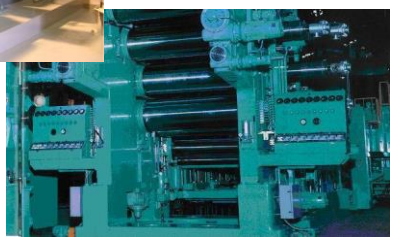
TOYODENKI

VF66

TOYO INTELLIGENT INVERTER

ASYC66-Z Operating Manual



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Preface

Thank you for choosing optional circuit board for Toyo VF66B inverter.

This operation manual contains information regarding the ASYC66-Z Optional Circuit Board for the VF66B Inverter. For correct use, please carefully read this instruction manual prior to using the ASYC66-Z.

In order to accommodate the many special functions to a wide variety of applications in addition to the basic inverter functions, please thoroughly read the VF66B inverter manual as well as any other applicable specialized instruction manuals.

Be Sure To Read This Before Use

Safety Notice

Before installing, operating, maintaining and inspecting ASYC66-Z option, please read this manual and all other appendices thoroughly in order to get familiarize with the feature of this option, safety information and correct handling. For safe operation, be sure to also thoroughly read the VF66B Inverter operating manual.

In this operation manual, the safety instructions are classified in to two levels: DANGER and CAUTION.

Indicates a hazardous situation which may result in death or serious injury if it is handled improperly.

Indicates a hazardous situation which may result in moderate or minor injury or only in property damage if it is handled improperly. However, such a situation may lead to serious consequences depending on circumstances.

CAUTION [Installation]

- Do not use optional circuit board if you discover damage or deformation during unpacking.
  Doing so may cause optional circuit board failure or malfunction.
- Do not place any flammable materials near the optional circuit board.
  Doing so may cause a fire.
- Do not allow the optional circuit board to drop, fall over or sustain severe impacts.
  Doing so may cause optional circuit board failure or damage.
- Do not install or operate the optional circuit board if it is damaged or has any of its parts missing.
  Doing so may lead to personal injury.

DANGER [Wiring]

- Before wiring, make sure the power is OFF.
  Failure to do so may cause an electric shock or fire.
- Wait more than 10 minutes after turning the power OFF before opening the unit case lid.
  Failure to do so may cause an electric shock or fire.
- Make sure that the unit is correctly earthed.
  Failure to do so may cause an electric shock or fire.
- Wiring must be done by skilled technicians.
  Failure to do so may cause an electric shock or fire.
- Wire the unit after it is installed.
  Failure to do so may cause an electric shock or fire.

CAUTION [Wiring]

- Make sure that communication cables and connectors are properly installed and locked in place.
  Failure to do so may cause optional circuit board failure or malfunction.

DANGER [Operation]

- Turn the power ON after fitting the inverter front cover. Do not remove the cover while the power is ON.
  Failure to do so may cause an electric shock.
- Do not operate any switch with wet hands.
  Failure to do so may cause an electric shock.
- Do not touch the inverter terminals while the power is ON, even if the inverter is in the idle state.
  Failure to do so may cause an electric shock.
- If the alarm is reset while the operation signal kept input, the inverter will suddenly restart. Reset the alarm after making sure that the operation signal is OFF.
  Failure to do so may lead to personal injury.
- The inverter can be set to operate in a wide range of speed. Operate the inverter after sufficiently checking the allowable range of the motor and equipment.
  Failure to do so may cause personal injury, equipment failure or damage.

CAUTION [Operation]

- The inverter radiating fin and the radiating resistance are hot. Do not touch them.
  Failure to follow this warning may cause burns.

DANGER [Maintenance, inspection and parts replacement]

- Always turn the power OFF before inspecting the inverter.
  Failure to do so may cause an electric shock, personal injury or fire.
- Unauthorized persons shall not perform maintenance, inspection or parts replacement.
  Use insulated tools for maintenance and inspection.
  Failure to do so may cause electric shock or personal injury.

CAUTION [Other]

- Never modify the unit.
  Doing so may cause electric shock or personal injury.

CAUTION [General precautions]

Some illustrations given in this manual show the inverter from which the covers or safety shields have been removed to illustrate the details. Before operating the inverter, reinstall the covers and shields to their original positions and the inverter according to this manual.
These safety precautions and specifications stated in this manual are subject to change without notice.

Chapter 1 Functional outline

ASYC66-Z is used with the substrate (VFC66-Z) in a VF66B inverter. The function of ASYC66-Z performs data communications with an external serial communication facility (higher rank CPU system,A personal computer, programmable controller :PLC, a panel controller, etc.), and controls a VF66B inverter, and also is monitoring of various parameter data.

Interface with external devices is based on RS485 and RS232C transmission procedure supports start-stop synchronization system. Transmission speed copes with until maximum 38400bps (RS232C side is until 19200bps).

Also, ASYC66-Z is equipped with the multifunctional input/output function, the analog input/output function, and PG input/output function.

In order to reduce an environmental impact, ASYC66-Z is designed so that the content of a lead, mercury, cadmium, hexavalent chrome, PBB, and PBDE may be based on the RoHS instructions which EU defined.

1.1 Primary feature and capabilities

1. Since hardware composition and a communications protocol are explained, a user can create the control software of an inverter uniquely. (The protocol of a Toyo system and Modbus RTU is supported)
2. Resetting of protection status of Inverter can be done by communication.
3. Communication commands are classified depending on the functions. (Operation command, speed command, setting of kinds of parameter, operation monitor, etc.).
4. By RS422/485 communication, plural (max. 31 sets) of Inverter can be connected with 1 set of master station, and be controlled individually.
5. Multifunction input/output function can be used. (Input: 6 terminal blocks, output: 2 terminal blocks)
6. Analog input/output function can be used. (Input: 1 terminal block, output: 1 terminal block)
7. PG input/output function can be used. (PG signal of the comprimentaly output is inputted and the signal which carried out the frequency division of the PG input signal is outputted.)
8. The ASYC66-Z board is based on RoHS instructions.

1.2 Communication function

By communication, Inverter can be controlled and data of kinds of parameter can be monitored.
(For details, refer to chapter 4.)

- **Control command**

Forward/reverse operaton command, Forward/reverse jog command, Stop command, Speed (frequency) command, Trace-back trigger, Protection status reset, Torque command, Initial excitation ON/OFF command, Time-of-day transfer, Multi-function input command.

- **Monitoring request**

Motor rotation speed (output frequency), Rotation speed command value (frequency command value), Output current, Output voltage, Overload counter, Line speed, Motor temperature, Input terminal status, Output terminal status, Accumulation operation time, Timer residual time, VF66B inverter program version, PLC function version, Analog input votage, Protection history data, Operation status, Protection status, Multifunction output status. 1 point trace-back, Trace-back data

- **Readout, alteration of setting item**

Readout of the function-settings topic of a VF66B inverter and a modification can be performed.

⚠CAUTION [Safety precautions]

Carefully read the instruction manual before use, and use the inverter correctly.

Our inverter and optional circuit board are not designed or manufactured for the purpose of use in life-support machines or systems.

If you intend to use the product stated in this document for special purposes, such as passenger cars, medical devices, aerospace devices, nuclear energy controls and submarine relaying machines or systems, consult our sales department.

This product is manufactured under strict quality control. However, if it is used in critical equipment in which inverter and optional circuit board failure may result in death or serious damage, provide safeguard to avoid serious accidents.

If you wish to use this inverter with loads other than three-phase AC traction, please contact us.

To use this product, electrical work is necessary. The electrical work must be done by qualified expert.

Chapter 2 Basic Specification

2.1 Serial Communication Specifications

***Communication basic specications**

items	Specification		
Elec. Characteristic of physical layer	Conforms to RS422/485 (*1)		Conforms to RS232C
	Toyo syaytem	Modbus RTU	
Transmission distance	1000[m]	Same as the left	3[m]
Number of station	1 : max. 31 sets	Same as the left	1:1
Number setting range	1 to 99	1 to 247	Nothing
Communication control system	Polling/selecting system	Polling/selecting/ Broadcast system	Polling system
Communication speed	1200/2400/4800/9600/19200/ 38400[bps]	Same as the left	1200/2400/4800/9600/19200 [bps]
Transmission procedure	Half duplex transmission (no procedure)	Same as the left	Same as the left
Synchronization system	Asynchronous system	Same as the left	Same as the left
Encoding system	NRZ	Same as the left	Same as the left
Modulation system	Base band	Same as the left	Same as the left
Type of connection	Terminal block (for M3)	Same as the left	Connector (MOLEX 5051-04)
Type of data	Data length ASCII (7 bits) Start bit (1 bit) Parity check (1 bit even number) Stop bit length (1 bit)	(Based on Modbus RTU) Data length binaly (7 bits) Start bit (1 bit) Parity check (1 bit even number) Stop bit length (1 bit)	Data length ASCII (7 bits) Start bit (1 bit) Parity check (1 bit even number) Stop bit length (1 bit)
Error detection	Sum check	CRC-16	Sum check

*1: Modbus RTU is based on RS485.

***Connection of communication cable**

	Terminal symbol		Function	Contents explanation
ASYC66-Z Terminal TB1	Rxa	For RS422/RS485	Receive signal (+)	SD (+) of a master station is connected.
	Rxb		Receive signal (-)	SD (-) of a master station is connected
	Txa		Transmission signal (+)	RD (+) of a master station is connected.
	Txb		Transmission signal (-)	RD (-) of a master station is connected
	SG		Ground (0v) of communication signal	GND (0 [V]) of a master station is connected. Do not connect SG terminal to a grounding terminal.
ASYC66-Z Connector CN3	1,2	For RS232C	Ground (0v) of communication signal	GND (0 [V]) of a master station is connected. Do not connect SG terminal to a grounding terminal.
	3		Transmission signal	RD of a master station is connected.
	4		Receive signal	RD of a master station is connected

2.2 Multifunction Input/ Output Terminal Specification

*** Multifunction Input/Output Terminal**

	Terminal No.	Use		Description
ASYC66-Z Terminal TB1	PS (2 Terminal)	Multifunction Input	+12V power terminal	Output +12V of DC voltage
	G (2 Terminal)		GND terminal	Never connect GND terminal to the earth. Never touch nor connect PS terminal and G terminal.
	MI6		Multifunction Input terminal (6)	(Maximum input voltage DC24V/Maximum input current 3mA) By input the signal in multifunction input terminal, the same operation can be done as that of VF66B inverter console. [In the initial condition, the VF66B inverter setting parameter for the C area are set to: ・For Multifunction input terminal (6), Preset speed selection 1 ・For Multifunction input terminal (7), Preset speed selection 2 ・For Multifunction input terminal (8), Preset speed selection 3 ・For Multifunction input terminal (9), Accel./decel time selection 1 ・For Multifunction input terminal (10),Accel./decal.time selection 2 ・For Multifunction input terminal (11),Speed Up Command *See each detailed mode instruction manuals for details of multifunction input terminals.
	MI7		Multifunction Input terminal (7)	
	MI8		Multifunction Input terminal (8)	
	MI9		Multifunction Input Terminal (9)	
	MI10		Multifunction Input Terminal (10)	
	MI11		Multifunction Input Terminal (11)	
	P	Multifunction output	External Power Supply Connecting Terminal	P Terminal is connected to the external power supply(DC).
	COM		Common Potential Connection Terminal	Never connect COM terminal to the earth.
	MO3		Multifunction output terminal (3)	(Max. voltage DC24V/Max. Output Current 20mA) Multifunction output terminal outputs the signal depends on the situation of performance. [In the initial condition, the followings are set by VF66B Inverter Setting Parameter : H area. ・For Multifunction output terminal (3), not used. ・Multifunction output terminal (4),Torque detected. *Refer to the instructions manual (each detailed mode) of VF66B inverter for the details of a multifunctional input terminal.
	MO4		Multifunction output terminal (4)	

*1:When inverter mode is V/f mode, "rotation speed" serves as "frequency."

*** Multifunction Input Source Mode/Sink Mode Configuration Jumper Connector**

	Connector	Use	Description
ASYC66-Z Jumper Connector	CN-SO	Source Mode	・Setting Source Mode／Sink Mode is conducted by replacement of Jumper socket CN-SI, CN-SO. ・In replacement of Jumper Socket, please cut off the power supply. [In the initial condition, the source mode is set.] ・In case of source mode, the switch etc. is connected between Multifunction Input terminal (6) to (9) and PS Terminal, and turn on/ off. ・In case of sink mode, the switch etc. is connected between Multifunction Input terminal (6) to (9) and G Terminal, and turn on / off. For the detail information, please see the Chapter 5.
	CN-SI	Sink Mode	

2.3 Analog Input/ Output Terminal Specification

***Analog Input/output function**

	Terminal No.	Use	Description
ASYC66-Z Terminal TB1	AIN2	Analog Input (2) Terminal	・The analog input (2) terminal can choose the input range from 0 to ±10V、0 to 10V and 4 to 20mA by the change of SW1, and alternation of inverter setting parameter. （Please refer to Chapter 6 for the change of the input range.） ・Input resistance is 150kΩ in input analog voltage. ・Input resistance is 250Ω in input analog current. [In the initial condition, 0～±10V is set.] *See each detailed mode instruction manual of VF66B inverter for details of Analog Input Terminal (2).
	AOT2	Analog Output (2) Terminal	・Output 0～±10V. ・Max. Current is 1mA. [In the initial condition, it is set to output the output current.] *See each detailed mode instruction manual of VF66B inverter for details of Analog output Terminal (2).
	G2	GND Terminal	Never connect G2 terminal to the earth.

2.4 PG Input/Output Terminal Specification

***PG input/output function**

	Terminal No.	Use	Description
ASYC66-Z Terminal TB2	+12	+12V power terminal	Output +12V of DC voltage
	G (3 terminals)	GND terminal	Never connect GND terminal to the earth.
	A	PG input terminal	Input A, B, U/Z, V, and W signal (complementary output) of 12 V power PG respectively.
	B		
	U/Z		
	V		
	W		
	PG-OUT	PG output terminal	Outputs a divided waveform of the PG A-signal.

2.5 Other

Other standard specifications apply to VF66B inverter correspondingly. For more details, please refer to the VF66B inverter manual.

⚠ DANGER [Wiring]

- Before wiring, make sure the power is OFF.
  Failure to do so may cause an electric shock or a fire.
- Substitution of Jumper socket is performed after certainly turning off an inverter.
  Failure to do so may cause an electric shock, personal injury, equipment failure or malfunction.

⚠ CAUTION [Wiring]

- G terminal and G2 terminal are not connected to a grounding by any means.
  Doing so may cause equipment failure or damage.
- Never connect or allow contact between the PS and G terminals.
  Doing so may cause equipment failure or damage.

Chapter 3 Description of Substrate

3.1 Name of Each Part

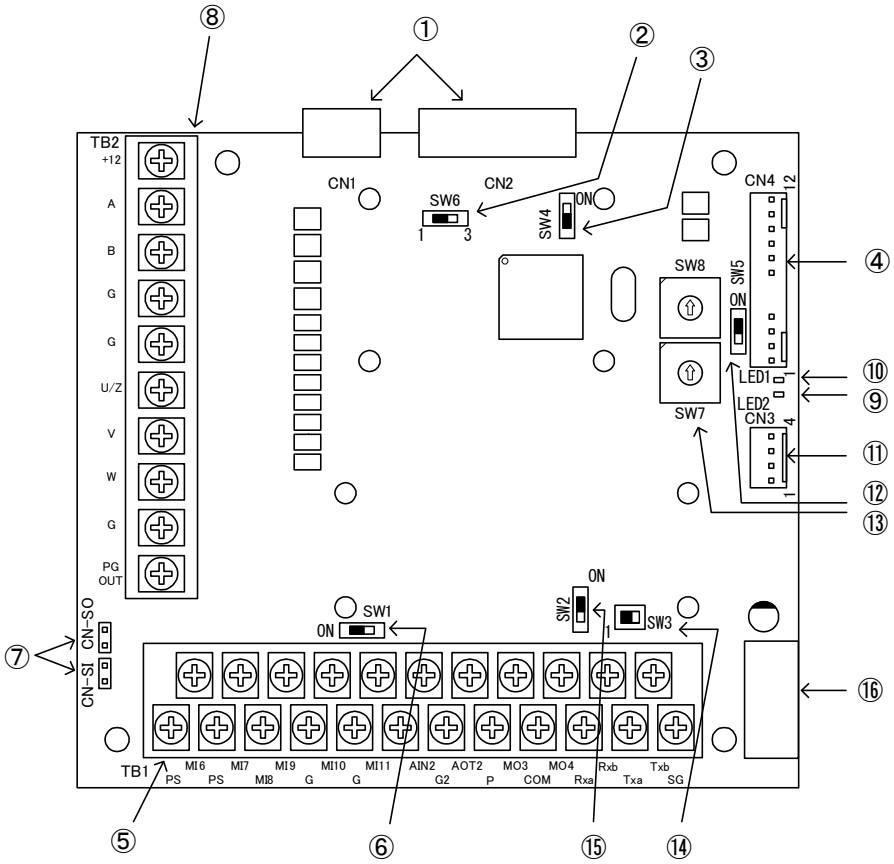


Figure3.1 ASYC66-Z substrate

① Connector to VFC66-Z (CN1,2)
② PG frequency dividing output switch (SW6)
③ PG signal ON/OFF switch (SW4)
④ Connector to external extension option"IOEXT66" (CN4)
⑤ Serial Communication (RS422/485), Multi function input/output, Analog input/output terminal block (TB1)
⑥ Analog input(2) signal characteristic switching switch (SW1)
⑦ Multi functional input signal characteristic switching jumper connector (CN-SI, CN-SO)
⑧ PG input/output terminal block (TB2)
⑨ LED (LED2) for a CPU operation check of ASYC66-Z
⑩ Modbus communication operation LED (LED1)
⑪ Connector (CN3) for serial communication (RS232C)
⑫ Toyo system / Modbus RTU changeover switch (SW5)
⑬ Station number setting switch (SW7, SW8)
⑭ Rxa-Txa, Rxb-Txb short circuit switch (SW3)
⑮ Terminator insertion switch (SW2)
⑯ Model name (ASYC66-Z-P1 or ASYC66-Z-P2)

As connector connecting to ④, please use housing :5051-12, terminal coated gold :2759G or 2759PBG producted by Molex. Refer to the operation manual about IOEXT66 for connection to CN4, and directions for use.

3.2 ASYC66-Z switches

The switch on ASYC66-Z can be switched and various functions can be changed.

Each kind of function of switch on ASYC66-Z

Name of switch	Use	Description
SW1	Analog input(2) signal characteristic switching switch	Switch input signal characteristics of Analog Input (2) Terminal. - 0 to 10V or 0 to ±10V when the switch is OFF. - 4 to 20mA input when the switch is ON. [In the initial condition, the switch is set to OFF] * When you switch input range, please change the parameters of VF66B inverter. For detail, refer to Chapter 6.
SW2	Terminator insertion switch	A terminating resistor can be connected on serial communication (RS422/485). - The terminating resistor is disconnected when the switch is OFF. - The terminating resistor (110 ohm) is connected when the switch is ON. [In the initial condition, the switch is set to OFF]
SW3	Rxa-Txa, Rxb-Txb short circuit switch	The change by opening / short circuit of Rxa and the Txa terminal of serial communication (RS422/485), and opening/simplistic one of Rxb and a Txb terminal can be performed. *The switch of Rxa and a Txa terminal is opened by the 1 and opposite side (3 sides), and Rxb and a Txb terminal are opened (RS422 connection). *In Rxa and a Txa terminal, a switch becomes simplistic by 1 side, and Rxb and a Txb terminal become simplistic (RS485 connection). [In the initial condition, the switch is set to thr opposite side (3 sides) of 1.]
SW4	PG signal ON/OFF switch	Switch ON/OFF PG signal. - PG signal is no effect when the switch is OFF. - PG signal is available when the switch is ON. [In the initial condition, the switch is set to ON]
SW5	Toyo system / Modbus RTU changeover switch	The protocol of serial communication (RS485) can switch a Toyo system and Modbus RTU. - Switch serves as a Toyo system in OFF. - Switch serves as a Modbus RTU in ON. [In the initial condition, the switch is set to OFF]
SW6	PG frequency dividing output switch	Switch output of PG frequency dividing signal. - ¼ frequency dividing signal is output when the switch is side “3”. - ½ frequency dividing signal is output when the switch is side “1”. [In the initial condition, the switch is set to position “3”]
SW7,SW8	Station number setting switch	The station number of serial communication (RS422/485) can be set up. *In the case of a Toyo system, station number is set up in the beam of 10 by SW7, and the beam of 1 is set up by SW8. * In Modbus RTU, top 4 bits is set up by SW7 and 4 bits of low ranks are set up by SW8.

⚠ DANGER [Switch]

- Change of a switch is performed by certainly turning off the inverter.
  Failure to do so may cause an electric shock, personal injury, equipment failure or malfunction.

3.3 Installation of ASYC66-Z

This board has different mounting methods depending on the model name. Check the board model name before installing the board with following procedure. The board model name is silk-printed at the position shown in Figure 3.1.

・**For ASYC66-Z-P1**

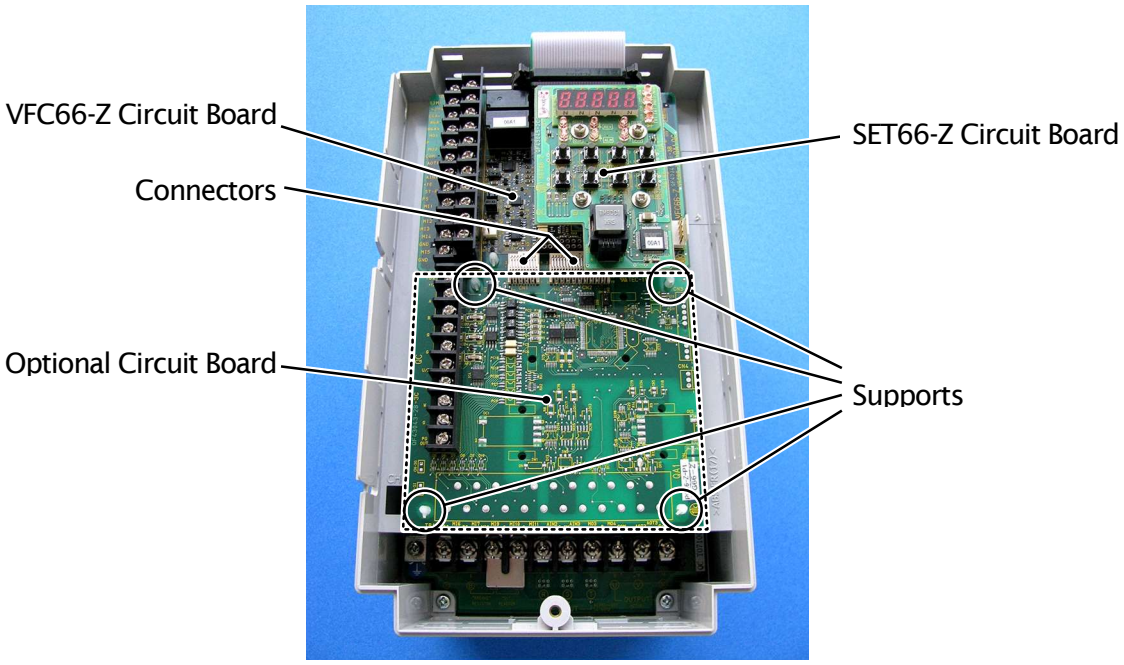


Figure 3.2 ASYC66-Z Installation Position (VF66B-2R222)

*For information about opening and closing the inverter unit cover lid, please refer to the VF66B inverter manual.

(1) Confirm that the power is off before performing any work.

(2) Install the ASYC66-Z board in the location designated by the dotted lines shown in Figure 3.2. (The figure shows the VF66B-2R222 model, however, the installation location is the same for other models.) If another optional circuit board is already installed, remove it by following the procedure described below. If another optional circuit board is not already installed, skip to (6).

(3) In order to safely remove the optional circuit board, first remove the SET66-Z board. Remove the 4 screws indicated by the circles in the figure on the right. Pull the SET66-Z board away from the VFC66-Z board in order to detach it.

(4) Next, release the two connectors between the VFC66-Z board and the optional circuit board. Figure 3.4 (a) shows the connector in its engaged position. Pull up the tab to release the connector as shown in Figure 3.4 (b).

(5) 4 board supports are included to mount the optional circuit board to the inverter housing, as indicated by the circles in Figure 3.2. Press down on the board support locking hooks as shown in Figure 3.5 to remove the optional circuit board.

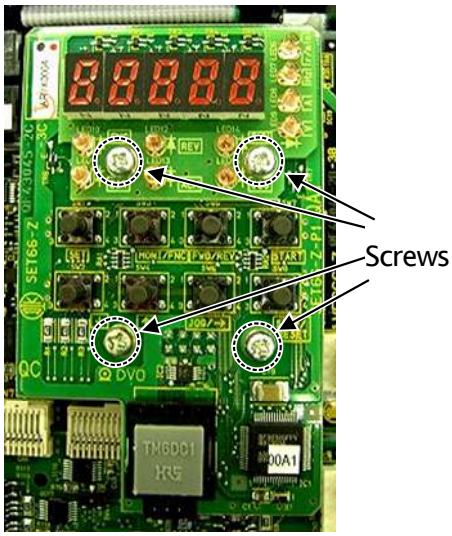
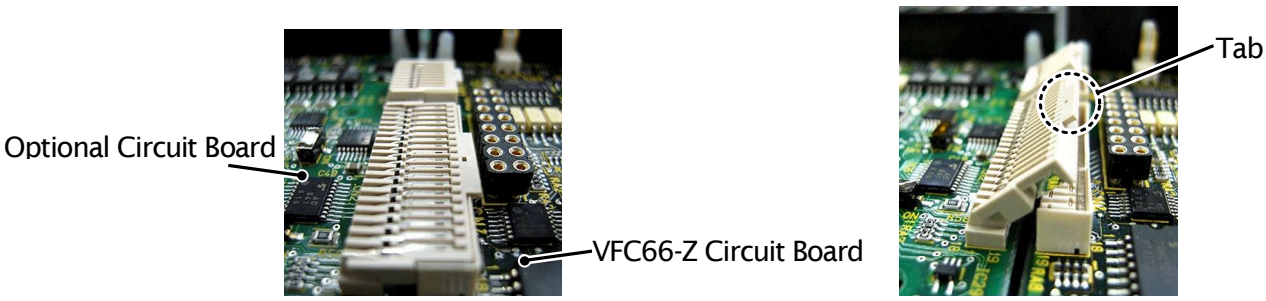


Figure 3.3 SET66-Z Circuit Board



(a) Locked Connector (b) Connector Tab

Figure 3.4 Connector

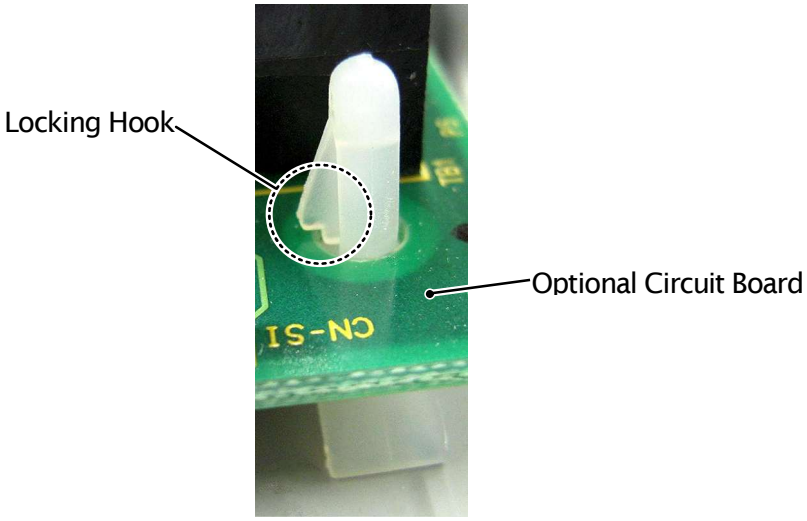


Figure 3.5 Support Locking Hook

(6) Align the four holes of the ASYC66-Z board with the 4 board supports indicated by the circles in Figure 3.2. Push down on the board until the support locking hooks snap into place as shown in Figure 3.5.
(7) Align the tabs (shown in Figure 3.4 (b)) of the ASYC66-Z board connectors CN1 and CN2 with the VFC66-Z board connectors CN7 and CN4. Press down on the tabs to engage with the connectors. Once the connectors are correctly joined, it will look like Figure 3.4 (a). The movable part of the connector has some elasticity and if the joint is weak, it may become disconnected. Ensure that is it properly locked in place.
(8) Install the SET66-Z board to its original position.
(9) Return the inverter unit cover lid to its original position.

⚠ DANGER [Installation/Removal]

- Always confirm that the power is off before installing/removing any circuit boards.
  Failure to do so may cause an electric shock, personal injury, equipment failure or malfunction.

⚠ CAUTION [Installation/Removal]

- Avoid excess connection and disconnection of the connectors.
  The connector mounting area may become loose, leading to problems such as poor connections.
- Do not attempt to insert any object other than a compatible connector.
  The connector mounting area may deform, leading to problems such as poor connections.

・**For ASYC66-Z-P2**

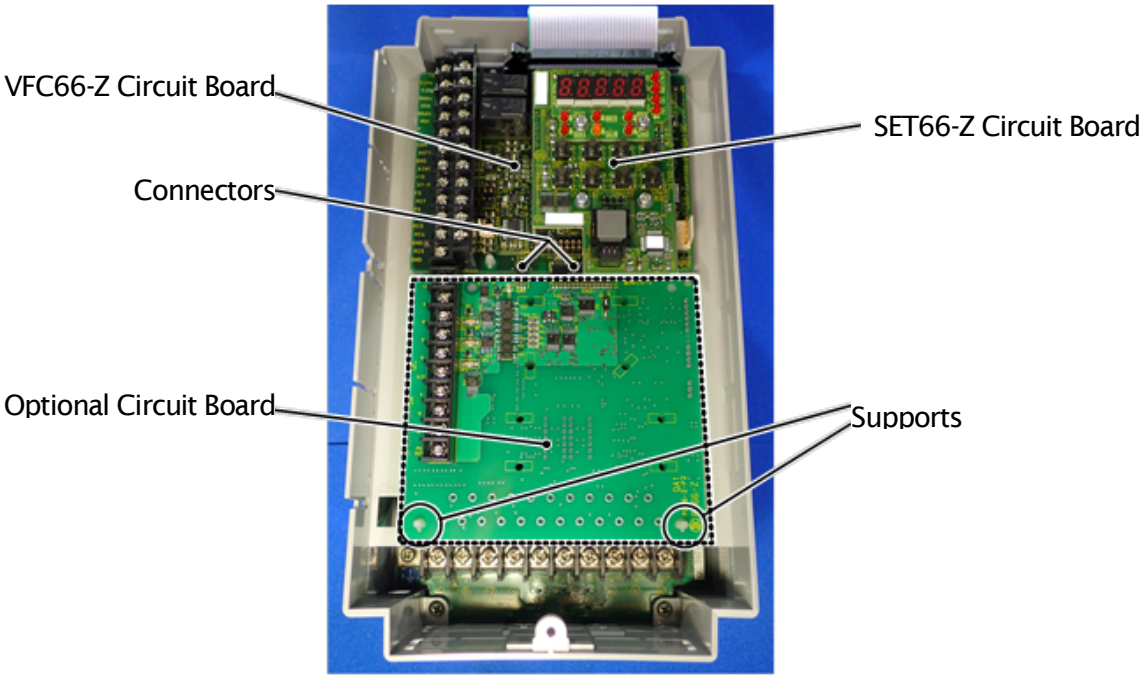


Figure 3.6 ASYC66-Z Installation Position (VF66B-2R222)

*For information about opening and closing the inverter unit cover lid, please refer to the VF66B inverter manual.

(1) Confirm that the power is off before performing any work.
(2) Install the ASYC66-Z board in the location designated by the dotted lines shown in Figure 3.6. (The figure shows the VF66B-2R222 model, however, the installation location is the same for other models.) If another optional circuit board is already installed, remove it by following the procedure described below. If another optional circuit board is not already installed, skip to (6).
(3) In order to safely remove the optional circuit board, first remove the SET66-Z board. Remove the 4 screws indicated by the circles in the figure on the right. Pull the SET66-Z board away from the VFC66-Z board in order to detach it.
(4) 2 board supports are included to mount the optional circuit board to the inverter housing, as indicated by the circles in Figure 3.6. Press down on the board support locking hooks as shown in Figure 3.8 (a) to remove the board. Do not lift the bottom edge of the board too much, the connectors could be damaged.

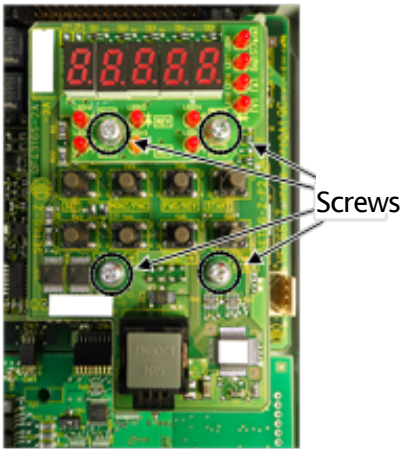
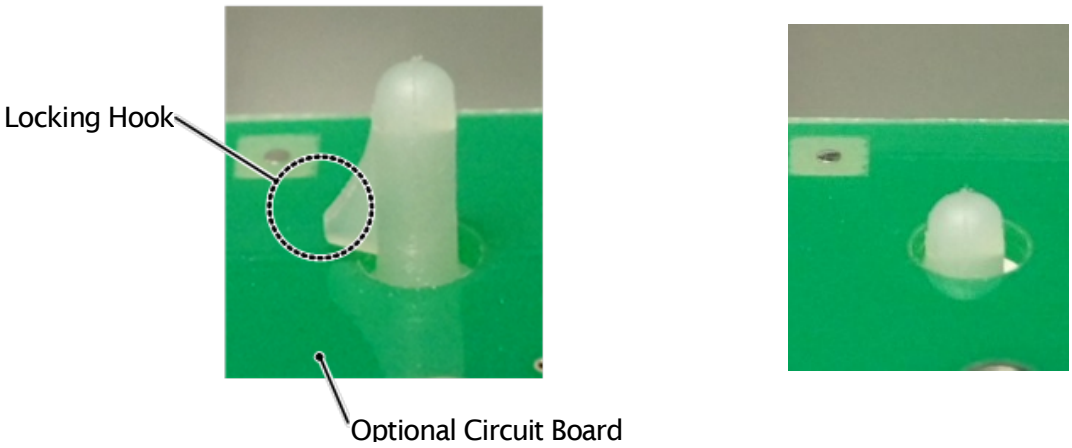


Figure 3.7 SET66-Z Circuit Board



(a) Locked (b) Unlocked

Figure 3.8 Support Locking Hook

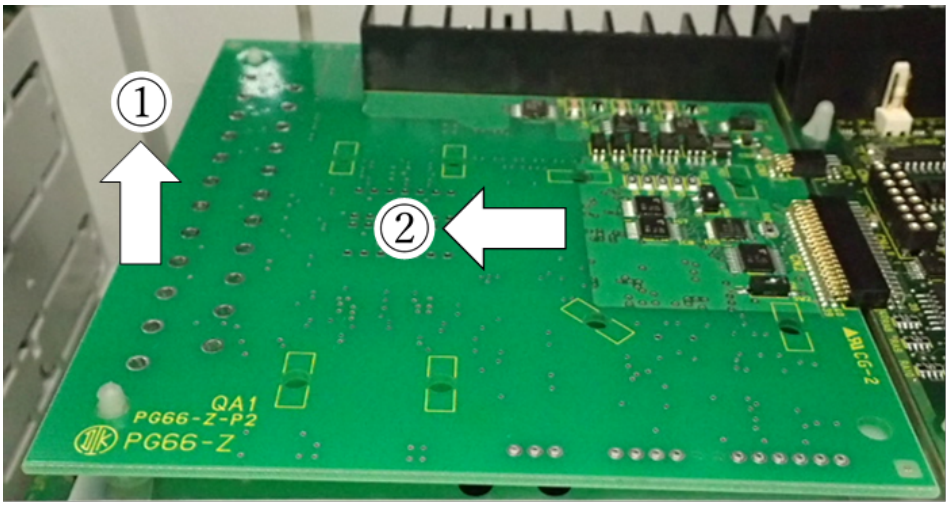
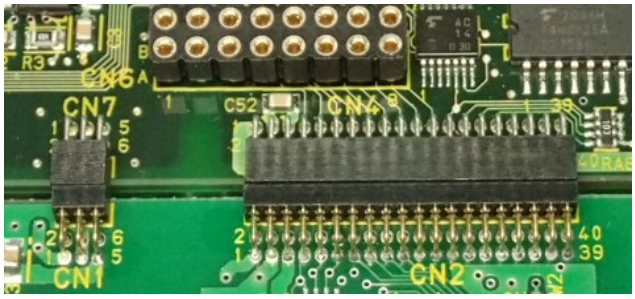
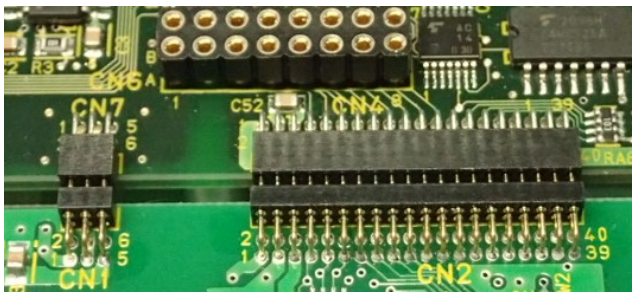


Figure 3.9 Removal of the Optional Circuit Board





(a) Correct Connection (b) Incorrect Connection

Figure 3.10 Connector

(5) As shown in Fig. 3.9, lift the bottom edge of the board in the direction of “1” and pull the board away from the VFC66-Z in the direction of "2".

(6) As shown in Fig. 3.10 (a), Align the pins of the ASYC66-Z board connectors CN1 and CN2 with the VFC66-Z board connectors CN7 and CN4, push the ASYC66-Z board to engage with the connectors. If the connectors are not connected properly, there will be a gap between the connectors as shown in Figure 3.10 (b).

(7) Align the four holes of the ASYC66-Z board with the 2 board supports indicated by the circles in Figure 3.6. Push down on the board until the support locking hooks snap into place as shown in Figure 3.8 (a).
(8) Install the SET66-Z board to its original position.
(9) Return the inverter unit cover lid to its original position.

⚠ DANGER [Installation/Removal]

- Always confirm that the power is off before installing/removing any circuit boards.
  Failure to do so may cause an electric shock, personal injury, equipment failure or malfunction.

⚠ CAUTION [Installation/Removal]

- Avoid excess connection and disconnection of the connectors.
  The connector mounting area may become loose, leading to problems such as poor connections.
- Do not attempt to insert any object other than a compatible connector.
  The connector mounting area may deform, leading to problems such as poor connections.

3.4 LED Operation

• **LED1 (yellow) Operation**

LED1 is turned on during transmission and reception of data at the time of a Modbus RTU setup of serial communication.

• **LED2 (green) Operation**

LED2 blinks in a cycle of about 2 seconds, when the ASYC66-Z is operating normally. Even if it switches on a power supply, when LED2 does not blink normally, the following causes can be considered, for example.

- Loose connection of VFC66-Z and ASYC66-Z
- Failure of VFC66-Z or ASYC66-Z

⚠ **CAUTION** [Safety Precautions]
● If LED2 is not operating normally, the ASYC66-Z or VFC66-Z board may be malfunctioning. If this is the case, please contact us immediately.

Chapter 4 Communication function explanation

By the serial communication function of ASYC66-Z, operation commands, speed command, torque command, etc. input into a VF66B inverter, and also the operational status of an inverter, a protection state, current, voltage, etc. can be monitored. Moreover, the setting data of an inverter readout/rewrites and readout of trace back data, readout of a protection history, and readout of monitor data can be performed.

In order to communicate with a master station, it is necessary to set the setting parameter of the VF66B inverter shown in the following table. Refer to the instructions manual of a VF66B inverter, and the instructions manual of the master station to be used collectively.

The direction of the serial communication in this chapter shows the direction where an "input" is inputted into a master station from ASYC66-Z, and an "output" shows the direction outputted to ASYC66-Z from a master station. It is not applied to explanation about a multifunctional input/output function.

Table 4.1 ASYC66-Z communication-related setup

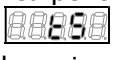
Console Display	Items	Item Selection	Default Data	Rewrites during Operation
J-00	Digital communication option selection	0: OFF 2: ASYC66-Z 1,3 to 7: Other options are set up at the time of use.	0	×
J-01	ASYC66-Z option baud rate	0: 1200[bps] 1: 2400[bps] 2: 4800[bps] 3: 9600[bps] 4: 19200[bps] 5: 38400[bps]	4	×
J-07	ASYC66-Z transmitting waiting time	0: 0[ms] 1: 5[ms] 2: 10[ms] 3: 20[ms] 4: 40[ms] 5: 60[ms] 6: 100[ms]	0	×
J-08	ASYC66-Z communication mode selection (*1)	0: Standard communication mode 1: Positioning mode 1 2: Positioning mode 2	0	×
i-00	PLCL function usage selection(*2)	OFF (not use) ON (use)	OFF	×
i-01	PLCH function usage selection(*2)	0: OFF (not use) 1: PLCH ON 2: PLCH ON (speed command input = PLCH output)	0	×

*When these setup is changed, please once turn OFF the power supply of an inverter and switch on a power supply again.

*1: J-08 should set to 0 (the positioning modes 1 and 2 cannot be used).

*2: Although i-00 (PLC-L function) and i-01 (PLC-H function) can be used, communication option-related a relay or a register (I00020-I0003F, O00040-O0004F, i00010-i0001F, o00010-o0001E) do not use them.

⚠ CAUTION

- In the option error in the state where  is displayed on the inverter console, it is checked again whether the VF66B inverter is correctly equipped with ASYC66-Z.
- Once communication with a master station and ASYC66-Z is established, if communication breaks off for a fixed period according to a certain trouble, it will become a communication timeout error (state where  is displayed on the inverter console). Please check again that VF66B inverter is correctly equipped with ASYC66-Z.

4.1 Before operation

In order to validate various kinds of instructions by the communication to a VF66B inverter, it is necessary to set correctly the inverter setting parameter shown in the following table. In order to validate an operation control signal, it is necessary to turn on the forward opeation terminal "ST-F" of terminal block TB1 of VF66B inverter control board VFC66-Z. For details, please refer to the instructions manual of the main part of a VF66B inverter.

Table 4.2 Setup of input place selection of various instructions

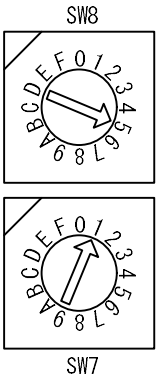
Console Display	Items	Item Selection	Default Data	Rewrites during Operation
b-09	Commanding place when coupled	0: Terminal block 1: Console (SET66-Z) 2: Digital communication option	1	×
b-10	Speed commanding place selection (*1)	0: Coupled 1: Analog input(1)[terminal block](AIN1) 2: Console (SET66-Z) 3: Digital communication option 4: Analog input(2)[terminal block for IO66-Z option or digital communication option] (AIN2) 5: (For extension option)*1 6: Analog input(3)[IO66-Z option terminal block](AIN3) 7: Built-in PLC	0	×
b-11	Operation commanding place selection	0: Coupled 1: Terminal block 2: Console (SET66-Z) 3: Digital communication option	0	×
b-12	JOG commanding place selection	0: Coupled 1: Terminal block 2: Console (SET66-Z) 3: Digital communication option	0	×
i-07	Operation mode selection(*2)	0: Speed control (ASR) mode 1: Torque command –direction priority 2: Torque command + direction priority 3: Torque control (ATR) mode 4: Speed/torque control contact switch	0	×
i-08	Torque command input place selection(*2)	0: Analog input (1) [terminal block](AIN1) 1: Analog input (2) [IO66-Z option or digital communication option](AIN2) 2: Digital communication option 3: Built-in PLC output	1	×

(*1) When inverter mode is set as V/f mode, b-10 becomes "input place selection of frequency instructions."

(*2) When inverter mode is set as V/f mode, i-07 and i-08 cannot be set up.

4.2 Setting of station number

Station number is set up with the switch (SW7, SW8) on an ASYC66-Z option PC board. When using an RS-232C interface, there is no necessity for a setup.



***In the case of a Toyo system**

Station number is set up in the beam of 10 by SW7, and the beam of 1 is set up by SW8.

The right figure expresses the state where the station number was set as No. 15.

Please give a setup of a station number as No. 1-99.

Please do not carry out a setup of No. 0 and more than No. 99.

***In the case of a Modbus RTU**

Station number sets up top 4 bits by SW7, and sets up 4 bits of low ranks by SW8.

The right figure expresses the state where the code was set as No. 21.

Please give a setup of a station number as one to 247 (F7) watch.

Please do not carry out a setup beyond No. 0 and 248 (F8) watch.

4.3 Connection method of a communication cable

*** Connection of RS422**

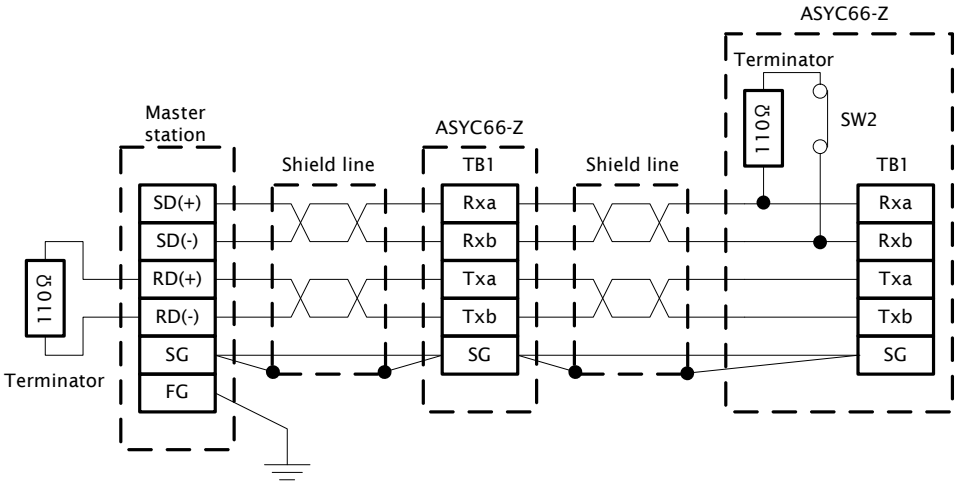


Figure 4.1 Connection of RS422

Please turn on SW2, in order to connect a terminator to the inverter (ASYC66-Z) which became a station of the end.

Please connect a terminator 110 [Ω] to a master station.

Please set SW3 to the 1 and opposite side.

A communication cable should use the twisted pair wire (a shield line, 3P) of SPEV(SB)-0.5.

*** Connection of RS485**

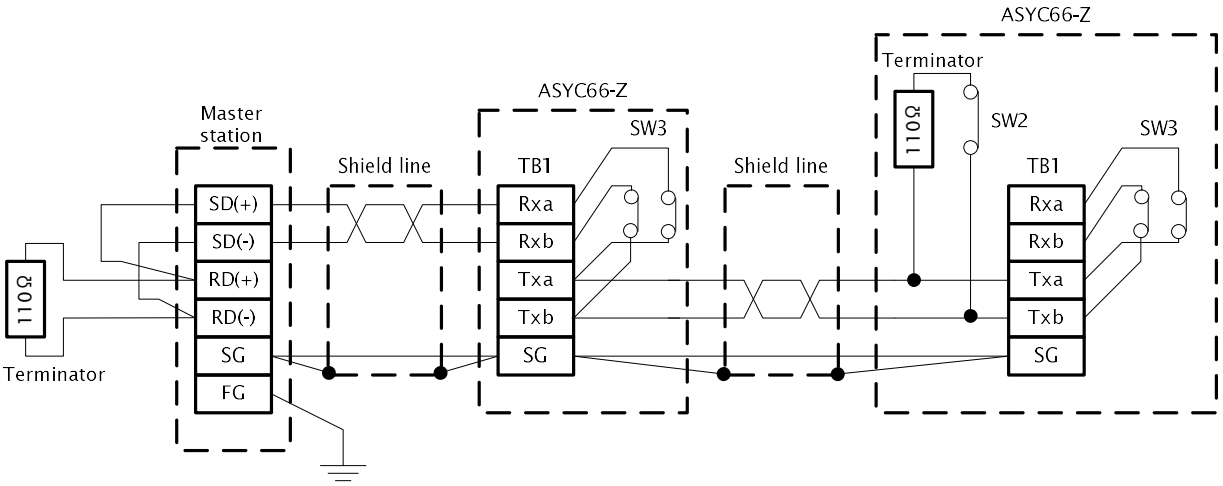


Figure 4.2 Connection of RS422

Please turn on SW2, in order to connect a terminator to the inverter (ASYC66-Z) which became a station of the end.

Please connect a terminator 110 [Ω] to a master station.

Please set SW3 to the 1 and opposite side.

A communication cable should use the twisted pair wire (a shield line, 2P) of SPEV(SB)-0.5.

*** Connection of RS232C**

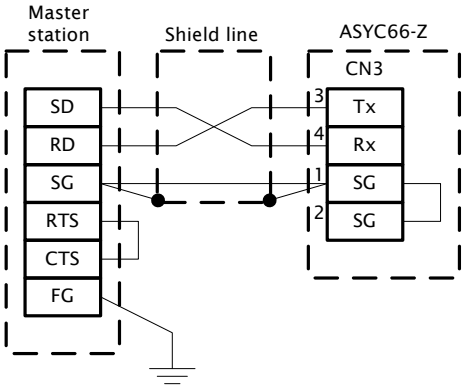


Figure 4.3 Connection of RS422

4.4 Communication format of RS422 / RS485 (Toyo system)

* Composition of a communication format

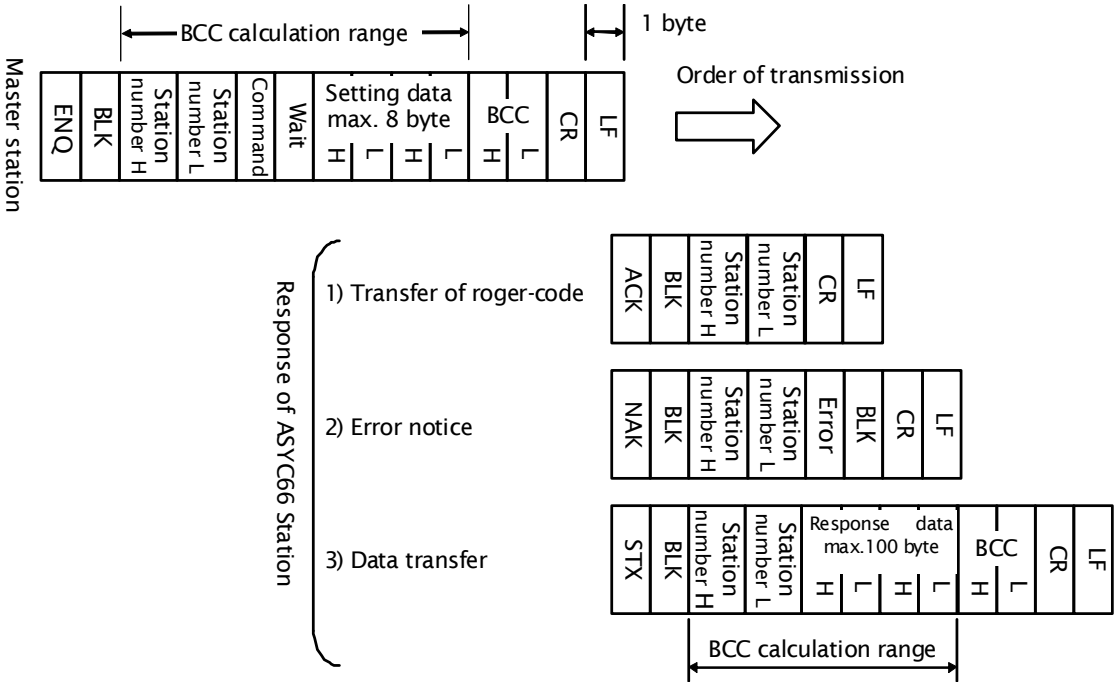


Figure 4.4 Communication format of RS422/RS485 (Toyo system)

Toyo system turns OFF SW5.

A communication data format is transmitted and received by an ASCII code. The communication from a master station always starts in [ENQ], and there are three kinds of responses of ASYC66-Z to it, as shown in Fig. 4.4. However, when all the station specifications are carried out by the communication from a master station, there is no response from ASYC66-Z.

1) A comprehension code is a synopsis transmitted when ASYC66-Z receives a communication data normally.

2) A poor advise is a synopsis transmitted from ASYC66-Z, when a communication data is normally unreceivable, or when it carries out the normal reception of the communication data and a treatment is not performed correctly.

3) Data transfer is a synopsis transmitted when ASYC66-Z needs to receive a communication data normally and it is necessary to transmit a data from ASYC66-Z.

When two or more ASYC66-Z stations are connected, the transmit data of a master station is sent to all the ASYC66-Z stations, and the ASYC66-Z station side answers, only when the station code set as the local station is the same as the station code specified by the communication data.

ASYC66-Z completes a reception, and after the longest time in the processing time, communication blank time, or the compulsive latency time passes, an ASYC66-Z station sends a reply. Refer to Table 4.3 for the processing time, communication blank time, and the compulsive latency time.

Table 4.3 Reply time from an ASYC66-Z station

Name	Contents
Processing time	It changes with each commands. Refer to Table 4.6 for an approximate value.
communication blank time	Time for 3.5 characters (*1)
Compulsive latency time	This time is set up by the setting item J-07 of VF66B inverter. Refer to the operation manual of VF66B inverter for details.

*1: The time for 1 character is a 10-/baud rate [s]. However, when a baud rate exceeds 19200 [bps], the time for 3.5 characters is uniformly 1.75 [ms].

Time after an ASYC66-Z station completes a transmission until it becomes ready for receiving ability is below 1 [ms].

***Communication data**

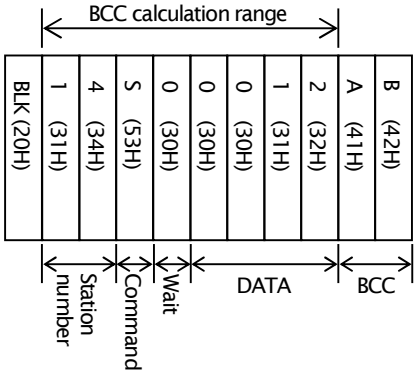
Table 4.4 Instruction of the symbol of a communication format

Symbol	ASCII code	Contents
ENQ	05H	Initial letter od data from master ststion
BLK	20H	Blank
ACK	06H	Initial letter of roger code to be transmitted from slave station to master station
NAK	15H	Error notice from slave station
STX	02H	Initial letter in case of data transmission from slave station to master station
CR	0DH	Transmission end 1
LF	0AH	Transmission end 2
Station number	—	ASYC66-Z station number of Inverter by 2 bytes. Station number can be designated from 1 until 99 (63H) by hexadecimal. In case of designation of all stations, designate FF. For example, when specifying the office code of No. 20, the value 31H which changed into the ASCII code "1" of 14H which is a hexadecimal of 20 is set as the office code H, and the value 34H which changed "4" of 14H into the ASCII code is set as the office code L.
Wait(*1)	—	After an ASYC66-Z station receives a data, even if it goes through the weight time + forced latency time (*2) in weight time set to an ASYC66-Z station, when there is no new command from a master station, an ASYC66-Z station is reset to an initial state. A setting range is F (hexadecimal) from 0, and a unit of measure is 10 [ms]. However, weight time becomes infinite when 0 (30H) is set up.
BCC(*3)	—	The total in every byte of the data of the BCC code numeration span shown in Fig. 4.4 is calculated, the hexadecimal representation of 1 byte of low-order of a calculation result is carried out, and it changes into an ASCII code, and expresses with a double byte.
Command	—	The commnad from a master is expressed with the English character of one character (ASCII code).
Error	—	When the treatment as the poor data from a master and a verb cannot be performed, what expressed the description with the English character of one character (ASCII code) is transmitted from an ASYC66-Z station. Refer to Table 4.5.
Data	—	The data length which data length changes with commands and a master office transmits is 8 bytes at the maximum, and the data length which an ASYC66-Z station transmits is 100 bytes at the maximumA data should change into an ASCII code what carried out the hexadecimal representation.

*1: Since the ASYC66-Z station side cannot detect the abnormal, it has an ASYC66-Z station reset by communicative time-out when abnormals occur in a master station or a communication cable. At this time, an ASYC66-Z station performs an initializing of a communication status, and the clearance of a transceiver buffer.

*2: This time is set up by the setting item J-07 of VF66B inverter. Refer to the operation manual of VF66B inverter for details.

*3: BCC is calculated as follows and changed into an ASCII code. The right figure expresses the example of transmit data of the master station. With the right figure, in an station code, 20 (=14H) and a command are set to S (=53H), a wait is set to 0H, and a data becomes 12 (31H, 32H). Since a numeration of BCC at this time is total from an office code to a data, it is set to BCC = 31H+34H+53H+30H+30H +30H+31H+32H=1ABH. BCC serves as ABH in order to consider it as 8 bit data, and it converts this data with an ASCII code (41H, 42H).



***Error code**

When neither the defect of the data from a master nor processing as ordered is completed, an ASYC66-Z station transmits the following error code.

Tabel 4.5 List of Error code

Error code	ASCII code	Error name	Contents
C	43H	Command error	Received the undefined command.
D	44H	Data error	Received the address of other than setting data address
E	45H	Extension error	Received the data of out of setting data range
F	46H	Framing error	Communication data length is different from specification
O	4FH	Over run error	Over run error occurs during a reception of a data
P	50H	Parity error	Parity error occurred during receiving
R	52H	Reading error	Designated the number of out of range, such as parameter setting
S	53H	Sum check error	There is an error in sum check.
W	57H	Writing error	During operation, changed the item of Inhibition of writing during operation.
X	58H	Othre errors	Errors of other than above-mentioned ones.

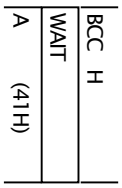
***Command data**

The command of a Toyo system is shown in Table 4.6.

Table 4.6 List of command by Toyo system

Command	ASCII code	Contents	Data length (bytes)	Reply initial data of an ASYC66-Z station (Data length)	Walk through processing time [ms]
A	41H	Forword operation command	0	ACK,NAK	0 to 4
B	42H	Reverse operation command			
C	43H	Stop command			
D	44H	Forwrod Jogging operation command			
E	45H	Reverse Jogging operation command			
F	46H	Initial excitation command	2		
G	47H	Rotation speed command change	0		
H	48H	Trace-back trigger command			
I	49H	Protection status reset			
J	4AH	Operation status request		STX(4),NAK	
K	4BH	Truble status request		STX(8),NAK	
L	4CH	Multifunction output status request		STX(4),NAK	
M	4DH	Rotation speed command (Effective by Command G)	4	ACK,NAK	
N	4EH	Rotation speed command (Directly)			
P	50H	Torque command			
R	51H	Multifunction input command	8		
S	53H	Monitor request	4	STX(4),NAK	15 to 20
T	54H	Setting data readout request			20 to 30
U	55H	Setting data change request	8	ACK,NAK	15 to 20
V	56H	Protection history readout	2	STX(4),NAK	
W	57H	1 point trace back readout			
X	58H	Trace back data readout	4		40 to 50
Y	59H	Date-time transfer	8	ACK,NAK	0 to 4
Z	5AH	Extended multifunctional output state request	0	STX(4),NAK	
k	6BH	Extended protection-state request 1		STX(8),NAK	
m	6DH	Extended protection-state request 2			
n	6EH	Extended multifunctional input command	4	ACK,NAK	
p	70H	Package readout		STX(104) or STX(4),NAK	15 to 280

(1)Command A,B,C,D,E,G,H,I·····Forword operation command、Reverse operation command、Stop command、Forwrod Jogging operation command、Reverse Jogging operation command、Rotation speed command change、Trace-back trigger command、Protection status reset are set up

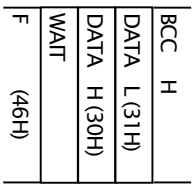


Command A, B, C, D, E, G, H, and I do not have master station transmitting data and ASYC66-Z response data.

An ASYC66-Z replies a comprehension code or a poor notice to a master station transmitting command.

The left figure expresses the case where forword operation instructions of Command A (41H) are transmitted from a master station.

(2)Command F·····It is ordered ON/OFF of initial excitation.



In Command F, master station transmitting data is as follows.

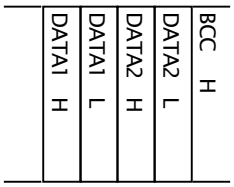
*Data H is always 0 (30H).

*As for Data L, initial excitation serves as OFF by 0 (30H), and initial excitation is set to ON by 1 (31H).

There is no response data of an ASYC66-Z , and a comprehension code or a poor notice is replied.

The above figure expresses the case where initial excitation is turned ON from a master station.

(3)Command J·····It is operational status data of VF66B inverter.



Command J do not have master station transmitting data.

An ASYC66-Z replies a data or a poor notice. Response data is the operational status of a VF66B inverter, and is 4 bytes of data.

Refer to Table 4.7 for the details of data.

Tbale 4.7 Response data of operation state

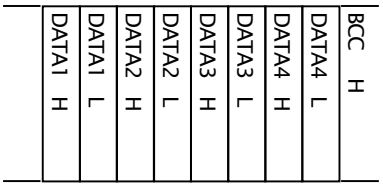
Bit	Contents	Bit	Contents
0	Under normal operation or jog operation commnad input	8	Excitation
1	Under inverter operation (It contains also during slowdown stop operation.)	9	DC brake
2	Jog operation	10	Not used
3	Reverse command	11	Not used
4	DC excitation	12	Not used
5	Power failure	13	Not used
6	Automatic measuring	14	Not used
7	Energization	15	Not used

Each bit is set to 1 when it changes into the state where it indicated by the contents. It is 0 except the state.

The relation of the response data in communication and a bit is as follows.

Data 1H: bit 12 to 15, Data 1L: bit 8 to 11, Data 2H: bit 4 to 7, Data 2L: bit 0 to 3

(4)Command K·····It is protection state data of a VF66B inverter.



Command J do not have master station transmitting data.

An ASYC66-Z replies a data or a poor notice. Response data is the protection status of a VF66B inverter, and is 8 bytes of data.

Refer to Table 4.8 for the details of data.

Table 4.8 Response data of a protection state

Bit	Contents	Console display	Bit	Contents	Console display
0 (*1)	Sensor-less start error	S L S E	16	Over-current protection	o c
1	Communication time-out error	t S	17	IGBT protection	i G b t
2 (*2)	Speed control error	S P d E	18	Not used	
3	Motor overheat (When using temperature detection option)	i n o H	19	Not used	
4	Charging resistor overheat	r o H	20	Gate PCB abnormality	G A c
5	FCL operation	F C L	21	DC part over-voltage	o V
6 (*4)	Setting error	S E－－	22	Overload protection	o L
7 (*1)	Open phase	C u t	23	Current sensor abnormality	C t E r
8 (*4)	CPU processing abnormality	P S L－	24	Start jam	S t r F
9	Fan failure	F n F	25(*2)	Over-speed protection	o S
10(*1)	PG error	P E r	26(*3)	Over-frequency protection	o F
11(*1)	Sensor error	S n E	27	Insufficient voltage (Power failure)	u V
12	External failure 1	E F 1	28(*2)	Over-torque protection	o t
13	External failure 2	E F 2	29	Unit overheat	o H
14	External failure 3	E F 3	30	Storage memory abnormality	c S 2
15	External failure 4	E F 4	31	Option error	o P E r

*1: This display operates, when inverter mode is an ED vector mode.

*2: This display operates, when inverter modes are IM vector mode and an ED vector mode.

*3: This display operates, when inverter mode is V/f mode.

*4: A number is shown in "-" of a console display. Refer to "a VF66B instructions manual (troubleshooting and preservation section)" for details. The number portion of "-" is not contained in the response data to Command K.

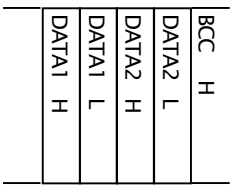
Each bit is set to 1 when it changes into the state where it indicated by the contents. It is 0 except the state. Moreover, bits 18 and 19 are always set to 0.

The relation of the response data in communication and a bit is as follows.

Data 1H: bit 28 to 31, Data 1L: bit 24 to 27, Data 2H: bit 20 to 23, Data 2L: bit 16 to 19

Data 3H: bit 12 to 15, Data 3L: bit 8 to 11, Data 4H: bit 4 to 7, Data 4L: bit 0 to 3

(5)Command L·····It is multifunctional output state data of a VF66B inverter.



Command L do not have master station transmitting data

An ASYC66-Z replies a data or a poor notice. Response data is the multifunctional output states of a VF66B inverter, and is 4 bytes of data.

Refer to Table 4.9 for the details of data.

Table 4.9 Response data of multifunctional output state

Bit	Contents	Bit	Contents
0	Not used	8	Torque detection
1	Rotation speed detection (1) (Rotation speed = Detection setting (1))	9	Absolute value of torque detection
2	Rotation speed detection (1) (Rotation speed ≥ Detection setting (1))	10	Power failure
3	Rotation speed detection (1) (Rotation speed ≤ Detection setting (1))	11	Overload pre-alarm
4	Rotation speed detection (2) (Rotation speed = Detection setting (2))	12	Retrying
5	Rotation speed detection (2) (Rotation speed ≥ Detection setting (2))	13	In reverse
6	Rotation speed detection (2) (Rotation speed ≤ Detection setting (2))	14	Selecting second setting block
7	Setting attainment	15	Fan motor failure

Each bit is set to 1 when it changes into the state where it indicated by the contents. It is 0 except the state.
The relation of the response data in communication and a bit is as follows.
Data 1H: bit 12 to 15, Data 1L: bit 8 to 11, Data 2H: bit 4 to 7, Data 2L: bit 0 to 3

(6)Command M·····The rotational speed command changed by Command G is set up.

M (4DH)	WAIT	DATA H(32H)	DATA L(37H)	DATA H(31H)	DATA L(30H)	BCC H

In Command M, master station transmit data is 4 bytes of rotational speed command data, and is set up with the value which set the maximum speed to 20000. The maximum speed is set up by the setting item A-00 of a VF66B inverter. Refer to the operation manual of a VF66B inverter for details.

The left figure expresses the case where the rotational speed command 900 [r/min] is transmitted from a master station in case the maximum speed is 1800 [r/min], and a data is set to 20000*900/1800=10000 (2710H).

There is no response data of an ASYC66-Z , and a comprehension code or a poor notice is replied.

(7)Command N·····Rotational speed command is set up directly.

N (4EH)	WAIT	DATA H(33H)	DATA L(41H)	DATA H(39H)	DATA L(38H)	BCC H

In Command N, master station transmit data is 4 bytes of rotational speed command data, and is set up with the value which set the maximum speed to 20000.

The left figure expresses the case where the rotational speed command 1350 [r/min] is transmitted from a master station in case the maximum speed is 1800 [r/min], and a data is set to 20000*1350/1800=15000 (3A98H).

There is no response data of an ASYC66-Z , and a comprehension code or a poor notice is replied.

(8)Command P·····Torque command is set up.

P (50H)	WAIT	DATA H(30H)	DATA L(39H)	DATA H(43H)	DATA L(34H)	BCC H

In Command P, master station transmit data is set up with the value which set 100 [%] torque to 5000 by 4 bytes of torque command data.

With the left figure, the case where a torque command transmits 50 [%] from a master station is expressed, and a data becomes 5000x50/100=2500 (9C4H).

There is no response data of an ASYC66-Z , and a comprehension code or a poor notice is replied.

(9)Command R·····Command of a multifunctional input

R (52H)	WAIT	DATA1 H	DATA1 L	DATA2 H	DATA2 L	DATA3 H	DATA3 L	DATA4 H	DATA4 L	BCC H

In Command R, master station transmit data is 8 bytes of multifunctional input command data. Each data is bit data and the functionality is assigned for every bit.

Refer to Table 4.10 for the details.

There is no response data of an ASYC66-Z , and a comprehension code or a poor notice is replied.

Table 4.10 Multifunction input bit command and fuction

Bit	Contents	Bit	Contents
0	Not used	16	<Multifunction input> Droop control inactive
1		17	<Multifunction input> Speed/torque control selection
2		18	<Multifunction input> Forward/reverse operation command selection
3		19	<Multifunction input> External failure signal 1 (Protection relay 86A active)
4	<Multifunction input> DC brake command	20	<Multifunction input> External failure signal 2(Protection relay 86A active)
5	<Multifunction input> Protection status reset	21	<Multifunction input> External failure signal 3 (Protection relay 86A active)
6	<Multifunction input> Preset speed selection bit 8-6 = 001: Preset speed 1, 010: Preset speed 2, = 011: Preset speed 3, 100: Preset speed 4, = 101: Preset speed 5, 110: Preset speed 6, =111: Preset speed 7, 000: Preset speed not used	22	<Multifunction input> External failure signal 4(Protection relay 86A active)
7		23	<Multifunction input> External failure signal 1 (Protection relay 86A inactive)
8		24	<Multifunction input> External failure signal 2(Protection relay 86A inactive)
9	<Multifunction input> Acceleration/deceleration time selection bit10-9 = 00:Acc1/dEc1,01:Acc2/dEc2 = 10:Acc3/dEc3,11:Acc4/dEc4	25	<Multifunction input> External failure signal 3 (Protection relay 86A inactive)
10		26	<Multifunction input> External failure signal 4 (Protection relay 86A inactive)
11	<Multifunction input> Rotation speed UP command (MRH mode)	27	<Multifunction input> Trace-back external trigger
12	<Multifunction input> Rotation speed DOWN command (MRH mode)	28	<Multifunction input> Second setting block selection
13	<Multifunction input> Rotation speed hold	29	<Multifunction input> Emergency stop input(B contact)
14	<Multifunction input> S-pattern acceleration/deceleration prohibited	30	Not used
15	<Multifunction input> Max rotation speed reduction	31	<Multifunction input> Rotation speed command terminal block selection

Data 1H: bit 28 to 31, Data 1L: bit 24 to 27, Data 2H: bit 20 to 23, Data 2L: bit 16 to 19
Data 3H: bit 12 to 15, Data 3L: bit 8 to 11, Data 4H: bit 4 to 7, Data 4L: bit 0 to 3

【Example】When making the 2nd setups block selection turn on by Data 4L, it is set to 0001B by a bit string. In hexadecimals, it is expressed as 01H and transmit data sets up 31H changed into the ASCII code.

(10)Command S·····Setups of a monitor request

In Command S, master station transmit data becomes the following.

* Top double byte is always 0 (30H).
* The remaining double byte is a monitor numbering of the monitor to demand.

Refer to Table 4.11 for the details.

An ASYC66-Z replies a data or a poor notice. Response data is 4 bytes of monitor data demanded from the

master station. When a monitor data is with decimal point, it is read as a data which removed decimal point.

In the figure of the following page, the monitor numbering of master station transmit data is set as the analog input voltage of 21 (=15H), and the case where an ASYC66-Z response data is 1000 (=3E8H) is expressed. The actual value of a response data is 10.00.

Table 4.11 Lists of Monitor data

Induction motor V/f Mode				Induction Motor Vector Mode/ ED Motor Vector Mode			
No.	Contents	Monitor data	Unit	No.	Contents	Monitor data	Unit
0	Output frequency	0.0 to max. frequency setting value	Hz	0	Motor speed	0 to max. speed setting value	r/min
1	Frequency command (set frequency)	0.0 to max. frequency setting value	Hz	1	Speed command (set speed)	0 to max. speed setting value	r/min
2	Output current(*2)	0.00 to Inverter rated current	A	2	Output current(*2)	0.000～Inverter rated current	A
3	Output torque	0 to 200	%	3	Output torque	0 to 200	%
4	DC voltage	0,0 to 800.0	V	4	DC voltage	0,0 to 800.0	V
5	Output voltage	0 to 480	V	5	Output voltage	0 to 480	V
6	Motor speed	0 to motor max. frequency	r/min	6	Output frequency	0.000～motor max. frequency	r/min
7	Overload counter	0 to 100	%	7	Overload counter	0 to 100	%
8	Line speed	0.0 to conversion value of gain setting	m/min	8	Line speed	0.0 to conversion value of gain setting	m/min
9	Motor temperature	0.0～150.0	℃	9	Motor temperature	0.0～150.0	℃
10	Input terminal check 1	0 to 11111(B)bit data	—	10	Input terminal check 1	0 to 11111(B)bit data	—
11	Input terminal check 2	0 to 11111(B)bit data	—	11	Input terminal check 2	0 to 11111(B)bit data	—
12	Input terminal check 3	0 to 11111(B)bit data	—	12	Input terminal check 3	0 to 11111(B)bit data	—
13	Input terminal check 4	0 to 111(B)bit data	—	13	Input terminal check 4	0 to 111(B)bit data	—
14	Output terminal check 1	0 to 1111(B)bit data	—	14	Output terminal check 1	0 to 1111(B)bit data	—
15	Output terminal check 2	0 to 1111(B)bit data	—	15	Output terminal check 2	0 to 1111(B)bit data	—
16	Cumulative operation time	0 to 65535	Hr	16	Cumulative operation time	0 to 65535	Hr
17	Remaining time of timer 1	0 to 65535	Hr	17	Remaining time of timer 1	0 to 65535	Hr
18	Remaining time of timer 2	0 to 65535	Hr	18	Remaining time of timer 2	0 to 65535	Hr
19	Main unit program version	0000 to FFFF(H)	—	19	Main unit program version	0000 to FFFF(H)	—
20	PLC function version	0000 to FFFF(H)	—	20	PLC function version	0000 to FFFF(H)	—
21	Analog input voltage (*1)	0.00 t0 10.00	V	21	Analog input voltage (*1)	0.00 t0 10.00	V
22	Monitor for adjustment	Our special monitor for adjustment	—	22	Monitor for adjustment	Our special monitor for adjustment	—

*1: The analog input voltage of a numbering 21 is chosen by the setting item G-16 of a VF66B inverter from AIN1-AIN5. Please refer to the operation manual of VF66B inverter for details.

*2: The output current differs in the decimal point location depending on the model of a VF66B inverter. Notice Table 4.12 about a reference depending on the model of a VF66B inverter at the handling of the output current

Table 4.12 The decimal point location of output current

VF66B Inverter type		Decimal point location	Example
200V series	400V series		
-	2R244 to 3R744	2	199.99
2R222 to 7522	5R544 to 16044	1	1999.9
9022 to 18022	20044 to 100044	0	19999

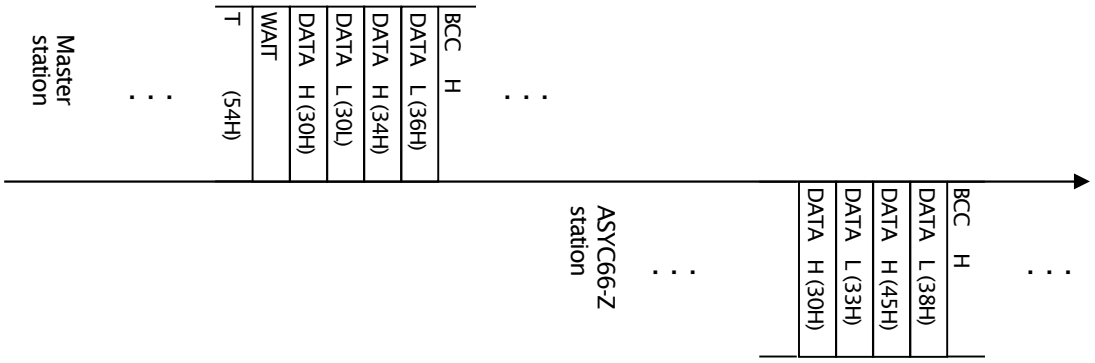
(11)Command T·····Setups of a setups data readout request

In Command T, master station transmit data is 4 bytes. When reading the setups data of the 1st setups block to 6 bits of a high order, 0 is set as them, and at the time of read-out of the 2nd setups block, 1 is set as them. The numbering of the setups data to read is set to 10 bits of low-orders.

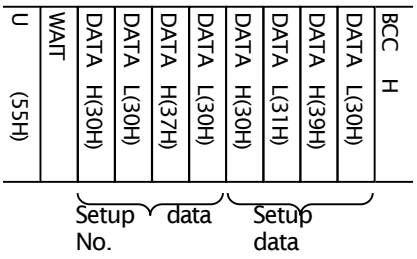
An ASYC66-Z replies a data or a poor notice. Response data is 4 bytes of setups data demanded from the master station. When a setups data is with decimal point, it is read as a data which removed decimal point.

Please ask separately about the setups data number of a VF66B inverter.

Since the master station transmit data is 70 (=46H), the following figure sets up the analog input 0 limit voltage of the 1st setups block, and expresses the case where an ASYC66-Z response data is 1000 (=3E8H). (The actual value of a response data is 1.000.)



(12)Command U·····Setups of a setups data change request



In Command U, master station transmit data is 4 bytes + 4 bytes of setuo data change request data. High order Word of a data sets up a setups block and a setups data number, and low-order Word is taken as the value of the setups data to change.

When reading the setups data of the 1st setups block, 0 is set up, and when reading the 2nd setups block, 1 is set as top 6 bits of high order Word. 10 bits of low-orders of high order Word set up the setups data number to read.

From a master station, since the data of high order Word is 112 (=70H), the acceleration time (3) of the 1st setups block is expressed, and since the data of low-order Word is 400 (=190H), the case where it is set as 40.0 [s] is expressed with the above figure.

Please ask separately about the setups data number of a VF66B inverter.

Refer to the operation manual of a VF66B inverter for the range of the setups data of a VF66B inverter.

There is no response data of an ASYC66-Z , and a comprehension code or a poor notice is replied.

(13)Command V·····Setups of a protection hysteresis readout request

In Command V, master station transmit data is a data of a double byte, and is as follows.

* Top 1 byte is always 0 (30H).

* Remaining 1 byte is a protection hysteresis numbering to demand.

Protection hysteresis numbering should set up 0-5 (30H-35H). The past 6 times of protection hysteresises can be read. 0 is the newest protection hysteresis.

An ASYC66-Z replies a data or a poor notice. Response data is 4 bytes of data. The low-order byte (bit0-7) of a data becomes a protection code, and bit8 and 9 are inverter modes (0:V/f control mode,.1:IM vector mode, 2:ED vector mode), and bit12 and 13 become a setups block (0:1st setups block, 1: the 2nd setups block). When there is no protection hysteresis specified from the master office, the protection code of the above-mentioned data is set to 0.

Refer to Table 4.13 for the further description of a protection code.

Since the transmit data of a master station is 1 (=31H), the following figure is a case where read-out of a new protection hysteresis is required of the 2nd, and an ASYC66-Z response data expresses the case of the external failure 2 (= 1DH) with the V/f control mode and the 1st setups block.

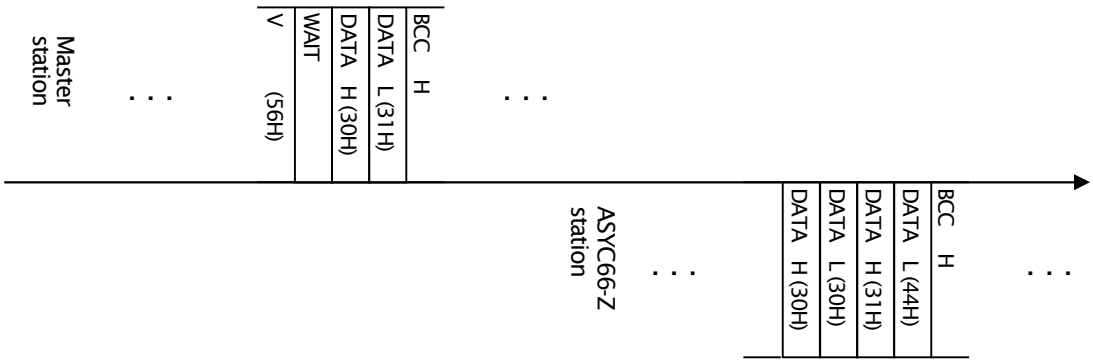


Table 4.13 Protection Codes

Code	Contents	Code	Contents	Code	Contents
1	Over-current protection	33	Gate amp board communication error (Master unit)	65	Gate amp board Power sorce error (Slave unit 3)
2	IGBT protection	34	Gate amp board Power sorce error (Master unit)	66	IGBT protection (phase U) (Slave unit 3)
3	Emergency stop A input contact is ON	35	IGBT protection (phase U) (Master unit)	67	IGBT protection (phase V) (Slave unit 3)
4	Emergency stop B input contact is OFF	36	IGBT protection (phase V) (Master unit)	68	IGBT protection (phase W) (Slave unit 3)
5	Gate PCB abnormality	37	IGBT protection (phase W) (Master unit)	69	Over voltage in DC. (Slave unit 3)
6	DC part over-voltage	38	Over Heat unit (phase U) (Master unit)	70	Over Heat unit (phase U) (Slave unit 3)
7	Overload protection	39	Fuse blowout (Master unit)	71	Fuse blowout (Slave unit 3)
8	Current sensor abnormality	40	FCL operation (Master unit)	72	Fan unit trouble (Slave unit 3)
9	Un-starting	41	Power source trouble (Master unit)	73	Control source trouble (Slave unit 3)
10	Over-speed protection	42	Fan unit trouble (Master unit)	74	MC response error (Master unit)
11	Over-frequency protection	43	Reserve	75	MC response error (Slave unit 1)
12	Insufficient voltage (Power failure)	44	Gate amp board communication error (Slave unit 1)	76	MC response error (Slave unit 2)
13	Over-torque protection	45	Gate amp board Power sorce error (Slave unit 1)	77	MC response error (Slave unit 3)
14	Unit overheat	46	IGBT protection (phase U) (Slave unit 1)	78	Over heat of converter unit (Master unit)
15	Storage memory abnormality	47	IGBT protection (phase V) (Slave unit 1)	79	Over heat of converter unit (Slave unit 1)
16	Option error	48	IGBT protection (phase W) (Slave unit 1)	80	Over heat of converter unit (Slave unit 2)
17	Sensor-less start error	49	Over voltage in DC. (Slave unit 1)	81	Over heat of converter unit (Slave unit 3)
18	Communication time-out error	50	Over Heat unit (phase U) (Slave unit 1)	82	VFDB1 error (Regeneration braking unit 1)
19	Speed control error	51	Fuse blowout (Slave unit 1)	83	VFDB2 error (Regeneration braking unit 2)
20	Motor overheat	52	Fan unit trouble (Slave unit 1)	84	VFDB3 error (Regeneration braking unit 3)
21	Charging resistor overheat	53	Control source trouble (Slave unit 1)	85	VFDB4 error (Regeneration braking unit 4)
22	FCL operation	54	Gate amp board communication error (Slave unit 2)	86	VFDB5 error (Regeneration braking unit 5)
23	Setting error	55	Gate amp board Power sorce error (Slave unit 2)	87	VFDB6 error (Regeneration braking unit 6)
24	Open phase	56	IGBT protection (phase U) (Slave unit 2)	88	Over Heat unit (phase V) (Master unit)
25	CPU processing abnormality	57	IGBT protection (phase V) (Slave unit 2)	89	Over Heat unit (phase W) (Master unit)
26	Fan failure	58	IGBT protection (phase W) (Slave unit 2)	90	Over Heat unit (phase V) (Slave unit 1)
27	PG error	59	Over voltage in DC. (Slave unit 2)	91	Over Heat unit (phase W) (Slave unit 1)
28	Sensor error	60	Over Heat unit (phase U) (Slave unit 2)	92	Over Heat unit (phase V) (Slave unit 2)
29	External failure 1	61	Fuse blowout (Slave unit 2)	93	Over Heat unit (phase W) (Slave unit 2)
30	External failure 2	62	Fan unit trouble (Slave unit 2)	94	Over Heat unit (phase V) (Slave unit 3)
31	External failure 3	63	Control source trouble (Slave unit 2)	95	Over Heat unit (phase W) (Slave unit 3)
32	External failure 4	64	Gate amp board communication error (Slave unit 3)		

(14)Command W·····Setups of 1 point trace back data readout request

Command W can read the data at the time of the past 6 times of protection states. Which protection state it is specifies with Command V.

Master station transmit data is a data of a double byte, and is as follows.

* Top 1 byte is always 0 (30H).
* Remaining 1 byte is a data number to demand.

Refer to Table 4.14 for a data number.

Please set 0-5 which are the data numbers to read (30H-35H) to a data. Refer to Table 4.14 for a data number.

An ASYC66-Z replies a data or a poor notice. A response data is 4 bytes of data, and when an one-point trace back data is with decimal point, it is read as a data which removed decimal point. Refer to Table 4.14 for the further description of a data.

Since the master office transmit data is 2 (=32H), the following figure expresses an output current read-out request of 1 point trace back data, and expresses that the response data of an ASYC66-Z station is 2986 (=BAAH). (The decimal point location changes by Table 4.12.)

Table 4.14 List of 1 point trace back data

Induction motor V/f Mode				Induction Motor Vector Mode/ ED Motor Vector Mode			
No.	Contents	Monitor data	Unit	No.	Contents	Monitor data	Unit
0	Frequency command	0.0 to max. frequency setting value	Hz	0	Speed command	0.0 to max. speed setting value	r/min
1	Output frequency	0.0 to max. frequency setting value	Hz	1	Motor speed	0.0 to max. speed setting value	r/min
2	Output current(*1)	0 to Inverter rated current	A	2	Output current (*1)	0 to Inverter rated current	A
3	Output voltage	0 to 480	V	3	Output voltage	0 to 480	V
4	DC voltage	0.0 to 800.0	V	4	DC voltage	0.0 to 800.0	V
5	Output torque	0 to 200	%	5	Output torque	0 to 200	%

*1: The output current differs in the decimal point location depending on the model of a VF66B inverter. Notice Table 4.12 about a reference depending on the model of a VF66B inverter at the handling of the output current

(15)Command W·····Setups of a trace back data readout request

In Command W, master station transmit data is a data of 2 byte + 2 byte, and is set up as follows.

* 1 byte of a head is a protection hysteresis numbering of 0-3 (30H-33H).
* The following 1 byte is a channel number of the trace back data to read.
* The remaining double byte is a sample point of the trace back data to read.

The trace back data can read the past 4 times of trace back data, and the protection hysteresis numbering 0 is the newest trace back data

A channel number should refer to those with 0 to 15 (30H to 45H), and refer to Table 4.15 for details.

Please set up the sample point of a trace back data out of 0 to 99.

An ASYC66-Z station replies a data or a poor notice. Response data is 4 bytes of data, and when a trace back data is with decimal point, it is read as a data which removed decimal point. Refer to Table 4.17 for the further description of a data.

By the following figure, since 1 byte of head of master office transmit data is 1 (=31H), a current data is shown in the 2nd. Since the following double byte is 2 (=32H), the data (W phase output current) of a channel 2 is shown, and since the remaining double byte is 50 (=33H, 32H), it is a case where the data of the 50th point is set up.

The data expressed as -200.0 by an ASYC66-Z response data is set to -2000 (=F830H). (The decimal point location changes by Table 4.12.)

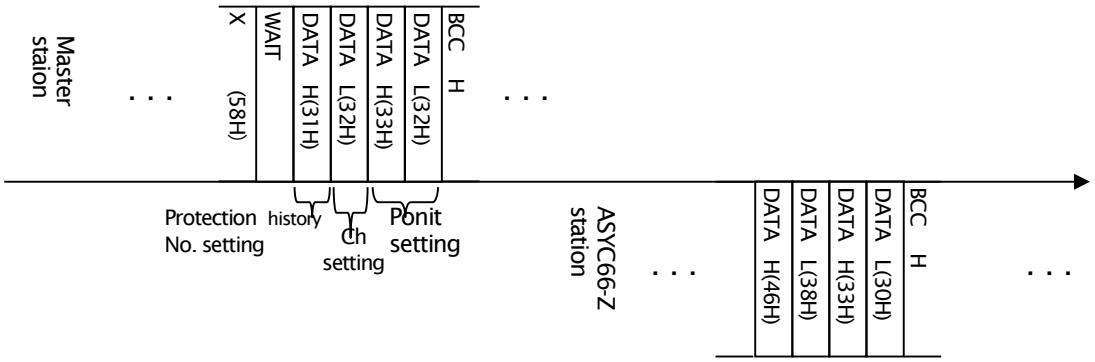


Table 4.15 Trace back data configuration table

Ch	Induction motor V/f Mode	IM Vector Mode/ ED Motor Vector Mode	Point 00	Point 99
Ch 0	U phase current (Instantaneous value)	U phase current (Instantaneous value)	data	data
Ch 1	V phase current (Instantaneous value)	V phase current (Instantaneous value)	〃	〃
Ch 2	W phase current (Instantaneous value))	W phase current (Instantaneous value))	〃	〃
Ch 3	DC voltage	DC voltage	〃	〃
Ch 4	Output voltage (Actual value)	Output voltage (Actual value)	〃	〃
Ch 5	Not used	Motor speed	〃	〃
Ch 6	Frequency command	Speed command	〃	〃
Ch 7	Torque command	Torque command	〃	〃
Ch 8	Output frequency	Output frequency	〃	〃
Ch 9	Not used	Slip frequency / d-axis current(*1)	〃	〃
Ch10	Not used	Flux command / q-axis current(*1)	〃	〃
Ch11	Motor temperature	Motor temperature / d-axis position(*1)[1]	〃	〃
Ch12	Failure flag (1)	Failure flag (1)	〃	〃
Ch13	Failure flag (2)	Failure flag (2)	〃	〃
Ch14	Inverter status flag	Inverter status flag (*2)	〃	〃
Ch15	Inverter command flag	Inverter command flag (*2)	〃	〃

*1: The left shows IM vector mode and the right shows the description of the ED motor vector mode.

*2: Refer to Table 4.16 for a status flag and a command flag.

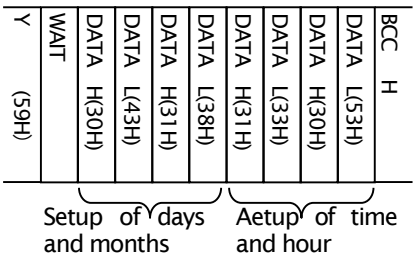
Table 4.16 Lists of flag

Status Flags				Command Flags			
Bit	Contents	Bit	Contents	Bit	Contents	Bit	Contents
0	Under normal operation or jog operation commnad input	8	Excitation	0	Normal operation command	8	DC excitation command
1	Under inverter operation	9	DC brake	1	Jog operation command	9	0 speed maintenance command
2	Jog operation	10	Stronger flux when starting	2	Reverse command	10	Automatic measuring command
3	Reverse command	11	Not used (Undefined)	3	Excitation command	11	Emergency B-contact command
4	DC excitation	12	Not used (Undefined)	4	DC brake command	12	Not used (Undefined)
5	Power failure	13	Reverse command state just before operation	5	Reset command	13	Not used (Undefined)
6	Automatic measuring	14	Not used (Undefined)	6	Initial excitation command	14	Not used (Undefined)
7	Energization	15	High speed current limiting FCL in operation	7	Emergency stop command	15	Constant recalculation request
Protection flags (1)				Protection flags (2)			
Bit	Contents	Bit	Contents	Bit	Contents	Bit	Contents
0	Over current protection	8	Starting stagnation	0	Setting error	8	External failure 3
1	IGBT protection	9	Over-speed protection	1	Open phase	9	External failure 4
2	Input contact of emergency stop A is ON	10	Over-frequency protection	2	CPU processing abnormality	10	Gate amp board communication error (Master unit)
3	Input contact of emergency stop B is OFF	11	Insufficient voltage (Power failure)	3	Fan failure	11	Gate amp board Power sorce error (Master unit)
4	Gate PCB abnormality	12	Over-torque protection	4	PG error	12	IGBT protection (phase U) (Master unit)
5	DC part over-voltage	13	Unit overheat	5	Sensor error	13	IGBT protection (phase V) (Master unit)
6	Overload protection	14	Storage memory abnormality	6	External failure 1	14	IGBT protection (phase W) (Master unit)
7	Current sensor abnormality	15	Option error	7	External failure 2	15	Over Heat unit (Master unit)

Table 4.17 Trace back data

Ch	Induction motor V/f Mode	IM Vector Mode/ ED Motor Vector Mode	Scale
Ch 0	U phase current (Instantaneous value)	U phase current (Instantaneous value)	2357/Inverter rated current [A]
Ch 1	V phase current (Instantaneous value)	V phase current (Instantaneous value)	
Ch 2	W phase current (Instantaneous value))	W phase current (Instantaneous value))	
Ch 3	DC voltage	DC voltage	10/1[V] (200V series) 5/1[V] (400V series)
Ch 4	Output voltage (Actual value)	Output voltage (Actual value)	20/1[V] (200V series) 10/1[V] (400V series)
Ch 5	Not used	Motor speed	20000/Max.rotation speed (frequensy)
Ch 6	Frequency command	Speed command	
Ch 7	Torque command	Torque command	5000/100[%]
Ch 8	Output frequency	Output frequency	20000/Mxa. frequency
Ch 9	Not used	Slip frequency / d-axis current(*1)	20000/Max. freqiency 10000/ Inverter rated current [A]
Ch10	Not used	Flux command / q-axis current(*1)	1024/100[%] 10000/ Inverter rated current [A]
Ch11	Motor temperature	Motor temperature / d-axis position(*1)[1]	10/[℃] 65536/360 [deree]
Ch12	Failure flag (1)	Failure flag (1)	Refer to table 4.12
Ch13	Failure flag (2)	Failure flag (2)	
Ch14	Inverter status flag	Inverter status flag	
Ch15	Inverter command flag	Inverter command flag	

(16)Command Y·····Time-of-day transfer request is set up.



In Command Y, master station transmit data is 4-byte +4 bytes of data. Days and months of the 1st 4 bytes are set up, and the time (time of a 24-hour military method) of the 2nd 4 bytes is set up.

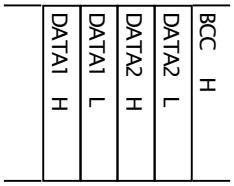
A data expresses with the double byte of an ASCII code from a head what was written in hexadecimals in order of the part at the moon, a day, and the time.

The transmitted time-of-day intelligence is taken in as an intelligence on the protection occurrence time of the trace back data of a VF66B inverter.

The above figure expresses the case where 19:05 on December 24 are set up.

There is no response data of an ASYC66-Z , and a comprehension code or a poor notice is replied.

(17)Command Z····· It is an extended multifunctional output state data of a VF66B inverter.



Command Z do not have master station transmitting data.

An ASYC66-Z replies a data or a poor notice. Response data is the extended multifunctional output state of a VF66B inverter, and is 4 bytes of data.

Refer to Table 4.18 for the details of data.

Table 4.18 Response data of extended multifunctional output state

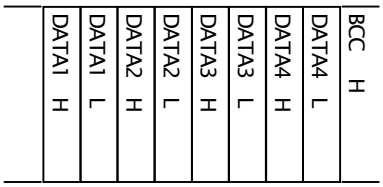
Bit	Contents	Bit	Content
0	Under operation	8	Not used
1	No function	9	Not used
2	Goes through the preset value of timer 1	10	Not used
3	Goes through the preset value of timer 2	11	Not used
4	Not used	12	Not used
5	Not used	13	Not used
6	Not used	14	Not used
7	Not used	15	Not used

Each bit is set to 1 when it changes into the state where it indicated by the contents. It is 0 except the state.

The relation of the response data in communication and a bit is as follows.

Data 1H: bit 12 to 15, Data 1L: bit 8 to 11, Data 2H: bit 4 to 7, Data 2L: bit 0 to 3

(18)Command k·····It is a protection-state data of VF66B inverter.



Command k do not have master station transmitting data.

An ASYC66-Z replies a data or a poor notice. Response data is the extended protection state 1 of a VF66B inverter, and is 8 bytes of data.

Refer to Table 4.19 for the details of data.

Table 4.19 Response data of extended protection state 1

Bit	Contents	Console display	Bit	Contents	Console display
0	Gate amp board communication error (Master unit)	Gnt	16	Over voltage in DC. (Slave unit 1)	G1oV
1	Gate amp board Power sorce error (Master unit)	GnP	17	Over Heat unit (phase U) (Slave unit 1)	G1H1
2	IGBT protection (phase U) (Master unit)	Gn1	18	Fuse blowout (Slave unit 1)	G1Fu
3	IGBT protection (phase V) (Master unit)	Gn2	19	Fan unit trouble (Slave unit 1)	G1FF
4	IGBT protection (phase W) (Master unit)	Gn3	20	Control source trouble (Slave unit 1)	G1CE
5	Over Heat unit (phase U) (Master unit)	GnH1	21	Gate amp board communication error (Slave unit 2)	G2t
6	Fuse blowout (Master unit)	GnFu	22	Gate amp board Power sorce error (Slave unit 2)	G2P
7	FCL operation (Master unit)	GFCL	23	IGBT protection (phase U) (Slave unit 2)	G21
8	Power source trouble (Master unit)	GPPE	24	IGBT protection (phase V) (Slave unit 2)	G22
9	Fan unit trouble (Master unit)	GnFF	25	IGBT protection (phase W) (Slave unit 2)	G23
10	Not used		26	Over voltage in DC. (Slave unit 2)	G2oV
11	Gate amp board communication error (Slave unit 1)	G1t	27	Over Heat unit (phase U) (Slave unit 2)	G2H1
12	Gate amp board Power sorce error (Slave unit 1)	G1P	28	Fuse blowout (Slave unit 2)	G2Fu
13	IGBT protection (phase U) (Slave unit 1)	G11	29	Fan unit trouble (Slave unit 2)	G2FF
14	IGBT protection (phase V) (Slave unit 1)	G12	30	Control source trouble (Slave unit 2)	G2CE
15	IGBT protection (phase W) (Slave unit 1)	G13	31	Gate amp board communication error (Slave unit 3)	G3t

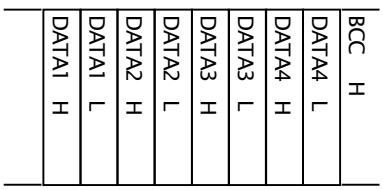
Each bit is set to 1 when it changes into the state where it indicated by the contents. It is 0 except the state.

The relation of the response data in communication and a bit is as follows.

Data 1H: bit 28 to 31, Data 1L: bit 24 to 27, Data 2H: bit 20 to 23, Data 2L: bit 16 to 19

Data 3H: bit 12 to 15, Data 3L: bit 8 to 11, Data 4H: bit 4 to 7, Data 4L: bit 0 to 3

(19)Commnad m·····It is a protection-state data of VF66B inverter.



Command m do not have master station transmitting data

An ASYC66-Z replies a data or a poor notice. Response data is the extended protection states 2 of a VF66B inverter, and is 8 bytes of data.

Refer to Table 4.20 for the details of data.

Table 4.20 Response data of extended protection state 2

Bit	Contents	Console display	Bit	Contents	Console display
0	Gate amp board Power sorce error (Slave unit 3)	G 3 P	16	Over heat of converter unit (Slave unit 3)	G 3 c H
1	IGBT protection (phase U) (Slave unit 3)	G 3 1	17	VFDB1 error (Regeneration braking unit 1)	d b 1
2	IGBT protection (phase V) (Slave unit 3)	G 3 2	18	VFDB2 error (Regeneration braking unit 2)	d b 2
3	IGBT protection (phase W) (Slave unit 3)	G 3 3	19	VFDB3 error (Regeneration braking unit 3)	d b 3
4	Over voltage in DC. (Slave unit 3)	G 3 o V	20	VFDB4 error (Regeneration braking unit 4)	d b 4
5	Over Heat unit (phase U) (Slave unit 3)	G 3 H 1	21	VFDB5 error (Regeneration braking unit 5)	d b 5
6	Fuse blowout (Slave unit 3)	G 3 F u	22	VFDB6 error (Regeneration braking unit 6)	d b 6
7	Fan unit trouble (Slave unit 3)	G 3 F F	23	Over Heat unit (phase V) (Master unit)	G n H 2
8	Control source trouble (Slave unit 3)	G 3 C E	24	Over Heat unit (phase W) (Master unit)	G n H 3
9	MC response error (Master unit)	G n n C	25	Over Heat unit (phase V) (Slave unit 1)	G 1 H 2
10	MC response error (Slave unit 1)	G 1 n C	26	Over Heat unit (phase W) (Slave unit 1)	G 1 H 3
11	MC response error (Slave unit 2)	G 2 n C	27	Over Heat unit (phase V) (Slave unit 2)	G 2 H 2
12	MC response error (Slave unit 3)	G 3 n C	28	Over Heat unit (phase W) (Slave unit 2)	G 2 H 3
13	MC response error (Master unit)	G n c H	29	Over Heat unit (phase V) (Slave unit 3)	G 3 H 2
14	MC response error (Slave unit 1)	G 1 c H	30	Over Heat unit (phase W) (Slave unit 3)	G 3 H 3
15	MC response error (Slave unit 2)	G 2 c H	31	Not used	

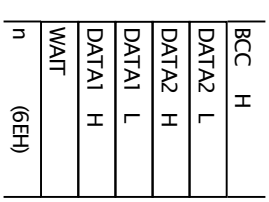
Each bit is set to 1 when it changes into the state where it indicated by the contents. It is 0 except the state. Moreover, a bit 31 is always set to 0.

The relation of the response data in communication and a bit is as follows.

Data 1H: bit 28 to 31, Data 1L: bit 24 to 27, Data 2H: bit 20 to 23, Data 2L: bit 16 to 19

Data 3H: bit 12 to 15, Data 3L: bit 8 to 11, Data 4H: bit 4 to 7, Data 4L: bit 0 to 3

(20)Commnad n·····Extended multifunctional input command is performed.



In Command n, master station transmit data is 4 bytes of data. Although each data is bit data and a functionality is assigned for every bit, since there is no functionality currently assigned to each bit, please do not use it.

There is no response data of an ASYC66-Z , and a comprehension code or a poor notice is replied.

(21)Commnad p·····Package read-out request is set up.

Command p reads a monitor data, a protection hysteresis, an 1 point trace back data, or a trace back data by package from a VF66B inverter.

Master office transmit data is 4 bytes. Refer to Table 4.21 for a data content.

An ASYC66-Z replies a data or a poor notice. The data in which 4 bytes of head shows master station transmit data, and a response data continues after that is a requested data. Refer to Table 4.22 for the further description of a requested data. When there is no requested data, it becomes a data of what set top 4 bits of 4 bytes of head to 15. In this case, data length becomes 4 bytes.

When there is a requested data, 104 bytes which totaled 4 bytes of master station transmit data and 100 bytes of requested data become data length. However, only the effective data length of Table 4.22 becomes an effective data from the head of a requested data.

In the following figure, since all master office transmit data are 0, they express the case where a monitor request is set up.

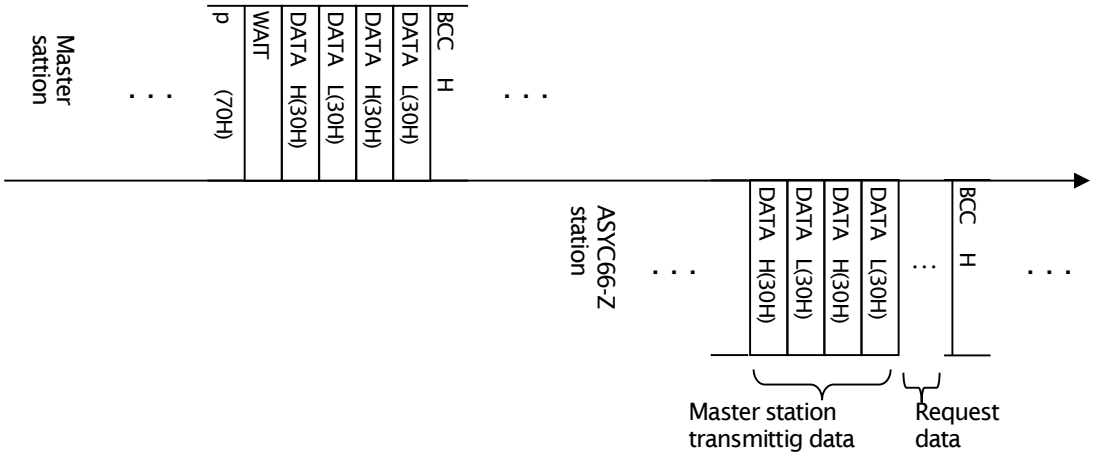


Table 4.21 Data of package read-out

Requirement	DATA		Near processing time [ms]
	Top 4 bits	12 bits of low-orders	
Monitor request	0	0	15 to 20
Protection hysteresis request	2	0	15 to 20
Request of 1 point trace back data	3	The numbering which distinguishes a protection hysteresis is 0 to 5. The protection with the newest numbering 0 is shown.	15 to 20
Request of trace back data	4	Top 4 bits : A numbering 0 shows the newest data and a numbering 15 shows the oldest data. Middle 4 bits : Channel number Low 4 bits : Sample point 0(0 to 24), 1(25 to 49), 2(50 to 74), 3(75 to 99)	260 to 280

Table 4.22 The description of a data in package read-out

Read-out data	Data content	Effective data length
Monitor data	Data of Table 4.11. Data is transmitted in order of Table 4.11.	92 bytes
Protection temporal data	6 times of protection hysteresis codes are transmitted from the newest protection hysteresis. Protection code is referring to Table 4.13.	24 bytes
1 point trace back data	Data of Table 4.14. Data is transmitted in order of Table 4.14.	24 bytes
Trace back data	Data of Table 4.15. Data is transmitted in order of a sample point.	100 bytes

4.5 Communication format of RS422

* Composition of a communication format

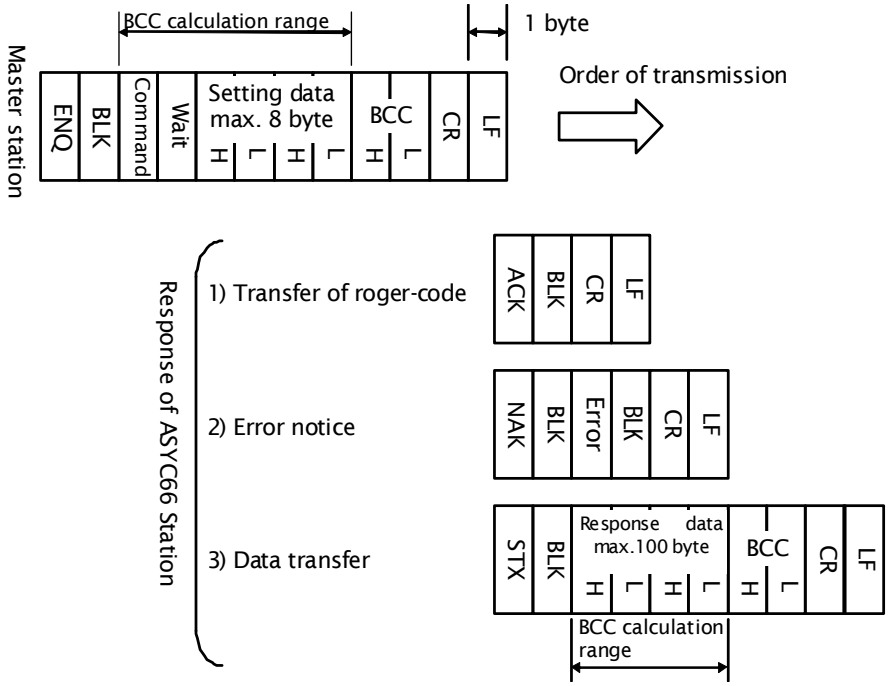


Figure 4.5 Communication format of RS232C

Communication data format serves as the form where the station code was omitted from the communication data format of RS-422 / RS485 (Toyo scheme).

The reply from an ASYC66-Z becomes since the longest time in the processing time and the compulsive latency time passes after ASYC66-Z completes a reception. Refer to Table 4.3 for the processing time and the compulsive latency time.

Time after a transmission of an ASYC66-Z station is completed until it becomes ready for receiving ability is a maximum of 4 [ms].

Communication data, Errorcode, Command data, Master station transmit data, Slave station response data

Communication data, errorcode, command data, master sttion transmit data, and slave station response data are the same as RS-422 / RS485 (Toyo scheme). Refer to Table 4.4, Table 4.5, and table 4.6 grade.

4.6 Communication format of RS485 (Modbus RTU)

* Composition of a communication format

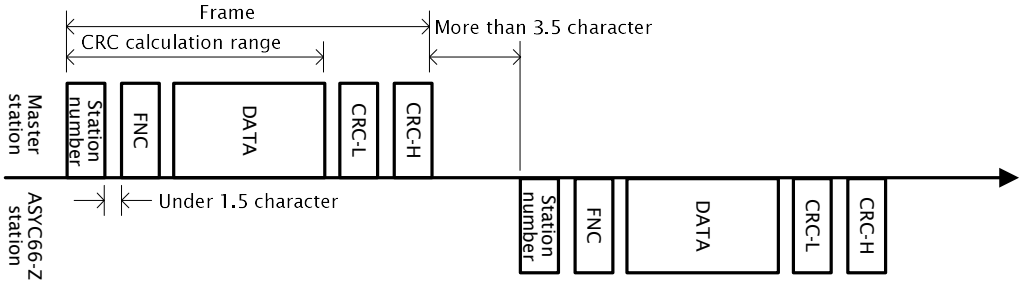


Figure 4.6 Communication format of RS485 (Modbus RTU)

In Modbus RTU, SW5 is turned ON.

A communication form serves as configuration object same as a master station and ASYC66-Z station.

A communication frame becomes from the signal after the non-signal status of 3.5 or more character lengths to the non-signal status of 3.5 or more character lengths. If there is a non-signal status of 1.5 or more character lengths in the middle of a communication frame, the communication frame will become invalid. 1 character length is an 11/baud rate [s]. However, when a baud rate exceeds 19200 [bps], 3.5 character lengths set to 1.75 [ms], and 1.5 character lengths are uniformly set to 0.75 [ms].

When connecting two or more ASYC66-Z stations, the transmit data of a master station is sent to all the ASYC66-Z stations, and only when its station code set to the station code specified by the communication data is the same, it answers by the ASYC66-Z station side.

The reply from an ASYC66-Z station becomes since the longest time in the processing time after ASYC66-Z completes a reception, communication blank time, and the compulsive latency time passes. Refer to Table 4.23 for the processing time, telecommunication blank time, and the compulsive latency time.

Table 4.23 Reply time from an ASYC66-Z station

Name	Contents
Processing time	It changes with each commands. Refer to Table 4.6 for an approximate value.
communication blank time	Time for 3.5 characters (*1)
Compulsive latency time	This time is set up by the setting item J-07 of VF66B inverter. Refer to the operation manual of VF66B inverter for details.

Time after an ASYC66-Z station completes a transmission until it becomes ready for receiving ability is below 1 [ms].

*Communication data

Table 4.24 Instruction of the symbol of a communication format

Mark	Data length	Contents
Station numbet	1 byte	In a master station, the value of 0-247 is taken and, in the case of 0, it becomes the broadcast transmission which transmits to all the slave stations (ASYC66-Z station). In an ASYC66-Z station, it becomes the same value as a master station except for 0.
FNC	1 byte	It is a function code. Refer to Table 4.25.
DATA	1 bytes or more	It becomes a data according to a function code (FN C).
CRC(*1)	2 byte	It is an error-checking field of all the transmit data (refer to Fig. 4.6) except CRC by the algorithm of CRC16.

*1: CRC calculates a station number, and FNC and DATA with the function of the following page.

```
int CRC16(unsigned char *puchMsg, int usDataLen)
{
/* Table of CRC values for high.order byte */
static const unsigned char auchCRCHi[] = {
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81,
0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81,
0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01,
0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81,
0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81,
0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0,
0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01,
0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81,
0x40
};
/* Table of CRC values for low.order byte */
static const char auchCRCLo[] = {
0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06, 0x07, 0xC7, 0x05, 0xC5, 0xC4,
0x04, 0xCC, 0x0C, 0x0D, 0xCD, 0x0F, 0xCF, 0xCE, 0x0E, 0x0A, 0xCA, 0xCB, 0x0B, 0xC9, 0x09,
0x08, 0xC8, 0xD8, 0x18, 0x19, 0xD9, 0x1B, 0xDB, 0xDA, 0x1A, 0x1E, 0xDE, 0xDF, 0x1F, 0xDD,
0x1D, 0x1C, 0xDC, 0x14, 0xD4, 0xD5, 0x15, 0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3,
0x11, 0xD1, 0xD0, 0x10, 0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3, 0xF2, 0x32, 0x36, 0xF6, 0xF7,
0x37, 0xF5, 0x35, 0x34, 0xF4, 0x3C, 0xFC, 0xFD, 0x3D, 0xFF, 0x3F, 0x3E, 0xFE, 0xFA, 0x3A,
0x3B, 0xFB, 0x39, 0xF9, 0xF8, 0x38, 0x28, 0xE8, 0xE9, 0x29, 0xEB, 0x2B, 0x2A, 0xEA, 0xEE,
0x2E, 0x2F, 0xEF, 0x2D, 0xED, 0xEC, 0x2C, 0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26,
0x22, 0xE2, 0xE3, 0x23, 0xE1, 0x21, 0x20, 0xE0, 0xA0, 0x60, 0x61, 0xA1, 0x63, 0xA3, 0xA2,
0x62, 0x66, 0xA6, 0xA7, 0x67, 0xA5, 0x65, 0x64, 0xA4, 0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F,
0x6E, 0xAE, 0xAA, 0x6A, 0x6B, 0xAB, 0x69, 0xA9, 0xA8, 0x68, 0x78, 0xB8, 0xB9, 0x79, 0xBB,
0x7B, 0x7A, 0xBA, 0xBE, 0x7E, 0x7F, 0xBF, 0x7D, 0xBD, 0xBC, 0x7C, 0xB4, 0x74, 0x75, 0xB5,
0x77, 0xB7, 0xB6, 0x76, 0x72, 0xB2, 0xB3, 0x73, 0xB1, 0x71, 0x70, 0xB0, 0x50, 0x90, 0x91,
0x51, 0x93, 0x53, 0x52, 0x92, 0x96, 0x56, 0x57, 0x97, 0x55, 0x95, 0x94, 0x54, 0x9C, 0x5C,
0x5D, 0x9D, 0x5F, 0x9F, 0x9E, 0x5E, 0x5A, 0x9A, 0x9B, 0x5B, 0x99, 0x59, 0x58, 0x98, 0x88,
0x48, 0x49, 0x89, 0x4B, 0x8B, 0x8A, 0x4A, 0x4E, 0x8E, 0x8F, 0x4F, 0x8D, 0x4D, 0x4C, 0x8C,
0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42, 0x43, 0x83, 0x41, 0x81, 0x80,
0x40
};
unsigned char uchCRCHi=0xFF;
unsigned char uchCRCLo=0xFF;
unsigned char uIndex;
        do
        {
                usDataLen--;
                uIndex = uchCRCLo ^ *puchMsg++ ;
                uchCRCLo = uchCRCHi ^ auchCRCHi[uIndex] ;
                uchCRCHi = auchCRCLo[uIndex] ;
        }
        while(usDataLen);
        return (uchCRCHi << 8 | uchCRCLo) ;
}
unsigned char *puchMsg : The head address of a routing
int usDataLen : The number of routings
```

***Function code**

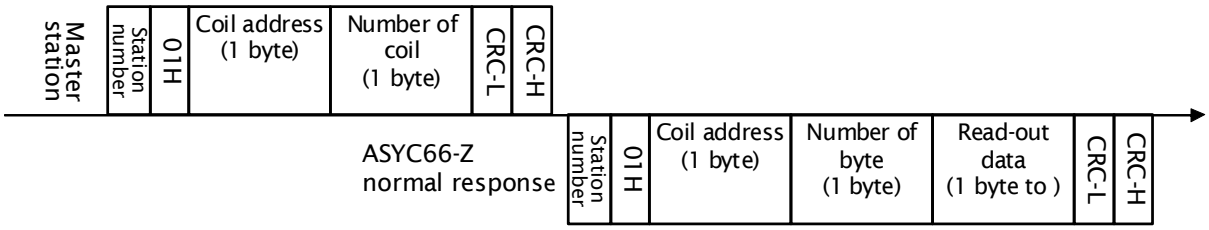
Function code of Modbus RTU is shown in Table 4.25.

Table 4.25 Modbus RTU function code

FNC	Contents	Near processing time [ms]	Specification of WAIT time (*1)
01H	Coil (bit information) read-out	0 to 4	
03H	Function read-out	Request of trace back data : 260 to 280 Request of setups data : 20 to 30 Others : 15 to 20	It is set to 0 (infinite) only at the time of a trace back data request.
05H	Coil (bit information) write-in	4	Specification possible
06H	Single function write-in	Request of setups data: 15 to 20 Others : 0 to 4	Specification possible
08H	Maintenance code	0 to 4	
0Fh	Succession coil write-in	0 to 4	Specification possible
80H -	Exception response	0 to 4	

*1: After an ASYC66-Z station receives a normal frame, even if the compulsive latency time + wait time pass, when a normal frame is not received, the datas of a write-in coil etc. are reset to an initial state. Wait time will become infinite if weight time is set to 0. The weight time at the time of power activation is 0 (infinite), is receiving Federal Networking Council which can specify weight time, and can update weight time. It recommends considering it as compulsive latency time + wait time longer than the near processing time of Table 4.25.

(1) Coil (bit information) read-out·····The bit information on a master station to an ASYC66-Z station is read.



The coil address specifies the coil address of the head of the coil to read. Refer to Table 4.26 for the coil address.

A byte count is a byte count of a read-out data.

The number of coils specified in order of the coil address is stored in the read-out data considering the coil specified in the coil address as the 1st byte of a LSB.

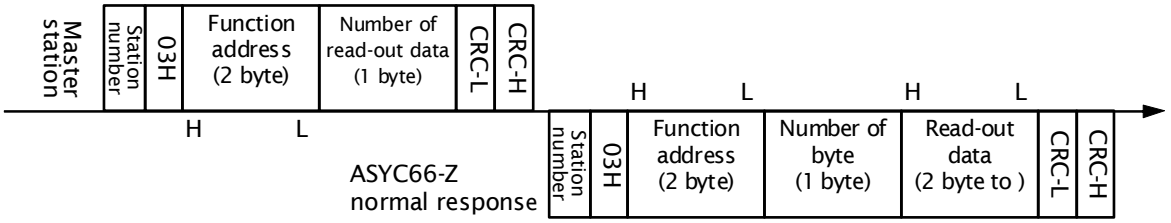
For example, if the coil address is set to 17 and the number of coils is set to 9, a byte count will serve as a double byte. The 1st byte of LSB of a read-out data shows a "Over-current protection", is stored in sequence, such as "IGBT protection", toward MSB, and MSB serves as "Current sensor abnormality." "A start-up delay" is stored in the next byte's LSB, and 0 is stored in the remaining 7 bits.

When there is a specification of the coil address and the number of coils which read the 114 or more coil addresses, it becomes an exception response of "the inaccurate address." Refer to (7) for an exception response.

Table 4.26 List of readout ciol

Ciol Address	The contents of a coil	Remark	Ciol Address	The contents of a coil	Remark	Ciol Address	The contents of a coil	Remark
0	Under normal operation or jog operation commnad input	Operational status	38	FCL operation	Protection state	76	Over Heat unit (phase U) (Slave unit 2)	Protection state
1	Under inverter operation (During slowdown stop operation)		39	Setting error		77	Fuse blowout (Slave unit 2)	
2	Jog operation		40	Open phase		78	Not used	
3	Reverse command		41	CPU processing abnormality		79	Not used	
4	DC excitation		42	Fan failure		80	Gate amp board communication error (Slave unit 3)	
5	Power failure		43	PG error		81	Gate amp board Power sorce error (Slave unit 3)	
6	Automatic measuring		44	Sensor error		82	IGBT protection (phase U) (Slave unit 3)	
7	Energization		45	External failure 1		83	IGBT protection (phase V) (Slave unit 3)	
8	Initial excitation		46	External failure 2		84	IGBT protection (phase W) (Slave unit 3)	
9	DC brake		47	External failure 3		85	Over voltage in DC. (Slave unit 3)	
10	Not used		48	External failure 4		86	Over Heat unit (phase U) (Slave unit 3)	
11	Not used		49	Gate amp board communication error (Master unit)		87	Fuse blowout (Slave unit 3)	
12	Not used		50	Gate amp board Power sorce error (Master unit)		88	Not used	Multifunctional output state
13	Not used		51	IGBT protection (phase U) (Master unit)		89	Not used	
14	Not used		52	IGBT protection (phase V) (Master unit)		90	Not used	
15	Not used		53	IGBT protection (phase W) (Master unit)		91	Rotation speed detection (1) (Rotation speed = Detection setting (1))	
16	Under protection operation	Protection state	54	Over Heat unit (phase U) (Master unit)		92	Rotation speed detection (1) (Rotation speed ≥ Detection setting (1))	
17	Over-current protection		55	Fuse blowout (Master unit)		93	Rotation speed detection (1) (Rotation speed ≤ Detection setting (1))	
18	IGBT protection		56	FCL operation (Master unit)		94	Rotation speed detection (2) (Rotation speed = Detection setting (2))	
19	Not used		57	Power source trouble (Master unit)		95	Rotation speed detection (2) (Rotation speed ≥ Detection setting (2))	
20	Not used		58	Not used		96	Rotation speed detection (2) (Rotation speed ≤ Detection setting (2))	
21	Gate PCB abnormality		59	Not used		97	Setting attainment	
22	DC part over-voltage		60	Gate amp board communication error (Slave unit 1)		98	Torque detection	
23	Overload protection		61	Gate amp board Power sorce error (Slave unit 1)		99	Absolute value of torque detection	
24	Current sensor abnormality		62	IGBT protection (phase U) (Slave unit 1)		100	Under power failure	
25	Un-starting		63	IGBT protection (phase V) (Slave unit 1)		101	Overload pre-alarm	
26	Over-speed protection		64	IGBT protection (phase W) (Slave unit 1)		102	Retrying	
27	Over-frequency protection		65	Over voltage in DC. (Slave unit 1)		103	In reverse	
28	Insufficient voltage (Power failure)		66	Over Heat unit (phase U) (Slave unit 1)		104	Selecting second setting block	
29	Over-torque protection		67	Fuse blowout (Slave unit 1)		105	Under fan motor failure	
30	Unit overheat		68	Not used		106	Under operation	
31	Storage memory abnormality		69	Not used		107	Not used	
32	Option error		70	Gate amp board communication error (Slave unit 2)		108	Transit of a timer 1	
33	Sensor-less start error		71	Gate amp board Power sorce error (Slave unit 2)		109	Transit of a timer 2	
34	Communication time-out error		72	IGBT protection (phase U) (Slave unit 2)		110	Not used	
35	Speed control error		73	IGBT protection (phase V) (Slave unit 2)		111	Not used	
36	Motor overheat		74	IGBT protection (phase W) (Slave unit 2)		112	Not used	
37	Charging resistor overheat		75	Over voltage in DC. (Slave unit 2)		113	Not used	

(2) Function read-out ·····The data of a master station to an ASYC66-Z station is read.



Refer to Table 4.27 for the function address.

The number of read-out datas specifies the required number of read-out datas.

A byte count is a byte count of a read-out data, and is twice the value of the number of read-out datas.

A read-out data is a word unit of measure, and serves as order of a high-order byte and a low-order byte.

When it is except that the function address and the number of read-out datas were indicated to be to Table 4.27, it becomes an exception response of "the inaccurate address."

When top 4 bits of the function address are five or more, it becomes an exception response of "other errors."

Refer to (7) for an exception response.

By an one-point trace back data request and trace back data request, when there is no specified data, an ASYC66-Z station sets top 4 bits of the function address to 15, and answers considering a byte count as 0. Refer to Table 4.14 for the trace back 1 point. Refer to Tables 4.15, 4.16, and 4.17 for a trace back data.

When the data of the specification by a monitor request and setups data request is intact, and when there is no protection hysteresis at a protection hysteresis request, an ASYC66-Z office answers 0. Please have an operation manual of a VF66B inverter referred to for a setups data, and ask separately about a setups data number.

As for the read-out data of a protection hysteresis request, a protection code is set to a low-order byte (bit0-7), inverter mode is set to bit8 and 9, a setups block is set to bit12 and 13, and 0 is set to bit10, 11, 14 and 15. Refer to Table 4.18 for a protection code. In a V/f control, 0 is set to inverter mode, in the case of IM vector, 1 is set to it, and, in the case of ED vector, 2 is set to it. In the 1st setups block, 0 is set to a setups block, and, in the 2nd setups block, 1 is set to it. Refer to the operation manual of a VF66B inverter for the further description about inverter mode and a setups block.

Refer to Table 4.11 for the read-out data of a monitor request.

Table 4.27 List of function address

Requirement	Function address		Number of read-out data	Transmitting sequence of a read-out data
	Top 4 bits	12 bits of low-orders		
Monitor request	0	Numbering of Table 4.11	The sum with a left column value is 25 or less.	Sequence of Table 4.11
Request of setups data	1	Top 2 bits 00: 1st setups block 01: 1st setups block 10 bits of low-orders Setups data number	10 or less	The sequence whose numbering increases a setups data number at the head
Protection hysteresis request	2	0	6	From the newest protection hysteresis
Request of 1 point trace back data	3	The numbering of the protection hysteresis of 1 point trances back data to demand (0 is the newest)	6	Sequence of Table 4.13
Request of trace back data	4	Top 4 bits : A numbering 0 shows the newest data and a numbering 15 shows the oldest data. Middle 4 bits : Channel number Low 4 bits : Sample point 0(0 to 24), 1(25 to 49), 2(50 to 74), 3(75 to 99)	25	Sequence of a sample point

(3) Coil (bit information) write-in ·····The bit information from a master station to an ASYC66-Z station is written in.

The coil address specifies the coil address of the coil to write in. Refer to Table 4.28 for the coil address.
When there is a 40 or more coil addresses specification, it becomes an exception response of "the inaccurate address." Refer to (7) for an exception response.
That to which WAIT increased the value 10 times serves as specification WAIT time in a unit of measure [ms] (refer to Table 4.25).
A data specifies FFH by ON and specifies 00H in OFF. In other than the following, it becomes an exception response of "the inaccurate address." Refer to (7) for an exception response.

Table 4.28 List of write-in coil

Ciol Address	The contents of a coil	Remark	Ciol Address	The contents of a coil	Remark
0	Operation command	Operational command	17	Speed/torque control selection	Multifunctional input
1	Jog command		18	Forward/reverse operation command selection	
2	Reverse command		19	External failure signal 1 (Protection relay 86A active)	
3	Initial excitation command		20	External failure signal 2(Protection relay 86A active)	
4	DC brake command		21	External failure signal 3 (Protection relay 86A active)	
5	Protection status reset (*1)		22	External failure signal 4(Protection relay 86A active)	
6	Preset speed selection 000: Presetting un-using it. 001: Preset rotational-speed selection 1 010: Preset rotational-speed selection 2 011: Preset rotational-speed selection 3 100: Preset rotational-speed selection 4 101: Preset rotational-speed selection 5 110: Preset rotational-speed selection 6 111: Preset rotational-speed selection 7	Multifunctional input	23	External failure signal 1 (Protection relay 86A inactive)	
7			24	External failure signal 2(Protection relay 86A inactive)	
8			25	External failure signal 3 (Protection relay 86A inactive)	
			26	External failure signal 4 (Protection relay 86A inactive)	
			27	Trace-back external trigger (*1)	
			28	Second setting block selection	
			29	Emergency stop input (B contact)	
			30		
9	Acceleration/deceleration time selection 00: Initial setting 01: Acceleration/deceleration time (2) 10: Acceleration/deceleration time (3) 11: Acceleration/deceleration time (4)		31	Rotation speed command terminal block selection	
10			32	Not used	
			33	Not used	
			34	Not used	
			35	Not used	
11	Rotation speed UP command (MRH mode)		36	Not used	
12	Rotation speed DOWN command (MRH mode)		37	Speed command modification (*1)	
13	Rotation speed hold		38	Not used	
14	S-pattern acceleration/deceleration prohibited		39	Not used	
15	Max rotation speed reduction				
16	Droop control inactive				

*1:These coils are automatically cleared after a coil writing.

(4) Single function write-in ·····The data from a master station to an ASYC66-Z station is written in.

Refer to Table 4.29 for the function address.

Please refer to the operation manual of a VF66B inverter for a setups data. Moreover, please ask separately about a setups data number.

When it is except that the function address was indicated to be to Table 4.29, it becomes an exception response of "the inaccurate address." Refer to (7) for an exception response.

That to which WAIT increased the value 10 times serves as specification WAIT time in a unit of measure [ms] (refer to Table 4.25).

A write data is word and becomes a sequence of a high-order byte and a low-order byte.

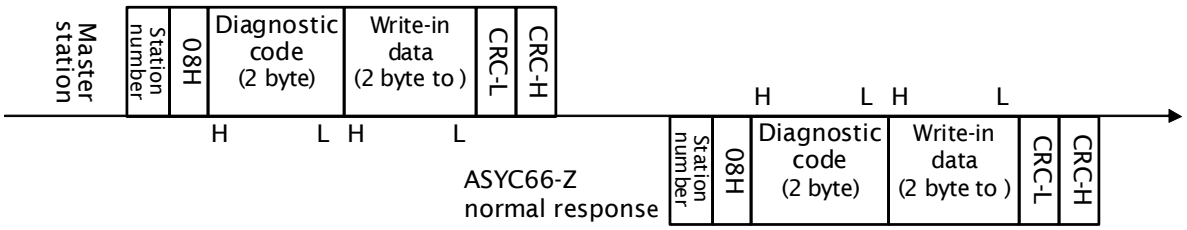
When the write data is over tolerance, it becomes an exception response of "an inaccurate data." Refer to (7) for an exception response.

Table 4.29 List of single function address

Write-in description	Function address	
	Top 4 bits	12 bits of low-orders
Speed/ frequency, or torque command	0	0: Speed/ frequency (20000 / Maximum speed or maximun frequency) 1: Speed / frequency buffer command (20000 / Maximum speed or maximun frequency)*1 2:Torque command（5000／100[%]）
change of a setups data	1	High order Double-bit 00: The 1st setups block, 01: The 2nd setups block 10 bits of low-orders Setups data number
Date	2	0: Days and months (the month from a high-order byte, day) 1: Time (being a 24-hour type from a high-order byte time)

*1: The command set up by turning on「37: Change of speed command」write-in coil becomes effective.

(5) Maintenance code·····Communication is checked.

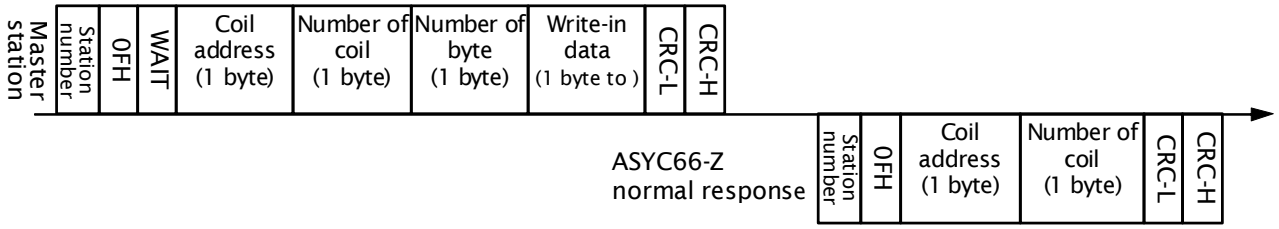


Set a diagnostic code to 0000H. When it is except this code, it becomes an exception response of "the inaccurate address." Refer to (7) for an exception response.

Write data should set up any value.

From an ASYC66-Z station, the same value as the diagnostic code from a master office and a write data is returned.

(6) Succession coil (bit information) write-in·····Two or more write-in of the bit information from a master station to an ASYC66-Z station are carried out.



WAIT and the coil address are the same as (3) coil write-in.

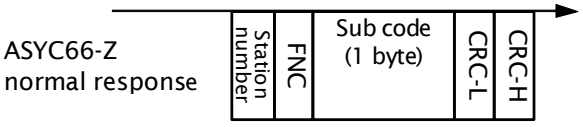
The number of coils specifies the number of the coils which make the coil address a head and are changed continuously.

A byte count is a byte count of a write data. A byte count should set up six or less.

A write data expresses a status specification of the coil corresponding to the coil address in the 1st byte of first LSB. Please specify the coil status of the coil address by which increment was carried out to the sequence in the orientation of MSB. In 1, by ON, zero means OFF.

When there is a command of the coil address and the number of coils which are written in the 40 or more coil addresses, it becomes an exception response of "the inaccurate address." Refer to (7) for an exception response.

(7) Exception correspondence·····An exception response is transmitted, when an ASYC66-Z station cannot receive a communication data correctly, or when even if it receives a communication data normally, the treatment is not performed correctly.



FNC is the value which added 80H to FNC of the received frame.

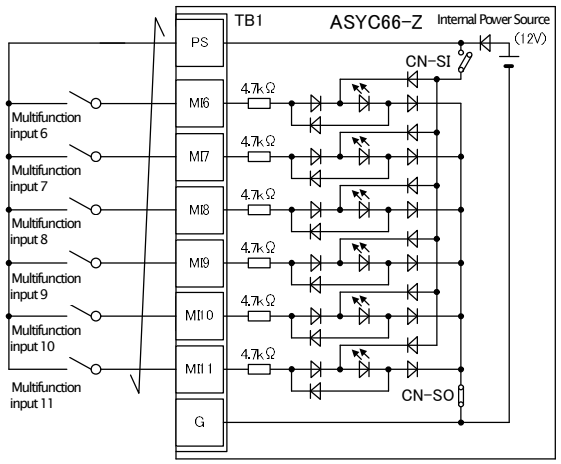
Refer to Table 4.30 for a sub-code.

Table 4.30 List of Subcode

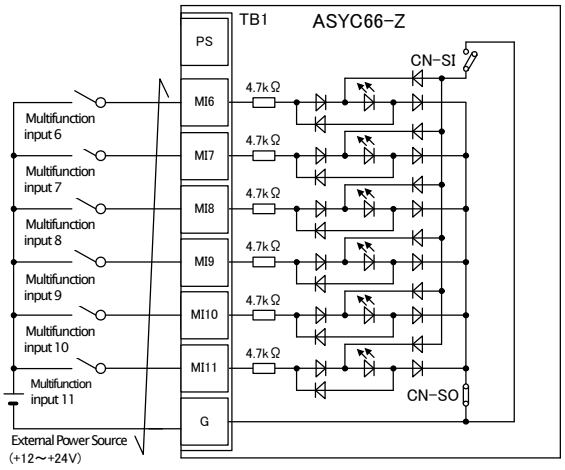
Subcode	Item	Contents
1	Inaccurate FNC	FNC other than table 4.25
2	Inaccurate adderss	A coil address, the number of coils, a diagnostic code, and a function address are outside the predetermined range.
3	Inaccurate data	In single function writing, write-in data is outside the predetermined range.
7	Other errors	Other errors

Chapter 5 Multifunction Input/ Output Specification

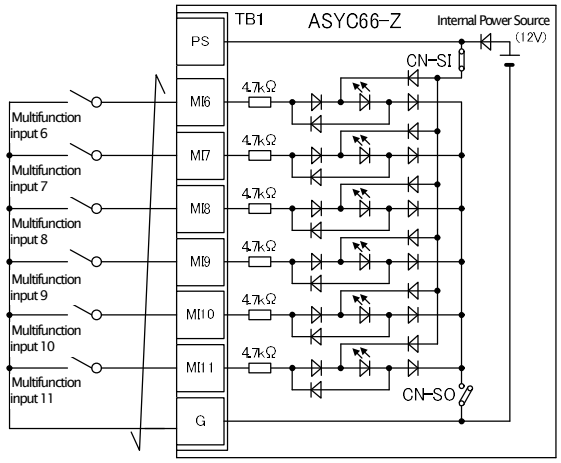
5.1 Multifunction Input



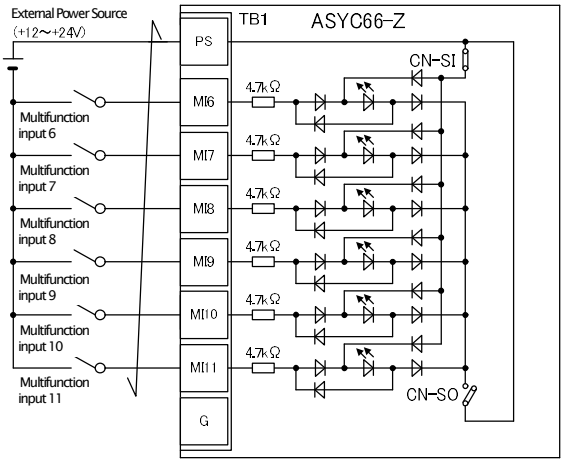
1. Source Mode (with internal power source)



2. Source Mode (with external power source)



3. Sink Mode (with internal power source)



4. Sink Mode (with external power source)

Figure 5.1 Multifunction Input Connections

The ASYC66-Z can use the VF66B inverter multifunction input. The above figures show typical multifunction input signal connection methods. The **maximum allowable voltage is 24V** and the **maximum allowable current for any one terminal is 3mA**. For more information about the functions of the individual multifunction input terminals, please refer to the VF66B inverter manual.

The multifunction input signal can be set to either source mode or sink mode and an internal power source or external power source can be chosen for the inverter. In the initial configuration, it is set to source mode. To switch between source mode and sink mode, place a jumper shunt on either the ASYC66-Z jumper connector CN-SO (source mode) or CN-SI (sink mode).

Multifunction Input Related Inverter Parameters

Console Display	Items	Item Selection	Default Setting Data	Unit
c-00	Multifunction input place selection	0: Terminal block 1: Digital communication option	0: Terminal block	—
c-06	Multifunction input terminal (6) function selection	0: Preset frequency selection 1 (V/f mode) Preset rotation speed selection 1 (induction motor/ED motor vector mode) 1: Preset frequency selection 2 (V/f mode) Preset rotation speed selection 2 (induction motor/ED motor vector mode) 2: Preset frequency selection 3 (V/f mode) Preset rotation speed selection 3 (induction motor/ED motor vector mode) 3: Acceleration/deceleration time selection 1 4: Acceleration/deceleration time selection 2 5: Frequency UP command (MRH mode) (V/f mode) Rotation speed UP command (MRH mode) (induction motor/ED motor vector mode) 6: Frequency DOWN command (MRH mode) (V/f mode) Rotation speed DOWN command (MRH mode) (induction motor/ED motor vector mode) 7: Frequency hold (V/f mode) Rotation speed hold (induction motor/ED motor vector mode) 8: S-pattern acceleration/deceleration prohibition 9: Max. frequency reduction (V/f mode) Max. rotation speed reduction (induction motor/ED motor vector mode) 10: Droop control disabled 11: No function (V/f mode) Speed/torque control selection (induction motor/ED motor vector mode) 12: Forward/reverse operation command selection 13: DC brake command 14: No function (V/f mode) Initial excitation command (induction motor/ED motor vector mode) 15: External failure signal 1 (protection relay 86A enable) 16: External failure signal 2 (protection relay 86A enable) 17: External failure signal 3 (protection relay 86A enable) 18: External failure signal 4 (protection relay 86A enable) 19: External failure signal 1 (protection relay 86A disabled) 20: External failure signal 2 (protection relay 86A disabled) 21: External failure signal 3 (protection relay 86A disabled) 22: External failure signal 4 (protection relay 86A disabled) 23: Trace back external trigger 24: Second set-up block selection 25: Emergency stop (B contact) 26: No function 27: Frequency commanding terminal block selection (V/f mode) Rotation speed commanding terminal block selection (induction motor/ED motor vector mode) 28: No function 29: Operation command [reverse] (STARTR) 30: Jog command [forward] (JOGF) 31: Jog command [reverse] (JOGR) 32: Emergency stop (A contact) 33: Protection reset (RESET) 34: External signal input 1 35: External signal input 2 36: External signal input 3 37: External signal input 4	0:Preset frequency selection 1	—
c-07	Multifunction input terminal (7) function selection		1:Preset frequency selection 2	
c-08	Multifunction input terminal (8) function selection		2:Preset frequency selection 3	
c-09	Multifunction input terminal (9) function selection		3:Acceleration/ deceleration time selection 1	
c-10	Multifunction input terminal (10) function selection		4:Acceleration/ deceleration time selection 2	
c-11	Multifunction input terminal (11) function selection		5:Frequency UP command	

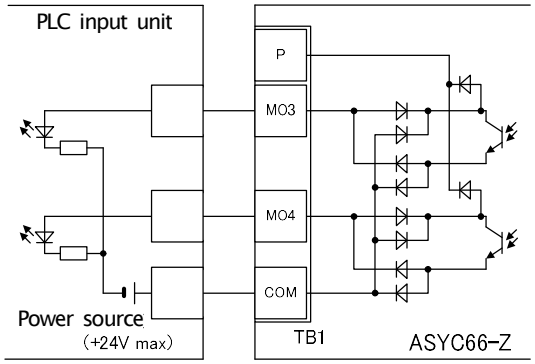
* This is included as there are plans for future optional expansions. Please do not set this option.

Besides the input from a terminal stand, the multifunction input of ASYC66-Z can be inputted from serial communication. Either can be chosen with the inverter setting parameter c-00. Refer to Chapter 5 for the details of the multifunction input by communication.

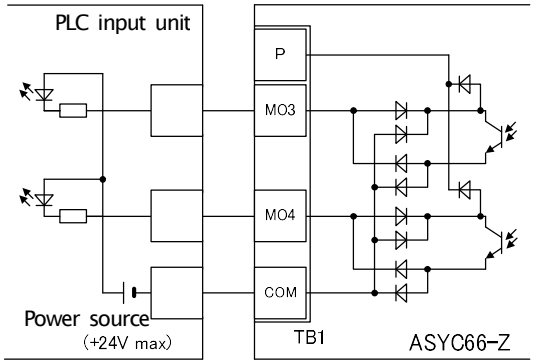
⚠ DANGER [Wiring]
● Before wiring, make sure the power is OFF. Failure to do so may cause an electric shock or a fire. ● Substitution of Jumper socket is performed after certainly turning off an inverter. Failure to do so may cause an electric shock, personal injury, equipment failure or malfunction.

⚠ CAUTION [Wiring]
● G terminal and G2terminal are not connected to a grounding by any means. Doing so may cause equipment failure or damage. ● Never connect or allow contact between the PS and G terminals. Doing so may cause equipment failure or damage.

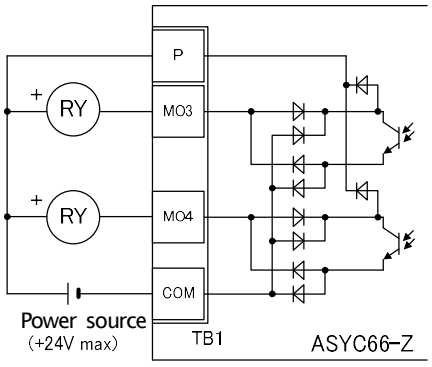
5.2 Multifunction Output



1. Connection with PLC (Source mode)



2. Connection with PLC (Sink mode)



3. Connection with Relay

Figure 5.2 Multifunction Output Connections

The ASYC66-Z can use the VF66B inverter multifunction output. The above figures show typical multifunction output signal connection methods. Multifunction output is open corrector output of transistor. In order to use it, DC power supply are required for the exterior. The **maximum allowable voltage is 24V** and the **maximum allowable current for any one terminal is 20mA**. For more information about the functions of the individual multifunction output terminals, please refer to the VF66B inverter manual.

Multifunction output Related Inverter Parameters

Console Display	Items	Item Selection	Default Setting Data	Unit
H-02	Multifunction output terminal (3) function selection	0: not used 1: Frequency detection (1) (V/f mode) (Frequency = detection setting) Motor speed detection (1) (vector mode) (Motor speed = detection setting) 2: Frequency detection (1) (V/f mode) (Frequency ≧ detection setting) Motor speed detection (1) (vector mode) (Motor speed ≧ detection setting) 3: Frequency detection (1) (V/f mode) (Frequency ≦ detection setting) Motor speed detection (1) (vector mode) (Motor speed ≦ detection setting) 4: Frequency detection (2) (V/f mode) (Frequency = detection setting) Motor speed detection (2) (vector mode) (Motor speed = detection setting) 5: Frequency detection (2) (V/f mode) (Frequency ≧ detection setting) Motor speed detection (2) (vector mode) (Motor speed ≧ detection setting) 6: Frequency detection (2) (V/f mode) (Frequency ≦ detection setting) Motor speed detection (2) (vector mode) (Motor speed ≦ detection setting) 7: Reach setting 8: Torque detection 9: Torque detection (absolute value) 10: Power failure 11: Overload pre-alarm 12: Restart mode 13: In reverse operation 14: Protection operation code 15: not used 16: In operation 17: Extended schedule function(Usually, not set up) 18: Timer 1 setup time passes 19: Timer 2 setup time passes) 20: 2nd set-up block selected 21: Fan motor failed	0:not used	—
H-03	Multifunction output terminal (4) function selection		1:Torque detection	

When connecting a PLC input unit outside, ASYC66-Z can choose an connection in sink mode and source mode. Recommends using a twist line to a product line of PLC and ASYC66-Z. When connecting a relay externally, a coil uses a relay of a D.C. operation (for example, OMRON: G7L-2 A-T-DC 24V etc.). Since ASYC66-Z builds in the reflux diode which controls surge voltage, it certainly connects the + side terminal of external power source to P terminal of a terminal block in ASYC66-Z.

The ASYC66-Z multifunction output signal can also be used as the VF66B inverter built-in PLC function output relay. For more information, refer to a "ASYC66-Z communications protocol description" and the operation manual of VF66B inverter, and the description of VF66 PC Tool.

⚠ CAUTION [Wiring]

- Before wiring, make sure the power is OFF.
  Failure to do so may cause an electric shock or a fire.
- COM terminal and G, G2 terminal in terminal block 1 are not connected to a grounding by any means.
  Doing so may cause equipment failure or damage.

Chapter 6 Analog Input/Output Function

6.1 Analog Input (2)

The Analog input (2) to the terminals on ASYC66-Z can be used as the input value to the rotation speed command value (or frequency command value), torque command value, and built –in PLC function by analog input (2) function.

For usage of Analog Input (2) function correctly, the correct VF66B Inverter parameter setting as mentioned below is required. Please refer to the VF66B Inverter operation manual together. Furthermore, for the built-in PLC function, please refer to VF66 PC Tool manual.

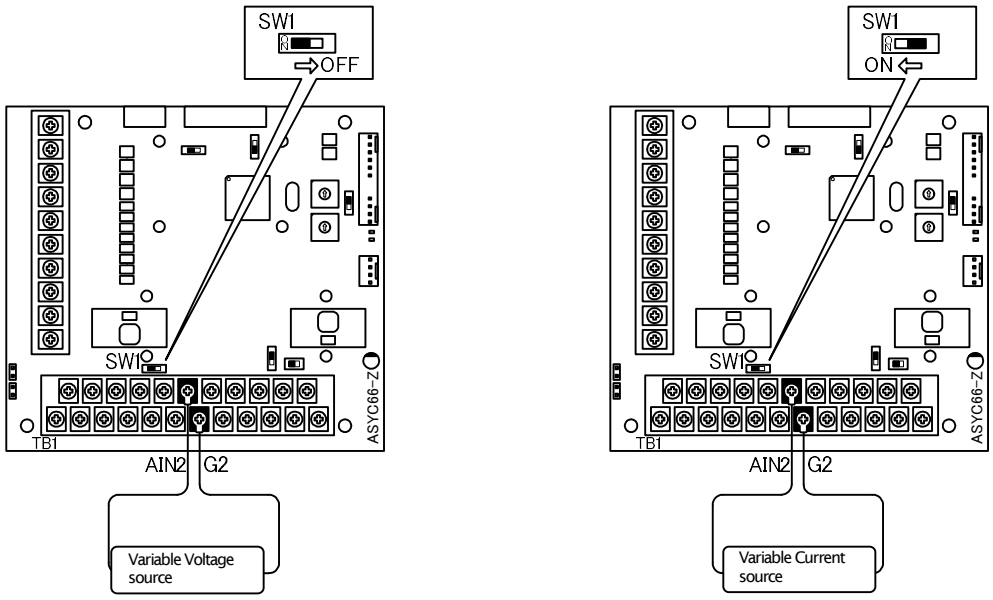
Before usage of Analog Input (2), please conduct the adjustment of gain as mentioned below.

Analog input (2) characteristic selection (when IO66-Z option or digital communication option is used)

Display	Item	Set-up range (Item selection)	Default Data	Unit
G-03	Analog input(2) characteristics selection	0:0 to ±10V 1:0 to 10V 2:4 to 20mA	1	—

* If setting the torque command value as Analog Input (2), set this to "0". Only the 0 to ±10V voltage input characteristic can be used.

The analog signal input into Analog Input (2) should be connected between the [AIN2] and [G2] terminals of the ASYC66-Z terminal block TB1, as shown in the following figures. The input analog signal characteristics can be chosen as either "voltage input 0 to ±10V", "voltage input 0 to 10V" or "current input 4 to 20mA", as shown in the above table. Choose an appropriate setting that matches the characteristics of the input signal. Also set the SW1 switch as shown in the following figures.



（a）Voltage input　　（b）Current input

Figure 6.1 Connection of analog input (2)

6.2 Analog Input (2) Input Gain and Offset Adjustment

Before usage of Analog Input (2), gain and offset adjustment are required. Adjustment is conducted under the temperature about 25℃.

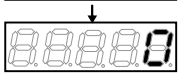
Inverter setting Parameter related to Analog Input(2) gain and offset adjustment

Display	Items	Set-up range (Item selection)	Default Data	Unit
L-05	Analog input(2) gain	50.00 to 150.00	100.00	%
L-06	Analog input(2) offset	-50.00 to 50.00	0.00	%
S-08	Analog input(2) adjust	1. Analog Input(2) Offset Adjustment Input the Analog(2) Voltage x 1000 Analog Input(2) Gain adjustment	-	-

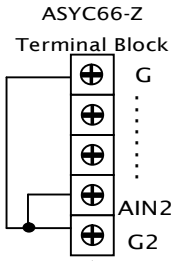
(1) Input Characteristics “0 to ±10V” or “0 to 10V”

Press [MONI/FNC]key to turn on FNC (function selection) mode (LED-FNC will be lit).

Use [↑][↓]keys to select「G-03」and press [SET] key to confirm it.



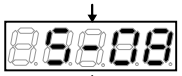
Use [JOG/→]key to shift the digit to right、and [↑][↓]keys to input “0” and press [SET]keys to confirm it.



Turn Off the inverter, open the front cover, and short circuit between [AIN2] [G] [G2] terminal on the terminal block of optional PCB (ASYC66-Z).

CAUTION [Short-Circuit of terminals]

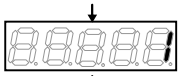
- Before short circuiting terminals, please be sure to turn OFF the inverter. There is a risk of electrical shock.



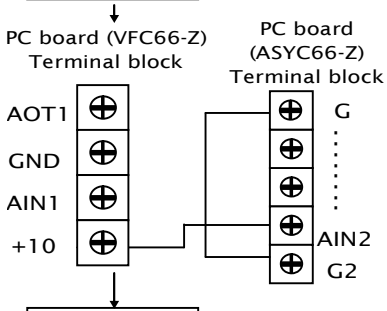
After power is ON, press [MONI/FNC]key to turn on FNC (function selection) mode. (LED-FNC will be lit). Use[JOG/→] [↑][↓]keys to select「S-08」,and press [SET] key to confirm it.

Use [JOG/→] [↑][↓]keys to input「1040」and press[SET]key to confirm it.

「S-08」will appear again, press[SET]key to confirm.



Use [JOG/→] and [↑][↓]keys to select “1” and press[SET]key to confirm it.



Turn OFF the inverter, open the front cover, and short circuit between [AIN2] on the terminal block TB1 of the ASYC66-Z PC board and [+10] on the terminal block TB1 of the VFC66-Z PC board. Remain short circuited terminals between [G] and [G2] of the PC board(ASYC66-Z)

CAUTION [Short-Circuit of terminals]

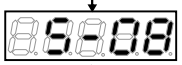
- Before short circuiting terminals, please be sure to turn OFF the inverter. There is a risk of electrical shock.

・After power is ON, press[MONI/FNC]key to turn on FNC（function selection）mode.（LED-FNC will be lit） then, use [JOG/→] [↑][↓]keys to select「S-08」and press [SET]key to confirm.
・Use [JOG/→] [↑][↓]keys to change numbers, Input 「1040」and press [SET]key to confirm.
・「S-08」will appear again、press [SET]key to confirm.

Measure the voltage between PC board (ASYC66-Z) terminals [AIN2] and [G-IN] with a tester and enter the 1000 times of the measured value. If measurement is not available, the value”9930” can be used. However accuracy is inferior

CAUTION [Voltage measurement]

When the voltage between the terminals is measured, please be sure not to touch wirings or terminals. There is a risk of electrical shock.



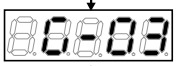
If「S-08」appears again, Analog input (2) gain(L-05)and Analog input (2) Offset (L-06) will be changed automatically. Press [MONI/FNC]Key to indicate monitor items.

When adjustment is done, turn OFF the inverter, open the front cover and remove the short circuit wirings installed between terminals、[AIN2]and [+10] of VFC66-Z PC board, as well as [G] and [G2] on the PC board (ASYC66-Z).

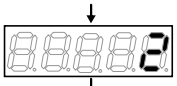
(2) Input Characteristics of "4～20mA"

*Conduct this after adjustment of aforementioned "(1) if the input characteristics is 0 to ±10V or 0 to 10V"

Press [MONI/FNC]key to turn on 、FNC（function selection）mode.（LED-FNC will be lid）

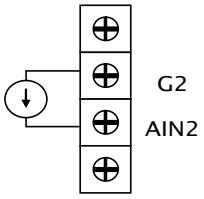


Use [↑][↓]keys to select「G-03」,press [SET]key to confirm.



Use [JOG/→][↑][↓]key to change the numbers and input「2(4-20mA)」and press[SET]key to confirm it.

PC board
(ASYC66-Z)
Terminal board

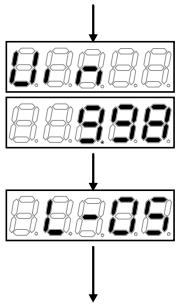


Turn off the inverter, open the front cover and connect the current power between terminals [AIN2] And [G2] on the terminal block of PC board (ASYC66-Z)

Turn the SW1 ON (terminal block side) while the power of inverter is OFF.

CAUTION [Connection of current power]

- Before connecting current power, please be sure to turn OFF the inverter.
  There is a risk of electrical shock
- Please be sure to turn OFF the inverter before switching a switch.
  There is a risk of electrical shock.



・After power is ON, select「2」in「G-16」and use monitor item[↑][↓]keys to select「Vin」of Analog input(2) appears in 「Vin」

・Turn the current power ON and input 20mA to [AIN2]terminal.

・A number will be displayed.

・Adjust the value「L-05」so that the value of monitor item 「Vin」 becomes 「10.00」.

When adjustment is done, remove the current power.

6.3 Analog Input (2) Usage Instructions

Before using the Analog Input (2) function, perform gain and offset adjustment as described in the preceding section.

Through the Analog Input (2), the input analog signal can be set to be the rotation speed command value (or frequency command value), torque command value or built-in PLC input value. The following explanation is for when it is set as the rotation speed command value or the torque command value. For instructions when using it as the input value to the built-in PLC, please refer to the VF66 PCTool manual.

(1)When using the input as a rotation speed command value

When using the analog input as a rotation speed command value, the inverter configuration parameters shown in the following table must be set.

Analog Input Rotation Speed Command Settings

Console Display	Items	Set-up Range (Item Selection)	Default Data	Unit
b-10	Rotation speed commanding input place selection	0: Coupled with b-09 1: Analog input (1) [VFC66-Z terminal block AIN1] 2: Console [SET66-Z] 3: Digital communication option 4: Analog Input (2) [Optional terminal block AIN2] 5: (For expansion option) 6: Analog Input (3) [Optional terminal block AIN3] 7: Built-in PLC function output	0	—
G-04	Analog Input (2) rotation speed upper limit	[Absolute value of Analog Input (2) rotation speed lower limit (G-05)] to [100.0](*)	100.0	%(*)
G-05	Analog Input (2) rotation speed lower limit	-[Analog Input (2) rotation speed upper limit (G-04)] to [Analog Input (2) rotation speed upper limit (G-04)](*)	0.0	%(*)

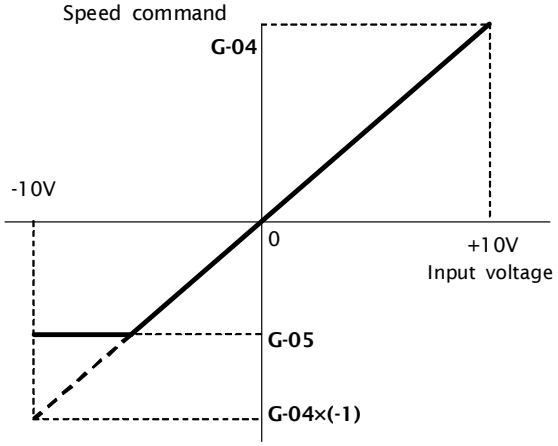
(*1): This is set as a percentage with respect to the maximum rotation speed (configuration parameter A-00). For information about configuration parameter A-00, please refer to the VF66B inverter manual.

(*2): When inverter mode is V/f mode, "rotation speed" serves as "frequency."

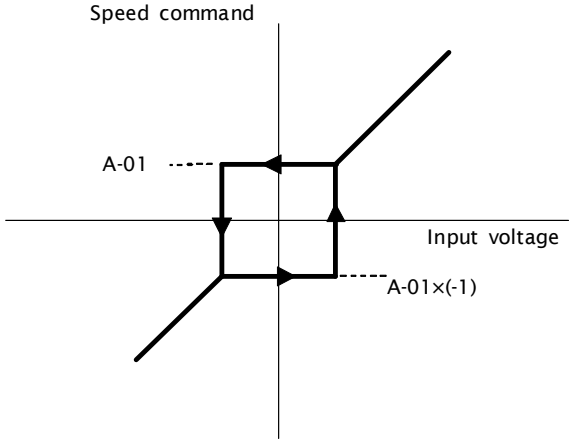
- Set b-10 to “4”.
- Set G-03 (described in section 6.1) to a set value that matches the input signal characteristics.

・In the case of voltage input of 0 to ±10V

The rotational direction can be reversed by setting the command input voltage to a negative value. The rotation speed command value is set as the Analog Input (2) rotation speed upper limit (G-04) when the input is +10V. When the input is -10V, it is set as the negative value of the Analog Input (2) rotation speed upper limit (G-04). However, it is possible to set a lower limit by setting the Analog Input (2) rotation speed lower limit (G-05). (Figure 6.2, left)If the minimum rotation speed (A-01) is other than “0”, the rotation speed command absolute value is controlled to prevent falling below the minimum speed. In this case, when the command input voltage is around the 0V range, its behavior shows hysteresis characteristics (It will run forward if started in the forward direction and will run in the minimum reverse speed if started in the reverse direction) as shown in the right side of Figure 6.2.



Input characteristics (0 to ±10V)

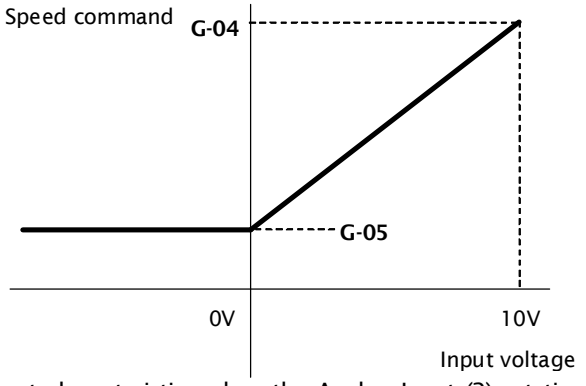


Minimum rotation speed hysteresis characteristics when near 0V

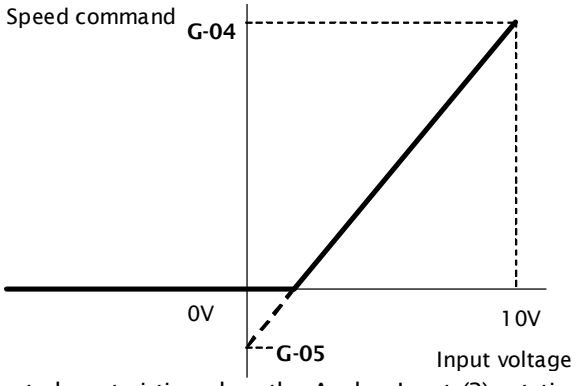
Figure 6.2 Speed command characteristics with voltage input of 0 to ±10V

· In the case of voltage input of 0 to 10V

The rotation speed command value is set as the Analog Input (2) rotation speed lower limit (G-05) when the input is 0V. When the input is 10V, it is set as the Analog Input (2) rotation speed upper limit (G-04). However, this will be set to "0" if the Analog Input (2) rotation speed lower limit (G-05) has a negative value. (Figure 6.3) If the minimum rotation speed (A-01) is other than "0", the rotation speed command absolute value is controlled to prevent falling below the minimum speed. As a speed command, this only allows forward operation. For reverse operation, a reverse operation command should be used.



Input characteristics when the Analog Input (2) rotation speed lower limit (G-05) is positive (0 to 10V)

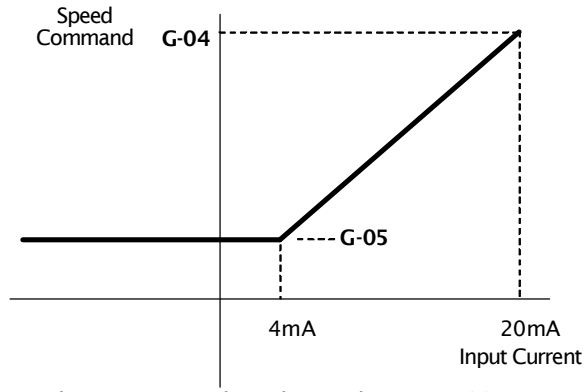


Input characteristics when the Analog Input (2) rotation speed lower limit (G-05) is negative (0 to 10V)

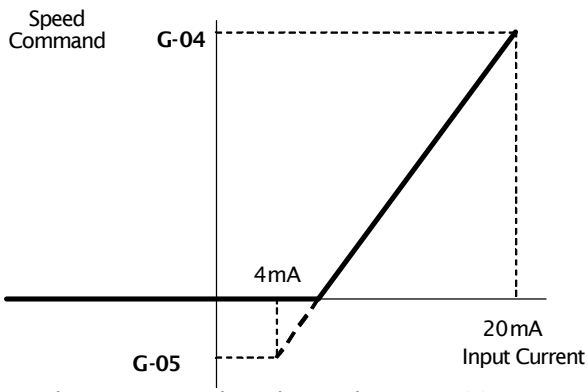
Figure 6.3 Speed command characteristics with voltage input of 0 to 10V

· In the case of current input of 4 to 20mA:

The rotation speed command value is set as the Analog Input (2) rotation speed lower limit (G-05) when the input is 4mA. When the input is 20mA, it is set as the Analog Input (2) rotation speed upper limit (G-04). However, this will be set to "0" if the Analog Input (2) rotation speed lower limit (G-05) has a negative value. (Figure 6.4) If the minimum rotation speed (A-01) is other than "0", the rotation speed command absolute value is controlled to prevent falling below the minimum speed. As a speed command, this only allows forward operation. For reverse operation, a reverse operation command should be used.



Input characteristics when the Analog Input (2) rotation speed lower limit (G-05) is positive (4 to 20mA)



Input characteristics when the Analog Input (2) rotation speed lower limit (G-05) is negative (4 to 20mA)

Figure 6.4 Speed command characteristics with current input of 4 to 20m

(2) When using the input as a torque command value

When using the analog input as a torque command value, the inverter configuration parameters shown in the following table must be set.

* **Torque command is disabled in V/f mode.**
* **The 4 to 20mA current input characteristic cannot be used for the torque command value. Only the 0 to ±10V voltage input characteristic can be used.**

Inverter Configuration Parameters Related To Analog Input Torque Command

Console Display	Items	Set-up Range (Item Selection)	Default Data	Unit
i-08	Torque command input place selection	0: Analog Input (1) [VFC66-Z terminal block AIN1] 1: Analog Input (2) [Optional terminal block AIN2] 2: Digital communication option 3: Built-in PLC function output	1	—
i-09	Analog input torque command gain	50.0 to 200.0	150.0	%

- Set i-08 to "1".
- Set G-03 (described in section 5.1) to "0". Only the 0 to ±10V voltage input characteristic can be used.

The torque command value is set as the negative value of the analog input torque gain (i-09) when the input is +10V. When the input is -10V, it is set as the positive value of the analog input torque gain (i-09). (Figure 6.5)

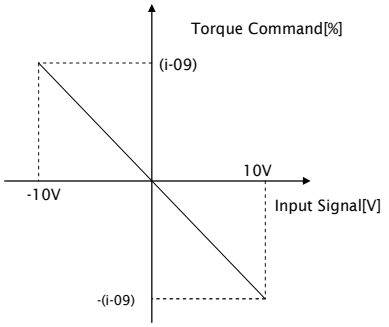


Figure 6.5 Analog Input Torque Command Characteristic

6.4 Analog output (2)

By analog output (2) function, output voltage of inverter, rotation speed and internal variable of output of built in PLC function are output as analog signal.

Analog output characteristic output by analog output (2) is "voltage output 0-±10V". Please set the characteristic by setting parameter G-09. Refer to operation manual about VF66B inverter with this manual. For built in PLC function, refer to the operation manual about "VF66 PC Tool".

Please adjust analog gain and offset before using analog output (2) function.

Analog output setting

display	Items	Set-up range (Selection items)	Default Data	Unit
G-09	Analog output(2) characteristic selection	0:Output voltage 1:Output current 2:Torque output (V/f mode) Torque command (vector mode) 3:Output frequency (V/f mode) Motor rotation speed (vector mode) 4:Output frequency command (V/f mode) Motor rotation speed command (vector mode) 5:Built in PLC output 6:Calibration 7:Internal monitor	1	—

Analog output selected by G-09

G-09	Selection items	Output voltage
0	Output voltage	7.5V／200V (200V class) 7.5V／400V (400V class)
1	Output current	5V／inverter rated current
2	Torque output (V/f mode) Torque command (vector mode)	5V／100%
3	Output frequency (V/f mode) Motor rotation speed (vector mode)	10V／maximum frequency (A-00) 10V／maximum rotation speed (A-00)
4	Frequency command (V/f mode) (*1) Motor rotation speed (vector mode) (*1)	10V／maximum frequency (A-00) 10V／maximum rotation speed (A-00)
5	Built in PLC output (*2)	5V／20000 (100%) (*2)
6	Calibration	5V
7	Internal monitor	—

(*1)It is value after acceleration/deceleration control. For more detail, please refer to the operation manual about VF66B inverter.

(*2)When built in PLC output is selected, the value of output resistor "o00009"is output at the rate of 5V/20000. For more detail, please refer to the operation manual about "VF66 PC Tool".

Analog output (2) is output between “AOT2” and “G-2” on the terminal block TB1 of ASYC66-Z substrate.

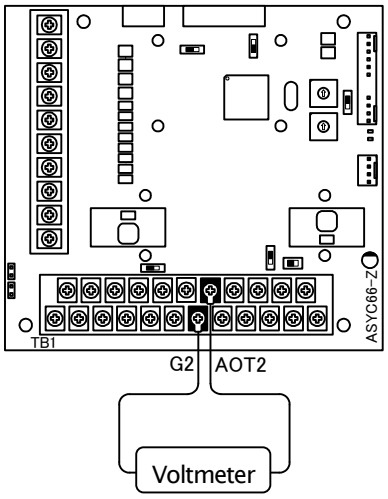


Figure 6.6 Connection of analog output (2)

6.5 Analog output (2) gain offset adjustment

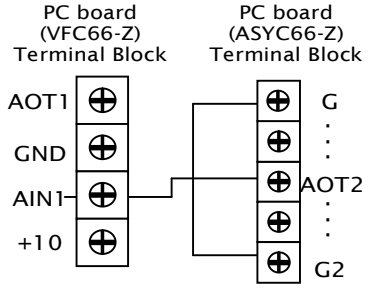
Before usage of Analog output(2),please adjust gain offset under the condition of 25[℃]

Analog output (2) gain offset adjustment is conducted after the VF66B inverter analog input(1) gain offset adjustment. As to adjustment of analog input (1) gain offset, please see the VF66B inverter operation manual. Analog input (1) gain offset is adjusted when the inverter is shipped from our works, therefore analog input (1) gain offset is not necessary to adjust.

Inverter setting parameter related to Analog output (2) gain offset adjustment

Display	Items	Set-up range (Item selection)	Default Data	Unit
L-09	Analog output(2) gain	50.0 to 150.0	100.0	%
L-10	Analog output(2) offset	-50.0 to 50.0	0.0	%
S-09	Analog output (2) adjust	1: Analog output (2) offset adjustment 2: Analog output (2) gain adjustment	-	-

(1) Adjustment of offset and gain of Analog output (2)

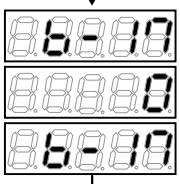


Turn OFF the inverter, open the front cover, and short circuit between terminals [A0T2]on the terminal block of the PCB(ASYC66-Z) and [AIN1] on the terminal block of PCB (VFC66-Z) and so as [G]and[G2]on terminal block of ASYC66-Z.

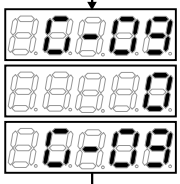
CAUTION [Short circuiting of terminals]

- Before short circuiting terminals, please be sure to turn OFF the inverter. There is a risk of electrical shock.

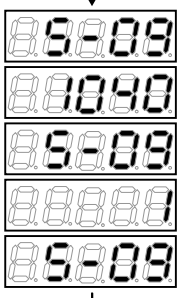
After power is ON, press [MONI/FNC] key to turn on FNC (function selection) mode. (LED-FNC will be lit).



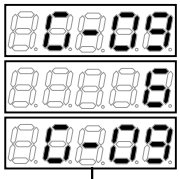
・After power is ON, press [MONI/FNC] key to turn on FNC (function selection) mode. (LED-FNC will be lit). Use [JOG/→] [↑][↓] keys to select “b-17” then press [SET] to confirm it.
・Use [JOG/→] [↑][↓]keys to input “0” and press[SET]key to confirm it.
・「b-17」appears again.



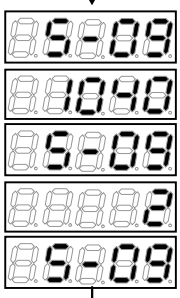
・Use [JOG/→] [↑][↓]keys to select「G-09」and press [SET]key to confirm it.
・Use [JOG/→] [↑][↓]keys to input “0” and press [SET]key to confirm it.
・「G-09」will appear again.



・Use[JOG/→] [↑][↓]keys to select「S-09」and press [SET]key to confirm it.
・Use[JOG/→] [↑][↓]keys to input「1040」and press [SET]key to confirm it.
・「S-09」will appear again, press [SET]key to confirm it.
・Use [JOG/→] [↑][↓]keys to input “1” and press [SET]key to confirm it.
・「S-09」will appear again.



・Use [JOG/→] [↑][↓]keys to select「G-09」and press [SET]key to confirm it.
・Use [JOG/→] [↑][↓]keys to input “6” and press[SET]key to confirm it.
・「G-09」will appear again.



・Use [JOG/→] [↑][↓]keys to select「S-09」and press[SET]key to confirm it.
・Use [JOG/→] [↑][↓]keys to input「1040」and press [SET]key to confirm it
・「S-09」will appear again and press [SET]key to confirm it.
・Use [JOG/→] [↑][↓]keys to input “2” and press [SET]key to confirm it.
・If “S-09” appears again, Analog output (2) gain (L-09) and Analog output (2) offset (L-10) will be changed automatically.
・Press [MONI/FNC] to indicate monitor items.

When adjustment is done, turn OFF the inverter, open the front cover, and remove the short circuit wirings installed between terminals [A0T2] on the IO66-Z PC board and [AIN1] on the VFC66-Z PC board, as well as [G] and [G2] on the ASYC66-Z PC board. Reset the setting of [G-09] and [b-17].

Chapter 7 PG input/output function

PG input/output functionality is used when driving a motor from the signal which detected the magnetic pole location and velocity of the rotor by the sensor (PG). PG input/output function is used by IM vector mode and ED motor vector mode of a VF66B inverter. PG is a correspondence only a complementary output with 12V power source. The operation manual of VF66B inverter (induction motor vector control mode or ED motor vector control mode) is referred to for a selection in PG mode, and an inverter mode change.

7.1 PG input signal

In order to use PG input/output functionality, it is necessary to set correctly the inverter setups parameter shown in the following table according to the operation mode of an inverter, and PG specification to be used. Please also refer to the operation manual of VF66B inverter collectively.

* **When switch SW4 on ASYC66-Z is ON, the input of PG signal is effective.**

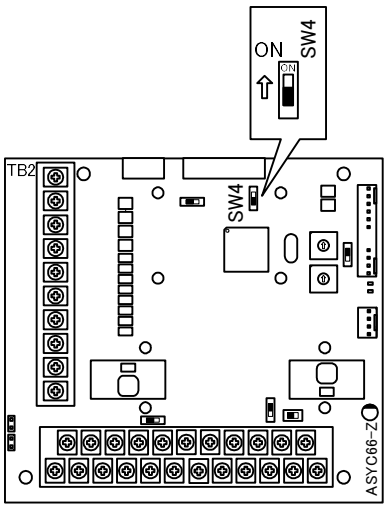


Figure 7.1 PG signal input switching

The inverter setups parameter of PG input signal setups

Display	Item	Set-up range (Item selection)	Set-up resolution	Default Data	Unit
A-10	PG Selection	V/f mode	(PG not used)	1	—
		Induction motor vector control mode	0: S-mode Sensor-less drive 1: V-mode with PG (AB phase input)	0	—
		ED motor vector control mode	0: S-mode Sensor-less drive 1: V-mode with PG (ABZ phase input) (*1) 2: P-mode with PG (ABUVW phase input) 3: RL-mode with resolver (resolution 10bit) (*2) 4: RH-mode with resolver (resolution 12bit) (*2)	0	—

(*1)For special motors
(*2)An option is required

(1)In the case of induction motor vector control mode

Please set 1 as the setups parameter A-10 shown in the upper table, and as shown in Fig. 7.2, connect PG wire to terminal block TB2 of ASYC66-Z. (Since it is not used, please do not connect U/Z, V, and W termination of TB2）

The recommendation cable of PG wire is CO-SPEV-SB(A)3Px0.5SQ (made by Hitachi Cable).

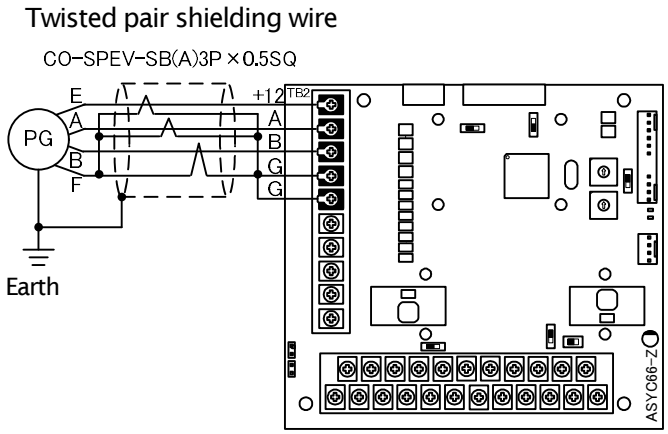


Figure 7.2　PG wire interconnection of an induction motor

(2)In the case of ED motor vector control mode

Please set 2 as the setups parameter A-10 shown in the upper table, and as shown in Fig. 7.3, connect PG wire to terminal block TB2 of ASYC66-Z. (As the setting value of "1" for A-10 is used for a special motor, it should not be selected for normal operation.)

The recommendation cable of PG wire is CO-SPEV-SB(A)7Px0.5SQ (made by Hitachi Cable). For ED motor PG connection, straight plugs (MS3106B-20-29S) and cable clamps (MS3057-12A) (Japan Aviation Electronics Industry, Ltd.) are required.

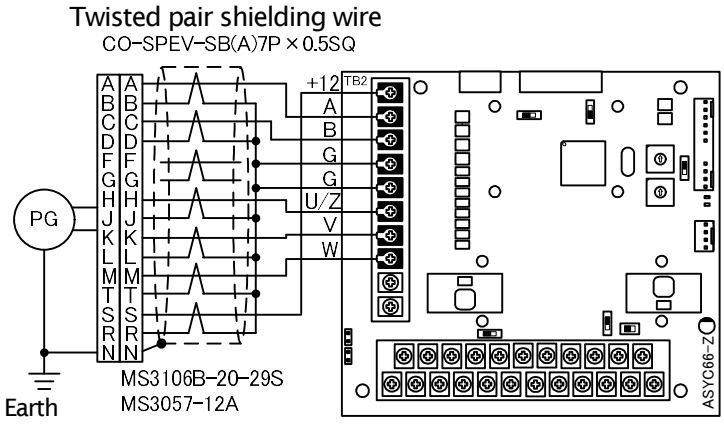


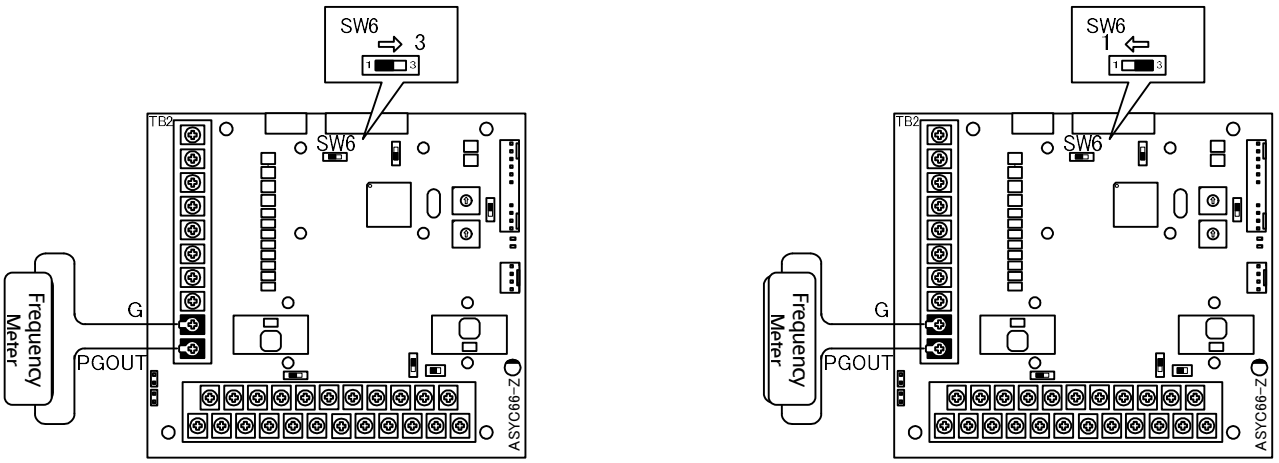
Figure 7.3　PG wire interconnection of an ED motor

⚠ **DANGER** [Wiring]
● When wiring PG, an inverter power source is certainly turned off. Failure to do so may cause an electric shock, personal injury, equipment failure or malfunction. ● Never connect the G terminal to earth. Doing so may cause equipment failure or damage.

⚠ DANGER [Switch]
● Change of a switch is performed by certainly turning off an inverter. Failure to do so may cause an electric shock, personal injury, equipment failure or malfunction.

7.2 PG Output signal

PG frequency dividing signal is outputted from A signal of PG input. Peak value is about 10v and duty1:1. If SW6 of ASYC66-Z is switched to side of 3, 1 / 4PG frequency divided signal is outputted, and if SW6 is switched to side of 1, 1 / 2PG frequency divided signal is outputted. Please switch according to a destination.



(a)1 / 4PG frequency divided output (b)1 / 2PG frequency divided output

Figure 7.4 PG signal output

⚠ DANGER [wiring]
● Before connecting anything to the terminals, please be sure to turn off the inverter. Failure to do so may cause an electric shock, personal injury, equipment failure or malfunction. ● Never connect the G terminal to earth. Doing so may cause equipment failure or damage.

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