-01
Setting run command from the control circuit terminal Setting "B1-02 = 1"	∨ ∧	b1-02
	DATA ENTER	03
	∨ ∧ RESET	01
	DATA ENTER	End
		01
	DSPL	b1-02
Drive mode selection	DRIVE / PRGM	P 0.00 Displays speed reference value.

Table 24 Typical Operation by Control Circuit Terminal Signal (Cont'd)

Description	Key Sequence	Digital Operator Display
② Speed Setting · Input speed reference voltage from control circuit terminal 9CN-4 and verify the input value by the digital operator.		 Reference voltage. 10 V
Changing to motor speed display	DSPL	
③ Forward Run · Close the control circuit terminals 9CN-17 to 9CN-25 to perform forward run.		 RUN LED lights. FWD LED lights. 
④ Stop · Open the control circuit terminals 9CN-17 to 9CN-25 to stop operation.		 STOP LED lights. (RUN LED blinks during deceleration.) 

7 MAINTENANCE AND INSPECTION

⚠ WARNING

- Never touch high-voltage terminals in the inverter.
  Failure to observe this warning can result in an electrical shock.
- Replace all protective covers before powering up the inverter. To remove the cover, make sure to shut OFF the molded-case circuit breaker.
  Failure to observe this warning can result in an electrical shock.
- Perform maintenance or inspection only after verifying that the CHARGE LED goes OFF, after the main circuit power supply is turned OFF.
  The capacitors are still charged and can be dangerous.
- Only authorized personnel should be permitted to perform maintenance, inspections or parts replacement.
  [Remove all metal objects (watches, bracelets, etc.) before operation.]
  (Use tools which are insulated against electrical shock.)
  Failure to observe this warning can result in an electrical shock.

⚠ CAUTION

- The control PC board employs CMOS ICs. Do not touch the CMOS elements.
  They are easily damaged by static electricity.
- Do not connect or disconnect wires or connectors while power is applied to the circuit.
  Failure to observe this caution can result in personal injury.

This chapter describes basic maintenance and inspection procedures for the VS-676H5.

7.1 PERIODIC INSPECTION

Perform the inspection as indicated below to ensure reliable operation of VS-676H5 for a prolonged time by preventing faults.

Before servicing, turn OFF the main circuit power and be sure that the CHARGED LED is OFF.

Table 25 Periodic Inspection

Component	Check	Corrective Action
External Terminals, Unit Mounting Bolts, Connectors, etc.	Loose screws	Tighten
	Loose connectors	Tighten.
Heatsink	Build-up of dust and dirt	Blow with dry compressed air of 39.2×10^4 to 58.8×10^4 Pa (4 to 6kg cm^2) pressure.
Printed Circuit Board	Accumulation of conductive dust or oil	Blow with dry compressed air of 39.2×10^4 to 58.8×10^4 Pa (4 to 6kg·cm^2) 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 39.2×10^4 to 58.8×10^4 Pa (4 to 6kg·cm^2) pressure
Smoothing Capacitor	Discoloration or odor	Replace the capacitor or inverter unit

7.2 PARTS REPLACEMENT SCHEDULE (GUIDELINES)

Replace the following parts periodically, for a long, safe, trouble free working life of VS-676H5.

Table 26 Parts Replacement Schedule

Parts	Interval (Approx.)	Remarks
Cooling Fan	2 to 3 years	Replace with new one.
Smoothing Capacitor	5 years	Replace with new one. (Decided after inspection.)
Breakers or Relays	—	Decided after inspection.
Fuse	10 years	Replace with new one.
Aluminum Electrolytic Capacitor on PC Board	5 years	Replace with new one. (Decided after inspection.)

NOTE

Operating conditions are as follows:

Ambient temperature : 30°C yearly average
Load factor : 80% or below
Operation rate : 20 hours or below /day

8 TROUBLESHOOTING

This chapter describes the inverter fault display and the fault contents caused by motor/machine malfunctions and the corrective actions to be taken.

8.1 FAULT DIAGNOSIS AND CORRECTIVE ACTIONS

(1) When the VS-676H5 detects a fault, it activates the fault contact output to turn ON or blink the LEDs on the control card as indicated in Table27. Details of faults can be checked by connecting the digital operator to 1CN. Check the cause in the tables in the following pages and take the corrective actions by referring to Table 28, "Fault Diagnosis and Corrective Actions".

(2) If the inspections or corrective actions described cannot solve the problem, contact your YASKAWA representative immediately.

(3) To restart, turn ON the reset input signal or depress [>RESET] key or shut OFF the main circuit power supply once, to reset the stop status.

Table 27 Status Indication by LEDs

Green	Red	Description
OFF	OFF	Base block status (excluding major fault)
ON	–	Running
Blinking	–	The motor does not run although the run command is input Speed reference < E1-09 (V/f control without PG, V/f control with PG, vector control without PG) External base block signal is input
–	Blinking	Minor fault
–	ON	Major fault
ON	ON	Flash write-in mode
During one blinking cycle (Note)	Blinks 1 time	Watchdog error (Control card error)
	Blinks 2 time	RAM check error (Control card error)
	Blinks 3 time	Sum check error (Control card error)
	Blinks 4 time	Illegal command (Control card error)
	Blinks 5 time	Slot illegal command (Control card error)
	Blinks 6 time	CPU bus error (Control card error)
	Blinks 7 time	DMA bus error (Control card error)

(Note) Example Sum check error

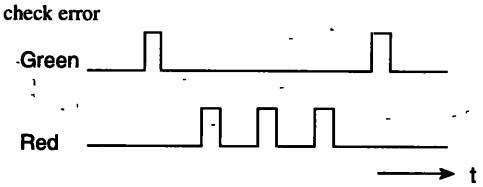


Table 28 Fault Diagnosis and Corrective Actions

Fault Display	Description	Details	Corrective Action	Rank* (Standard Value)
Uu1	Main circuit undervoltage (PUV)	Undervoltage in the direct current main circuit during running Detection level 200 V class Approx 190 V or less 400 V class Approx 380 V or less	Check the power supply wiring Correct the line voltage	A
Uu2	Control circuit undervoltage (CUV)	Undervoltage in the control circuit during running		A
Uu3	Pre-charge contactor open	The pre-charge contactor opened during running		A
Uu4	Power unit control supply undervoltage	Undervoltage in the power unit control supply during running		A
Uu	Momentary power loss	The main circuit direct current voltage fell below the PUV level The pre-charge contactor opened The control power source fell below the CUV level	—	B
GF	Ground fault (GF) (Earth fault)	Inverter output grounding current exceeded 50% of inverter rated current	Check that motor insulation has not deteriorated Check that connection between inverter and motor is not damaged	A
oC	Overcurrent (OC)	The inverter output current exceeded the OC level	Check the motor coil resistance Extend the accel/decel time Check the motor insulation Multi-meter check	A
ou	Overvoltage (OV)	The main circuit direct current voltage exceeded the OV level Detection level 200 V class Approx 400 V 400 V class Approx 800 V	Extend the deceleration time, add braking circuit	A
oS	Overspeed (OS)	The motor speed exceeded the overspeed level	Check the load	A
dEu	Speed deviation (DEV)	The deviation of the speed reference and speed feedback exceeded the regulation level	Check the load	A
PGo	PG open circuit (PGO)	The PG line is broken	Check the PG line Check the condition of the motor lock or the load	A
rHn	Thermistor open circuit	Motor temperature detection thermistor wiring is broken	Check the thermistor	A
PF	Excessive ripple in DC bus bar voltage	Inverter input power supply has open-phase Large unbalance in input voltage	Check the line voltage Re-tighten the input terminal screws	A
LF	Output open-phase	Inverter output has open-phase	Check the output wiring Check the motor impedance Re-tighten the output terminal screws	A

Table 28 Fault Diagnosis and Corrective Actions (Cont'd)

Fault Display	Description	Details	Corrective Action	Rank* (Standard Value)
SC	Load short-circuit (SC)	Inverter output (load) is short-circuited	Check the motor coil resistance Check the motor insulation	A
UnbC	Current unbalance	Output current of individual power units became unbalanced (Detects models of 600kW or larger)	Check the wiring	A
oH4	Converter overheat	Converter fin temperature exceeds 105℃ (Detects models of 600kW or larger)	Check the fan and the ambient temperature	A
PUF	Fuse blown (FU)	The output transistors were damaged The direct current circuit fuse is blown	Check for damaged transistor, load side short circuit, grounding, etc	A
oH	Heatsink overheat warning	The transistor heatsink temperature exceeded the allowable value	· Check the heatsink and ambient temperature Check the filter and fan	B
oH1	Heatsink overheat	The transistor heatsink temperature exceeded the allowable value		A
oH3	Motor overheat	The motor temperature exceeded the allowable value	Reduce the load · Check the ambient temperature.	A
oL1	Motor overload	Inverter output exceeded the motor overload level	· Reduce the load	A
oL2	Inverter overload	Inverter output exceeded the inverter overload level	Reduce the load Extend the acceleration/deceleration time	A
oL3	Overtorque 1	Torque exceeded the overtorque detection level	Check the load	A/B
oL4	Overtorque 2	Torque exceeded the overtorque detection level 2		A/B
rr	Braking transistor failure	The braking transistor has failed.	Replace the inverter.	A
rH	Braking resistor unit overheat	The braking resistor unit temperature has exceeded the allowable value. (Protects only inverter built-in type)	Reduce the regenerative load	A
EF0	External fault by master controller	External fault was input from the master controller	External fault, defined by user specification, was input from the master controller Find the external fault items from the I/O list and correct it.	A/B
EF3	External fault at terminal 3 (9CN-19)	Fault occurred in the external control circuit	Check the condition of the input terminal If the LED lights when terminal is not connected, replace the inverter	A
EF4	External fault at terminal 4 (9CN-20)			A
EF5	External fault at terminal 5 (9CN-21)			A
EF6	External fault at terminal 6 (9CN-22)			A

Table 28 Fault Diagnosis and Corrective Actions (Cont'd)

Fault Display	Description	Details	Corrective Action	Rank* (Standard Value)
EF7	External fault at terminal 7 (9CN-23)	Fault occurred in the external control circuit	Check the condition of the input terminal If the LED lights when terminal is not connected, replace the inverter	A
EF8	External fault at terminal 8 (9CN-24)			A
SE 10	Motor change error	Motor was changed in program mode, EMS control mode, or during motor running	Make sure that the digital operator is in the drive mode Make sure that the control mode is not EMS control Make sure that the motor is not running	B
CPF00	Control circuit fault 1	Transmission between the inverter and digital operator cannot be established until 5 seconds after supplying power MPU peripheral element check faulty (at power–up)	Insert the digital operator connector again Check the control circuit wiring Replace the control card	A/B
CPF01	Control circuit fault 2	Transmission between the inverter and digital operator is established once after supplying power, but later transmission faults continue three times for a duration of more than 2 seconds each time MPU peripheral element check fault (at power–up)	Insert the digital operator connector again Check the control circuit wiring Replace the control card	A/B
CPF02	Baseblock circuit fault (CPF02)	Inverter control unit fault	Replace the control card	A
CPF03	EEPROM fault (CPF03)			A
CPF04	CPU internal A/D converter fault			A
CPF05	CPU external A/D converter fault			A
CPF06	Option card connection fault	The option card is not installed correctly	Install the option card again	A
CPF07	PWM timer fault	Inverter control unit fault (Detects models of 600kW or larger)	Replace the control card	A
CPF08	Common RAM BCC error			A
CPF09	Cross-diagnose fault between common RAMs			A
CPF10	Common RAM initial check fault			A
CPF21	Transmission control card hardware fault	Transmission control card hardware check error (at power–up)	Replace the control card	A
CPF22	Transmission control card code No error	Transmission control card which is not applicable for the inverter is connected	Replace the control card with applicable one	A
CPF23	Cross-diagnose fault between master controller and control card	Diagnosis data has not been updated for more than 0 2 seconds between the transmission control card and the control card	Replace the transmission control card	A

Table 28 Fault Diagnosis and Corrective Actions (Cont'd)

Fault Display	Description	Details	Corrective Action	Rank* (Standard Value)
Err	EEPROM writing fault (ERR)	EEPROM internal data did not match when initializing the constant	Replace the control card	B
bUS	CP-216 Transmission error	CP-216 Transmission error continued for 2 5 seconds	Check transmission devices and transmission signals	A/B
bASE	Base test mode fault	During the test, main circuit DC power supply voltage exceeded 20 V	Lower the main circuit DC voltage	C
oPE01	kVA selection fault	Inverter capacity selection fault	Check and set the constant data	C
oPE02	Constant setting range fault	Constant data is out of range	Check the constant data settings	C
oPE03	Multi-function contact input selection fault	In H1-01 to H1-06 settings Not set in the ascending order The same values are set except for F and FF	Check the function selection	C
oPE05	Option reference selection fault (OPE05)	C-option is not connected although speed reference from C-option is selected C-option is not connected although run command from C-option is selected	Check and set the constant data. Connect the C-option	B
oPE06	Control mode selection fault	PG card is not connected during flux vector control or V/f with PG feedback	Connect PG card	B
oPE10	V/f data setting fault (E1-04 to E1-10)	When the settings of E1-04 to E1-10 do not satisfy the following conditions: E1-04 ≧ E1-11 ≧ E1-06 > E1-07 ≧ E1-09	Check the constants.	C
oPE11	Carrier frequency constant setting fault	Any of the following constant setting is not correct Carrier frequency upper limit (C6-01) > 5 Hz Carrier frequency lower limit (C6-02) ≦ 5 kHz Carrier frequency proportional gain (C6-03) > 6 (C6-01) < (C6-02)	Check and set the constant data	C
oPr	Digital operator fault	In the digital operator run command mode, the digital operator circuit is open (Detected only when O2-06 is set to 1	Check the wiring and connectors Replace the control card	A

* The ranks are classified as follows:

Rank A : Major fault (Motor coasts to stop, digital operator indication lights, and fault contact is output.)

Rank B : Fault [Operation continues, digital operator indication blinks, no fault contact is output, and minor fault contact is output (when multi-function output is selected).]

Rank C : Warning (Operation cannot be performed, digital operator indication lights, no fault contact is output, no minor fault contact is output.)

8.2 MOTOR FAULTS AND CORRECTIVE ACTIONS

(1) If any of the faults shown in 29 occurs in the motor, check the cause and provide the relevant corrective action.

(2) If these inspections and corrective actions cannot solve the problem, contact your YASKAWA representative immediately.

Table 29 Motor Faults and Corrective Actions

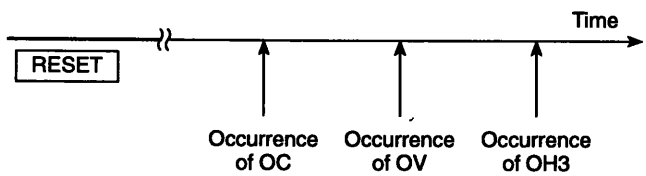
Fault	Check Point	Corrective Action
Motor does not rotate	Power supply voltage applied to power supply terminals R, S, T? Is CHARGE LED ON?	· Turn ON power supply · Turn OFF power supply, and then ON again · Check power supply voltage · Make sure terminal screws are tight
	Use rectifier type voltmeter to test Voltage output to output terminals U, V, W correct?	Turn OFF power supply, then turn ON again
	Motor locks due to excessive load?	Reduce the load and release the lock
	Fault displayed in operator display?	Check troubleshooting table
	FWD or REV run command entered?	Check the wiring
	Frequency setting voltage entered?	· Correct the wiring · Check frequency setting voltage
	Reference selection (b1–01), operation method selection(b1–02) correct?	Input the correct set value
Motor rotation reverses	Wiring of terminals U, V, W correct?	Match wiring to the phase order of the motor leads U, V, W.
	FWD and REV wiring run signals entered?	Correct the wiring
Motor rotates, but variable speed not available	Wiring of frequency setting circuit correct?	Correct the wiring
	Reference selection (b1–01), operation method selection(b1–02) correct?	With the digital operator, check the reference selecton or operation mode selection
	Load excessively large?	Reduce the load
Motor r/min too high or too low	Motor ratings (number of poles, voltage) correct?	Check motor nameplate specifications
	Accel/decel speed change ratio for gears, etc correct?	Check speed changer (gears, etc)
	Maximum frequency set value correct?	Check the maximum frequency set value
	Use rectifier voltmeter Voltage between motor terminals not excessively reduced?	Check V/f characteristics values
Motor r/min not stable during operation	Load excessively large?	Reduce the load
	Load variation excessively large?	· Reduce the load variation · Increase inverter motor capacity
	Open phase?	· Check the wiring if power supply is open phase

8.3 DISPLAY SEQUENCE OF FAULT CODES

If more than one fault occurs, up to four faults are logged in the order of occurrence (excluding CPF00 and CPF01). They are displayed in order by pressing the ∧ and ∨ keys in the drive mode by connecting the digital operator.

The record of major fault is cleared when the fault is cleared by the fault reset operation.

Example of display:



① First display — oC

② Pressing ∧ — 1 oC

③ Pressing ∧ — 2 ou

④ Pressing ∧ — 3 oH3

⑤ Pressing ∧ — 1 oC Returns to ②

8.4 MONITOR CONSTANTS RELATED WITH FAULTS

By using the U2 constants, it is possible to check the controlled status of the inverter at the occurrence of major faults only.

With the U3 constants, it is possible to check the contents of previous major faults only and the cumulative operation time until the occurrence of that fault (U1–13). The data are displayed for up to four faults from the latest fault. Since U2 and U3 constants are stored to the EEPROM, the stored data are retained even after the power is turned OFF.

NOTE

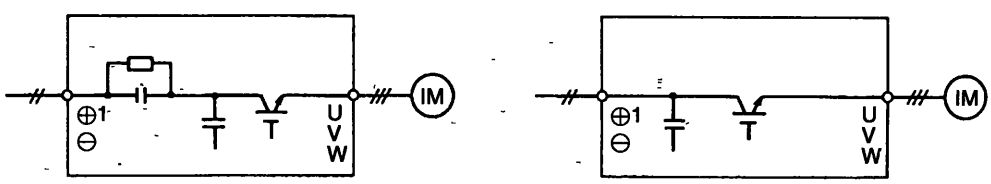
1. Concerning the contents of faults stored to U3–01 to U3–04, only lower three digits can be displayed since "F " is displayed in the first two digits.
   Example: CPF05 is displayed as "F F05".
2. By initialization processing called by A1–03, U2 and U3 constants are cleared.

APPENDIX 1 SPECIFICATIONS

Table A-1 200 V Class Specifications (DC Input)

	Inverter Model CIMR-H5D ☐	20P4	20P7	21P5	22P2	23P7	25P5	27P5	2011	2015	2018	2022	2030	2037	2045	2055	2075
	Max Applicable Motor Output (*1) kW	0 4	0 75	1 5	2 2	3 7	5 5	7 5	11	15	18 5	22	30	37	45	55	75
Output Characteristics	Inverter Capacity kVA	1	1 5	2	3	5	7 5	10	15	20	25	30	40	50	60	70	100
	Rated Output Current A	3 2	6	8	11	17 5	25	33	49	64	80	96	130	160	183	224	300
	Max Output Voltage	3-phase, 190 V (*2)															
	Rated Output Frequency	Up to 400 Hz available by programming															
Power Supply	Rated Input Voltage and Frequency	DC 270 to 330 V															
	Allowable Voltage Fluctuation	+10%, −15%															
Control Characteristics	Control Method	Sine wave PWM															
	Starting Torque	150% / 0 r/min (150% / 1 Hz without PG)															
	Speed Control Range	1 1000 (1 100 without PG)															
	Speed Control Accuracy	±0 01% (±0 2% without PG)															
	Speed Response	30 Hz (5 Hz without PG) (*3)															
	Torque Limit	Available (Parameter setting, 4 quadrants can be changed)															
	Torque Accuracy	±3% (*4)															
	Torque Response	150 Hz (20 Hz without PG) (*5)															
	Speed Control Range	0 to 24000 r/min (2-pole motor)															
	Speed Reference Setting Resolution	Digital reference 30000/100%															
		Analog reference 1000/100%															
	Torque Reference Setting Resolution (Calculation Resolution)	Digital reference 10000/100%															
		Analog reference 1000/100%															
	Overload Capacity	150% of rated output current for 1 minute															
	Accel/Decel Time	0 01 to 6000 0 sec (Accel/decel time setting independently, 2 steps available)															
	Braking Torque	Approx 20%															
Protective Functions	Motor Overload Protection	Protected by thermistor (*6) or electronic thermal overload relay															
	Instantaneous Overcurrent	Motor coasts to a stop at approx 200% of inverter rated current															
	DC Bus Line Protection	Motor coasts to a stop by blown-fuse															
	Overload	150% of rated output current															
	Overvoltage	Motor coasts to a stop if converter output voltage exceeds 410 V															
	Undervoltage	Motor coasts to a stop if converter output voltage drops to 190 V or below															
	Momentary Power Loss	Immediately stop by 15 ms and above momentary power loss (Factory setting) Continuous operation during power loss less than 2 sec can be selected by operation mode															
	Heatsink Overheat	Protected by thermistor															
	Stall Prevention	Stall prevention during accel/decel and constant speed operation															
	Ground Fault	Protected by electronic circuit (Overcurrent level)															
	Power Charge Indication	Charge LED stays ON until bus voltage drops below 50 V															
Environment	Ambient Temperature	−10°C to +45°C (Enclosed wall-mounted type)															
	Humidity	90% RH or less (Non-condensing)															
	Storage Temperature	−20°C to +60°C (Not frozen)															
	Location	Indoor (protected from corrosive gases and dust)															
	Elevation	1000 m or less															
	Vibration	9 8 m/s^2 (1G) at 10 to less than 20 Hz, up to 2 m/s^2 (0 2G) at 20 to 50 Hz															

*1 Based on a YASKAWA standard 4-pole motor for max applicable motor output
*2 Output voltage in the vector control mode (300 V DC input)
*3 Response when ratio of inertia between motor and load is 1 1
*4 To achieve this value tests are required by actually connecting to a motor
*5 Electric torque response
*6 Valid for the motor with built-in thermistor



CIMR-H5D20P4 - 27P5
CIMR-H5D2030 - 2075

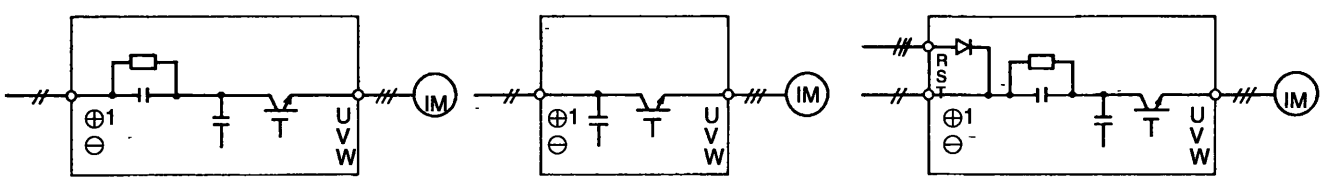
CIMR-H5D2011 - 2022

Fig. A-1 Main Circuit Configuration (200 V Class DC Input)

Table A-2 400 V Class Specifications (DC Input)

	Inverter Model CIMR-H5D☐	40P4	40P7	41P5	42P2	43P7	45P5	47P5	4011	4015	4018	4022	4030	4037	4045	4055	4075	4110	4160	4185 (*7)	4220 (*7)	4300 (*7)
Max Applicable Motor Output (*1) kW		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	110	160	185	220	300
Output Characteristics	Inverter Capacity kVA	1	1.5	2	3	5	7.5	10	15	20	25	30	40	50	60	80	100	140	200	250	300	400
	Rated Output Current A	1.8	3.4	4.8	6.2	8	14	18	27	34	41	48	65	80	96	128	165	224	302	340	450	605
	Rated Output Voltage	3-phase, 380 V (*2)																				
	Rated Output Frequency	Up to 400 Hz available by programming																				
Power Supply	Rated Input Voltage and Frequency	DC 540 to 660 V																				
	Allowable Voltage Fluctuation	+10%, -15%																				
Control Characteristics	Control Method	Sine wave PWM																				
	Starting Torque	150% / 0 r/ min (150% / 1 Hz without PG)																				
	Speed Control Range	1:1000 (1:100 without PG)																				
	Speed Control Accuracy	±0.01% (±0.2% without PG)																				
	Speed Response	30 Hz (5 Hz without PG) (*3)																				
	Torque Limit	Available (Parameter setting, 4 quadrants can be changed)																				
	Torque Accuracy	±3% (*4)																				
	Torque Response	150 Hz (20 Hz without PG) (*5)																				
	Speed Control Range	0 to 24000 r/min (2-pole motor)																				
	Speed Reference Setting Resolution	Digital reference 30000/100%																				
		Analog reference 1000/100%																				
	Torque Reference Setting Resolution (Calculation Resolution)	Digital reference 10000/100%																				
		Analog reference 1000/100%																				
	Overload Capacity	150% of rated output current for 1 minute																				
	Accel/Decel Time	0.01 to 6000.0 sec (Accel/decel time setting independently, 2 steps available)																				
	Braking Torque	Approx. 20%																				
Protective Functions	Motor Overload Protection	Protected by thermistor (*6) or electronic thermal overload relay																				
	Instantaneous Overcurrent	Motor coasts to a stop at approx. 200% of inverter rated current																				
	DC Bus Line Protection	Motor coasts to a stop by blown-fuse																				
	Overload	150% of rated output current																				
	Overvoltage	Motor coasts to a stop if converter output voltage exceeds 820 V																				
	Undervoltage	Motor coasts to a stop if converter output voltage drops to 380 V or below																				
	Momentary Power Loss	Immediately stop by 15 ms and above momentary power loss (Factory setting) Continuous operation during power loss less than 2 sec can be selected by operation mode																				
	Heatsink Overheat	Protected by thermistor																				
	Stall Prevention	Stall prevention during accel and constant speed operation																				
	Ground Fault	Protected by electronic circuit (Overcurrent level)																				
	Power Charge Indication	Charge LED stays ON until bus voltage drops below 50 V																				
Environment	Ambient Temperature	-10°C to +45°C (Enclosed wall-mounted type)																				
	Humidity	90% RH or less (Non-condensing)																				
	Storage Temperature	-20°C to +60°C (Not frozen)																				
	Location	Indoor (protected from corrosive gases and dust)																				
	Elevation	1000 m or less																				
	Vibration	9.8 m/s² (1G) at 10 to less than 20 Hz, up to 2 m/s² (0.2G) at 20 to 50 Hz																				

*1 Based on a YASKAWA standard 4-pole motor for max. applicable motor output
*2 Output voltage in the vector control mode (600 V DC input)
*3 Response when ratio of inertia between motor and load is 1:1
*4 To achieve this value tests are required by actually connecting to a motor
*5 Electric torque response
*6 Valid for the motor with built-in thermistor
*7 For 185 to 300 kW, model name is CIMR-H5A☐ since an AC input and a unit are in common



CIMR-H5D40P4 - 47P5
CIMR-H5D4055 - 4160

CIMR-H5D4011 - 4045

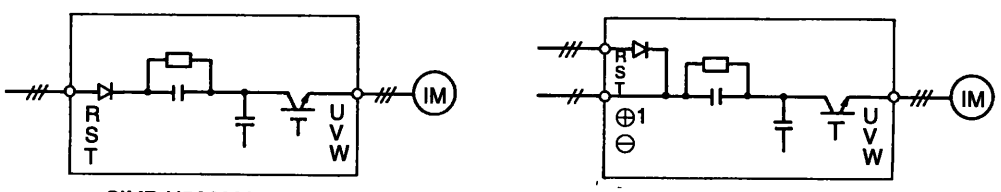
CIMR-H5A4185 - 4300

Fig. A-2 Main Circuit Configuration (400 V Class DC Input)

Table A-3 200/400 V Class Specifications (AC Input)

	Inverter Model CIMR-H5A ☐	2030	2037	2045	2055	2075	4055	4075	4110	4160	4185	4220	4300
	Max Applicable Motor Output (*1) kW	30	37	45	55	75	55	75	110	160	185	220	300
Output Characteristics	Inverter Capacity kVA	40	50	60	70	100	80	100	140	200	250	300	400
	Rated Output Current A	130	160	183	224	300	128	165	224	302	340	450	605
	Max Output Voltage	3-phase, 190 V (*2)					3-phase, 380 V (*2)						
	Rated Output Frequency	Up to 400 Hz available by programming											
Power Supply	Rated Input Voltage and Frequency	3-phase 200/208/220 V 50 Hz 200/208/220/230 V 60 Hz					3-phase 380/400/415/440/460 V 50/60 Hz						
	Allowable Voltage Fluctuation	+10%, −15%											
	Allowable Frequency Fluctuation	±5%											
Control Characteristics	Control Method	Sine wave PWM											
	Starting Torque	150% / 0 r/min (150% / 1 Hz without PG)											
	Speed Control Range	1:1000 (1:100 without PG)											
	Speed Control Accuracy	±0.01% (±0.2% without PG)											
	Speed Response	30 Hz (5 Hz without PG) (*3)											
	Torque Limit	Available (Parameter setting, 4 quadrants can be changed)											
	Torque Accuracy	±3% (*4)											
	Torque Response	150 Hz (20 Hz without PG) (*5)											
	Speed Control Range	0 to 24000 r/min (2-pole motor)											
	Speed Reference Setting Resolution	Digital reference 30000/100% Analog reference 1000/100%											
	Torque Reference Setting Resolution (Calculation Resolution)	Digital reference 10000/100% Analog reference 1000/100%											
	Overload Capacity	150% of rated output current for 1 minute											
	Accel/Decel Time	0.01 to 6000.0 sec (Accel/decel time setting independently, 2 steps available)											
	Braking Torque	Approx. 20%											
Protective Functions	Motor Overload Protection	Protected by thermistor (*6) or electronic thermal overload relay											
	Instantaneous Overcurrent	Motor coasts to a stop at approx. 200% of inverter rated current											
	DC Bus Line Protection	Motor coasts to a stop by blown-fuse											
	Overload	Motor coasts to a stop after 1 minute at 150% of rated output current											
	Overvoltage	Motor coasts to a stop if converter output voltage exceeds 410 V					Motor coasts to a stop if converter output voltage exceeds 820 V						
	Undervoltage	Motor coasts to a stop if converter output voltage drops to 190 V or below					Motor coasts to a stop if converter output voltage drops to 380 V or below						
	Momentary Power Loss	Immediately stop by 15 ms and above momentary power loss (Factory setting) Continuous operation during power loss less than 2 sec can be selected by operation mode											
	Heatsink Overheat	Protected by thermistor											
	Stall Prevention	Stall prevention during accel/decel and constant speed operation											
	Ground Fault	Protected by electronic circuit (Overcurrent level)											
	Power Charge Indication	Charge LED stays ON until bus voltage drops below 50 V											
Environment	Ambient Temperature	−10°C to +45°C (Enclosed wall-mounted type)											
	Humidity	90% RH or less (Non-condensing)											
	Storage Temperature	−20°C to +60°C (Not frozen)											
	Location	Indoor (protected from corrosive gases and dust)											
	Elevation	1000 m or less											
	Vibration	9.8 m/s^2 (1G) at 10 to less than 20 Hz, up to 2 m/s^2 (0.2G) at 20 to 50 Hz											

*1 Based on a YASKAWA standard 4-pole motor for max. applicable motor output
*2 Output voltage in the vector control mode (220/440V AC input)
*3 Response when ratio of inertia between motor and load is 1:1
*4 To achieve this value tests are required by actually connecting to a motor
*5 Electric torque response
*6 Valid for the motor with built-in thermistor



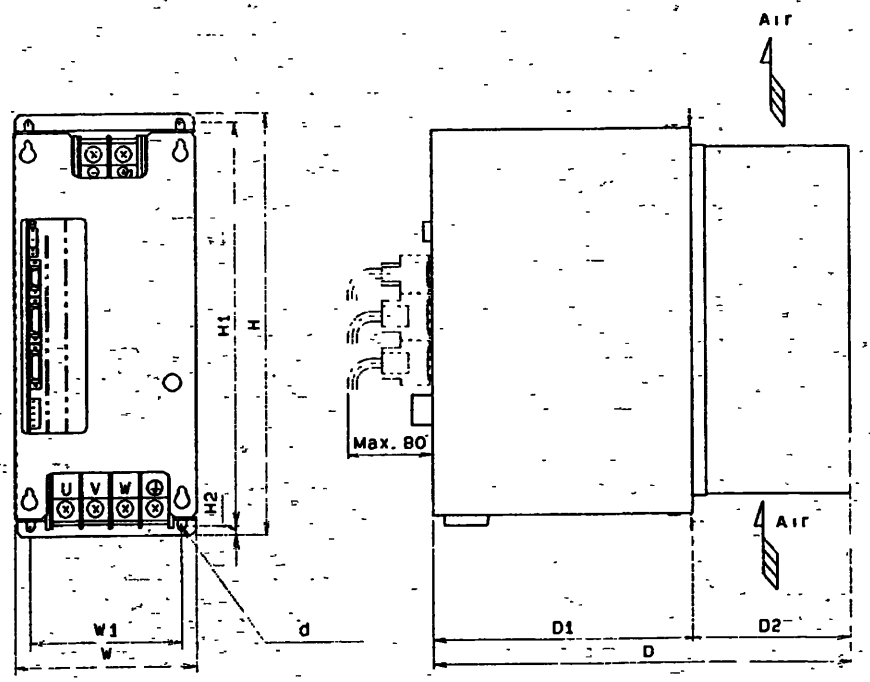
CIMR-H5A2030 - 2075
CIMR-H5A4055 - 4110

CIMR-H5A4185 - 4300

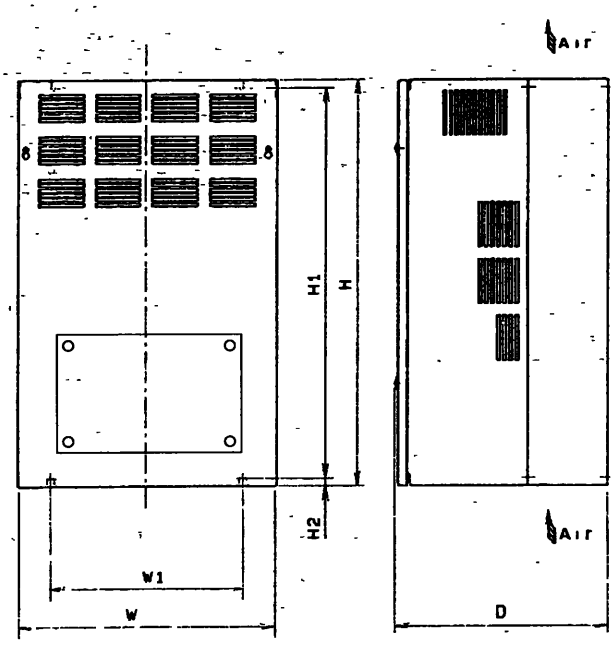
Fig. A-3 Main Circuit Configuration (200/400 V Class AC Input)

APPENDIX 2 DIMENSIONS (mm)

The figures below show 200V 7.5 kW model and 30 kW model.



(a) Book Type (CIMR-H5D27P5)



(b) Cubic Type (CIMR-H5D2030)

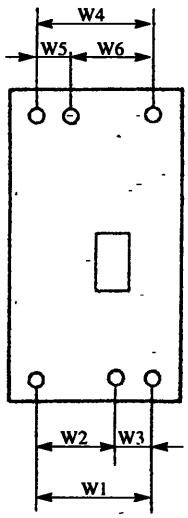
Fig. A-4 Dimensions of VS-676H5

Table A-4 Dimensions (mm) and Approx. Mass (kg) of VS-676H5

Voltage	Motor Capacity kW	Enclosed Wall-mounted Type											
		W	H	D	W1	H1	H2	D1	D2	Mass (kg) DC input	Mass (kg) AC input	d	Type
200V Class	0 4	100	350	350	75	335	7 5	220	130	7	–	M5	Book type
	0 75												
	1 5												
	2 2												
	3 7												
	5 5	125	350	350	100	335	7 5	220	130	8	–	M5	
	7 5												
	11	150	350	350	125	335	7 5	220	130	10	–	M5	
	15												
	18 5	200	350	350	150	335	7 5	220	130	15	–	M5	
	22												
	30	425	675	355	320	650	12 5	–	–	48	61	M10	Cubic type
	37										62		
	45	475	800	355	370	775	12 5	–	–	65	80	M10	
	55												
	75	575	925	405	445	895	15	–	–	110	135	M12	
400V Class	0 4	100	350	350	75	335	7 5	220	130	7 5	–	M5	Book type
	0 75												
	1 5												
	2 2												
	3 7												
	5 5	125	350	350	100	335	7 5	220	130	9 5	–	M5	
	7 5												
	11	150	350	345	125	335	7 5	215	130	9 5	–	M5	
	15												
	18 5	200	350	350	150	335	7 5	220	130	15	–	M5	
	22												
	30	250	350	350	200	335	7 5	220	130	19 5	–	M5	
	37												
	45												
	55	455	820	355	350	795	12 5	–	–	62	79	M10	Cubic type
	75										80		
	110	575	925	380	445	895	15	–	–	112	135	M12	
	160			405						116	145		
	185 (*2)	950	1450	435	(*1)	1400	25	–	–	–	360	M12	
	220 (*2)												
	300 (*2)	960	1600	455	(*1)	1550	25	–	–	–	420		

*1 Mounting dimensions of 400V 185 kW to 300 kW models are indicated on next page

*2 400 V 185 kW to 300 kW models are AC input models

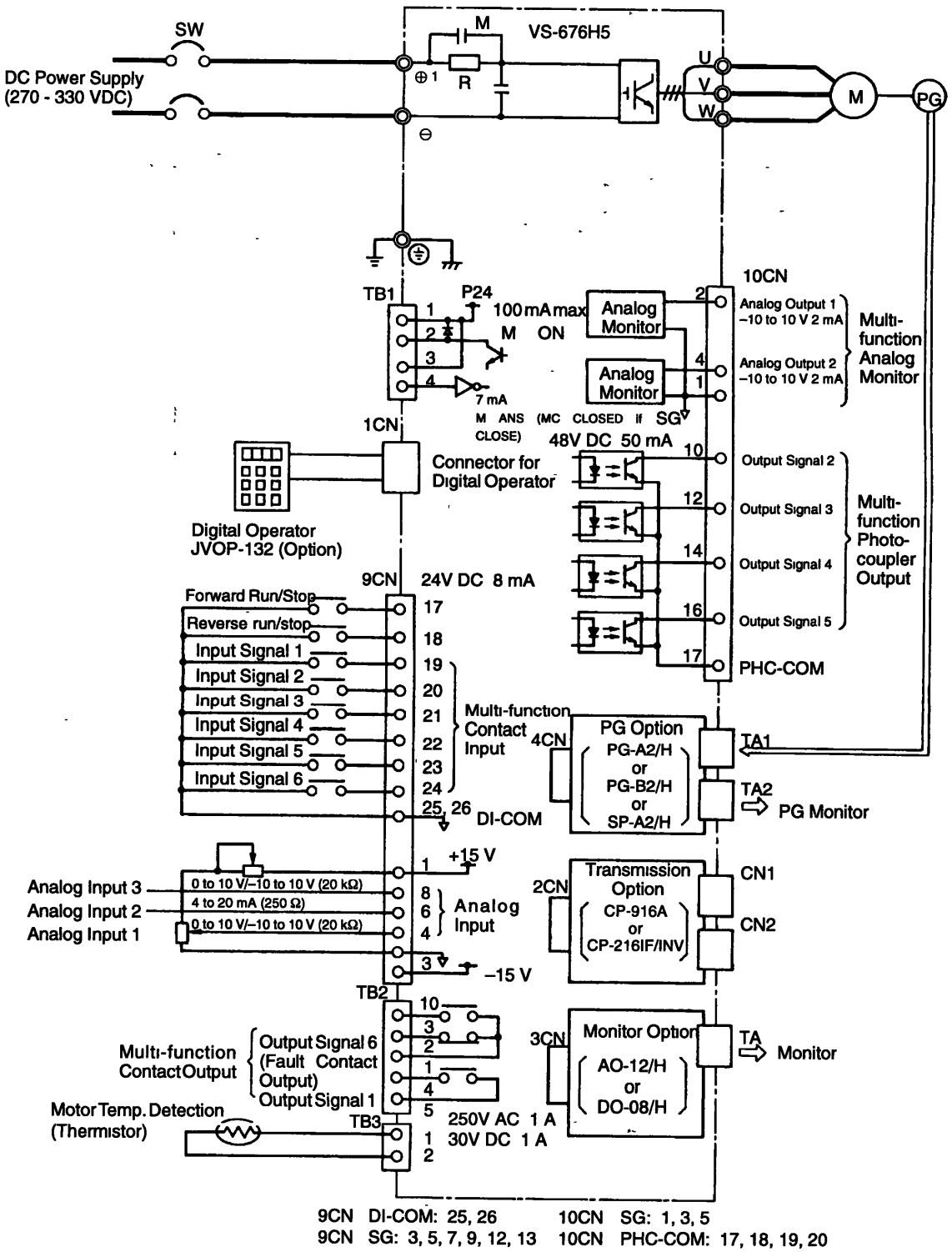


Applicable Motor Capacity kW	W1	W2	W3	W4	W5	W6
185, 220	750	440	310	850	285	565
300	750	440	310	873	298	575

APPENDIX 3 TYPICAL CONNECTION DIAGRAMS

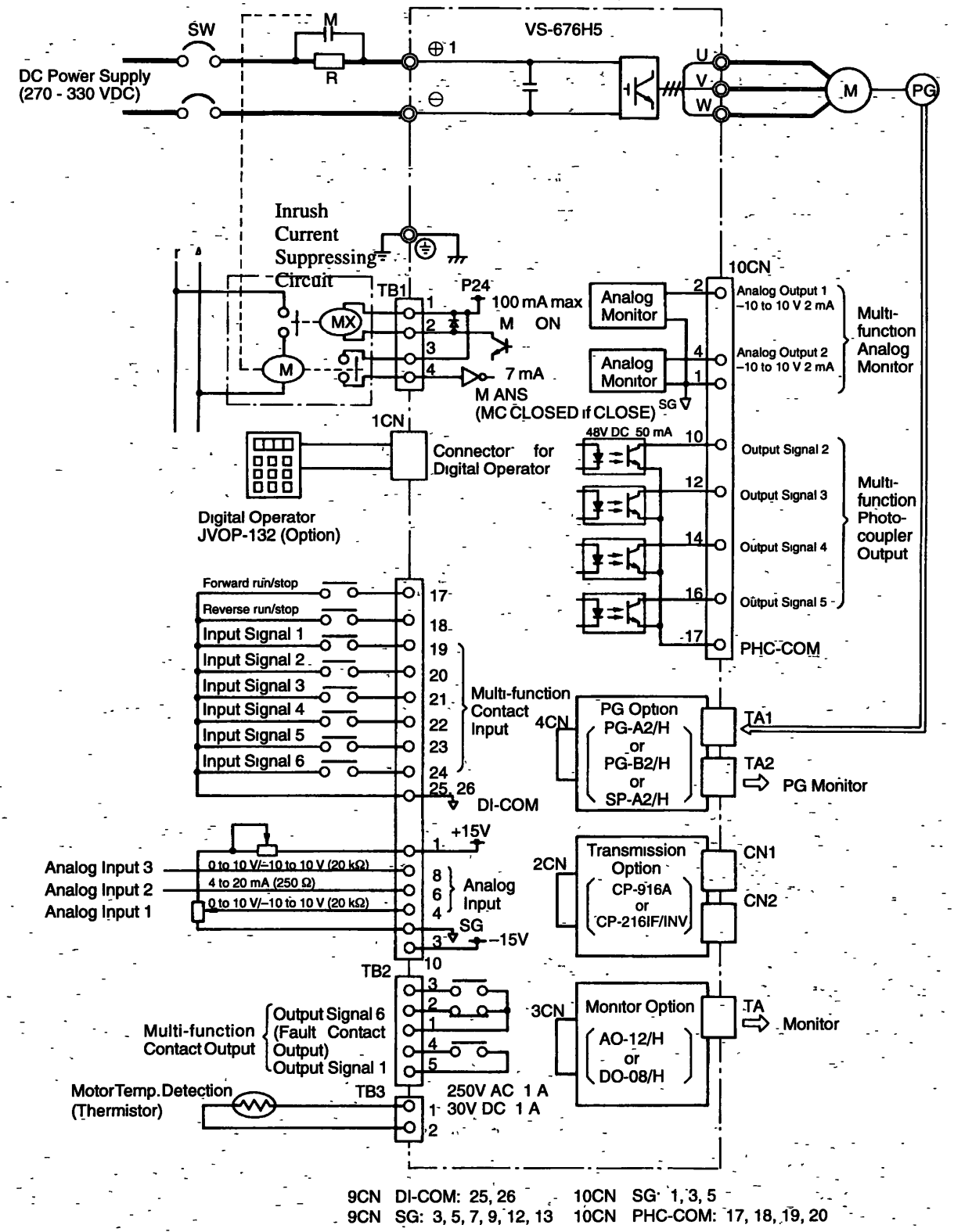
3.1 USING DC INPUT UNIT WITH BUILT-IN INRUSH CURRENT SUPPRESSING CIRCUIT

For Models CIMR-H5D20P4 to H5D27P5 (200 V Class 0.4 to 7.5 kW),
Models CIMR-H5D40P4 to H5D47P5 (400 V Class 0.4 to 7.5 kW)
For Models CIMR-H5D2030 to H5D2075 (200 V Class 30 to 75 kW),
Models CIMR-H5D4055 to H5D4160 (400 V Class 55 to 160 kW)



3.2 USING DC INPUT UNIT WITHOUT BUILT-IN INRUSH CURRENT SUPPRESSING CIRCUIT

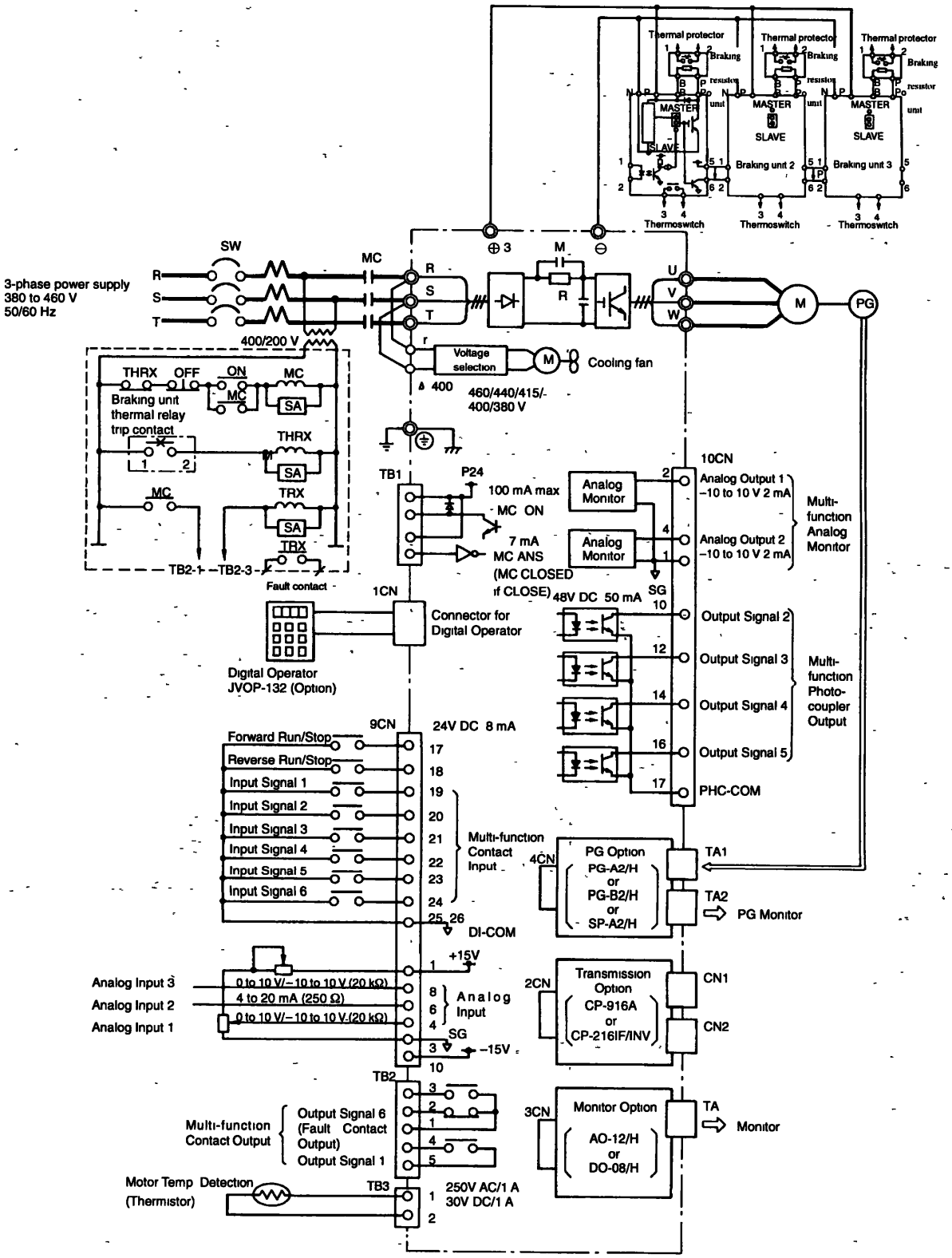
For models CIMR-H5D2011 to H5D2022 (200 V Class 11 - 22 kW)
For models CIMR-H5D4011 to H5D4045 (400 V Class 11 - 45 kW)



9CN DI-COM: 25, 26 10CN SG: 1, 3, 5
9CN SG: 3, 5, 7, 9, 12, 13 10CN PHC-COM: 17, 18, 19, 20

3.3 USING AC INPUT UNIT

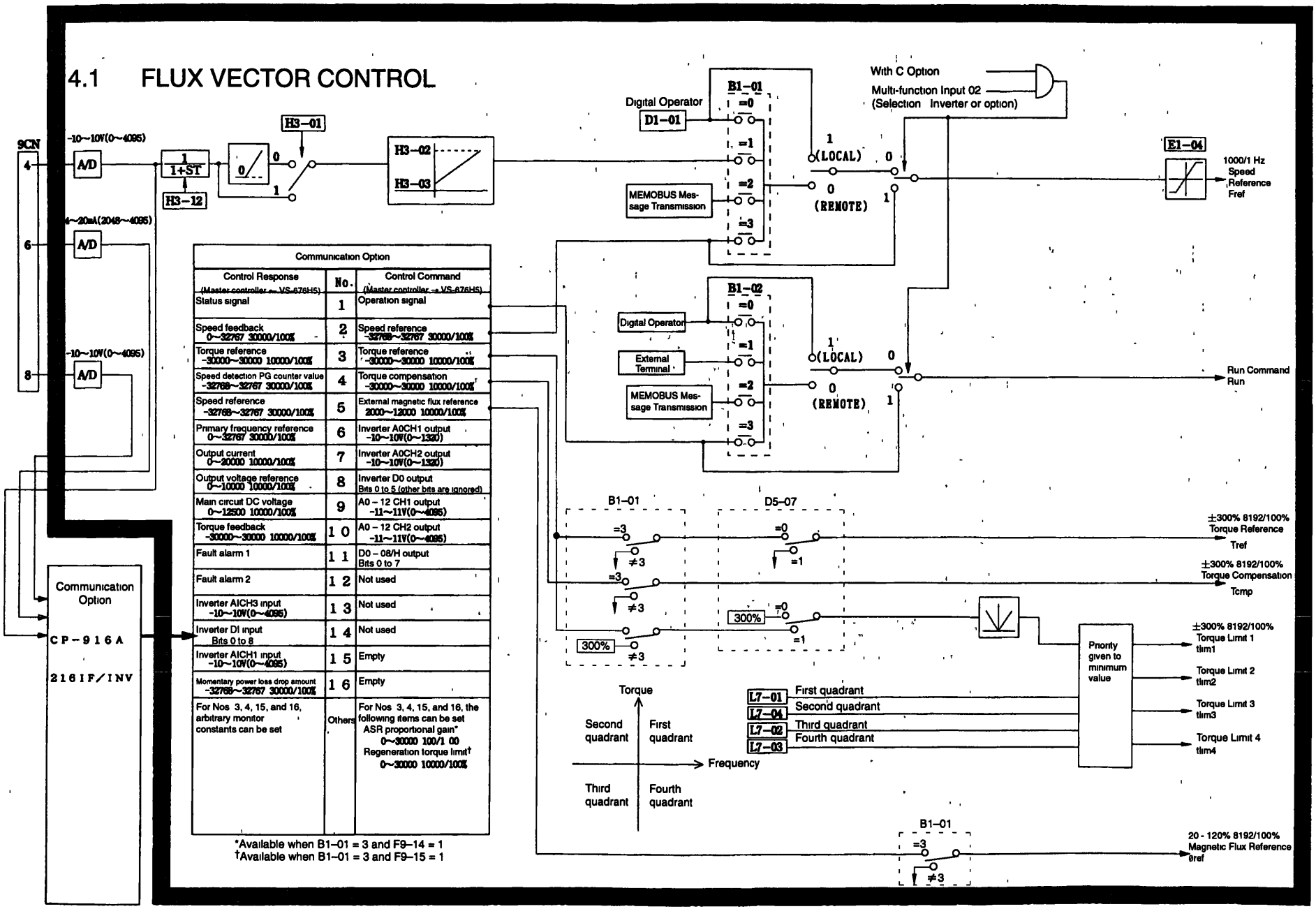
For models CIMR-H5A2030 to H5A2075 (200 V Class 30 to 75 kW)
For models CIMR-H5A4055 to H5A4300 (400 V Class 55 to 300 kW)



9CN DI-COM: 25, 26 10CN SG: 1, 3, 5
9CN SG. 3, 5, 7, 9, 12, 13 10CN PHC-COM: 17, 18, 19, 20

APPENDIX 4 FUNCTION BLOCK DIAGRAMS

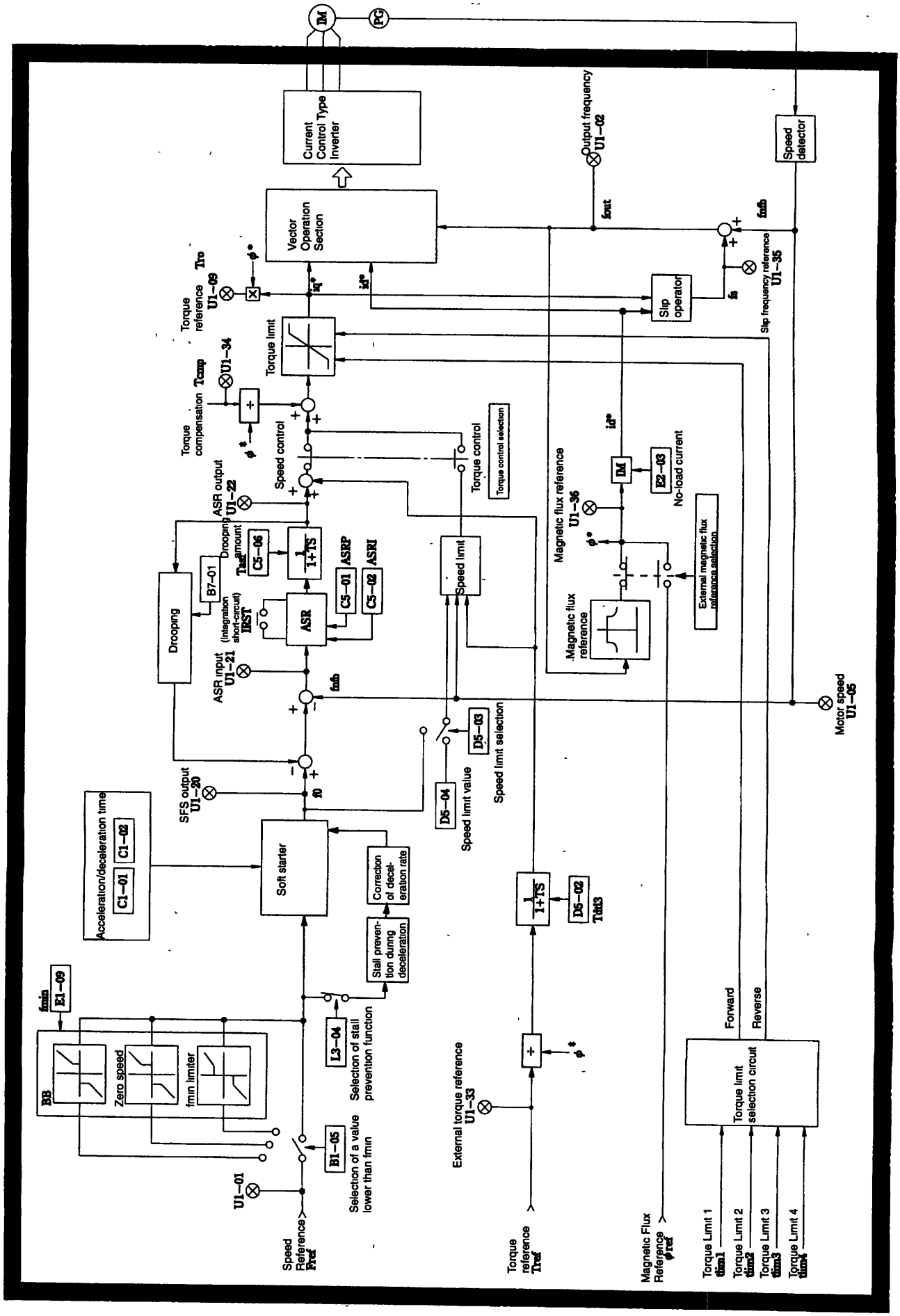
4.1 FLUX VECTOR CONTROL



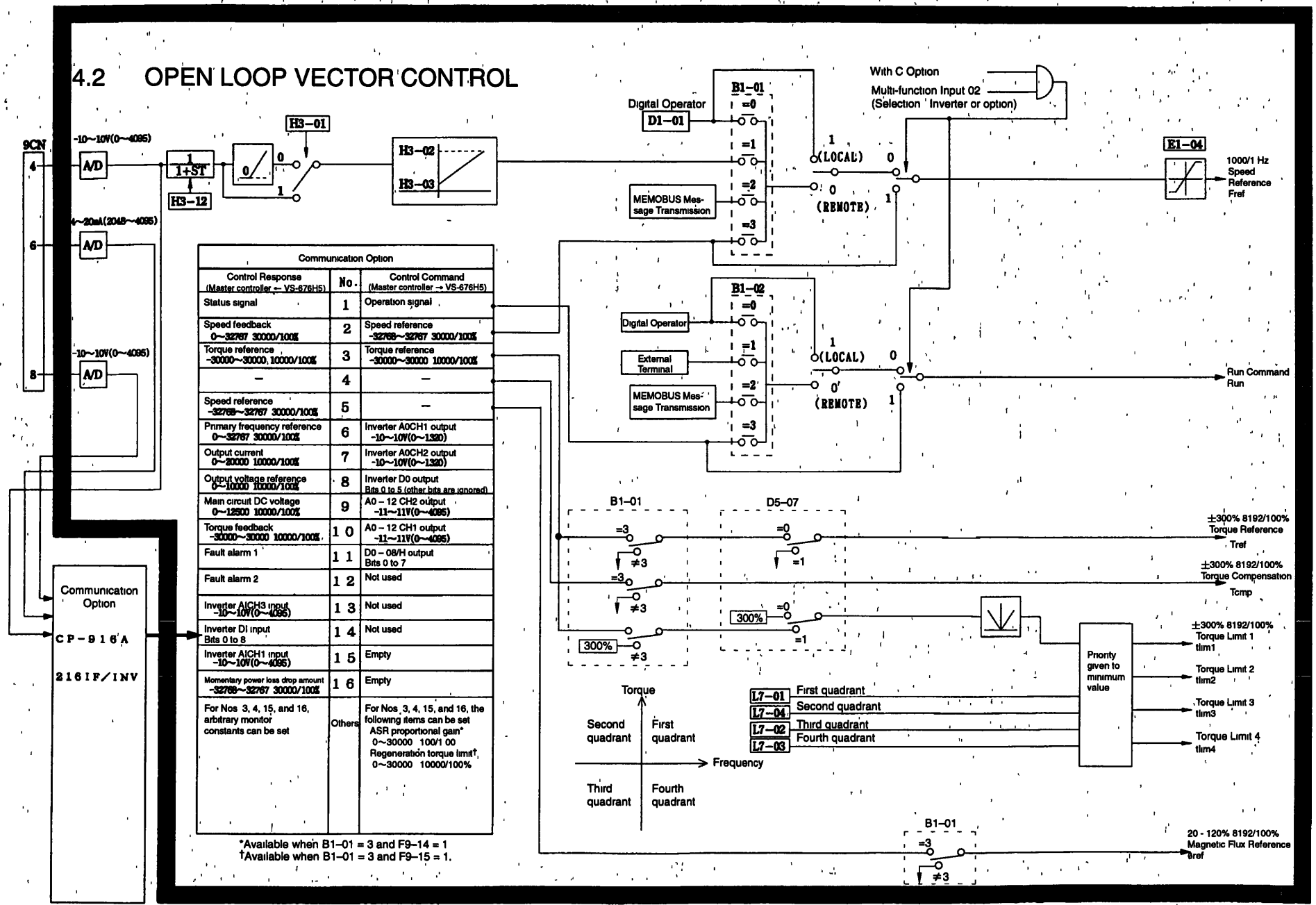
Communication Option		
Control Response (Master controller ← VS-676H5)	No.	Control Command (Master controller → VS-676H5)
Status signal	1	Operation signal
Speed feedback 0~32767 30000/100%	2	Speed reference -32768~32767 30000/100%
Torque reference -30000~30000 10000/100%	3	Torque reference -30000~30000 10000/100%
Speed detection PG counter value -32768~32767 30000/100%	4	Torque compensation -30000~30000 10000/100%
Speed reference -32768~32767 30000/100%	5	External magnetic flux reference 2000~12000 10000/100%
Primary frequency reference 0~32767 30000/100%	6	Inverter AOCH1 output -10~10V(0~1320)
Output current 0~20000 10000/100%	7	Inverter AOCH2 output -10~10V(0~1320)
Output voltage reference 0~10000 10000/100%	8	Inverter DO output Bits 0 to 5 (other bits are ignored)
Main circuit DC voltage 0~12500 10000/100%	9	AO - 12 CH1 output -11~11V(0~4095)
Torque feedback -30000~30000 10000/100%	10	AO - 12 CH2 output -11~11V(0~4095)
Fault alarm 1	11	DO - 08/H output Bits 0 to 7
Fault alarm 2	12	Not used
Inverter AICH3 input -10~10V(0~4095)	13	Not used
Inverter DI input Bits 0 to 8	14	Not used
Inverter AICH1 input -10~10V(0~4095)	15	Empty
Momentary power loss drop amount -32768~32767 30000/100%	16	Empty
For Nos 3, 4, 15, and 16, arbitrary monitor constants can be set	Others	For Nos 3, 4, 15, and 16, the following items can be set ASR proportional gain* 0~30000 100/1 00 Regeneration torque limit† 0~30000 10000/100%

*Available when B1-01 = 3 and F9-14 = 1
†Available when B1-01 = 3 and F9-15 = 1

(cont'd)


IM
PG
Current Control Type Inverter
Vector Operation Section
Output frequency U1-02
Speed detector
Slip operator
Slip frequency reference U1-35
Torque reference U1-09
Torque limit
Torque compensation
U1-34
Speed control
Torque control
Torque control selection
ASR output U1-22
Drooping amount
C5-06
B7-01
Drooping
(Integration short-circuit)
ASR
C5-01 ASRP
C5-02 ASRI
ASR input U1-21
Speed limit
Magnetic flux reference U1-36
Magnetic flux reference
External magnetic flux reference selection
E2-03 No-load current
Motor speed U1-05
SFS output U1-20
D5-03 Speed limit selection
D5-04 Speed limit value
Acceleration/deceleration time
C1-01 C1-02
Soft starter
Correction of deceleration rate
Stall prevention during deceleration
L3-04 Selection of stall prevention function
B1-05 Selection of a value lower than fmin
E1-09
BB
Zero speed
fmin limiter
U1-01
Speed Reference
External torque reference U1-33
D5-02
Forward
Reverse
Torque limit selection circuit
Torque reference
Magnetic Flux Reference
Torque Limit 1
Torque Limit 2
Torque Limit 3
Torque Limit 4

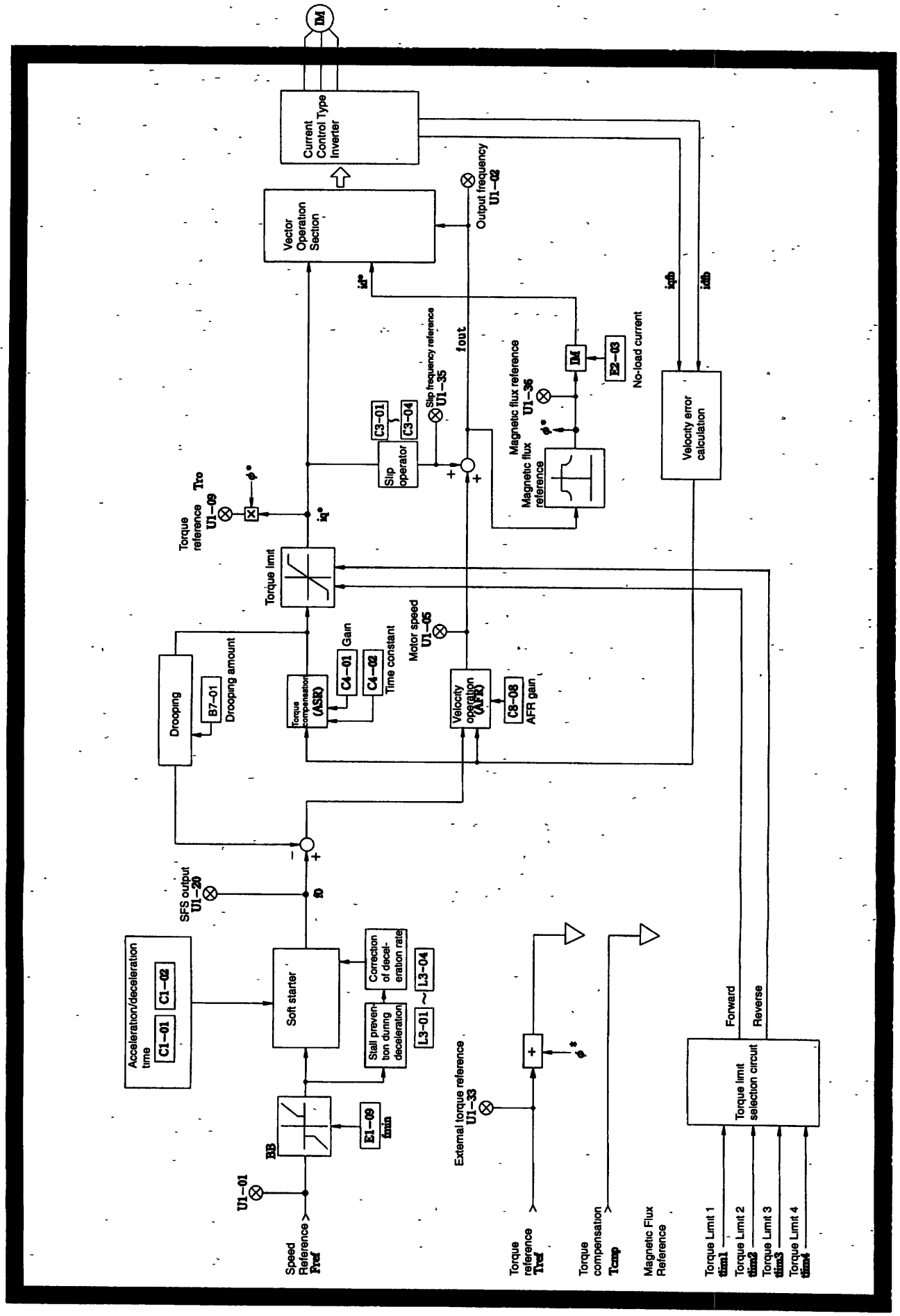
4.2 OPEN LOOP VECTOR CONTROL



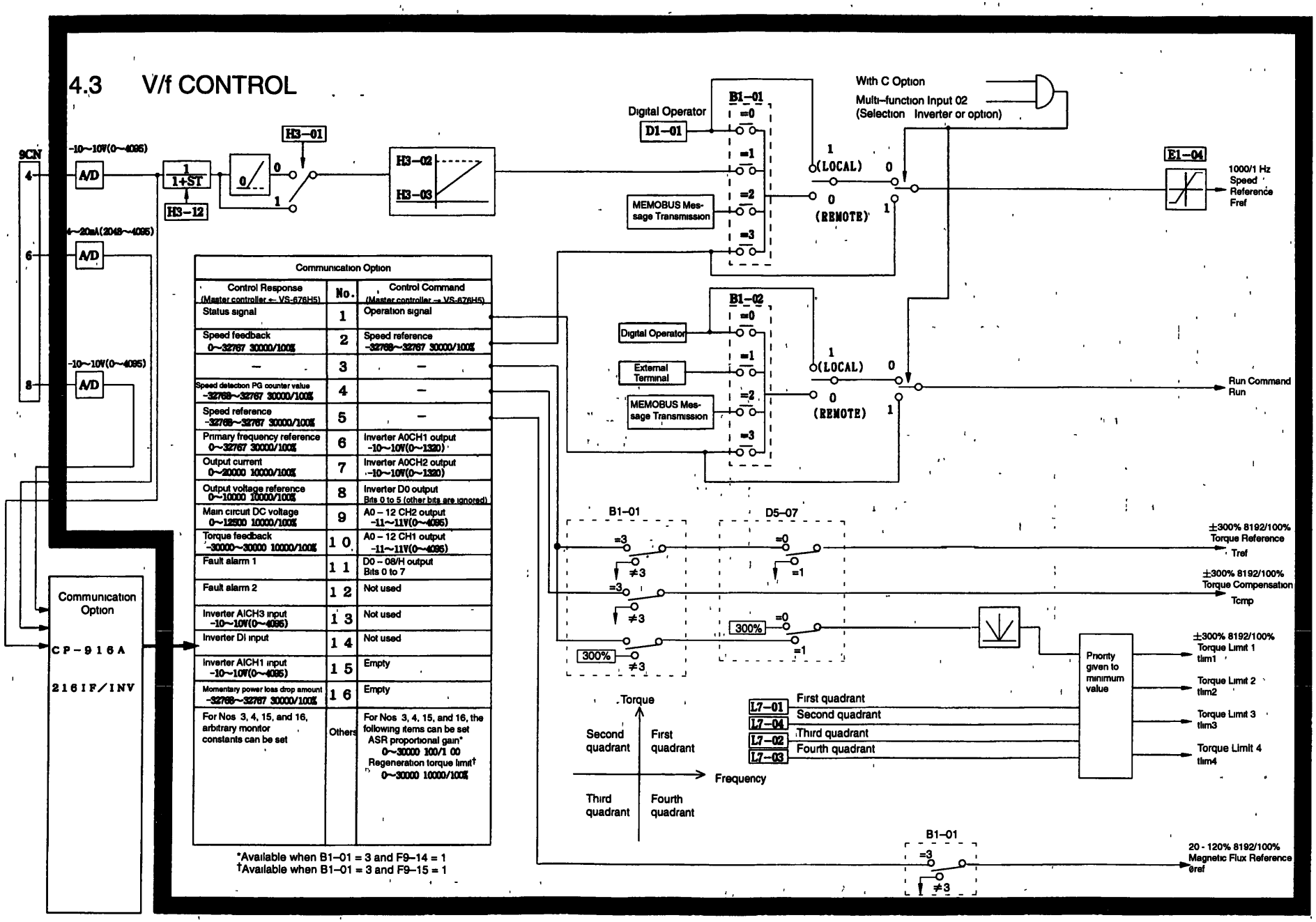
Communication Option		
Control Response (Master controller ← VS-676H5)	No.	Control Command (Master controller → VS-676H5)
Status signal	1	Operation signal
Speed feedback 0~32767 30000/100%	2	Speed reference -32768~32767 30000/100%
Torque reference -30000~30000, 10000/100%	3	Torque reference -30000~30000 10000/100%
–	4	–
Speed reference -32768~32767 30000/100%	5	–
Primary frequency reference 0~32767 30000/100%	6	Inverter A0CH1 output -10~10V(0~1320)
Output current 0~20000 10000/100%	7	Inverter A0CH2 output -10~10V(0~1320)
Output voltage reference 0~10000 10000/100%	8	Inverter D0 output Bits 0 to 5 (other bits are ignored)
Main circuit DC voltage 0~12500 10000/100%	9	A0 – 12 CH2 output -11~11V(0~4095)
Torque feedback -30000~30000 10000/100%	10	A0 – 12 CH1 output -11~11V(0~4095)
Fault alarm 1	11	D0 – 08/H output Bits 0 to 7
Fault alarm 2	12	Not used
Inverter AICH3 input -10~10V(0~4095)	13	Not used
Inverter DI input Bits 0 to 8	14	Not used
Inverter AICH1 input -10~10V(0~4095)	15	Empty
Momentary power loss drop amount -32768~32767 30000/100%	16	Empty
For Nos. 3, 4, 15, and 16, arbitrary monitor constants can be set	Others	For Nos. 3, 4, 15, and 16, the following items can be set ASR proportional gain* 0~30000 100/1 00 Regeneration torque limit† 0~30000 10000/100%

*Available when B1-01 = 3 and F9-14 = 1
†Available when B1-01 = 3 and F9-15 = 1.

(cont'd)


IM
Current Control Type Inverter
Vector Operation Section
Output frequency U1-02
iu*
iqb
idb
Slip frequency reference U1-35
fout
C3-01
C3-04
Slip operator
Magnetic flux reference U1-36
Magnetic flux reference
IM
E2-03
No-load current
Velocity error calculation
Torque reference U1-09
Tro
φ*
iq*
Torque limit
Motor speed U1-05
Drooping
B7-01
Drooping amount
Torque compensation (ASR)
C4-01
Gain
C4-02
Time constant
Velocity operation (AFR)
C3-06
AFR gain
SFS output U1-20
f0
Acceleration/deceleration time
C1-01
C1-02
Soft starter
Correction of deceleration rate
L3-04
Stall prevention during deceleration
L3-01
E1-09
fmin
B3
U1-01
Speed Reference
Fref
External torque reference U1-33
Torque reference
Tref
Torque compensation
Tcmp
Magnetic Flux Reference
Forward
Reverse
Torque limit selection circuit
Torque Limit 1
tlim1
Torque Limit 2
tlim2
Torque Limit 3
tlim3
Torque Limit 4
tlim4

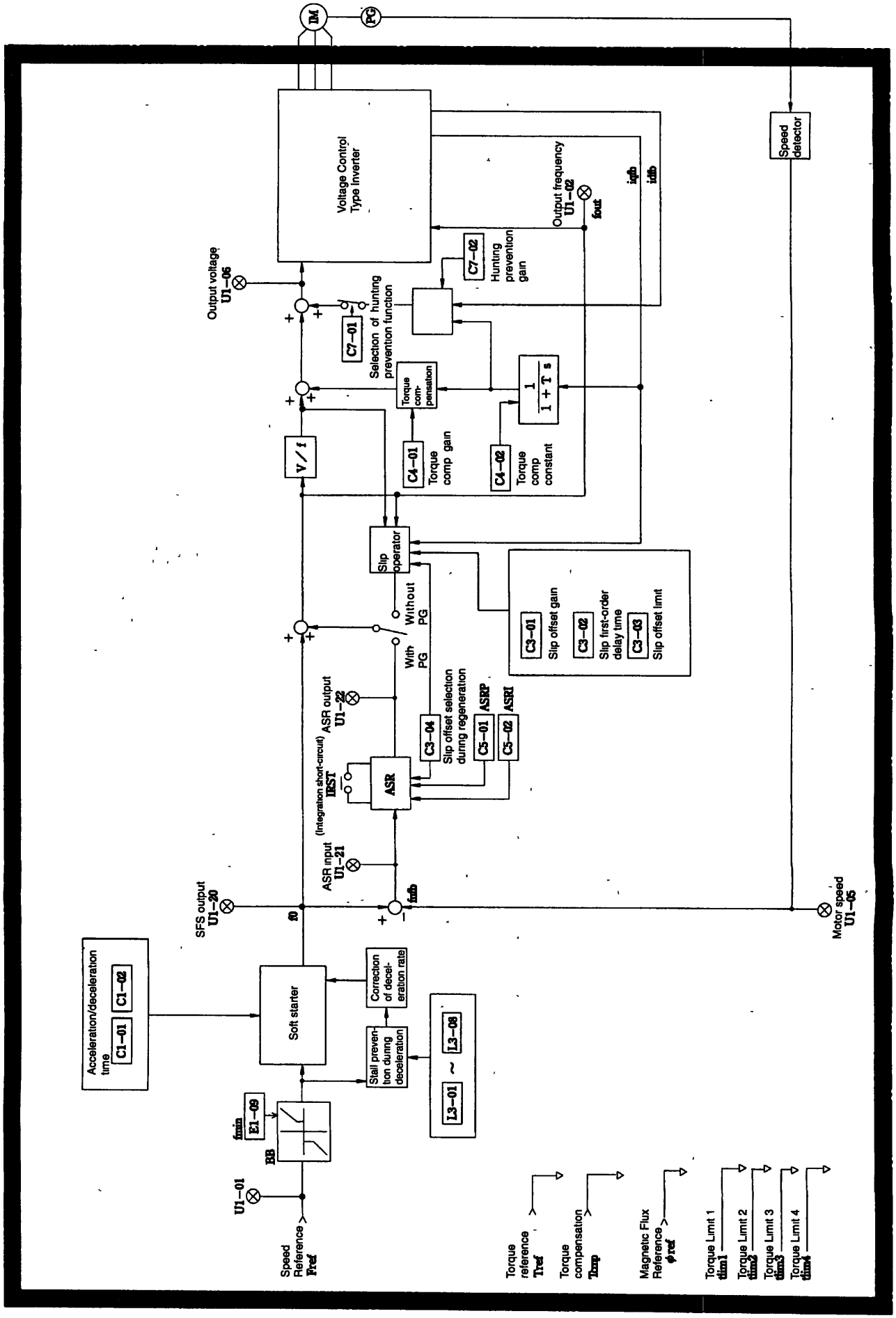
4.3 V/f CONTROL



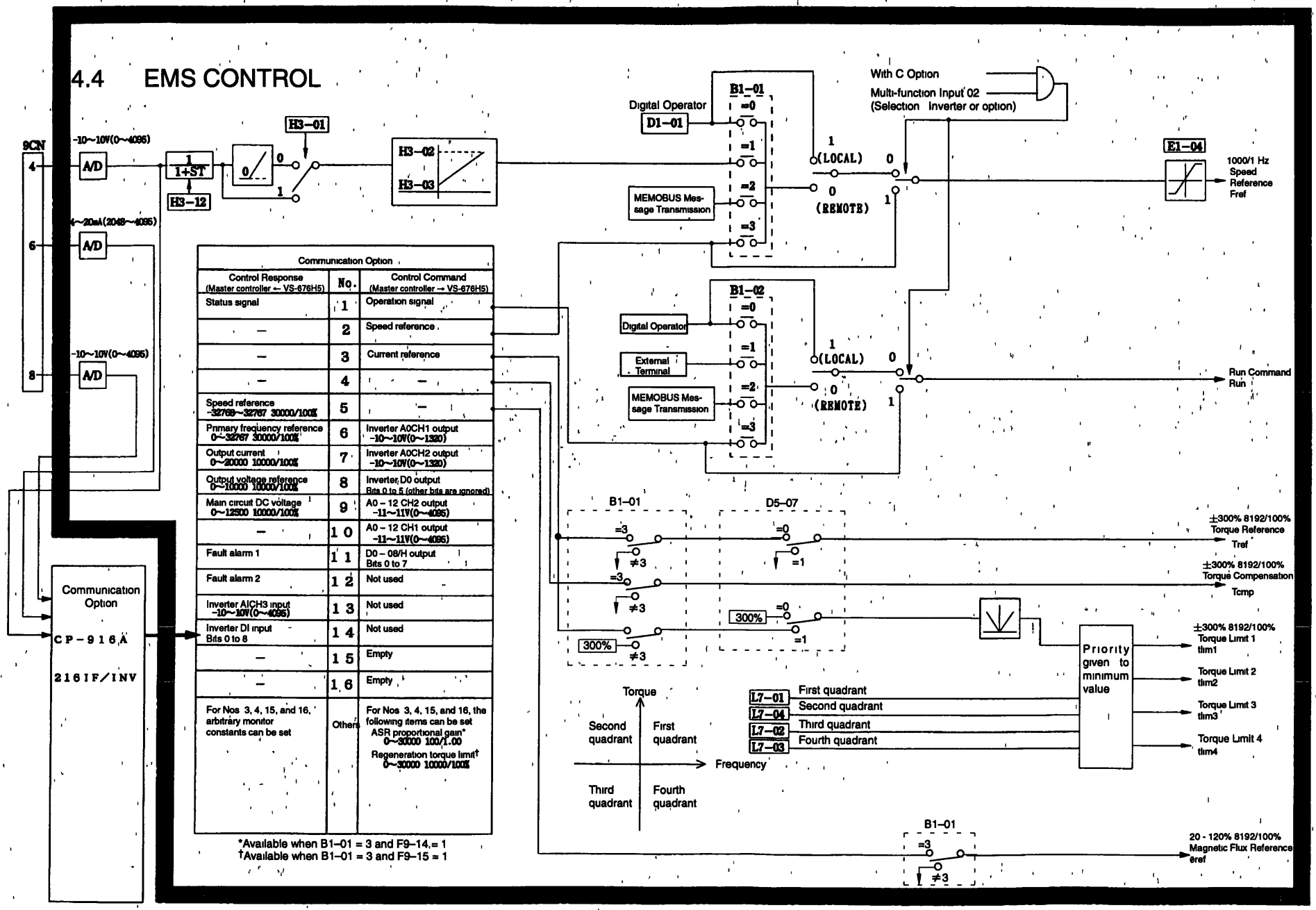
Communication Option		
Control Response (Master controller ← VS-676H5)	No.	Control Command (Master controller → VS-676H5)
Status signal	1	Operation signal
Speed feedback 0~32767 30000/100%	2	Speed reference -32768~32767 30000/100%
—	3	—
Speed detection PG counter value -32768~32767 30000/100%	4	—
Speed reference -32768~32767 30000/100%	5	—
Primary frequency reference 0~32767 30000/100%	6	Inverter A0CH1 output -10~10V(0~1320)
Output current 0~20000 10000/100%	7	Inverter A0CH2 output -10~10V(0~1320)
Output voltage reference 0~10000 10000/100%	8	Inverter D0 output Bits 0 to 5 (other bits are ignored)
Main circuit DC voltage 0~12500 10000/100%	9	A0 – 12 CH2 output -11~11V(0~4095)
Torque feedback -30000~30000 10000/100%	10	A0 – 12 CH1 output -11~11V(0~4095)
Fault alarm 1	11	D0 – 08/H output Bits 0 to 7
Fault alarm 2	12	Not used
Inverter AICH3 input -10~10V(0~4095)	13	Not used
Inverter DI input	14	Not used
Inverter AICH1 input -10~10V(0~4095)	15	Empty
Momentary power loss drop amount -32768~32767 30000/100%	16	Empty
For Nos 3, 4, 15, and 16, arbitrary monitor constants can be set	Others	For Nos 3, 4, 15, and 16, the following items can be set ASR proportional gain* 0~30000 100/1 00 Regeneration torque limit† 0~30000 10000/100%

*Available when B1-01 = 3 and F9-14 = 1
†Available when B1-01 = 3 and F9-15 = 1

(cont'd)


IM
PG
Voltage Control Type Inverter
Speed detector
Output frequency U1-02
fout
Output voltage U1-06
C7-02
Hunting prevention gain
C7-01
Selection of hunting prevention function
Torque com-pensation
1 / 1 + T s
V / f
C4-01
Torque comp gain
C4-02
Torque comp constant
Slip operator
Without PG
With PG
C3-01
Slip offset gain
C3-02
Slip first-order delay time
C3-03
Slip offset limit
C3-04
Slip offset selection during regeneration
C5-01
ASR
C5-02
ASR
ASR output U1-22
(Integration short-circuit)
RST
ASR input U1-21
SFS output U1-20
f0
fmfb
Motor speed U1-05
Acceleration/deceleration time
C1-01
C1-02
Soft starter
Correction of deceleration rate
Stall prevention during deceleration
L3-01 ~ L3-06
fmin
E1-09
BB
U1-01
Speed Reference fref
Torque reference Tref
Torque compensation Tcmp
Magnetic Flux Reference φref
Torque Limit 1 dlm1
Torque Limit 2 dlm2
Torque Limit 3 dlm3
Torque Limit 4 dlm4

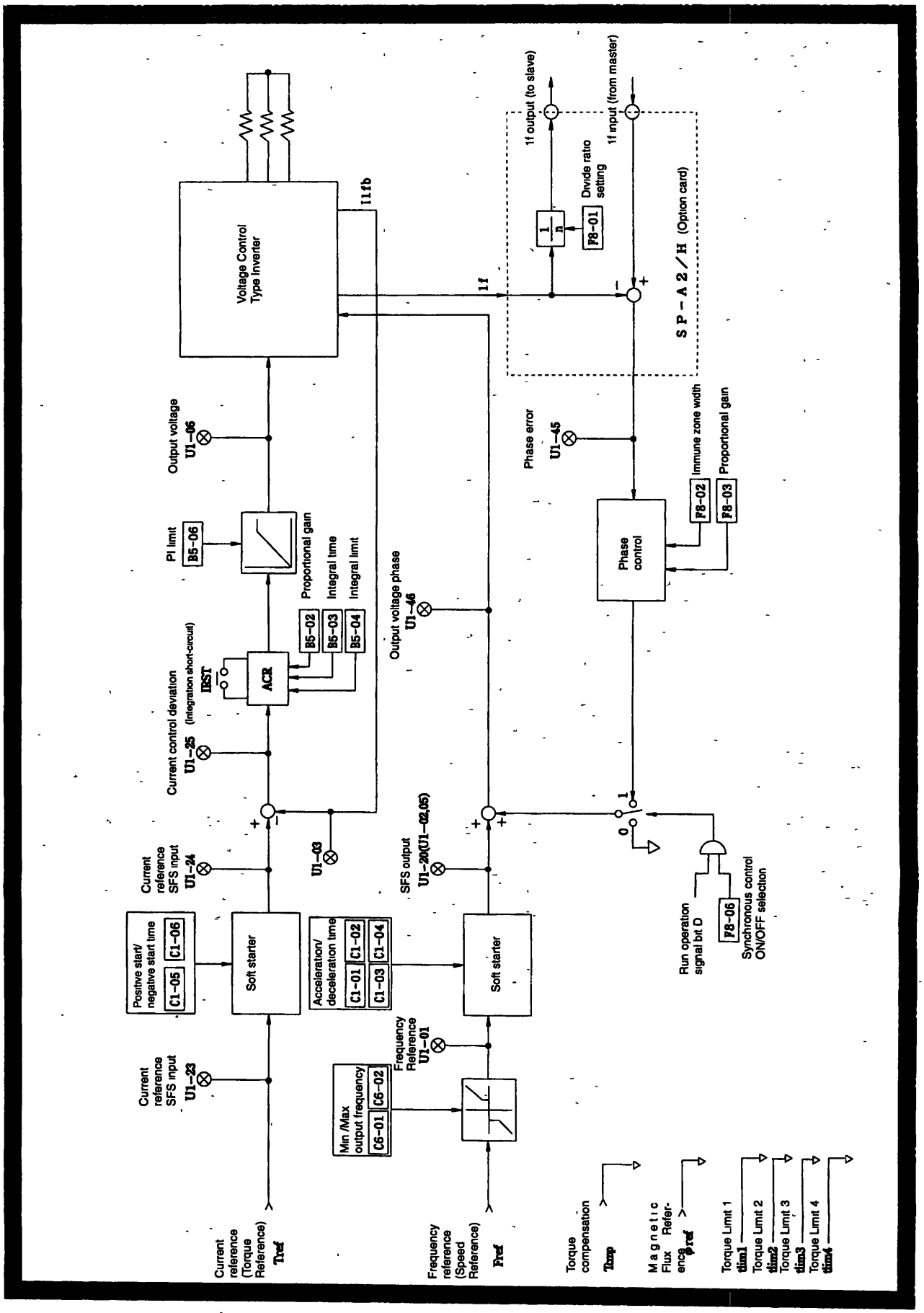
4.4 EMS CONTROL



Communication Option		
Control Response (Master controller ← VS-676H5)	No.	Control Command (Master controller → VS-676H5)
Status signal	1	Operation signal
—	2	Speed reference
—	3	Current reference
—	4	—
Speed reference -32768~32767 30000/100%	5	—
Primary frequency reference 0~32767 30000/100%	6	Inverter AOCH1 output -10~10V(0~1320)
Output current 0~20000 10000/100%	7	Inverter AOCH2 output -10~10V(0~1320)
Output voltage reference 0~10000 10000/100%	8	Inverter DO output Bits 0 to 5 (other bits are ignored)
Main circuit DC voltage 0~12800 10000/100%	9	AO – 12 CH2 output -11~11V(0~4095)
—	10	AO – 12 CH1 output -11~11V(0~4095)
Fault alarm 1	11	DO – 08/H output Bits 0 to 7
Fault alarm 2	12	Not used
Inverter AICH3 input -10~10V(0~4095)	13	Not used
Inverter DI input Bits 0 to 8	14	Not used
—	15	Empty
—	16	Empty
For Nos 3, 4, 15, and 16, arbitrary monitor constants can be set	Others	For Nos 3, 4, 15, and 16, the following items can be set ASR proportional gain* 0~30000 100/1.00 Regeneration torque limit† 0~30000 10000/100%

*Available when B1-01 = 3 and F9-14 = 1
†Available when B1-01 = 3 and F9-15 = 1

(cont'd)


Voltage Control Type Inverter
11fb
1f
1f output (to slave)
1f input (from master)
Divide ratio setting
F8-01
S P - A 2 / H (Option card)
Output voltage U1-06
PI limit B5-06
Proportional gain
Integral time
Integral limit
B5-02
B5-03
B5-04
ACR
IRST
Current control deviation (Integration short-circuit) U1-25
Output voltage phase U1-46
Phase error U1-45
Phase control
F8-02 Immune zone width
F8-03 Proportional gain
Current reference SFS input U1-24
U1-03
SFS output U1-20(U1-02,05)
Positive start/ negative start time C1-05 C1-06
Soft starter
Acceleration/ deceleration time C1-01 C1-02 C1-03 C1-04
Soft starter
Run operation signal bit D
F8-06 Synchronous control ON/OFF selection
Current reference SFS input U1-23
Min /Max output frequency C6-01 C6-02
Frequency Reference U1-01
Current reference (Torque Reference) Tref
Frequency reference (Speed Reference) fref
Torque compensation Tcmp
Magnetic Flux Reference φref
Torque Limit 1 tlim1
Torque Limit 2 tlim2
Torque Limit 3 tlim3
Torque Limit 4 tlim4

APPENDIX 5 TABLE OF COMMUNICATION DATA

Table A-5 Control Commands (Master Controller to VS-676H5)

No.	V/f Control		V/f with PG Feedback		Open Loop Vector		Flux Vector		EMS Control	
	Item	Specification	Item	Specification	Item	Specification	Item	Specification	Item	Specification
1	Operation signal		Operation signal		Operation signal		Operation signal		Operation signal	
2	Speed reference	0 to 32767 30000/100%	Speed reference	0 to 32767 30000/100%	Speed reference	−32768 to 32767 30000/100%	Speed reference	−32768 to 32767 30000/100%	Frequency reference	0 to 32767 30000/100%
3	–	–	–	–	Torque reference	−30000 to 30000 10000/100%	Torque reference	−30000 to 30000 10000/100%	Current reference	0 to 20000 10000/100%
4	–	–	–	–	–	–	Torque compensation	−30000 to 30000 10000/100%	–	–
5	–	–	–	–	–	–	External magnetic flux reference	−2000 to 12000 10000/100%	–	–
6	Inverter AO CH1 output	−10 to 10 V/0 to 1320	Inverter AO CH1 output	−10 to 10 V/0 to 1320	Inverter AO CH1 output	−10 to 10 V/0 to 1320	Inverter AO CH1 output	−10 to 10 V/0 to 1320	Inverter AO CH1 output	−10 to 10 V/0 to 1320
7	Inverter AO CH2 output	−10 to 10 V/0 to 1320	Inverter AO CH2 output	−10 to 10 V/0 to 1320	Inverter AO CH2 output	−10 to 10 V/0 to 1320	Inverter AO CH2 output	−10 to 10 V/0 to 1320	Inverter AO CH2 output	−10 to 10 V/0 to 1320
8	Inverter DO output	Bits 0 to 5 are used 0 to FFFFH (7 bits or more are disregarded)	Inverter DO output	Bits 0 to 5 are used 0 to FFFFH (7 bits or more are disregarded)	Inverter DO output	Bits 0 to 5 are used 0 to FFFFH (7 bits or more are disregarded)	Inverter DO output	Bits 0 to 5 are used 0 to FFFFH (7 bits or more are disregarded)	Inverter DO output	Bits 0 to 5 are used 0 to FFFFH (7 bits or more are disregarded)
9	AO-12 CH1 output	−11 to 11 V/0 to 4095	AO-12 CH1 output	−11 to 11 V/0 to 4095	AO-12 CH1 output	−11 to 11 V/0 to 4095	AO-12 CH1 output	−11 to 11 V/0 to 4095	AO-12 CH1 output	−11 to 11 V/0 to 4095
10	AO-12 CH2 output	−11 to 11 V/0 to 4095	AO-12 CH2 output	−11 to 11 V/0 to 4095	AO-12 CH2 output	−11 to 11 V/0 to 4095	AO-12 CH2 output	−11 to 11 V/0 to 4095	AO-12 CH2 output	−11 to 11 V/0 to 4095
11	DO-08/H output	Bits 0 to 7 are used 0 to FFH	DO-08/H output	Bits 0 to 7 are used 0 to FFH	DO-08/H output	Bits 0 to 7 are used 0 to FFH	DO-08/H output	Bits 0 to 7 are used 0 to FFH	DO-08/H output	Bits 0 to 7 are used 0 to FFH
12	Not used	–	Not used	–	Not used	–	Not used	–	Not used	–
13	Not used	–	Not used	–	Not used	–	Not used	–	Not used	–
14	Not used	–	Not used	–	Not used	–	Not used	–	Not used	–
15	Empty	–	Empty	–	Empty	–	Empty	–	Empty	–
16	Empty	–	Empty	–	Empty	–	Empty	–	Empty	–

Notes 1 Notes 1 No 1 to No 4 are accessed in a scan cycle (1 to 2 msec)

2 For Nos 3, 4, 15, and 16, data items can be changed by the setting for a parameter In addition to the parameter items indicated above, the following parameters are added

- ASR proportional gain (No 17) 0 to 30000 (100/1)
- Regeneration torque limit (No 18) 0 to 30000 (10000/100%)

3 The data of Nos 6 and 11 are disregarded at the inverter unless the communication mode is the "through mode"

4 If the same data is set in the selection permitted area and the selection not permitted area, only the high-speed data are accessed The data at the low-speed communication side are disregarded

Table A-6 Control Response (VS-676H5 to Master Controller)

No.	V/f Control		V/f with PG Feedback		Open Loop Vector		Flux Vector		EMS Control	
	Item	Specification	Item	Specification	Item	Specification	Item	Specification	Item	Specification
1	Status signal		Status signal	–	Status signal	–	Status signal	–	Status signal	–
2	–	–	Speed feedback	–	Speed feedback*1	–	Speed feedback	–	–	–
3	–	–	–	–	Torque reference	–30000 to 30000 10000/100%	Torque reference	–30000 to 30000 10000/100%	–	–
4	–	–	Speed detection PG count value	0 to 32767	–	–	Speed detection PG count value	–32768 to 32767	–	–
5	Speed reference	0 to 32767 30000/100%	Speed reference	0 to 32767 30000/100%	Speed reference	–32768 to 32767 30000/100%	Speed reference	–32768 to 32767 30000/100%	Speed reference	–32768 to 32767 30000/100%
6	Primary frequency reference	0 to 32767 30000/100%	Primary frequency reference	0 to 32767 30000/100%	Primary frequency reference	0 to 32767 30000/100%	Primary frequency reference	0 to 32767 30000/100%	Primary frequency reference	0 to 32767 30000/100%
7	Output current	0 to 20000 10000/100%	Output current	0 to 20000 10000/100%	Output current	0 to 20000 10000/100%	Output current	0 to 20000 10000/100%	Output current	0 to 20000 10000/100%
8	Output voltage reference	0 to 10000/100%	Output voltage reference	0 to 10000/100%	Output voltage reference	0 to 10000/100%	Output voltage reference	0 to 10000/100%	Output voltage reference	0 to 10000/100%
9	Main circuit DC voltage	0 to 12500 (200 V class 400 [V]) 10000/100% (400 V class: 800 [V])	Main circuit DC voltage	0 to 12500 (200 V class 400 [V]) 10000/100% (400 V class: 800 [V])	Main circuit DC voltage	0 to 12500 (200 V class. 400 [V]) 10000/100% (400 V class: 800 [V])	Main circuit DC voltage	0 to 12500 (200 V class: 400 [V]) 10000/100% (400 V class: 800 [V])	Main circuit DC voltage	0 to 12500 (200 V class: 400 [V]) 10000/100% (400 V class: 800 [V])
10	–	–	–	–	Torque feedback	–30000 to 30000 10000/100%	Torque feedback	–30000 to 30000 10000/100%	–	–30000 to 30000 10000/100%
11	Fault alarm signal 1	–	Fault alarm signal 1	–	Fault alarm signal 1	–	Fault alarm signal 1	–	Fault alarm signal 1	–
12	Fault alarm signal 2	–	Fault alarm signal 2	–	Fault alarm signal 2	–	Fault alarm signal 2	–	Fault alarm signal 2	–
13	Inverter AI CH3 input	–10V to +10V/ 0 to 4095	Inverter AI CH3 input	–10V to +10V/ 0 to 4095	Inverter AI CH3 input	–10V to +10V/ 0 to 4095	Inverter AI CH3 input	–10V to +10V/ 0 to 4095	Inverter AI CH3 input	–10V to +10V/ 0 to 4095
14	Inverter DI input	–	Inverter DI input	–	Inverter DI input	–	Inverter DI input	–	Inverter DI input	–
15	Inverter AI CH1 input	–10V to +10V/ 0 to 4095	Inverter AI CH1 input	–10V to +10V/ 0 to 4095	Inverter AI CH1 input	–10V to +10V/ 0 to 4095	Inverter AI CH1 input	–10V to +10V/ 0 to 4095	Inverter AI CH1 input	–10V to +10V/ 0 to 4095
16	Momentary power loss drop amount	–32768 to 32767 30000/100%	Momentary power loss drop amount	–32768 to 32767 30000/100%	Momentary power loss drop amount	–32768 to 32767 30000/100%	Momentary power loss drop amount	–32768 to 32767 30000/100%	Momentary power loss drop amount	–32768 to 32767 30000/100%

Notes 1 Nos 1 to 4 are output in ASR scan (1 to 2 msec)

2 For Nos 3, 4, 15, and 16, data items can be changed by the setting for a parameter
By setting the selection permitted parameter, data items can be changed. Send the data to a master controller in the internal access cycle

3 With Nos 13 to 15 (inverter input signals), the contents of the signals are sent to the master controller even when the communication mode is not the through mode

4. (*1) The assumed speed is output

Table A-7 Operation Signals (Master Controller to VS-676H5)

Bit No.	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control
0	Run/stop	Run/stop	Run/stop	Run/stop	Run/stop
1	Reverse run	Reverse run	Reverse run	Reverse run	Reverse run
2	Base block/release	Base block/release	Base block/release	Base block/release	Base block/release
3	Trace start/stop	Trace start/stop	Trace start/stop	Trace start/stop	Trace start/stop
4	External fault	External fault	External fault	External fault	External fault
5	Fault reset	Fault reset	Fault reset	Fault reset	Fault reset
6	Changing acceleration/deceleration time	Changing acceleration/deceleration time	Changing acceleration/deceleration time	Changing acceleration/deceleration time	Changing acceleration/deceleration time
7	Accel /decel prohibit (speed hold) / release	Accel /decel prohibit (speed hold) / release	Accel./decel prohibit (speed hold) / release	Accel./decel. prohibit (speed hold) / release	Accel /decel. prohibit (speed hold) / release
8	DB command	DB command	Initial excitation	Initial excitation	Not used
9	–	Integration reset (ASR)	–	Integration reset (ASR)	Integration reset (ACR)
A	–	Integration hold (ASR)	–	Integration hold (ASR)	Integration hold (ACR)
B	Soft starter cancel	Soft starter cancel	Soft starter cancel	Soft starter cancel	Soft starter cancel
C	Trace reset (after occurrence of fault)	Trace reset (after occurrence of fault)	Trace reset (after occurrence of fault)	Trace reset (after occurrence of fault)	Trace reset (after occurrence of fault)
D	Energy saving control ON/OFF	Energy saving control ON/OFF	–	Servo ON	Synchronous control ON/OFF
E	Empty	Empty	Empty	Torque/speed control selection	Not used
F	Motor selection (No. 2/No. 1)	Motor selection (No. 2/No. 1)	Motor selection (No 2/No 1)	Motor selection (No 2/No 1)	Not used

Table A-8 Status Signals (VS-676H5 to Master Controller)

Bit No.	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control
0	Run/stop	Run/stop	Run/stop	Run/stop	Run/stop
1	Zero speed	Zero speed	Zero speed	Zero speed	–
2	Reverse run	Reverse run	Reverse run	Reverse run	–
3	Reset signal input	Reset signal input	Reset signal input	Reset signal input	Reset signal input
4	Speed agree	Speed agree	Speed agree	Speed agree	Current agree/not agree
5	Inverter ready/not ready	Inverter ready/not ready	Inverter ready/not ready	Inverter ready/not ready	Inverter ready/not ready
6	Minor fault	Minor fault	Minor fault	Minor fault	Minor fault
7	Major fault	Major fault	Major fault	Major fault	Major fault
8	Command error (control data 16W)	Command error (control data 16W)	Command error (control data 16W)	Command error (control data 16W)	Command error (control data 16W)
9	Recovery from power loss/momentary power loss	Recovery from power loss/momentary power loss	Recovery from power loss/momentary power loss	Recovery from power loss/momentary power loss	Recovery from power loss/momentary power loss
A	Remote/Local	Remote/Local	Remote/Local	Remote/Local	Remote/Local
B	Regeneration/Current	Regeneration/Current	Regeneration/Current	Regeneration/Current	Regeneration/Current
C	Current (torque) limit	Current (torque) limit	Current (torque) limit	Current (torque) limit	–
D	–	Speed limited (ASR limit)	–	Speed limited (ASR limit)	Synchronous control
E	Motor selection (No 2/No 1)	Motor selection (No. 2/No. 1)	Motor selection (No 2/No 1)	Motor selection (No 2/No. 1)	–
F	–	–	–	Zero servo complete	–

Table A-9 Fault and Alarm Signals (VS-676H5 to Master Controller)

Bit No.	Signal 1		Fault Rank
	V/f, Vector	EMS	
0	Overcurrent (OC)	Overcurrent (OC)	A
1	Ground fault (GF)	Ground fault (GF)	A
2	Over voltage (OV)	Over voltage (OV)	A
3	Main circuit low voltage (UV1)	Main circuit low voltage (UV1)	B
4	Control power supply low voltage (UV2)	Control power supply low voltage (UV2)	A
5	Inrush current resistor short MC fault (UV3)	Inrush current resistor short MC fault (UV3)	A
6	Fuse blown (FU)	Fuse blown (FU)	A
7	–	–	A
8	Inverter overheat alarm (OH)	Inverter overheat alarm (OH)	B
9	Inverter overheat (OH1)	Inverter overheat (OH1)	A
A	Inverter overload (OL2)	Inverter overload (OL2)	A
B	Over torque 1 (OL3)	–	A
C	Over torque 2 (OL4)	–	A
D	Motor overload (OL1)	–	B
E	Motor overheat (OH3)*1	–	A
F	Thermistor open circuit (THM)*1	–	A
	Signal 2		
0	Braking transistor fault (RR)*1	–	A
1	Braking resistor overheat (RH)*1	–	A
2	External fault (EF1 to EF8)	External fault (EF1 to EF8)	B
3	Over speed (OS)*1	–	A
4	Speed deviation (DEV)*1	Excessive current deviation (DEV)*1	B
5	PG open circuit (PGO)*1	–	A
6	Excessive ripple in DC bus bar voltage (PF)	Excessive ripple in DC bus bar voltage (PF)	A
7	Output open-phase (LF)	Output open-phase (LF)	A
8	Load short circuit (SC)	Load short circuit (SC)	A
9	–	–	A
A	Digital operator fault (OPR)	Digital operator fault (OPR)	A
B	CP-216 transmission error (CE)	CP-216 transmission error (CE)	A
C	Hardware fault (CPF**)	Hardware fault (CPF**)	A
D	–	Synchronous control error	A
E	–	–	
F	–	–	

Note(*1) Error or fault is detected only when the corresponding hardware is installed.

APPENDIX 6 TABLE OF CONSTANTS

Table A-10 Table of Monitor Constants

Constant No.	MEMOBUS Address	Constant Name	Unit	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
U1-01	20H	Speed reference	0 01%	Q	Q	Q	Q	Q	The unit varies depending on the setting of O1–03
U1-02	21H	Output frequency	0 01 Hz	Q	Q	Q	Q	Q	
U1-03	22H	Output current	0 1 A	Q	Q	Q	Q	Q	For 7 5 kW model or smaller, minimum unit is 0 01A
U1-04	23H	Control method	–	Q	Q	Q	Q	Q	0 V/f control 1 V/f with PG feedback 2: Open loop vector 3. Flux vector 4· EMS control
U1-05	24H	Motor speed	0 01%	Q	Q	Q	Q	Q	The unit varies depending on the setting of O1-03
U1-06	25H	Output voltage	0 1 V	Q	Q	Q	Q	Q	
U1-07	26H	DC bus voltage	1 V	Q	Q	Q	Q	Q	
U1-08	27H	Output power	0 1 kW	Q	Q	Q	Q	Q	
U1-09	28H	Torque reference (internal)	0 1%	–	–	Q	Q	–	
U1-10	29H	Input terminal status	–	Q	Q	Q	Q	Q	
U1-11	2AH	Output terminal status	–	Q	Q	Q	Q	Q	
U1-12	2BH	Operation status	–	Q	Q	Q	Q	Q	
U1-13	2CH	Cumulative operation time	1H	Q	Q	Q	Q	Q	
U1-14	2DH	PROM No. (at FLASH side)	–	Q	Q	Q	Q	Q	
U1-15	2EH	Input voltage at 9CN-4 (AI-1) terminal	0 1%	B	B	B	B	B	
U1-16	2FH	Input voltage at 9CN-6 (AI-2) terminal	0.1%	B	B	B	B	B	
U1-17	30H	Input voltage at 9CN-8 (AI-3) terminal	0 1%	B	B	B	B	B	
U1-18	31H	Motor secondary current (Iq)	0 1%	B	B	B	B	–	
U1-19	32H	Motor exciting current (Id)	0 1%	–	–	B	B	–	
U1-20	33H	Soft starter output	0.01%	A	A	A	A	A	The unit varies depending on the setting of O1-03.
U1-21	34H	ASR input (speed deviation)	0 01%	–	A	–	A	–	
U1-22	35H	ASR output	0.01%	–	A	–	A	–	

Constant No.	MEMOBUS Address	Constant Name	Unit	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
U1-23	36H	Current reference soft starter input	0.01%	–	–	–	–	Q	
U1-24	37H	Current reference soft starter output	0.01%	–	–	–	–	Q	
U1-25	38H	Current control deviation	0.01%	–	–	–	–	A	
U1-26	39H	Output voltage reference (Vq)	0.1 V	–	–	A	A	–	
U1-27	3AH	Output voltage reference (Vd)	0.1 V	–	–	A	A	–	
U1-28	3BH	PROM No. (at CPU ROM side)	–	A	A	A	A	A	
U1-29	3CH	LED check (diagnosis)	–	A	A	A	A	A	
U1-30	3DH	Operation status 2	–	Q	Q	Q	Q	Q	
U1-31	3EH	Master controller command 1	–	Q	Q	Q	Q	Q	
U1-32	3FH	Master controller command 2	–	Q	Q	Q	Q	Q	
U1-33	40H	External torque reference	0.01%	–	–	A	A	–	
U1-34	41H	Torque compensation	0.01%	–	–	–	A	–	
U1-35	42H	Slip frequency reference	0.01%	–	–	A	A	–	
U1-36	43H	Magnetic flux reference	0.01%	A	A	A	A	–	
U1-37	44H	DO-08/H output status	–	Q	Q	Q	Q	Q	
U1-38	45H	Momentary power loss drop amount	0.01%	B	B	B	B	–	The unit varies depending on the setting of Q1-03
U1-39	46H	Motor temperature	1°C	B	B	B	B	–	Valid when thermistor provided is selected
U1-40	47H	Speed detection PG counter value	Pulse	–	A	–	A	–	
U1-41	48H	Acceleration torque monitor (observer)	0.1%	–	–	–	A	–	
U1-42	49H	Acceleration torque reference (observer)	0.1%	–	–	–	A	–	
U1-43	4AH	Torque observer control PI output	0.1%	–	–	–	A	–	
U1-44	4BH	Torque observer control output	0.1%	–	–	–	A	–	
U1-45	4CH	Synchronous phase difference	0.1 deg	–	–	–	–	A	
U1-46	4DH	Output voltage phase	0.1 deg	–	–	–	–	A	
U1-47	4EH	Zero-servo move pulse	Pulse	–	–	–	A	–	
U1-48	4FH	ACRq output	0.1%	–	–	A	A	–	
U1-49	50H	ACRd output	0.1%	–	–	A	A	–	
U1-50	51H	Not used	–	–	–	–	–	–	

Constant No.	MEMOBUS Address	Constant Name	Unit	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
U2-01	70H	Current fault	–	Q	Q	Q	Q	Q	
U2-02	71H	Last fault	–	Q	Q	Q	Q	Q	
U2-03	72H	Speed reference (U1-01) at fault	0 01%	Q	Q	Q	Q	Q	The unit varies depending on the setting of O1-03
U2-04	73H	Output frequency (U1-02) at fault	0 01 Hz	Q	Q	Q	Q	Q	
U2-05	74H	Inverter output current (U1-03) at fault	0 1 A	Q	Q	Q	Q	Q	For 7 5 kW model or smaller, minimum unit is 0 01A
U2-06	75H	Motor speed (U1-05) at fault	0 01%	Q	Q	Q	Q	Q	The unit varies depending on the setting of O1-03
U2-07	76H	Output voltage reference (U1-06) at fault	0 1 V	Q	Q	Q	Q	Q	
U2-08	77H	DC bus voltage (U1-07) at fault	1 V	Q	Q	Q	Q	Q	
U2-09	78H	Output power (U1-08) at fault	0 1 kW	Q	Q	Q	Q	Q	
U2-10	79H	Torque reference (U1-09) at fault	0 1%	–	–	Q	Q	–	
U2-11	7AH	Input terminal status (U1-10) at fault	–	Q	Q	Q	Q	Q	
U2-12	7BH	Output terminal status (U1-11) at fault	–	Q	Q	Q	Q	Q	
U2-13	7CH	Operation status (U1-12) at fault	–	Q	Q	Q	Q	Q	
U2-14	7DH	Cumulative operation time (U1-13) at fault	1H	Q	Q	Q	Q	Q	
U2-15	7EH	Speed controller (ASR) output (U1-22) at fault	0 01%	–	A	–	A	–	
U2-16	7FH	Current control deviation (U1-25) at fault	0.01%	–	–	–	–	A	
U2-17	80H	Operation status 2 (U1-30) at fault	–	Q	Q	Q	Q	Q	
U2-18	81H	Master controller command 1 (U1-31) at fault	–	Q	Q	Q	Q	Q	
U2-19	82H	Master controller command 2 (U1-32) at fault	–	Q	Q	Q	Q	Q	
U2-20	83H	External torque reference (U1-33) at fault	0 01%	–	–	A	A	–	
U2-21	84H	Torque compensation (U1-34) at fault	0.01%	–	–	–	A	–	
U2-22	85H	Magnetic flux reference (U1-36) at fault	0 01%	A	A	A	A	–	

Constant No.	MEMOBUS Address	Constant Name	Unit	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
U2-23	86H	Observer control output (U1-44) at fault	0.1%	–	–	–	A	–	
U2-24	87H	Output voltage phase (U1-46) at fault	0.1 deg	–	–	–	–	A	
U3-01	90H	Most recent fault	–	Q	Q	Q	Q	Q	
U3-02	91H	Second most recent fault	–	Q	Q	Q	Q	Q	
U3-03	92H	Third most recent fault	–	Q	Q	Q	Q	Q	
U3-04	93H	Fourth/oldest fault	–	Q	Q	Q	Q	Q	
U3-05	94H	Cumulative operation time at fault	1H	Q	Q	Q	Q	Q	
U3-06	95H	Accumulated operation time of second fault	1H	Q	Q	Q	Q	Q	
U3-07	96H	Accumulated operation time of third fault	1H	Q	Q	Q	Q	Q	
U3-08	97H	Accumulated operation time of fourth/oldest fault	1H	Q	Q	Q	Q	Q	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
A1-00	100H	Not used	–	–	–	–	–	–	–	–	
A1-01	101H	Access level	2	0 to 9999	○	Q	Q	Q	Q	Q	0. For monitoring 2 Quick-start (Q) 3 Basic (B) 4 Advanced (A)
A1-02	102H	Control method selection	3	0 to 4		Q	Q	Q	Q	Q	0 V/f control 1 V/f with PG feedback 2 Open loop vector 3 Flux vector 4 EMS control
A1-03	103H	Initialize	0000	0000 to 9999		Q	Q	Q	Q	Q	0000, 1110, 3330 Setting permitted, no processing 2220 Constants initialization
A1-04	104H	Password 1 (for inputting)	0	0000 to 9999		Q	Q	Q	Q	Q	
A1-05	105H	Password 2 (for setting)	0	0000 to 9999		–	–	–	–	–	
A2-01 to 32	106H to 125H	Not used	–	–	–	–	–	–	–	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
B1-01	180H	Reference selection	3	0 to 3		Q	Q	Q	Q	Q	0 Digital operator 1. Control circuit terminal 2. Transmission 3. Option
B1-02	181H	Operation method selection	3	0 to 3		Q	Q	Q	Q	Q	0· Digital operator 1· Control circuit terminal 2: Transmission 3 Option
B1-03	182H	Stopping method selection (for stop command)	0	0 to 3		Q	Q	Q	Q	Q	0. Deceleration to stop 1. Coast to stop 2: DC injection braking to stop 3. Timer controlled coast to stop Note· For flux vector control, selection is possible only from 0 and 1.
B1-04	183H	Reverse run prohibition selection	0	0/1		B	B	B	B	–	0. Reverse run enabled 1· Reverse run prohibited
B1-05	184H	Operation selection at a speed lower than the minimum r/min (E1-09)	0	0 to 3		–	–	–	A	–	0. Normal operation 1: Stop 2. Run at E1-09 3· Zero-speed run
B1-06	185H	Read sequence input twice	1	0/1		A	A	A	A	A	0 1 ms - 2 scans 1· 5 ms - 2 scans
B2-01	186H	Zero-speed level (DC injection braking starting speed)	0 50	0 00 to 10 00%		B	B	B	B	–	The unit varies depending on the setting of O1-03
B2-02	187H	DC injection braking current	50	0 to 100%		B	B	B	–	–	
B2-03	188H	Initial excitation (DC injection braking) time at start	0 00	0 00 to 10 00 sec		B	B	B	B	–	
B2-04	189H	DC injection braking time at stop	0 00	0 00 to 10 00 sec		B	B	B	B	–	
B2-05	18AH	Not used	–	–	–	–	–	–	–	–	
B2-06	18BH	Not used	–	–	–	–	–	–	–	–	
B2-07	18CH	Not used	–	–	–	–	–	–	–	–	
B3-01	18DH	Speed search selection at start	1	0/1		A	A	A	A	–	For V/f control and open loop vector control, initial value is 0 0· Disabled 1 Enabled
B3-02	18EH	Speed search operating current at start	150	0 to 200%		A	–	–	–	–	
B3-03	18FH	Speed search deceleration time	2 0	0 0 to 10 0 sec		A	–	–	–	–	
B3-04	190H	Not used	–	–	–	–	–	–	–	–	
B4-01	191H	Not used	–	–	–	–	–	–	–	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
B4-02	192H	Not used	–	–	–	–	–	–	–	–	
B5-01	193H	Not used	–	–	–	–	–	–	–	–	
B5-02	194H	EMS current control proportional gain	0.10	0.00 to 10.00	○	–	–	–	–	A	
B5-03	195H	EMS current control integral time	0.10	0.00 to 360.00 sec	○	–	–	–	–	A	
B5-04	196H	EMS current control integral limit	115.0	0.0 to 200.0%	○	–	–	–	–	A	
B5-05	197H	Not used	–	–	–	–	–	–	–	–	
B5-06	198H	PI limit	115.0	0.0 to 200.0%	○	–	–	–	–	A	
B5-07	199H	Not used	–	–	–	–	–	–	–	–	
B5-08	19AH	Not used	–	–	–	–	–	–	–	–	
B6-01	19BH	Not used	–	–	–	–	–	–	–	–	
B6-02	19CH	Not used	–	–	–	–	–	–	–	–	
B6-03	19DH	Not used	–	–	–	–	–	—	–	–	
B6-04	19EH	Not used	–	–	–	–	–	–	–	–	
B7-01	19FH	Droop amount	0.0	0.0 to 100.0%	○	–	–	A	A	–	
B7-02	1A0H	Not used	–	–	–	–	–	–	–	–	
B8-01	1A1H	Not used	–	–	–	–	–	–	–	–	
B8-02	1A2H	Not used	–	–	–	–	–	–	–	–	
B9-01	1A3H	Zero-servo gain	5	0 to 100	○	–	–	–	A	–	
B9-02	1A4H	Zero-servo completion width	10	0 to 16383 pulse		–	–	–	A	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
C1-01	200H	Acceleration time 1	10 0	0 0 to 6000.0 sec (C1-10=1) 0 00 to 600 00 sec (C1-10=0)	○	Q	Q	Q	Q	Q	
C1-02	201H	Deceleration time 1	10.0		○	Q	Q	Q	Q	Q	
C1-03	202H	Acceleration time 2	10 0		○	B	B	B	B	B	
C1-04	203H	Deceleration time 2	10 0		○	B	B	B	B	B	
C1-05	204H	Current reference positive start time (EMS)	10 0			–	–	–	–	Q	
C1-06	205H	Current reference negative start time (EMS)	10 0			–	–	–	–	Q	
C1-07	206H	Not used	–		–	–	–	–	–	–	
C1-08	207H	Not used	–		–	–	–	–	–	–	
C1-09	208H	Emergency stop time	10 0			B	B	B	B	–	
C1-10	209H	Accel./decel time setting unit	1	0/1		A	A	A	A	A	0 0 01 sec 1 0 1 sec
C1-11	20AH	Not used	–	–	–	–	–	–	–	–	
C2-01	20BH	Not used	–	–	–	–	–	–	–	–	
C2-02	20CH	Not used	–	–	–	–	–	–	–	–	
C2-03	20DH	Not used	–	–	–	–	–	–	–	–	
C2-04	20EH	Not used	–	–	–	–	–	–	–	–	
C3-01	20FH	Slip compensation gain	0 0	0 0 to 2 5	○	A	–	A	A	–	For open loop vector control, initial value is 1 0
C3-02	210H	Slip compensation primary delay time	200	0 to 10000 msec		A	–	A	–	–	For V/f control, initial value is 2000
C3-03	211H	Slip compensation limit	200	0 to 250%		A	–	A	–	–	
C3-04	212H	Slip compensation selection during regeneration	0	0/1		A	A	A	–	–	0 Disabled 1 Enabled
C4-01	213H	Torque compensation gain	1 00	0 00 to 2 50	○	B	B	B	–	–	
C4-02	214H	Torque compensation time constant	20	0 to 10000 msec		A	A	A	–	–	For V/f control, initial value is 200
C5-01	215H	ASR proportional (P) gain 1	20 00	0 00 to 300 00	○	–	B	–	B	–	For V/f with PG feedback, initial value is 0 20 For flux vector control, lower limit is 1 00
C5-02	216H	ASR integral (I) time 1	0 500	0.000 to 10 000 sec	○	–	B	–	B	–	For V/f with PG feedback, initial value is 0 200
C5-03	217H	ASR proportional (P) gain 2	20 00	0 00 to 300 00	○	–	B	–	B	–	For V/f with PG feedback, initial value is 0 02 For flux vector control, lower limit is 1 00

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
C5-04	218H	ASR integral (I) time 2	0 500	0 000 to 10.000 sec	○	–	B	–	B	–	For V/f with PG feedback, initial value is 0 050
C5-05	219H	ASR limit	5.0	0.0 to 20 0%		–	A	–	–	–	
C5-06	21AH	ASR primary delay time	0 000	0 000 to 0 500 sec	○	–	–	–	A	–	
C5-07	21BH	ASR switching speed	0 00	0 00 to 100 00%		–	–	–	A	–	The unit varies depending on the setting of O1-03.
C6-01	21CH	Carrier frequency upper limit	2 0	0 4 to 15.0 kHz		A	A	A	A	A	For vector control, lower limit is 2 0 Upper limit changes depending on the inverter capacity (Refer to para 4 5)
C6-02	21DH	Carrier frequency lower limit	2 0	0 4 to 15.0 kHz		A	A	–	–	–	For vector control, lower limit is 2 0 Upper limit changes depending on the inverter capacity (Refer to para 4 5)
C6-03	21EH	Carrier frequency proportional gain	00	00 to 99		A	A	–	–	–	
C7-01	21FH	Hunting prevention selection	1	0/1		A	A	–	–	–	0 Disabled 1. Enabled
C7-02	220H	Hunting prevention gain	1.00	0 00 to 2.50		A	A	–	–	–	
C7-03	221H	Not used	–	–	–	–	–	–	–	–	
C7-04	222H	Not used	–	–	–	–	–	–	–	–	
C8-01	223H	Not used	–	–	–	–	–	–	–	–	
C8-02	224H	Not used	–	–	–	–	–	–	–	–	
C8-03	225H	Not used	–	–	–	–	–	–	–	–	
C8-04	226H	Not used	–	–	–	–	–	–	–	–	
C8-05	227H	Not used	–	–	–	–	–	–	–	–	
C8-06	228H	Not used	–	–	–	–	–	–	–	–	
C8-07	229H	Not used	–	–	–	–	–	–	–	—	
C8-08	22AH	AFR gain	2.00	0 00 to 10.00		–	–	A	–	–	
C8-09	22BH	Not used	–	–	–	–	–	–	–	–	
C8-10	22CH	Not used	–	–	–	–	–	–	–	–	
C8-11	22DH	Not used	–	–	–	–	–	–	–	–	
C8-12	22EH	Not used	–	–	–	–	–	–	–	–	
C8-13	22FH	Not used	–	–	–	–	–	–	–	–	
C8-14	230H	Not used	–	–	–	–	–	–	–	–	
C8-15	231H	Not used	–	–	–	–	–	–	–	–	
C8-16	232H	Not used	–	–	–	–	–	–	–	–	
C8-17	233H	Not used	–	–	–	–	–	–	–	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
C8-18	234H	Not used	–	–	–	–	–	–	–	–	
C8-19	235H	Not used	–	–	–	–	–	–	–	–	
C8-20	236H	Test (simulation) mode	0	0 to 3		A	A	A	A	A	0 Normal operation 1 Simulation mode 2 Base test mode (only when individual control power supplies are used) 3 V/f test mode
C8-21	237H	Not used	–	–	–	–	–	–	–	–	
C8-22	238H	Not used	–	–	–	–	–	–	–	–	
C8-23	239H	Not used	–	–	–	–	–	–	–	–	
C8-24	23AH	Not used	–	–	–	–	–	–	–	–	
C8-25	23BH	Not used	–	–	–	–	–	–	–	–	
C8-26	23CH	Not used	–	–	–	–	–	–	–	–	
C8-27	23DH	Not used	–	–	–	–	–	–	–	–	
C8-28	23EH	Not used	–	–	–	–	–	–	–	–	
C8-29	23FH	Not used	–	–	–	–	–	–	–	–	
C8-30	240H	Not used	–	–	–	–	–	–	–	–	
C8-31	241H	Not used	–	–	–	–	–	–	–	–	
C8-32	242H	Not used	–	–	–	–	–	–	–	–	
C8-33	243H	Not used	–	–	–	–	–	–	–	–	
C8-34	244H	Not used	–	–	–	–	–	–	–	–	
C8-35	245H	Not used	–	–	–	–	–	–	–	–	
C9-01	246H	Rated speed adjustment	1.0000	0.5000 to 1.3000		B	B	B	B	–	
C9-02	247H	Energy-saving control selection	0	0/1		A	A	–	–	–	0 Normal mode 1. Energy-saving mode
C9-03	248H	Energy-saving control coefficient K2	0.00	0.00 to 655.00		A	A	–	–	–	
C9-04	249H	Energy-saving voltage upper limit (60 Hz)	120	0 to 120%		A	A	–	–	–	
C9-05	24AH	Energy-saving voltage upper limit (6 Hz)	16	0 to 25%		A	A	–	–	–	
C9-06	24BH	Energy-saving voltage lower limit (60 Hz)	50	0 to 120%		A	A	–	–	–	
C9-07	24CH	Energy-saving voltage lower limit (6 Hz)	12	0 to 25%		A	A	–	–	–	
C9-08	24DH	Power average time	1.00	0.01 to 5.00 sec		A	A	–	–	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
C9-09	24EH	Probing operation voltage limit	0	0 to 100%		A	A	–	–	–	
C9-10	24FH	Probing operation voltage step (at Vout 100%)	0 5	0 1 to 10 0%		A	A	–	–	–	
C9-11	250H	Probing operation voltage step (at Vout 5%)	0 2	0 1 to 10 0%		A	A	–	–	–	
C9-12	251H	Power detection filter time constant	0 140	0 000 to 2 000 sec		A	A	–	–	–	
C9-13	252H	Power detection filter switching width	10	1 to 100%		A	A	–	–	–	
C9-14	253H	Torque observer selection	0	0/1		–	–	–	A	–	0 Control OFF 1 Control ON
C9-15	254H	Speed/torque control switching	0	0/1		–	–	–	A	–	0 Speed control 1. Torque control Valid only when C9-14=1
C9-16	255H	Droop control selection	0	0/1		–	–	–	A	–	0 Speed control 1 Droop speed control Valid only when C9-14=1
C9-17	256H	Motor mechanical time constant	0.000	0 000 to 5 000 sec		–	–	–	A	–	
C9-18	257H	Torque observer proportional gain	0.000	0 000 to 2 000	○	–	–	–	A	–	
C9-19	258H	Torque observer integral time	0.000	0 000 to 0 500 sec	○	–	–	–	A	–	
C9-20	259H	Torque observer secondary filter time constant 1	0 000	0 000 to 1 000 sec	○	–	–	–	A	–	
C9-21	25AH	Torque observer secondary filter time constant 2	0 000	0 000 to 5 000 sec	○	–	–	–	A	–	
C9-22	25BH	Torque observer output leading time	0 000	0 000 to 0 050 sec	○	–	–	–	A	–	
C9-23	25CH	Filter time constant for torque observer acceleration torque monitor	0 000	0 000 to 0 500 sec		–	–	–	A	–	
C9-24	25DH	Torque observer control integral hold	0.00	0 00 to 100 00%		–	–	–	A	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
D1-01	280H	Speed reference	0 00	0 00 to 100.00%	○	Q	Q	Q	Q	Q	The unit varies depending on the setting of O1-03.
D1-02	281H	Current reference (EMS)	0 0	0 0 to 100.0%	○	–	–	–	–	Q	
D1-03	282H	Not used	–	–	–	–	–	–	–	–	
D1-04	283H	Not used	–	–	–	–	–	–	–	–	
D1-05	284H	Not used	–	–	–	–	–	–	–	–	
D1-06	285H	Not used	–	–	–	–	–	–	–	–	
D1-07	286H	Not used	–	–	–	–	–	–	–	–	
D1-08	287H	Not used	–	–	–	–	–	–	–	–	
D1-09	288H	Jog speed reference	10 00	0 00 to 100 00%	○	Q	Q	Q	Q	–	The unit varies depending on the setting of O1-03
D2-01	289H	Not used	–	–	–	–	–	–	–	–	
D2-02	28AH	Not used	–	–	–	–	–	–	–	–	
D3-01	28BH	Not used	–	–	–	–	–	–	–	–	
D3-02	28CH	Not used	–	–	–	–	–	–	–	–	
D3-03	28DH	Not used	–	–	–	–	–	–	–	–	
D3-04	28EH	Not used	–	–	–	–	–	–	–	–	
D4-01	28FH	Not used	–	–	–	–	–	–	–	–	
D4-02	290H	Not used	–	–	–	–	–	–	–	–	
D5-01	291H	Not used	–	–	–	–	–	–	–	–	
D5-02	292H	Torque reference delay time	0	0 to 1000 msec		–	–	–	A	–	
D5-03	293H	Speed limit selection	1	1/2		–	–	–	A	–	1 Speed reference 2 D5-04
D5-04	294H	Speed limit	0	–120 to 120%		–	–	–	A	–	
D5-05	295H	Speed limit bias	5	0 to 120%		–	–	–	A	–	
D5-06	296H	Speed/torque control switching timer	50	0 to 1000 msec		–	–	–	A	–	
D5-07	297H	Torque reference function selection	0	0/1		–	–	A	A	–	0 Torque reference 1 Torque limit
D6-01	298H	External magnetic flux reference selection	0	0/1		–	–	–	A	–	0 Magnetic flux reference input from master controller is invalid 1 Magnetic flux reference input from master controller is valid

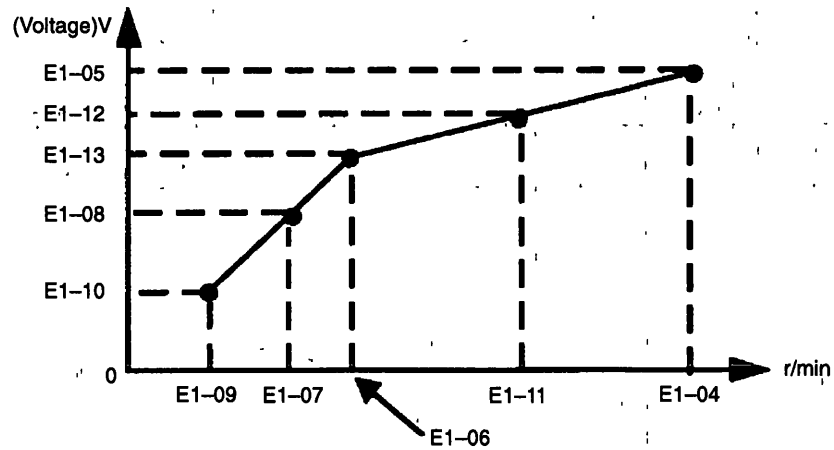
Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
E1-01	300H	Input voltage setting	200	180 to 230 V		Q	Q	Q	Q	Q	For 400 V class, the value to be set is twice as that of 200 V class
E1-02	301H	Motor selection (V/f or vector)	2	0 to 2		Q	Q	Q	Q	–	0 General-purpose motor 1 V/f control motor 2 Vector control motor
E1-03	302H	V/f pattern selection	0F	00 to 0F		Q	Q	–	–	–	00 - 0E Preset V/f pattern (15 kinds) 0F Custom V/f pattern In vector control mode, fixed to 0F
E1-04	303H	Rated r/min	1750	0 to 24000 r/min		Q	Q	Q	Q	–	The unit varies depending on the setting of O1-04 With V/f control and V/f with PG feedback, initial value is 1800
E1-05	304H	Rated voltage	180 0	0 0 to 255 0 V		Q	Q	Q	Q	–	For 400 V class, the value to be set is twice as that of 200 V class.
E1-06	305H	Base r/min	1750	0 to 24000 r/min		Q	Q	Q	Q	–	The unit varies depending on the setting of O1-04. With V/f control and V/f with PG feedback, initial value is 1800
E1-07	306H	Middle r/min	90	0 to 24000 r/min		Q	Q	A	–	–	The unit varies depending on the setting of O1-04
E1-08	307H	Middle voltage	0 0	0 0 to 255 0 V		Q	Q	A	–	–	Initial values 11 0 Open loop vector 15 0 . V/f control, 0 4 to 1 5 kW 14 0 . V/f control, 2 2 to 45 kW 12 0 . V/f control, 55 kW or more For 400 V class, the value to be set is twice as that of 200 V class
E1-09	308H	Minimum r/min	100	0 to 24000 r/min		Q	Q	Q	B	–	Initial values 15 . Open loop vector 45 . . V/f control The unit varies depending on the setting of O1-04.
E1-10	309H	Minimum voltage	0.0	0.0 to 255.0 V		Q	Q	A	–	–	Initial values. 2 0 . . Open loop vector 9 0 V/f control, 0 4 to 1 5 kW 7 0 . . V/f control, 2 2 to 45 kW 6 0 V/f control, 55 kW or more For 400 V class, the value to be set is twice as that of 200 V class
E1-11	30AH	Middle r/min 2	0	0 to 24000 r/min		B	B	B	B	–	The unit varies depending on the setting of O1-04
E1-12	30BH	Middle voltage 2	0 0	0.0 to 255 0 V		B	B	B	B	–	For 400 V class, the value to be set is twice as that of 200 V class.

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
E1-13	30CH	Base voltage	180 0	0.0 to 255 0 V		Q	Q	Q	Q	–	With V/f control and V/f with PG feedback, initial value is 0 0. For 400 V class, the value to be set is twice as that of 200 V class
E2-00	30DH	Motor rated output (not used)	*	00 to FF		Q	Q	Q	Q	–	Same setting as the inverter output
E2-01	30EH	Motor rated current	*	0 01 to 2000.0 A**		Q	Q	Q	Q	Q	*. Initial values vary depending on the kVA setting and motor selection **. For 7 5 kW model or smaller, minimum unit is 0 01A
E2-02	30FH	Motor rated slip	*	0.00 to 20 00 Hz	○	A	A	Q	Q	–	
E2-03	310H	Motor no-load current	*	0.01 to 1500 0 A**	○	A	A	Q	Q	–	
E2-04	311H	Number of motor poles	4	2 to 48		Q	Q	Q	Q	–	
E2-05	312H	Motor line-to-line resistance	*	0 000 to 65 000 ohm	○	A	A	A	A	–	
E2-06	313H	Motor leak inductance	*	0 0 to 30 0%	○	–	–	A	A	–	
E2-07	314H	Motor iron-core saturation coefficient 1	0 50	0 00 to 1 00	○	–	–	A	A	–	
E2-08	315H	Motor iron-core saturation coefficient 2	0 75	0.00 to 1 00	○	–	–	A	A	–	
E2-09	316H	Motor mechanical loss	0 0	0 0 to 10 0%	○	–	–	–	A	–	
E2-10	317H	Motor overheat temperature	120	50 to 200°C		Q	Q	Q	Q	–	
E2-11	318H	Motor feeder resistance	1 0	0 0 to 10 0%	○	A	A	A	A	–	
E3-01	319H	Motor 2 control method selection	2	0 to 3		A	A	A	A	–	0 V/f control 1: V/f with PG feedback 2: Open loop vector 3: Flux vector
E3-02	31AH	Motor 2 rated output (not used)	*	00 to FF		A	A	A	A	–	Same setting as the inverter capacity
E3-03	31BH	Motor 2 PG constant	600	0 to 10000		–	A	–	A	–	
E4-01	31CH	Motor 2 rated r/min	1750	0 to 24000 r/min		A	A	A	A	–	The unit varies depending on the setting of O1-04 With V/f control and V/f with PG feedback, initial value is 1800
E4-02	31DH	Motor 2 rated voltage	180.0	0.0 to 255 0 V		A	A	A	A	–	For 400 V class, the value to be set is twice as that of 200 V class.
E4-03	31EH	Motor 2 base r/min	1750	0 to 24000 r/min		A	A	A	A	–	The unit varies depending on the setting of O1-04 With V/f control and V/f with PG feedback, initial value is 1800
E4-04	31FH	Motor 2 mid. r/min	90	0 to 24000 r/min		A	A	A	–	–	The unit varies depending on the setting of O1-04.

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
E4-05	320H	Motor 2 mid. voltage	0.0	0 0 to 255 0 V		A	A	A	–	–	Initial values 11 0 Open loop vector 15 0 V/f control, 0 4 to 1 5 kW 14 0 V/f control, 2 2 to 45 kW 12 0 V/f control, 55 kW or more For 400 V class, the value to be set is twice as that of 200 V class.
E4-06	321H	Motor 2 minimum r/min	100	0 to 24000 r/min		A	A	A	A	–	Initial values. 15 . . Open loop vector 45 V/f control The unit varies depending on the setting of O1-04
E4-07	322H	Motor 2 minimum voltage	0 0	0.0 to 255.0 V		A	A	A	–	–	Initial values 2 0 Open loop vector 9 0 V/f control, 0 4 to 1 5 kW 7 0 V/f control, 2 2 to 45 kW 6 0 V/f control, 55 kW or more For 400 V class, the value to be set is twice as that of 200 V class
E4-08	323H	Motor 2 input voltage selection	200	180 to 230 V		A	A	A	A	–	For 400 V class, the value to be set is twice as that of 200 V class
E4-09	324H	Motor 2 motor selection (V/f or vector)	0	0 to 2		A	A	A	A	–	0 General-purpose motor 1 V/f control motor 2 Vector control motor
E4-10	325H	Motor 2 rated current	0F	00 to 0F		A	A	–	–	–	00 - 0E Preset V/f pattern (15 kinds) 0F. Custom V/f pattern In vector control mode, fixed to 0F
E4-11	326H	Motor 2 rated slip	0	0 to 24000 r/min		A	A	A	A	–	The unit varies depending on the setting of O1-04
E4-12	327H	Motor 2 no-load current	0.0	0 0 to 255 0 V		A	A	A	A	–	For 400 V class, the value to be set is twice as that of 200 V class
E4-13	328H	Motor 2 base voltage	180 0	0.0 to 255.0 V		A	A	A	A	–	With V/f control and V/f with PG feedback, initial value is 0 0 For 400 V class, the value to be set is twice as that of 200 V class
E5-01	329H	Motor 2 rated current	*	0.00 to 2000.0 A**		A	A	A	A	–	*, Initial values vary depending on the kVA setting and motor selection. ** For 7 5 kW model or smaller, minimum unit is 0 01A
E5-02	32AH	Motor 2 rated slip	*	0 00 to 20 00 Hz	○	A	A	A	A	–	
E5-03	32BH	Motor2 no-load current	*	0 00 to 1500.0 A**	○	A	A	A	A	–	
E5-04	32CH	Motor 2 number of poles	4	2 to 48		A	A	A	A	–	
E5-05	32DH	Motor 2 line-to-line resistance	*	0.000 to 65.000 ohm	○	A	A	A	A	–	
E5-06	32EH	Motor 2 leak inductance	*	0 0 to 30.0%	○	–	–	A	A	–	
E5-07	32FH	Motor 2 iron-core saturation coefficient 1	0 50	0 00 to 1 00	○	–	–	A	A	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
E5-08	330H	Motor 2 iron-core saturation coefficient 2	0.75	0.00 to 1.00	○	–	–	A	A	–	
E5-09	331H	Motor 2 mechanical loss	0.0	0.0 to 10.0%	○	–	–	–	A	–	
E5-10	332H	Motor 2 overheat temperature	120	50 to 200°C		A	A	A	A	–	
E5-11	333H	Motor 2 feeder resistance	1.0	0.0 to 10.0%	○	A	A	A	A	–	
E6-01	334H	Maximum output frequency (EMS)	60.0	0.0 to 400.0 Hz		–	–	–	–	Q	
E6-02	335H	Minimum output frequency (EMS)	1.5	0.0 to 400.0 Hz		–	–	–	–	Q	

[V/f Pattern Setting]



Set r/min to be E1–09 ≦ E1–07 < E1–06 ≦ E1–11 ≦ E1–04

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
F1-01	380H	PG constant	600	0 to 10000		–	Q	–	Q	–	
F1-02	381H	Operation selection at PG open circuit	1	0 to 3		–	B	–	B	–	For flux vector control, selection is possible only from 1 and 3 0: Ramp to stop 1 Coast to stop 2 Emergency stop 3 Operation continue
F1-03	382H	Operation selection at overspeed detection	1	0 to 3		–	B	–	B	–	0 Ramp to stop 1 Coast to stop 2: Emergency stop 3: Operation continue
F1-04	383H	Operation selection at excessive speed deviation detection	3	0 to 3		–	B	–	B	–	0 Ramp to stop 1: Coast to stop 2 Emergency stop 3 Operation continue
F1-05	384H	PG rotation	0	0/1		–	B	–	B	–	0 Forward direction 1 Reverse direction
F1-06	385H	PG division rate (PG pulse monitor output)	1	1 to 132		–	B	–	B	–	Valid only for PG-B2/H
F1-07	386H	Integral value during accel/decel enable/disable	0	0/1		–	B	–	–	–	0 Disabled 1 Enabled
F1-08	387H	Overspeed detection level	115	0 to 120%		–	A	–	A	–	
F1-09	388H	Overspeed detection delay time	0 0	0 0 to 2 0 sec		–	A	–	A	–	For V/f with PG feedback, initial value is 1 0
F1-10	389H	Excessive speed deviation detection level	10	0 to 50%		–	A	–	A	–	
F1-11	38AH	Excessive speed deviation detection delay time	0 5	0 0 to 10 0 sec		–	A	–	A	–	
F1-12	38BH	Number of PG gear teeth 1	0	0 to 1000		–	A	–	–	–	
F1-13	38CH	Number of PG gear teeth 2	0	0 to 1000		–	A	–	–	–	
F2-01	38DH	Not used	–	–	–	–	–	–	–	–	
F3-01	38EH	Not used	–	–	–	–	–	–	–	–	
F4-01	38FH	AO-12/H channel 1 monitor selection	0	0 to 50	○	B	B	B	B	B	0 Through mode
F4-02	390H	AO-12/H channel 1 gain	1 00	–300.00 to 300 00	○	B	B	B	B	B	Digital operator setting range –99 99 ~ +99 99
F4-03	391H	AO-12/H channel 2 monitor selection	0	0 to 50	○	B	B	B	B	B	0 Through mode
F4-04	392H	AO-12/H channel 2 gain	1 00	–300 00 to 300 00	○	B	B	B	B	B	Digital operator setting range –99.99 ~ +99 99
F4-05	393H	AO-12/H channel 1 bias	0	–32768 to 32767	○	B	B	B	B	B	30000/10V

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
F4-06	394H	AO-12/H channel 2 bias	0	–32768 to 32767	○	B	B	B	B	B	30000/10V
F5-01	395H	Not used	–	–	–	–	–	–	–	–	
F5-02	396H	Not used	–	–	–	–	–	–	–	–	
F6-01	397H	DO-08/H output mode selection	2	0 to 2		B	B	B	B	B	0: Individual outputs at 8 channels 1. Code output 2 General-purpose individual outputs
F7-01	398H	Not used	–	–		–	–	–	–	–	
F8-01	399H	Division rate setting (EMS)	1	1 to 10			–	–	–	A	
F8-02	39AH	Not used	–	–	–	–	–	–	–	–	
F8-03	39BH	Not used	–	–	–	–	–	–	–	–	
F8-04	39CH	Not used	–	–	–	–	–	–	–	–	
F8-05	39DH	Not used	–	–	–	–	–	–	–	–	
F8-06	39EH	Synchronous control ON/OFF selection (EMS)	0	0/1		–	–	–	–	A	0: OFF 1. ON
F9-01	39FH	External fault bit selection	0	0/1		A	A	A	A	A	0 Fault at "1" 1 Fault at "0"
F9-02	3A0H	External fault detection mode	0	0/1		A	A	A	A	A	0 Detected always 1. Detected during run
F9-03	3A1H	Operation selection at external fault detection	1	0 to 3		A	A	A	A	A	0 Ramp to stop 1 Emergency stop 2 Coast to stop 3 Operation continue
F9-04	3A2H	Operation selection at bus error	1	0 to 3		A	A	A	A	A	0: Ramp to stop 1 Emergency stop 2: Coast to stop 3 Operation continue
F9-05	3A3H	Control data item selection, at high-speed side 1	3	1 to 18		A	A	A	A	A	Third control data
F9-06	3A4H	Control data item selection, at high-speed side 2	4	1 to 18		A	A	A	A	A	Fourth control data
F9-07	3A5H	Control data item selection, at low-speed side 1	15	1 to 18		A	A	A	A	A	15th control data
F9-08	3A6H	Control data item selection, at low-speed side 2	16	1 to 18		A	A	A	A	A	16th control data
F9-09	3A7H	Monitor data item selection, at high-speed side 1	9	1 to 50		A	A	A	A	A	Third monitor data
F9-10	3A8H	Monitor data item selection, at high-speed side 2	40	1 to 50		A	A	A	A	A	Fourth monitor data
F9-11	3A9H	Monitor data item selection, at low-speed side 1	15	1 to 50		A	A	A	A	A	15th monitor data

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
F9-12	3AAH	Monitor data item selection, at low-speed side 2	38	1 to 50		A	A	A	A	A	16th monitor data
F9-13	3ABH	Trace sampling cycle	0	0 to 60000 scan		A	A	A	A	A	0 Every scan
F9-14	3ACH	Transmission ASR proportional gain selection	0	0/1		–	A	–	A	–	0 The gain set by the constant is used 1 The gain sent from the master controller is used
F9-15	3ADH	Transmission regeneration side torque limit selection	0	0/1		–	–	A	A	–	0 The regeneration side torque limit set by the constant is used 1 The regeneration side torque limit sent from the master controller is used
F9-16	3AEH	Not used	–	–	–	–	–	–	–	–	
F9-17	3AFH	Not used	–	–	–	–	–	–	–	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
H1-01	400H	Multi-function input (terminal 9CN-19)	0F	00 to FF		B	B	B	B	B	0F: Through mode
H1-02	401H	Multi-function input (terminal 9CN-20)	0F	00 to FF		B	B	B	B	B	0F: Through mode
H1-03	402H	Multi-function input (terminal 9CN-21)	0F	00 to FF		B	B	B	B	B	0F. Through mode
H1-04	403H	Multi-function input (terminal 9CN-22)	0F	00 to FF		B	B	B	B	B	0F: Through mode
H1-05	404H	Multi-function input (terminal 9CN-23)	0F	00 to FF		B	B	B	B	B	0F Through mode
H1-06	405H	Multi-function input (terminal 9CN-24)	0F	00 to FF		B	B	B	B	B	0F. Through mode
H2-01	406H	Multi-function output (terminal TB2-4, 5)	0F	00 to FF		B	B	B	B	B	0F: Through mode
H2-02	407H	Multi-function output (terminal 10CN-10)	0F	00 to FF		B	B	B	B	B	0F Through mode
H2-03	408H	Multi-function output (terminal 10CN-12)	0F	00 to FF		B	B	B	B	B	0F. Through mode
H2-04	409H	Multi-function output (terminal 10CN-14)	0F	00 to FF		B	B	B	B	B	0F. Through mode
H2-05	40AH	Multi-function output (terminal 10CN-16)	0F	00 to FF		B	B	B	B	B	0F Through mode
H2-06	40BH	Multi-function output (terminal TB2-1, 2, 3)	0E	00 to FF		B	B	B	B	B	0E Error
H3-01	40CH	Signal level selection (terminal 9CN-4)	0	0/1		B	B	B	B	B	0 0 to 10 V 1 −10 V to +10V
H3-02	40DH	Gain (terminal 9CN-4)	100 0	0 0 to 1000 0%	○	B	B	B	B	B	
H3-03	40EH	Bias (terminal 9CN-4)	0 0	−100 0 to 100 0%	○	B	B	B	B	B	
H3-04	40FH	Signal level selection (terminal 9CN-8)	0	0/1		B	B	B	B	B	0 0 to 10 V 1. −10 V to.+10V
H3-05	410H	Not used	–	–	–	–	–	–	–	–	
H3-06	411H	Gain (terminal 9CN-8)	100 0	0 0 to 1000 0%	○	B	B	B	B	B	
H3-07	412H	Bias (terminal 9CN-8)	0 0	−100 0 to 100 0%	○	B	B	B	B	B	
H3-08	413H	Signal level selection (terminal 9CN-6)	2	0 to 2		A	A	A	A	A	0: 0 to 10 V 1. −10 V to +10V 2 4 to 20 mA
H3-09	414H	Not used	–	–	–	–	–	–	–	–	
H3-10	415H	Gain (terminal 9CN-6)	100 0	0 0 to 1000 0%	○	A	A	A	A	A	
H3-11	416H	Bias (terminal 9CN-6)	0 0	−100 0 to 100 0%	○	A	A	A	A	A	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
H3-12	417H	Analog input filter time constant	0 00	0 00 to 2 00 sec		A	A	A	A	A	
H4-01	418H	Multi-function AO (terminal 10CN-2)	0	0 to 50	○	B	B	B	B	B	0. Through mode
H4-02	419H	Gain (terminal 10CN-2)	1.00	-300 00 to 300 00	○	B	B	B	B	B	Digital operator setting range -99 99 ~ +99 99
H4-03	41AH	Bias (terminal 10CN-2)	0	-32768 to 32767	○	B	B	B	B	B	30000/10V
H4-04	41BH	Multi-function AO (terminal 10CN-4)	0	0 to 50	○	B	B	B	B	B	0 Through mode
H4-05	41CH	Gain (terminal 10CN-4)	1.00	-300 00 to 300 00	○	B	B	B	B	B	Digital operator setting range -99 99 ~ +99 99
H4-06	41DH	Bias (terminal 10CN-4)	0	-32768 to 32767	○	B	B	B	B	B	30000/10V
H4-07	41EH	Analog output signal polarity selection	1	0/1		B	B	B	B	B	Also used for signal characteristics of AO-12/H 0: Unsigned 1. Signed
H5-01	41FH	Not used	–	–	–	–	–	–	–	–	
H5-02	420H	Not used	–	–	–	–	–	–	–	–	
H5-03	421H	Not used	–	–	–	–	–	–	–	–	
H5-04	422H	Not used	–	–	–	–	–	–	–	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
L1-01	480H	Not used	–	–	–	–	–	–	–	–	
L1-02	481H	Motor OL operation time	60.0	1 0 to 300 0 sec		B	B	B	B	B	
L1-03	482H	Motor OL detection start current	110	50 to 200%		B	B	B	B	B	
L1-04	483H	Operation selection at motor overload	1	0 to 3		B	B	B	B	B	0. Ramp to stop at C1–02 setting time 1· Output stops (coast to stop) (major fault) 2. Ramp to stop at C1–09 setting time (major fault) 3 Operation continue (minor fault)
L2-01	484H	Momentary power loss detection	0	0/1		B	B	B	B	–	0· None 1· Operation continue
L2-02	485H	Momentary power loss ridethru time	1 0	0 0 to 2 0 sec		B	B	B	B	–	
L2-03	486H	Minimum base block time	*	0 0 to 5.0 sec	○	B	B	B	B	–	Varies depending on inverter capacity
L2-04	487H	Voltage recovery time	0 100	0 010 to 2.000 sec	○	A	A	A	A	–	For flux vector control; initial value is 0 300
L2-05	488H	Undervoltage detection level	190	150 to 210 V	○	A	A	A	A	A	For 400 V class, the value to be set is twice as that of 200 V class
L2-06	489H	Not used	–	–	–	–	–	–	–	–	
L2-07	48AH	Acceleration time at recovery from momentary power loss	10 00	0 00 to 600 00 sec	○	A	A	A	A	–	
L3-01	48BH	Stall prevention selection during acceleration	1	0 to 2		B	B	B	–	–	0· Disabled 1 Enabled 2 Optimum acceleration
L3-02	48CH	Stall prevention level during acceleration	150	0 to 200%		B	B	B	–	–	
L3-03	48DH	Stall prevention limit during acceleration	100	0 to 100%		A	A	A	–	–	For V/f control and V/f with PG feedback, initial value is 50.
L3-04	48EH	Stall prevention selection during acceleration	1	0 to 2		B	B	B	B	–	0 Disabled 1· Enabled 2· Optimum deceleration (selection is not allowed for vector control)
L3-05	48FH	Stall prevention selection during running	1	0 to 2		B	B	–	–	–	0. Disabled 1. Enabled (deceleration time· C1-02) 2 Enabled (deceleration time· C1-04)
L3-06	490H	Stall prevention level during running	160	30 to 200%		B	B	–	–	–	
L3-07	491H	Not used	–	–	–	–	–	–	–	–	
L3-08	492H	Not used	–	–	–	–	–	–	–	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
L4-01	493H	Desired speed agree detection level	0 00	0 00 to 100 00%		B	B	B	B	B	The unit varies depending on the setting of O1-03 EMS Desired current detection level should be set Minimum setting unit is fixed at 0 01%
L4-02	494H	Speed detection width	2.00	0 00 to 100 00%		B	B	B	B	B	The unit varies depending on the setting of O1-03 For V/f control and V/f with PG feedback, initial value is 1 20 Hz EMS Current detection width should be set Minimum setting unit is fixed at 0 01%
L4-03	495H	Not used	–	–	–	–	–	–	–	–	
L4-04	496H	Not used	–	–	–	–	–	–	–	–	
L4-05	497H	Not used	–	–	–	–	–	–	–	–	
L5-01	498H	Number of auto restart attempts	0	0 to 10		B	B	B	B	–	
L5-02	499H	Auto restart operation selection	0	0/1		B	B	B	B	–	0 No fault retry 1 Fault retry active
L5-03	49AH	Not used									
L6-01	49BH	Torque detection selection	0	0 to 4		B	B	B	B	–	0 Disabled 1 Detects during constant-speed run (operation continue) 2 Detects during run (operation continue) 3 Detects during constant-speed run (operation stopped) 4 Detects during running (operation stopped)
L6-02	49CH	Torque detection level	150	0 to 300%		B	B	B	B	–	
L6-03	49DH	Torque detection time	0.1	0 0 to 10 0 sec		B	B	B	B	–	
L6-04	49EH	Torque detection selection 2	0	0 to 4		A	A	A	A	–	0 Disabled 1 Detects during constant-speed run (operation continue) 2 Detects during run (operation continue) 3: Detects during constant-speed run (operation stopped) 4 Detects during running (operation stopped)
L6-05	49FH	Torque detection level 2	150	0 to 300%		A	A	A	A	–	
L6-06	4A0H	Torque detection time 2	0.1	0.0 to 10.0 sec		A	A	A	A	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
L7-01	4A1H	Forward torque limit	160	0 to 300%		–	–	B	B	–	
L7-02	4A2H	Reverse torque limit	160	0 to 300%		–	–	B	B	–	
L7-03	4A3H	Forward regenerative torque limit	160	0 to 300%		–	–	B	B	–	
L7-04	4A4H	Reverse regenerative torque limit	160	0 to 300%		–	–	B	B	–	
L7-05	4A5H	Not used	–	–	–	–	–	–	–	–	
L7-06	4A6H	Not used	–	–	–	–	–	–	–	–	
L8-01	4A7H	Braking circuit protection selection	2	0 to 2		B	B	B	B	–	0 Braking transistor provided, braking resistor not provided 1 Braking transistor provided, braking resistor not provided 2. Braking transistor not provided
L8-02	4A8H	Inverter overheat pre-alarm level	100	50 to 110 deg		A	A	A	A	A	
L8-03	4A9H	Operation selection after inverter overheat pre-alarm	3	0 to 3		A	A	A	A	A	0 Ramp to stop 1 Emergency stop 2 Coast to stop 3. Operation continue
L8-04	4AAH	Not used	–	–	–	–	–	–	–	–	
L8-05	4ABH	Input open-phase protection selection	0	0/1		A	A	A	A	A	0. Input open-phase protection not provided 1 Input open-phase protection provided
L8-06	4ACH	Not used	–	–	–	–	–	–	–	–	
L8-07	4ADH	Output open-phase protection selection	1	0/1		A	A	A	A	A	0 Output open-phase protection not provided 1 Output open-phase protection provided
L8-08	4AEH	Not used	–	–	–	–	–	–	–	–	
L8-09	4AFH	Not used	–	–	–	–	–	–	–	–	
L8-10	4B0H	Not used	–	–	–	–	–	–	–	–	
L8-11	4B1H	Not used	–	–	–	–	–	–	–	–	
L8-12	4B2H	Not used	–	–	–	–	–	–	–	–	
L8-13	4B3H	Not used	–	–	–	–	–	–	–	–	
L9-01	4B4H	Thermistor provided/not provided selection	1	0/1		B	B	B	B	–	For V/f control and V/f with PG feedback, initial value is 0 0 Not provided 1. Provided
L9-02	4B5H	Operation selection at thermistor open circuit	3	0 to 3		B	B	B	B	–	

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remarks
L9-03	4B6H	Operation selection at motor overheat (OH3)	1	0 to 3		B	B	B	B	–	
L9-04	4B7H	Motor 2 thermistor provided/not provided selection	1	0/1		A	A	A	A	–	For V/f control and V/f with PG feedback, initial value is 0.

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remark
O1-01	500H	Monitor selection	6	4 to 50	○	B	B	B	B	B	
O1-02	501H	Monitor selection after power up	1	1 to 4	○	B	B	B	B	B	1. Speed reference 2. Motor speed (equivalent to U1-05) 3 Output current 4. Monitor items set by O1-01
O1-03	502H	Setting/display unit of speed reference/monitor	1	0 to 39999		B	B	B	B	–	For V/f control and V/f with PG feedback, initial value is 0. EMS Fixed to 0
O1-04	503H	Setting unit of V/f patterns	1	0/1		B	B	B	B	–	0 Hz 1. r/min
O1-05	504H	Not used	–	–	–	–	–	–	–	–	
O2-01	505H	LOCAL/REMOTE key enable/disable	1	0/1		B	B	B	B	B	0: Disabled 1 Enabled
O2-02	506H	STOP key enable/disable during remote operation	0	0/1		B	B	B	B	B	0 Disabled 1· Enabled
O2-03	507H	Not used	–	–	–	–	–	–	–	–	
O2-04	508H	kVA selection	*	00 to FF		B	B	B	B	B	Depends on inverter capacity
O2-05	509H	Speed reference setting method selection	0	0/1		A	A	A	A	A	0· ENTER key operation is necessary 1 ENTER key operation is not necessary
O2-06	50AH	Digital operator disconnection detection enable/disable selection	0	0/1		A	A	A	A	A	0 Operation continues even when digital operator is disconnected 1. Inverter fault when digital operator is disconnected
O2-07	50BH	Cumulative operation time setting	–	0 to 65535H		A	A	A	A	A	
O2-08	50CH	Cumulative operation time selection	0	0/1		A	A	A	A	A	0 Power ON time 1· Running time

Constant No.	MEMOBUS Address	Constant Name	Initial Value	Setting Range	Change during Operation	V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS Control	Remark
T1-01	F0H	Motor selection	1*	1/2		–	–	B	B	–	1. No 1 motor 2 No 2 motor
T1-02	F1H	Tuning mode	0*	0 to 4		–	–	B	B	–	0 Normal operation mode 1 Tuning by inputting nameplate value (digital operator) 2. Tuning by inputting motor constant (digital operator) 3 Tuning by inputting nameplate value (master controller) 4 Tuning by inputting motor constant (master controller)
T2-01	F2H	Motor base voltage	E1-13† (E4-13)‡	0 0 to 255 0 V		–	–	B	B	–	Motor nameplate value should be input
T2-02	F3H	Motor rated current	E2-01† (E5-01)‡	0 00 to 2000 0 A		–	–	B	B	–	Motor nameplate value should be input Input the base side value For 7 5 kW model or smaller, minimum unit is 0 01A
T2-03	F4H	Motor base frequency	*†	0 00 to 400 00 Hz		–	–	B	B	–	Motor nameplate value should be input No 1 motor (E1-06) × (E2-04)/120 No. 2 motor (E4-03) × (E5-04)/120
T2-04	F5H	Motor base r/min	E1-06† (E4-03)	0 to 24000 r/min		–	–	B	B	–	Motor nameplate value should be input.
T2-05	F6H	Number of motor poles	E2-04 (E5-04)‡	2 to 48		–	–	B	B	–	Motor nameplate value should be input
T2-06	F7H	Motor insulation class	0	0 to 4		–	–	B	B	–	Motor nameplate value should be input Insulation class A (100°C) . . . 0 E (120°C) . 1 B (130°C) 2 F (155°C) 3 H (180°C) 4
T2-07	F8H	PG constant	F1-01† (E3-03)‡	0 to 10000		–	–	B	B	–	

*When setting up, return to the initial value

†When setting up, or changing T1-01 setting, return to the initial value.

‡For No 2 motor (T1-01 = 2)

Table A-11 Table of Multi-function Input/Output Terminal Setting

Setting Value	Multi-function Input Terminal Functions (H1-01, 02, 03, 04, 05, 06)
02	Option/inverter selection
08	External base block (NO contact)
09	External base block (NC contact)
0F	Through mode
14	Fault reset
15	Emergency stop
20	External fault
21 - 2F	

Setting Value	Multi-function Output Terminal Functions (H2-01, 02, 03, 04, 05, 06)
00	During run
01	Zero speed
02	Frequency agree 1
03	Desired frequency agree 1
06	Inverter ready
07	Low voltage detected
08	Base block
0E	Fault
0F	Through mode
11	Fault reset
1A	During reverse run

The following constants are changed when the set value of A1–02 is changed.

Table A-12 Constants for Which Factory-set Values Vary Depending on Control Mode

Constant No.	Constant Name	Factory-set Values				
		V/f Control	V/f with PG Feedback	Open Loop Vector	Flux Vector	EMS
B3-01	Speed search selection at start	0	1	0	1	–
C3-01	Slip compensation gain	0.0	–	1.0	0.0	–
C3-02	Slip compensation primary delay time	2000	–	200	–	–
C4-02	Torque compensation time constant	200	200	20	–	–
C5-01	ASR proportional (P) gain 1	–	0.20	–	20.00	–
C5-02	ASR integral (I) time 1	–	0.200	–	0.500	–
C5-03	ASR proportional (P) gain 2	–	0.02	–	20.00	–
C5-04	ASR integral (I) time 2	–	0.050	–	0.500	–
C5-05	ASR limit	–	5.0	–	–	–
C5-06	ASR primary delay time	–	–	–	0.000	–
E1-04 E4-01	Rated r/min	1800		1750		–
E1-06 E4-03	Base speed	1800		1750		–
E1-08 E4-05	Middle voltage	① 15.0 * ② 14.0 ③ 12.0		11.0	–	–
E1-09 E4-06	Minimum speed	45		15	0	–
E1-10 E4-07	Minimum voltage	① 9.0 * ② 7.0 ③ 6.0		2.0	–	–
E1-13 E4-13	Base voltage	0.0		180.0		–
F1-09	Overspeed detection delay time	–	1.0	–	0.0	–
L2-04	Voltage recovery time	0.300	0.300	0.300	0.100	–
L3-03	Stall prevention limit during acceleration	50	50	100	–	–
L4-02	Speed detection width	1.20 Hz	1.20 Hz	2.00%	2.00%	2.00%
L9-01	Thermistor provided/not provided selection	0	0	1	1	–
L9-04	Motor 2 thermistor provided/not provided selection	0	0	1	1	–
O1-03	Setting/display unit of speed reference/monitor	0	0	1	1	–

*Constants that vary depending on kVA selection

① 0.4 to 1.5 kW
② 2.2 to 45 kW
③ 55 kW or larger

The following constants are changed when the set value of O2–04 is changed.

Table A-13 Constants for Which Factory-set Values Vary Depending on Inverter Output (O2-04)

200 V Class

Constant No.	Constant Name	Unit	Factory-set Values									
–	Inverter capacity	kW	0 4	0 75	1 5	2 2	3 7	5 5	7 5	11	15	18 5
O2-04	kVA selection	1	0	1	2	3	4	5	6	7	8	9
C6-01	Carrier frequency upper limit	kHz	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0
–	Upper limit range of carrier frequency	kHz	15 0	15 0	15.0	15 0	15 0	15 0	15 0	15 0	15 0	15 0
C6-02	Carrier frequency lower limit	kHz	2 0	2 0	2.0	2 0	2 0	2.0	2 0	2 0	2 0	2 0
C6-03	Carrier frequency proportional gain	1	0	0	0	0	0	0	0	0	0	0
–	Inverter rated current	A	3.2	6 0	8 0	11 0	17 5	25 0	33 0	49 0	64 0	80 0
E2-01	Motor rated current	A	1 90	3 30	6 20	8 50	14 00	19 60	26.60	39 7	53 0	65 8
E2-02	Motor rated slip	Hz	2 90	2 50	2 60	2 90	2 73	1 50	1 30	1 70	1 60	1 67
E2-03	Motor no-load current	A	1 20	1 80	2.80	3 00	4 50	5 10	8 00	11 2	15 2	15 7
E2-05	Motor line-to-line resistance	Ω	9 842	5 156	1 997	1 601	0 771	0 399	0 288	0 230	0 138	0 101
E2-06	Motor leak inductance	%	18 2	13 8	18 5	18 4	19 6	18 2	15 5	19.5	17.2	20 1
L2-02	Momentary power loss ridethru time	sec	1 0	1 0	1 0	1.0	1 0	1 0	1 0	1 0	1 0	1 0
L2-03	Minimum base block time	sec	0 5	0 5	0 5	0.5	0.5	0.7	0 7	0 7	0 7	1 0

200 V Class

Constant No.	Constant Name	Unit	Factory-set Values					
–	Inverter capacity	kW	22	30	37	45	55	75
O2-04	kVA capacity selection	1	A	B	C	D	E	F
C6-01	Carrier frequency upper limit	kHz	2 0	2 0	2 0	2 0	2 0	2 0
–	Upper limit range of carrier frequency	kHz	10 0	10.0	10 0	10.0	10 0	10 0
C6-02	Carrier frequency lower limit	kHz	2 0	2 0	2 0	2 0	2 0	2 0
C6-03	Carrier frequency proportional gain	1	0	0	0	0	0	0
–	Inverter rated current	A	96.0	130 0	160 0	183.0	224 0	300 0
E2-01	Motor rated current	A	77 2	105.0	131 0	160 0	190 0	260 0
E2-02	Motor rated slip	Hz	1 70	1 80	1 33	1 60	1 43	1 39
E2-03	Motor no-load current	A	18 5	21 9	38 2	44 0	45 6	72.0
E2-05	Motor line-to-line resistance	Ω	0 079	0 064	0 039	0 030	0.022	0.023
E2-06	Motor leak inductance	%	19 5	20 8	18 8	20 2	20 5	20 0
L2-02	Momentary power loss ridethru time	sec	1 0	1 0	1 0	1 0	1 0	1 0
L2-03	Minimum base block time	sec	1 0	1 0	1 0	1 0	1 0	1.0

The following constants are changed when the set value of O2–04 is changed.

Table A-14 Constants for Which Factory-set Values Vary Depending on Inverter Output (O2-04)

400 V Class

Constant No.	Constant Name	Unit	Factory-set Values										
–	Inverter capacity	kW	0 4	0 75	1 5	2 2	3 7	4 0	5 5	7 5	11	15	18 5
O2-04	kVA selection	1	20	21	22	23	24	25	26	27	28	29	2A
C6-01	Carrier frequency upper limit	kHz	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0
–	Upper limit range of carrier frequency	kHz	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0
C6-02	Carrier frequency lower limit	kHz	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0
C6-03	Carrier frequency proportional gain	1	0	0	0	0	0	0	0	0	0	0	0
–	Inverter rated current	A	1 8	3 4	4 8	6 2	8 0	11 0	14 0	18 0	27 0	34 0	41 0
E2-01	Motor rated current	A	1 00	1 60	3 10	4 20	7 00	7 00	9 80	13 30	19 9	26 5	32 9
E2-02	Motor rated slip	Hz	2 90	2 60	2 50	3 00	2 70	2 70	1 50	1 30	1 70	1 60	1 67
E2-03	Motor no-load current	A	0 60	0 80	1 40	1 50	2 30	2 30	2 60	4 00	5 6	7 6	7 8
E2-05	Motor line-to-line resistance	Ω	38 198	22 459	10 100	6 495	3 333	3 333	1 595	1 152	0 922	0 550	0 403
E2-06	Motor leak inductance	%	18 2	14 3	18 3	18 7	19 3	19 3	18 2	15 5	19 6	17 2	20 1
L2-02	Momentary power loss ridethru time	sec	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
L2-03	Minimum base block time	sec	0 5	0 5	0 5	0 5	0 5	0 7	0 7	0 7	0 7	0 7	1 0

400 V Class

Constant No.	Constant Name	Unit	Factory-set Values										
–	Inverter capacity	kW	22	30	37	45	55	75	110	160	185	220	300
O2-04	kVA selection	1	2B	2C	2D	2E	2F	30	32	34	35	36	37
C6-01	Carrier frequency upper limit	kHz	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0
–	Upper limit range of carrier frequency	kHz	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	2 5	2 5	2 5
C6-02	Carrier frequency lower limit	kHz	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0
C6-03	Carrier frequency proportional gain	1	0	0	0	0	0	0	0	0	0	0	0
–	Inverter rated current	A	48 0	65 0	80 0	96 0	128 0	165 0	224 0	302 0	340 0	450 0	605.0
E2-01	Motor rated current	A	38 6	52 3	65 6	79 7	95 0	130 0	190 0	270 0	310 0	370 0	500 0
E2-02	Motor rated slip	Hz	1 70	1 80	1 33	1 60	1 46	1 39	1 40	1 35	1 30	1 30	1 25
E2-03	Motor no-load current	A	9 2	10 9	19 1	22 0	24 0	36 0	49 0	70 0	81-0	96 0	130 0
E2-05	Motor line-to-line resistance	Ω	0 316	0.269	0 155	0.122	0 088	0 092	0 046	0.029	0 025	0 020	0 014
E2-06	Motor leak inductance	%	23 5	20 7	18 8	19 9	20 0	20 0	20 0	20 0	20 0	20 0	20 0
L2-02	Momentary power loss ridethru time	sec	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
L2-03	Minimum base block time	sec	1 0	1 0	1 0	1 0	1 0	1 0	4 0	4 0	4 0	4 0	4 0

Table A-15 Monitor Unit

Constant No.	Constant Name	Digital Operator	MEMOBUS	Master Controller Control Response Level	Analog Output Level (At Gain=1.0)	Value at 100%
U1-01	Speed reference	*1	0.1Hz	30000/100%	10V/100%	E1-04 *4
U1-02	Output frequency	0.01Hz	0.1Hz	30000/100%	10V/100%	E1-04 *4
U1-03	Output current	0.1A *2	8192/100%	10000/100%	10V/100%	Inverter rated current
U1-04	Control method	No	No	No	0	–
U1-05	Motor speed	*1	0.1Hz	30000/100%	10V/100%	(E1-04)×(C9-01) *4
U1-06	Output voltage	0.1V	0.1V	10000/100%	10V/100%	Voltage class *7
U1-07	DC bus voltage	1V	1V	10000/100%	10V/100%	Voltage class×2 *7
U1-08	Output power	0.1kW	0.1kW	0.1kW	10V/100%	Motor rated output
U1-09	Torque reference (internal)	0.1%	0.1%	10000/100%	10V/100%	Motor rated torque
U1-10	Input terminal status	bit	bit	bit	0	–
U1-11	Output terminal status	bit	bit	bit	0	–
U1-12	Operation status	bit	bit	bit	0	–
U1-13	Cumulative operation time	1H	1H	1H	0	–
U1-14	PROM No (at FLASH side)	No	No	0	0	–
U1-15	Input voltage at 9CN-4 (AI-1) terminal	0.1%	0.1%	0~4095/-10~10V	10V/100%	10V
U1-16	Input voltage at 9CN-6 (AI-2) terminal	0.1%	0.1%	2048~4095/ 4~20mA *5	10V/100%	20mA
U1-17	Input voltage at 9CN-8 (AI-3) terminal	0.1%	0.1%	0~4095/-10~10V	10V/100%	10V
U1-18	Motor secondary current (Iq)	0.1%	0.1%	10000/100%	10V/100%	E2-01
U1-19	Motor exciting current (Id)	0.1%	0.1%	10000/100%	10V/100%	E2-01
U1-20	Soft starter output	*1	0.1Hz	30000/100%	10V/100%	E1-04 *4
U1-21	ASR input (speed deviation)	*1	0.01%	10000/100%	10V/100%	(E1-04)×(C9-01) *4
U1-22	ASR output	0.01%	0.01%	10000/100%	10V/100%	*4 *6
U1-23	Current reference soft starter input	0.01%	0.01%	10000/100%	10V/100%	E2-01
U1-24	Current reference soft starter output	0.01%	0.01%	10000/100%	10V/100%	E2-01
U1-25	Current control deviation	0.01%	0.01%	10000/100%	10V/100%	E2-01
U1-26	Output voltage reference (Vq)	0.1V	0.1V	10000/100%	10V/100%	Voltage class *7
U1-27	Output voltage reference (Vd)	0.1V	0.1V	10000/100%	10V/100%	Voltage class *7
U1-28	PROM No (at CPU ROM side)	No	No	0	0	–
U1-29	LED check (diagnosis)	–	0	0	0	–
U1-30	Operation status 2	bit	bit	bit	0	–
U1-31	Master controller command 1	bit	bit	bit	0	–
U1-32	Master controller command 2	bit	bit	bit	0	–
U1-33	External torque reference	0.01%	0.01%	10000/100%	10V/100%	Motor rated torque
U1-34	Torque compensation	0.01%	0.01%	10000/100%	10V/100%	Motor rated torque
U1-35	Slip frequency reference	0.01%	0.01%	10000/100%	10V/100%	E1-04 *4
U1-36	Magnetic flux reference	0.01%	0.01%	10000/100%	10V/100%	–
U1-37	DO-08/H output status	bit	bit	bit	0	–
U1-38	Momentary power loss drop amount	*1	0.1Hz	30000/100%	10V/100%	(E1-04)×(C9-01) *4
U1-39	Motor temperature	1°C	1°C	1°C	10V/100%	200°C
U1-40	Speed detection PG counter value	Pulse	Pulse	Pulse	10V/100%	32768

Table A–15 Monitor Unit (Cont'd)

Constant No.	Constant Name	Digital Operator	MEMOBUS	Master Controller Control Response Level	Analog Output Level (At Gain=1.0)	Value at 100%
U1–41	Acceleration torque monitor (observer)	0.1%	0.1%	10000/100%	10V/100%	Motor rated torque
U1–42	Acceleration torque reference (observer)	0.1%	0.1%	10000/100%	10V/100%	Motor rated torque
U1–43	Torque observer control PI output	0.1%	0.1%	10000/100%	10V/100%	Motor rated torque
U1–44	Torque observer control output	0.1%	0.1%	10000/100%	10V/100%	Motor rated torque
U1–45	Synchronous phase difference	0.1deg	0.1deg	0.1deg	10V/100%	360deg
U1–46	Output voltage phase	0.1deg	0.1deg	0.1deg	10V/100%	360deg
U1–47	Zero-servo move pulse	Pulse	Pulse	Pulse	10V/100%	32768
U1–48	ACR (q) output	0.1%	0.1%	10000/100%	10V/100%	Voltage class *7
U1–49	ACRd output	0.1%	0.1%	10000/100%	10V/100%	Voltage class *7
U1–50	Setting Fault Data Address	*3	ADDRESS	0	0	–

Table A–15 Monitor Unit (Cont'd)

Constant No.	Constant Name	Digital Operator	MEMOBUS	Value at 100%
U2–01	Current fault	–	–	–
U2–02	Last fault	–	–	–
U2–03	Speed reference (U1-01) at fault	*1	0.1Hz	–
U2–04	Output frequency (U1-02) at fault	0.01Hz	0.1Hz	–
U2–05	Inverter output current (U1-03) at fault	0.1A *2	8192/100%	Motor rated current
U2–06	Motor speed (U1-05) at fault	*1	0.1Hz	–
U2–07	Output voltage reference (U1-06) at fault	0.1V	0.1V	–
U2–08	DC bus voltage (U1-07) at fault	1V	1V	–
U2–09	Output power (U1-08) at fault	0.1kW	0.1kW	–
U2–10	Torque reference (U1-09) at fault	0.1%	0.1%	Motor rated torque
U2–11	Input terminal status (U1-10) at fault	bit	bit	–
U2–12	Output terminal status (U1-11) at fault	bit	bit	–
U2–13	Operation status (U1-12) at fault	bit	bit	–
U2–14	Cumulative operation time (U1-13) at fault	1H	1H	–
U2–15	Speed controller (ASR) output (U1-22) at fault	0.01%	0.01%	*4 *6
U2–16	Current control deviation (U1-25) at fault	0.01%	0.01%	E2-01
U2–17	Operation status 2 (U1-30) at fault	bit	bit	–
U2–18	Master controller command 1 (U1-31) at fault	bit	bit	–
U2–19	Master controller command 2 (U1-32) at fault	bit	bit	–
U2–20	External torque reference (U1-33) at fault	0.01%	0.01%	Motor rated torque
U2–21	Torque compensation (U1-34) at fault	0.01%	0.01%	Motor rated torque
U2–22	Magnetic flux reference (U1-36) at fault	0.01%	0.01%	–
U2–23	Observer control output (U1-44) at fault	0.1%	0.1%	Motor rated torque
U2–24	Output voltage phase (U1-46) at fault	0.1deg	0.1deg	–

*1 The unit varies depending on the setting of O1–03

*2 For 7.5kW model or smaller, minimum unit is 0.01A

*3 The constant No. at setting fault is displayed

*4 E1–04 changes into E4–01 when selecting the No. 2 motor

*5 0 to 4095/–10V to 10V when H3–08=0

*6 For V/f control (E1–04) × (C9–01), For Vector control: $\sqrt{[(E2\text{–}01)^2\text{–}(E2\text{–}03)^2]}$

*7 Voltage class: 200V or 400V

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