

<b><u>DNET66-Z Operation manual</u></b>	No.	QG 1 8 7 4 1
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# Preface

Thank you for choosing Optional Circuit Board for Toyo inverter product.

This instruction manual contains information regarding the DNET 66-Z Optional Circuit Board for the VF66 Inverter. For correct use, please carefully read this instruction manual prior to using the DNET 66-Z.

This instruction manual covers the functions, connection procedures for the DNET 66-Z, as well as guidelines for setting up the VF66 Inverter. (Regarding DevuceNET communication functions are refer to the Insutruction Manual of Dnet 66-Z commucatin protocol.)

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 VF66 inverter manual as well as any other applicable specialized instruction manuals.

# Please read before use

## For safety

Before installing, operating, maintaining and inspecting DNET66-Z option, please read this manual and all other appendices thoroughly in order to get familiarize with the feature of this option, safely information and correct handling. For safe operation, be sure to also thoroughly read the VF66B Inverter operating manual. In this instruction manual, the safety instructions are classified in to two levels: DANGER and CAUTION. These signs have important instructions. Please follow the instructions without fail



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.  
Doing so may cause an electric shock.
- Do not operate any switch with wet hands.  
Doing 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.  
Doing 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.



## DANGER [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.

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# Chapter 1 Functional outline

DNET66-Z is used equipping the connector of the PC board (VFC66-Z) in a VF66B inverter. The functions with which DNET66-Z is equipped are a multifunctional input/output function, an analog input/output function, and PG input/output function.

DeviceNet is an *open network standard*, the specification and protocol are opened by Open DeviceNet Vendor Association Inc.(ODVA), providing interchangeability of similar devices from multiple vendors.

Through DeviceNet communication function of Dnet66-z, the input analog signal can be set to be the operation command or rotation speed command value or torque instructions or built-in PLC input value. or trace back monitor function which read datas of operation status,protected operation, current ,voltage,etc, or data set function which upload & download Of the setting data.

Regarding of DeviceNet communication function ,please refer to " DNET66-Z COMMUNICATIN PROTOCOL INSTRUCTION MANUAL"

Regarding of built-in PLC function ,please refer to VF66 PC TOOL MANUAL.

In order to reduce an environmental impact, DNET66-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.



## **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 Multifunction Input Terminal Specification

### Multifunction Input Terminal

DNET 66-Z Terminal T B 1	Terminal No.	Use	Description
	PS (2 Terminal)	+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)
	MI7	Multifunction Input terminal (7)	By input the signal in multifunction input terminal, the same operation can be done as that of console.
	MI8	Multifunction Input terminal (8)	[In the initial condition, the VF66B inverter setting parameter for the C area are set to:
	MI9	Multifunction Input Terminal (9)	<ul style="list-style-type: none"> <li>• For Multifunction input terminal (6) ,Preset speed selection 1</li> <li>• For Multifunction input terminal (7) ,Preset speed selection 2</li> <li>• For Multifunction input terminal (8) ,Preset speed selection 3</li> <li>• For Multifunction input terminal (9) ,Accel./decel time selection 1</li> </ul> ※See each detailed mode instruction manuals of <b>INVERTER VF66</b> for details of multifunction input terminals.

### Setting Jumper Connector for Multifunction Source Mode/Sink Mode

DNET 66-Z Jumper Connector	Connector	Use	Description
	CN-SO	Source Mode	<ul style="list-style-type: none"> <li>• Setting Source Mode/Sink Mode is conducted by replacement of Jumper socket CN-SI, CN-SO.</li> <li>• In replacement of Jumper Socket, please cut off the power supply. [In the initial condition, the source mode is set.]</li> <li>• In case of source mode, the switch etc. is connected between Multifunction Input terminal (6)~(9)and PS Terminal, and turn on/off.</li> </ul>
	CN-SI	Sink Mode	<ul style="list-style-type: none"> <li>• In case of sink mode, the switch etc. is connected between Multifunction Input terminal (6) ~ (9) and G Terminal, and turn on / off.</li> </ul> For the detail information, please see the Chapter 4.

## 2. 2 Analog Input/ Output Terminal Specification

### Analog Input output function

DNET 66-Z Terminal TB1	Terminal No.	Use	Description
	AIN2	Analog Input Analog Input (2) Terminal	<ul style="list-style-type: none"> <li>Type of input can be selected from 0~±10V, 0~10V, 4~20mA by the swift of SW1 and alternation of VF66 inverter setting parameter. (Please refer to Chapter 5 for the change of the input range.)</li> <li>Input resistance is 150kΩ in input analog voltage.</li> <li>Input resistance is 250Ω in input analog current.</li> </ul> [In the initial condition, 0~±10V is set.] ※See each detailed mode instruction manual of VF66 inverter for details of Analog Input Terminal (2).
	AOT2	Analog Output Analog Output (2) Terminal	<ul style="list-style-type: none"> <li>Type of input can be selected from 0~10V, 0~±10V alternation of VF66 inverter setting parameter.</li> </ul> Max. current is 1mA in output Analog voltage. [In the initial condition, it is set to 5V/Inverter rated Current.] ※See each detailed mode instruction manual of VF66 inverter for Analog output terminal(3)
G2	GND Terminal	Never connect G2 terminal to the earth.	

## 2. 3 P G Input/Output Terminal Specification

### PG input/output function

DNET66-Z Terminal TB2	Terminal No.	Use	Description
	+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. 4 DeviceNet Communcation Function Specification Terminal

### DeviceNet Communication Function

DNET 66 – Z Terminal T B3	Terminal No.	Use	Description	
	V-	DeviceNet Communication	Net Work Power Source – Terminal	Connect with Earth or Ground of Power source
	CAN-		Communication signal terminal	Connect with Communication Signal CAN
	SHIELD		Protective ground terminal	FG terminal is used when grounding over all the MAC ID
	CAN+		Communication signal terminal	Connect with Earth or Ground of Power source
	V+		Net Work Power Source – Terminal	Connect with +24V Power Source

## 2. 5 DeviceNet Communication Specification

### DeviceNet Communication Specification

DeviceNet Communication Function	Slave Function	
MAC ID Setting Range	01 ~63	
Network Line	Trunk Line , Drop Line	
Connection Style	T type Drop line, Daisy chain drop line	
Network speed	125kbps, 250kbps, 500kbps	
Network speed & Network length	DeviceNet Thick Trunk Length	500m (125kbps), 250m (250kbps), 100m (500kbps)
	DeviceNet Thin Trunk Length	100m (125kbps, 250kbps, 500kbps)
	Maximum Drop Length	6m (125kbps, 250kbps, 500kbps)
	Cumulative Drop Length	156m (125kbps), 78m (250kbps), 39m (500kbps)
Communication Function	① I/O Message Poll Command Request/Response ② Explicit Message Group2 Only Server command Request/Response Duplicate MAC ID	
Message Data Length	① I/O Message 4 Byte ② Explicit Message Maximum 55Byte	
Vendor ID	178	
Product Code	0003(hex)	
Device Type	AC Drive Profile [02(hex)]	
Product Name	DNET66 for VF66 Series	

## 2. 6 Other

Other standard specifications apply to VF66 inverter correspondingly. For more details, please refer to the VF66 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&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

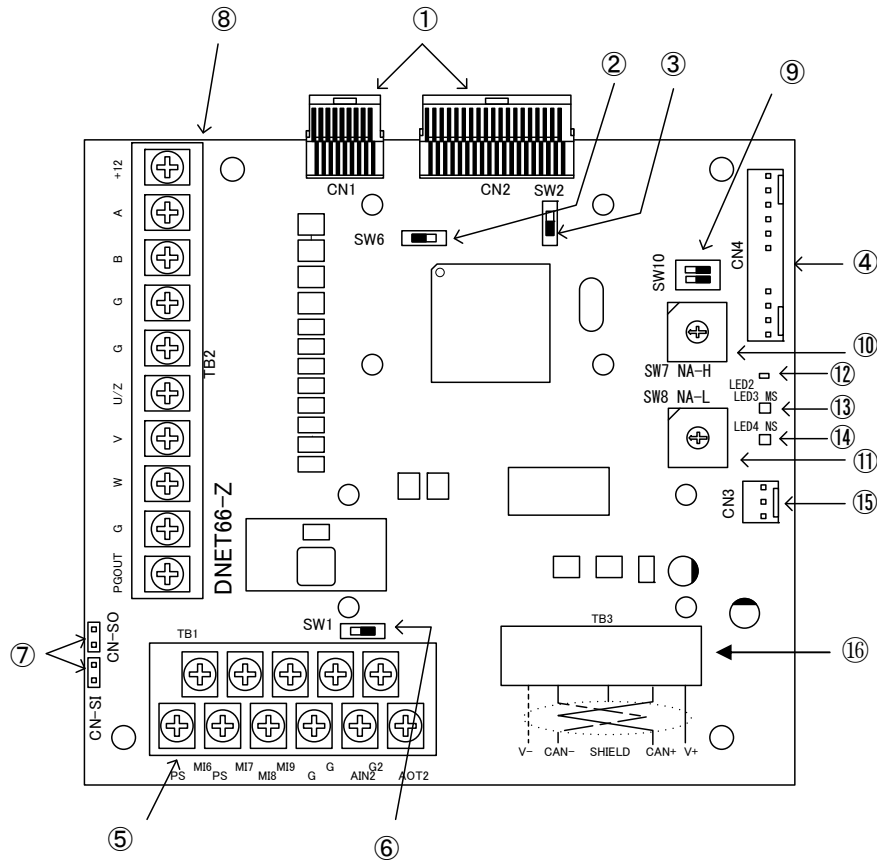


Figure3-1 DNET66-Z substrate

- ① Connector to VFC66-Z (CN1,2)
- ② PG frequency dividing output switch (SW6)
- ③ PG signal ON/OFF switch (SW2)
- ④ Connector to external extension option "IOEXT66" (CN4)
- ⑤ Multi function input/output, Analog input/output terminal block (TB1)
- ⑥ Analog input(2) signal characteristic switching switch (SW1)
- ⑦ Multi function input signal characteristic switching jumper connector (CN-SI, CN-SO)
- ⑧ PG input/output terminal block (TB2)
- ⑨ DeviceNet communication baud rate switch (SW10)
- ⑩ DeviceNet higher digits MAC ID setting switch (SW7)
- ⑪ DeviceNet lower digits MAC ID setting switch (SW8)
- ⑫ DeviceNet communication LED (LED2, COMN, GREEN)
- ⑬ DeviceNet module status LED (LED3, GREEN/RED)
- ⑭ DeviceNet Network status LED (LED4, 1/赤)
- ⑮ Not use
- ⑯ DeviceNet communication Terminal (TB3)

As connector connecting to ④, please use housing :5051-12, terminal coated gold :2759G or 2759PBG produced by Molex. For connection to CN4 and usage of CN4 and so on, please refer to the instruction manual about IOEXT66

### 3. 2 DNET66-Z switches

You can change various function by switching the switch on DNET66-Z.

#### Each kind of function of switch on DNET66-Z

Name of switch	Use	Description															
SW1	Analog input(2) signal characteristic switching switch	<p>witch input signal characteristic of analog input (2) terminal.</p> <ul style="list-style-type: none"> <li>• 0-10V,0±10V input when the switch is OFF.</li> <li>• 4-20mA input when the switch is ON.</li> </ul> <p>[In the initial condition, the switch is set to OFF.]</p> <p>※When you switch input range, please change the parameter of VF66B inverter. For more detail, please refer to chapter 5.</p>															
SW2	PG signal ON/OFF switch	<p>Switch ON/OFF PG signal.</p> <ul style="list-style-type: none"> <li>• PG signal is no effect when the switch is OFF.</li> <li>• PG signal is available when the switch is ON.</li> </ul> <p>[As default, the switch is ON.]</p>															
SW6	PG frequency dividing output switch	<p>Switch output of PG frequency dividing signal.</p> <ul style="list-style-type: none"> <li>• 1/4 frequency dividing signal is output when the switch is side of 3.</li> <li>• 1/2 frequency dividing signal is output when the switch is side of 1.</li> </ul> <p>[In the initial condition, the switch is set to position "3"]</p>															
SW10	BAUD RATE setting Switch	<p>This electric switch sets Data Rate. Setting description of an electric switch is recognized in power initialization of DNET64.</p> <p>BAUD RATE is set in factory shipping by 500kbps. BAUD RATE sets it with ON/OFF of switch 1 and switch 2. Switch 1 is a least significant bit.</p> <table border="1" data-bbox="753 1167 1401 1301"> <thead> <tr> <th>Network speed</th> <th>125k bps</th> <th>250k bps</th> <th>500k bps</th> <th>Prohibition</th> </tr> </thead> <tbody> <tr> <td>Switch1</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>Switch2</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>ON</td> </tr> </tbody> </table> <p>[In the initial condition,,Switch1 is set toOFF,Switch2 is set toON]</p>	Network speed	125k bps	250k bps	500k bps	Prohibition	Switch1	OFF	ON	OFF	ON	Switch2	OFF	OFF	ON	ON
Network speed	125k bps	250k bps	500k bps	Prohibition													
Switch1	OFF	ON	OFF	ON													
Switch2	OFF	OFF	ON	ON													
SW7, SW8	DeviceNet MAC ID setting Switch	<p>This electric switch is possible to set MAC ID on DeviceNet of DNET-66</p> <ul style="list-style-type: none"> <li>•Set MAC ID by 2 digits of decimal system, lower digits for SW8 &amp; higher for Sw7.</li> <li>•Set this electric switch on DeviceNet of DNET-66 to range 01 ~ 63.</li> </ul> <p>(In the initial condition, Sw 7 is set to 6,Sw 8 is set to 3.)</p>															



## 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 DNET66-Z

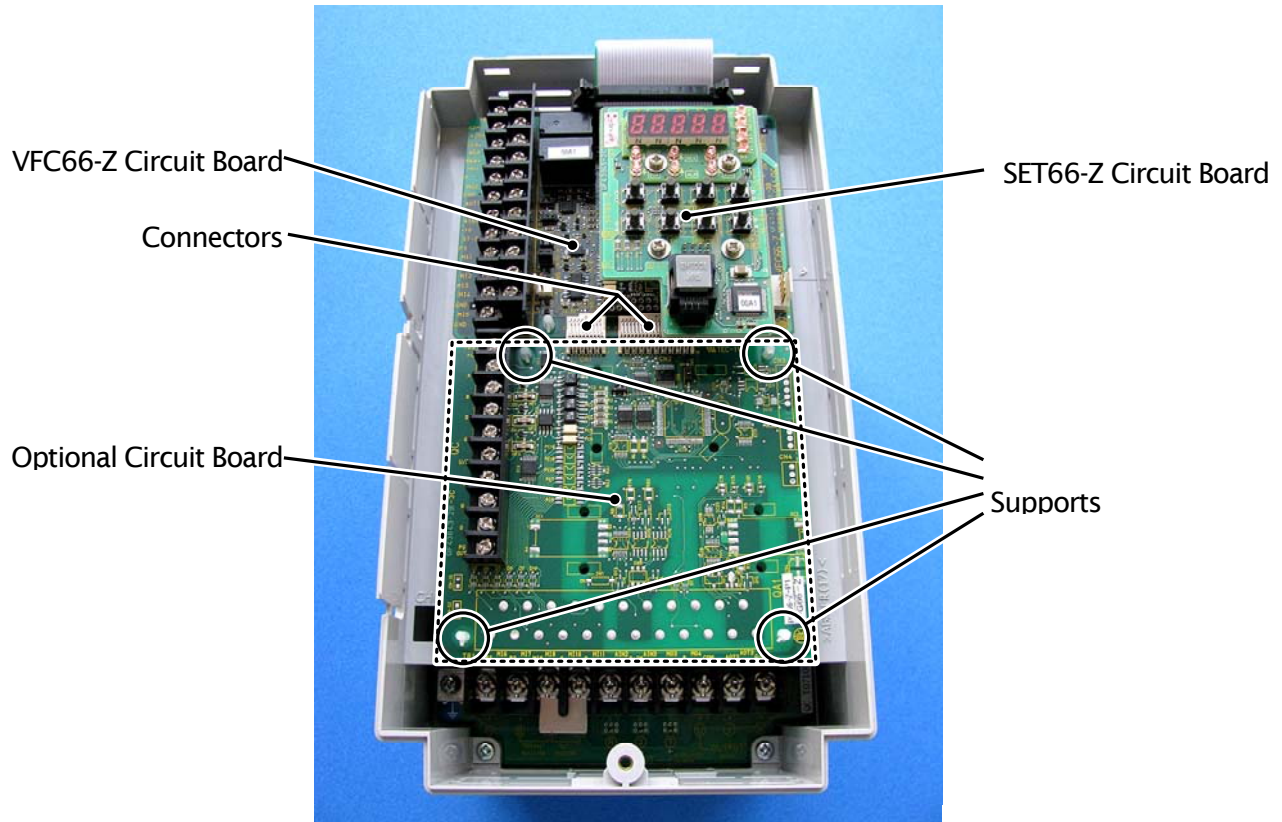


Figure 3.2 Optional Circuit Board Installation Position (VF66B-2R222)

\*For information about opening and closing the inverter unit cover lid, please refer to the VF66 inverter manual.

- (1) Confirm that the power is off before performing any work
- (2) Install the DNET66-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

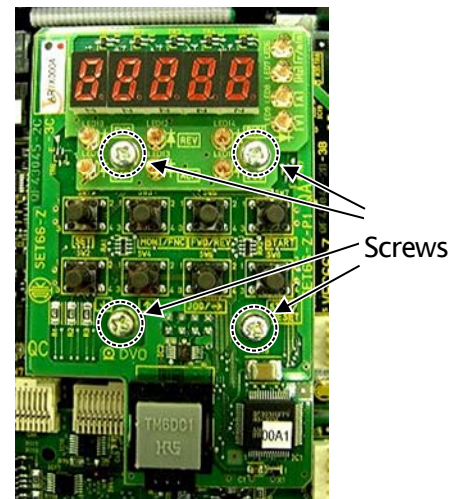


Figure 3.3 SET66-Z Circuit Board

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.

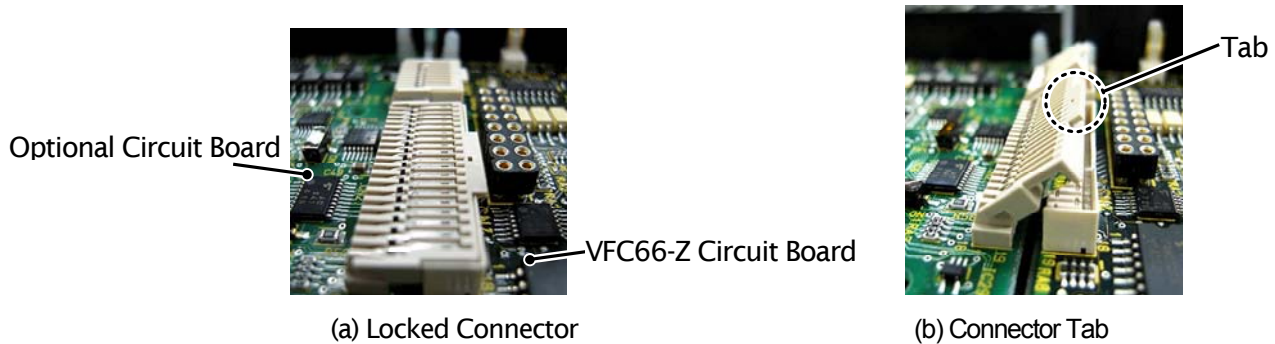


Figure 3.4 Connector

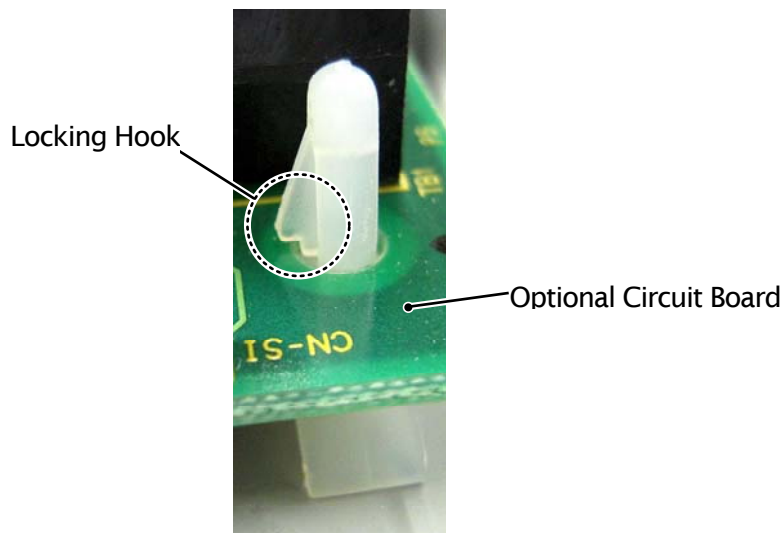


Figure 3.5 Support Locking Hook

- (6) Align the four holes of the DNET66-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 DNET66-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 it is 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.

### 3. 4 LED Operation

#### • LED2 Operation

LED2 illuminates in a cycle of about 1 seconds when DNET66-Z is operating normally. If LED2 is not illuminated properly when power is on, the following situations may be the cause:

- The connection between VFC66-Z and DNET66-Z may be faulty.
- VFC66-Z or DNET66-Z may be malfunctioning

#### • LED3 Operation

MS(LED3):Module Status LED

This bi-color (green/red) LED provides device status. It indicates whether or not the device has power and is operating properly. The followings define the Module Status LED states.

For this state:	LED is:	To indicate:
Power Off	Off	There is no power applied to the device.
Device Operational	Green	The device is operating in a normal condition.
Device in Standby	Flashing Green	The device needs commissioning due to configuration missing, incomplete or incorrect. The Device may be in the Standby state.
Minor Fault	Flashing Red	Recoverable Fault
Unrecoverable Fault	Red	The device has an unrecoverable fault; may need replacing.
Device Self Testing	Flashing Red-Green	The Device is in Self Test.

## • LED4 Operation

NS (LED4) : Network Status LED

This bi-color (green/red) LED indicates the status of the communication link. The followings define the Module Status LED states.

For this state:	LED is:	To indicate:
Not Powered/ Not On-line	Off	Device is not on-line. - The device has not completed the Dup_MAC_ID test yet. - The device may not be powered, look at Module Status LED.
On-line, Not Connected	Flashing Green	Device is on-line but has no connections in the established state. - The device has passed the Dup_MAC_ID test, is on-line, but has no established connections to other nodes. - For a Group 2 Only device it means that this device is not allocated to a master.
Link OK On-line, Connected	Green	The device is on-line and has connections in the established state. - For a Group 2 Only device it means that the device is allocated to a Master.
Connection Time-out	Flashing Red	One or more I/O Connections are in the Timed-out state.
Critical Link Failure	Red	Failed communication device. The device has detected an error that or that has rendered it incapable of communicating on the network (Duplicate MAC ID, or Bus-off).
Device Self Testing	Flashing Red-Green	The Device is in Self Test

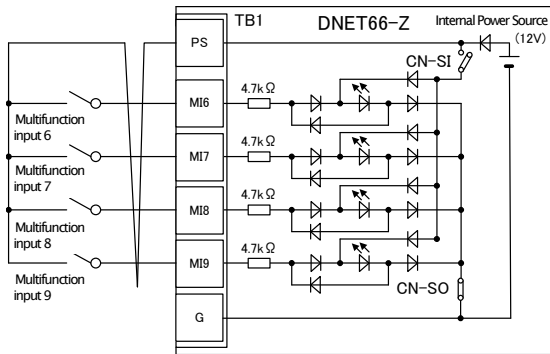


## CAUTION [Safety Precautions]

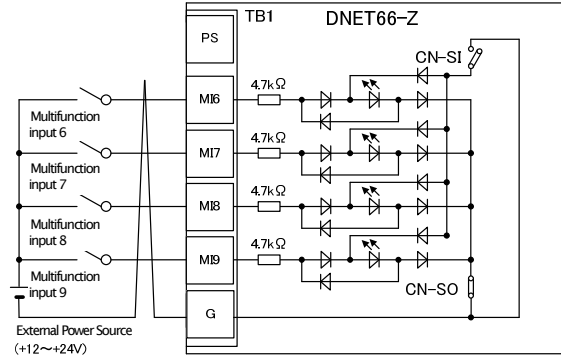
If LED1 is not operating normally, the DNET66-Z or VFC66-Z board may be malfunctioning.  
If this is the case, please contact us immediately.

# Chapter 4 Multifunction Input/ Output Specification

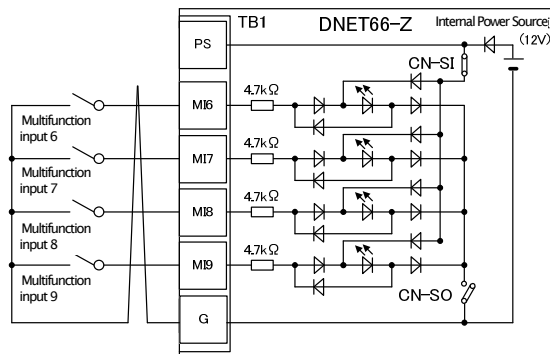
## 4. 1 Multifunction Input



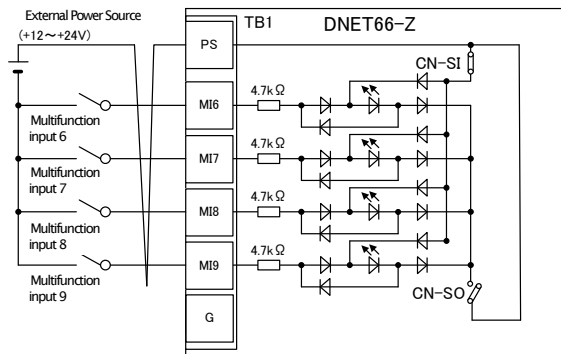
**1. Source Mode (with internal power source)**



**2. Source Mode (with external power source)**



**3. Sink Mode (with internal power source)**



**4. Sink Mode (with external power source)**

**Figure 4.1 Multifunction Input Connections**

The DNET66-Z can use the VF66 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 VF66 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 DNET66-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)	0:Preset frequency selection 1	—
c-07	Multifunction input terminal (7) function selection	1: Preset frequency selection 2 (V/f mode) Preset rotation speed selection 2 (induction motor/ED motor vector mode)	1:Preset frequency selection 2	
c-08	Multifunction input terminal (8) function selection	2: Preset frequency selection 3 (V/f mode) Preset rotation speed selection 3 (induction motor/ED motor vector mode)	2:Preset frequency selection 3	
c-09	Multifunction input terminal (9) function selection	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)	3:Acceleration/ deceleration time selection 1	
c-10	Multifunction input terminal (10) function selection	6: Frequency DOWN command (MRH mode) (V/f mode) Rotation speed DOWN command (MRH mode) (induction motor/ED motor vector mode)	4:Acceleration/ deceleration time selection 2	
c-11	Multifunction input terminal (11) function selection	7: Frequency hold (V/f mode) Rotation speed hold (induction motor/ED motor vector mode)	5:Frequency UP command	
		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] (JOCR) 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		

The DNET66-Z multifunction input can not be used from the terminal and Devicenet communication but be chosen input method by set parameter C-00,for more information ,please refer to instruction manual of DNET66-Zcommunication protocol

The DNET66-Z multifunction input signal can also be used as the VF66 inverter built-in PLC function input relay. For more information, please refer to the VF66 inverter manual and the VF66 PCTool 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, G-IN terminal, and G-OT 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 5 Analog Input/Output Function

## 5. 1 Analog Input (2)

The Analog input (2) to the terminals on DNET66-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 VF66 Inverter parameter setting as mentioned below is required. Please see the VF66 Inverter instruction manual together. Furthermore, for the built-in PLC function, please see VF66 PC Tool manual.

Before usage of Analog Input(2), Please conduct the adjustment of gain & offset as mentioned next paragraph 5.2

Analog input (2) characteristic selection

Display	Item	Set-up range (Item selection)	Default Data	Unit
G-03	Analog input(2) characteristics selection	0:0 to $\pm 10V$ 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  $\pm 10V$  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 DNET66-Z terminal block TB1, as shown in the following figures. The input analog signal characteristics can be chosen as either "voltage input 0 to  $\pm 10V$ ", "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.

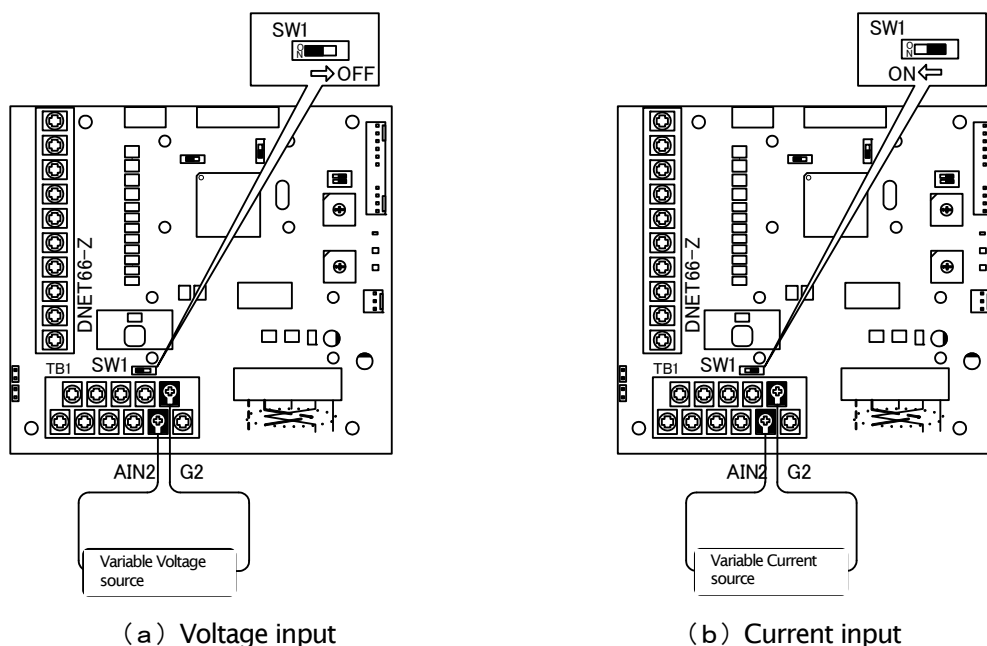


Figure 5.1 Connection of analog input (2)

## 5. 2 Analog Input (2) Input Gain and Offset Adjustmen

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

After adjusting of Analog Input (1), Gain and offset adjustment of Analog Input (2) are required.

Gain and offset adjustment method of Analog Input (1) is refer to the instruction manual of VF66 TOYO INTELLIGENT INVERTER.

Usually gain and offset adjustment of Analog Input (1) is not necessary as such a adjustment did in our Works befor delivery.

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"



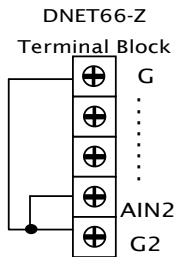
Press [MONI/FNC]key to turn on FNC (function selection) mode (LED-FNC will be lit).



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 (DNET66-Z).

**⚠ CAUTION [Short-Circuit of terminals]**

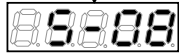
- Before short circuiting terminals, please be sure to turn OFF the inverter. There is a risk of electrical shock.



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.



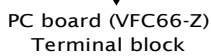
Use [JOG/→] [↑][↓]keys to input 「1040」 and press [SET]key to confirm it.



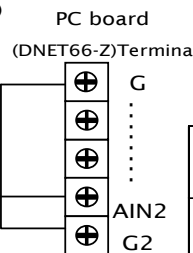
「S-08」 will appear again, press [SET]key to confirm.



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 DNET66-Z PC board and [+10] on the terminal block TB1 of the VFC66-Z PC board. Remain short circuited terminals between [G] and [G-IN] of the PC board (DNET66-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.



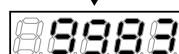
After power is ON, press [MONI/FNC]key to turn on FNC (function selection) mode. (LED-FNC will be lit) then, use [JOG/→] [↑][↓]keys to select 「S-08」 and press [SET]key to confirm.



Use [JOG/→] [↑][↓]keys to change numbers, Input 「1040」 and press [SET]key to confirm.



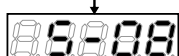
「S-08」 will appear again, press [SET]key to confirm.



Measure the voltage between PC board (DNET66-Z) terminals [AIN2] and [G] with a tester and enter the 1000times 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.

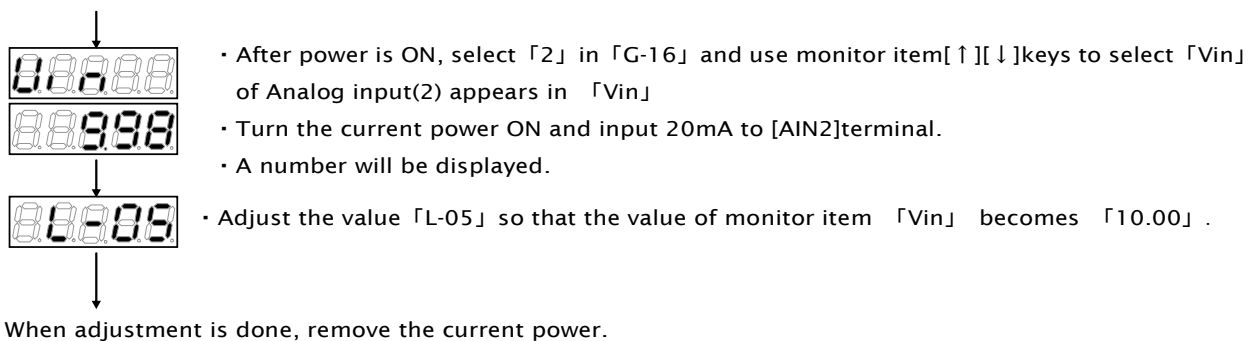
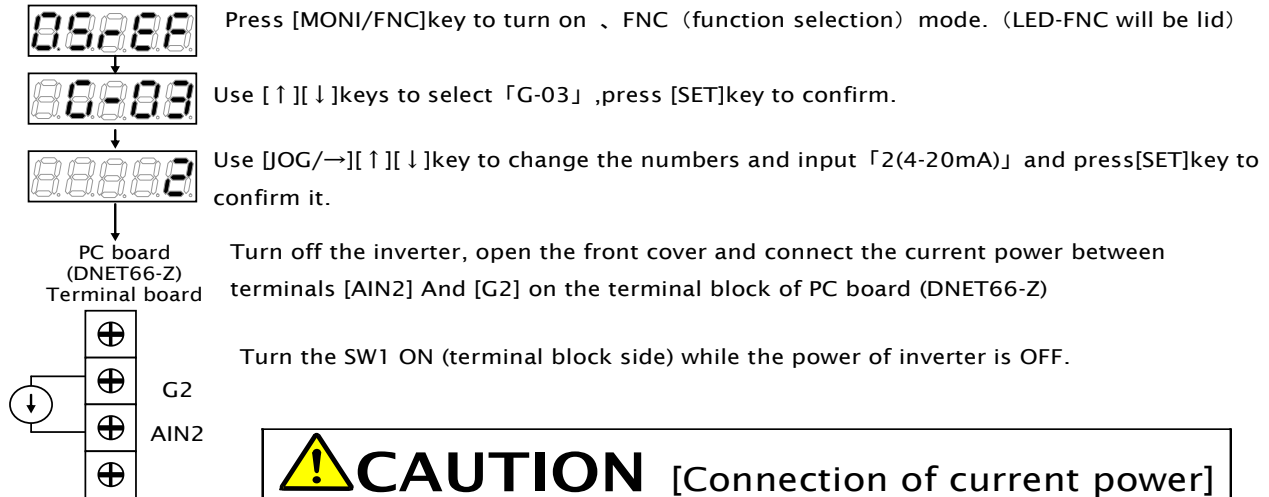


If 「S-08」 appears again, Analog input (2) gain(L-05)and Analog input (2) Offset(L-06)will be changed automatically. Press [MONI/FNC]Key to indicate monitor items.

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 (IO66-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”



## 5. 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] <sup>(*)</sup>	100.0	% <sup>(*)</sup>
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)] <sup>(*)</sup>	0.0	% <sup>(*)</sup>

(\*) 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.

- Set b-10 to "4".
- Set G-03 (described in section 5.1) 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 5.2, 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 5.2.

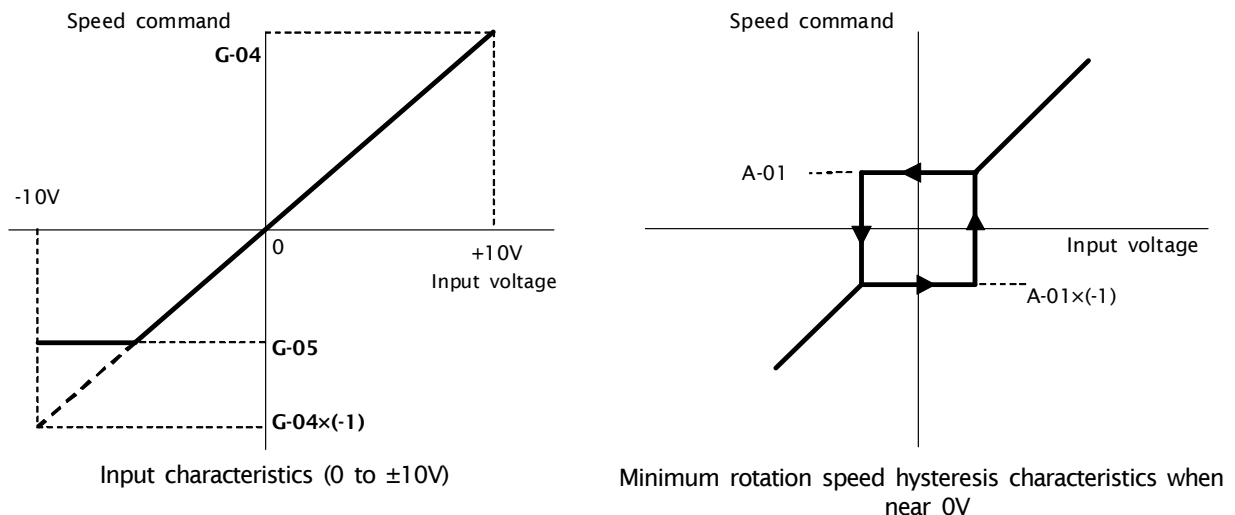


Figure 5.2 Speed command characteristics with voltage input of 0 to ±10V

• 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 5.3) 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.

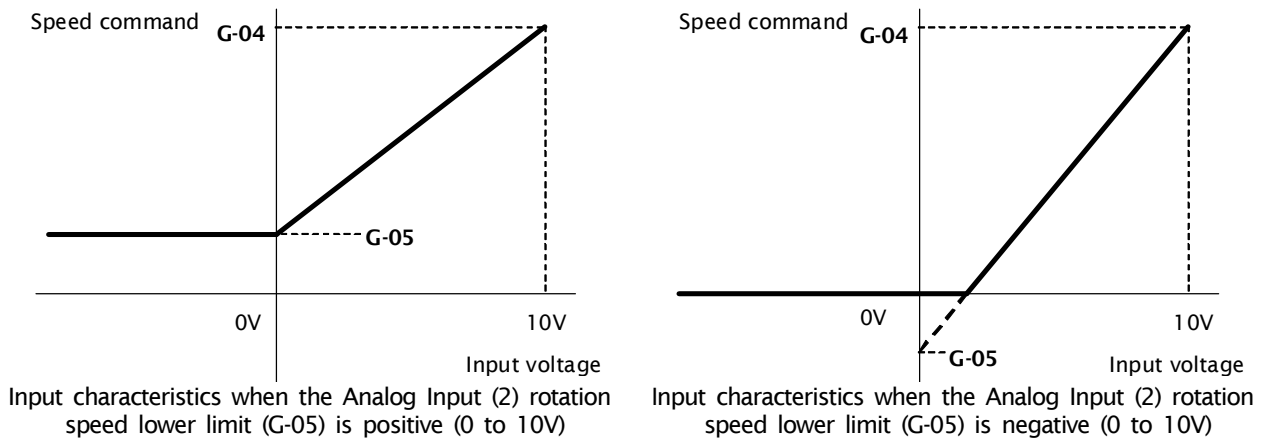


Figure 5.3 Speed command characteristics with voltage input of 0 to 10V

• 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 5.4) 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.

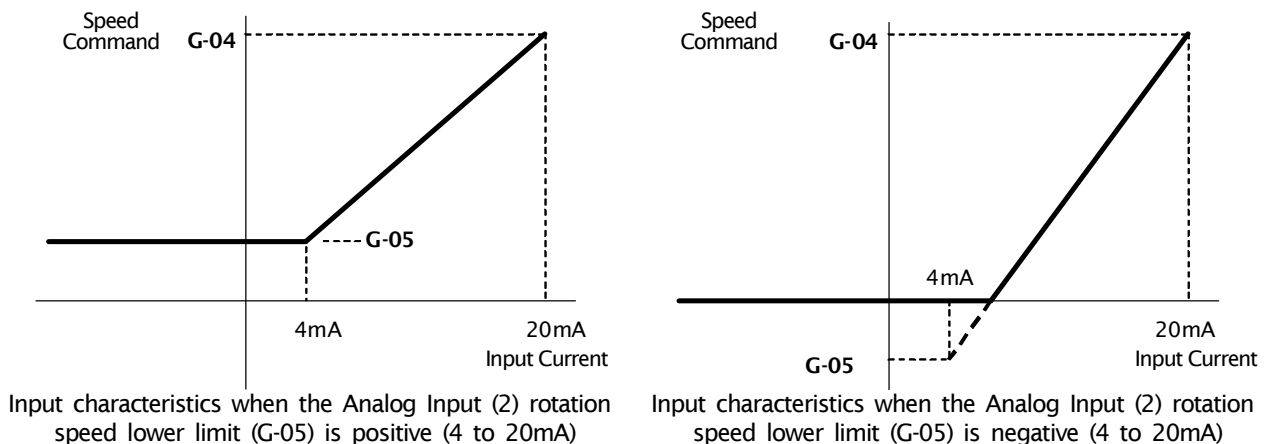


Figure 5.4 Speed command characteristics with current input of 4 to 20mA

(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 5.5)

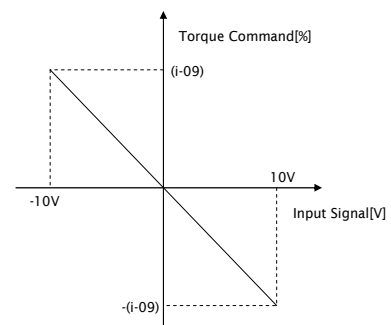


Figure 5.5 Analog Input Torque Command Characteristic

## 5. 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.

Please refer to operation manual about VF66B inverter with this manual.

For built in PLC function, please 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 "G2" on the terminal block TB1 of DNET66-Z substrate.

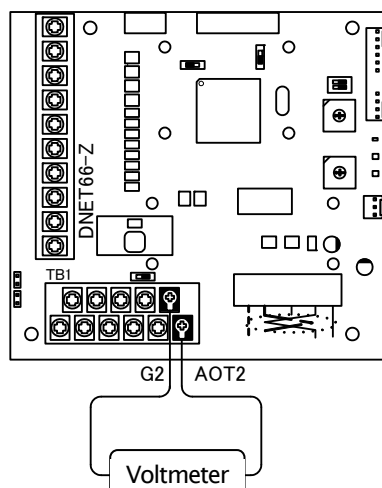


Figure 5.9 Connection of analog output (2)

## 5. 5 Analog output (2) gain offset adjustment

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

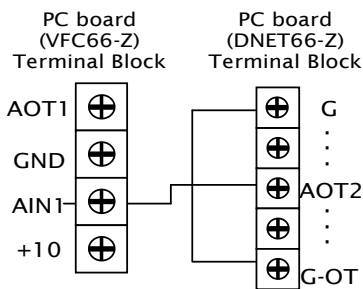
Analog output (2) gain offset adjustment is conducted after the VF66 inverter analog input(1) gain offset adjustment. As to adjustment of analog input (1) gain offset, please see the VF66 inverter instruction manual.

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 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	-	-

## • Adjustment of offset and gain of Analog output (2)



Turn OFF the inverter, open the front cover, and short circuit between terminals [AOT2] on the terminal block of the PCB(DNET66-Z) and [AIN1] on the terminal block of PCB (VFC66-Z) and so as [G]and[G-OT]on terminal block of DNET66-Z.



### CAUTION [Short circuiting of terminals]

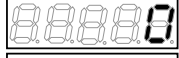
- Before short circuiting terminals, please be sure to turn OFF the inverter. There is a risk of electrical shock.



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



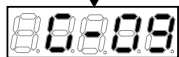
• After power is ON, press [MONI/FNC] key to turn on FNC (function selection) mode. (LED-FNC will be lit). Use [JOG/→] [↑][↓] keys to select “b-17” then press [SET] to confirm it.



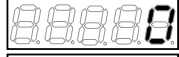
• Use [JOG/→] [↑][↓] keys to input “0” and press [SET] key to confirm it.



• 「b-17」 appears again.



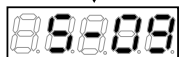
• Use [JOG/→] [↑][↓] keys to select 「G-09」 and press [SET] key to confirm it.



• 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.



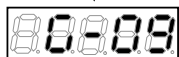
• 「S-09」 will appear again, press [SET] key to confirm it.



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



• 「S-09」 will appear again.



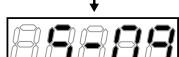
• Use [JOG/→] [↑][↓] keys to select 「G-09」 and press [SET] key to confirm it.



• 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 [AOT2] on the DNET66-Z PC board and [AIN1] on the VFC66-Z PC board, as well as [G] and [G2] on the DNET66-Z PC board. Reset the setting of [G-09] and [b-17].

# Chapter 6 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 is a correspondence only a complementary output with 12V power source. The operation manual of VF66 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.

## 6. 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 VF66 inverter collectively.

※When switch SW2 on DNET66-Z is ON, the input of PG signal is effective.

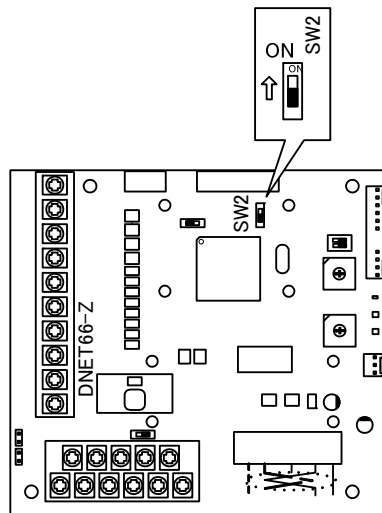


Figure 6.1 PG signal input switching

### 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. 6.2, connect PG wire to terminal block TB2 of DNET66-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)3P×0.5SQ (made by Hitachi Cable).

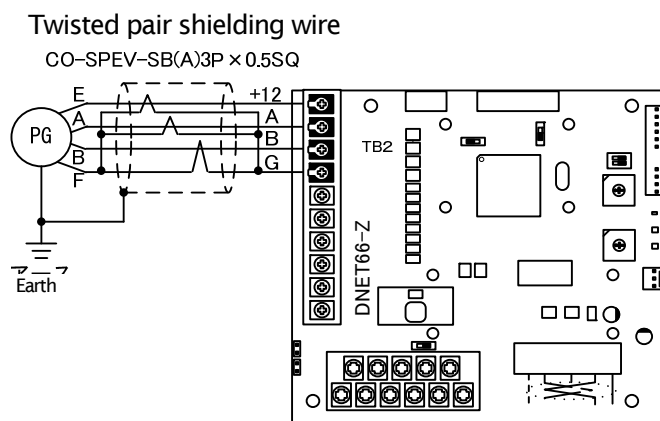


Figure 6.2 PG wire interconnection of an induction motor

**(2) In the case of induction motor vector control mode**

Please set 2 as the setups parameter A-10 shown in the upper table, and as shown in Fig. 6.3, connect PG wire to terminal block TB2 of DNET66-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)3P×0.5SQ (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.

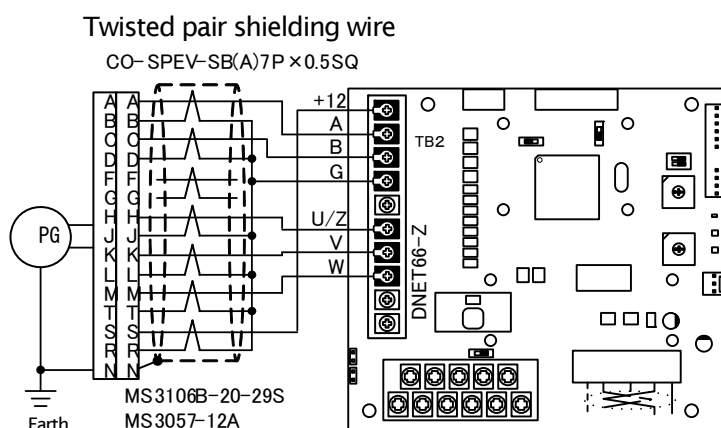


Figure 6.3 PG wire interconnection of an ED motor

**⚠ DANGER [Wiring]**

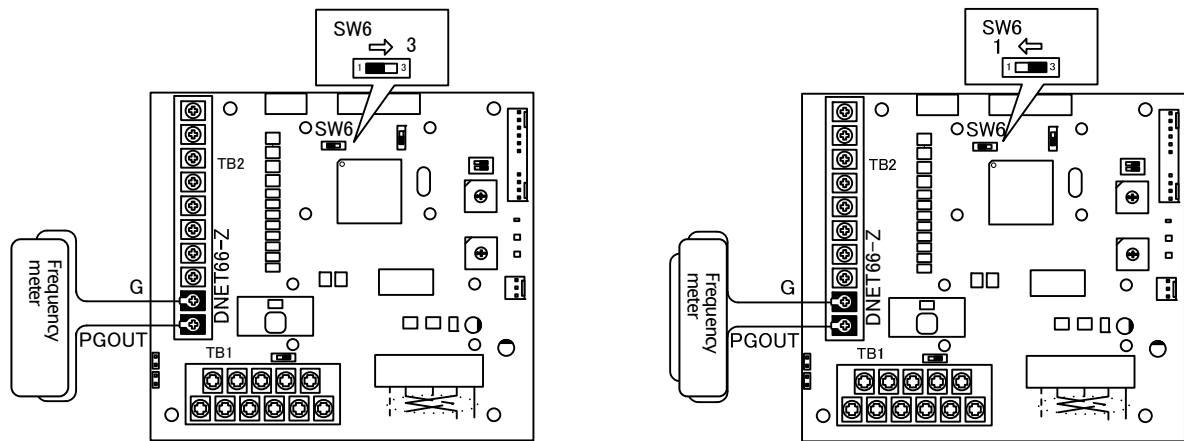
- When wiring PG, an inverter power source is certainly turned off.  
Failure to do so may cause an electric shock, personal injury, equipment failure or malfunction.
- Never connect the G terminal to earth.  
Doing so may cause equipment failure or damage.

## **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.

### 6. 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 SW4 of DNET66-Z is switched to side of 3, 1 / 4PG frequency divided signal is outputted, and if SW4 is switched to side of 3, 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 6.4 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.

# Chapter 7 DeviceNet Communication function

This section explains electric wiring and termination attention of trunk line and drop line in connection of DeviceNet.

## 7. 1 Connection of DeviceNet

In connection of DeviceNet, terminating resistors are required on each end of the trunk line. Drop lines as long as 6 m (20 feet) each are permitted, allowing one or more nodes to be attached. DeviceNet allows branching structures only on the drop line.

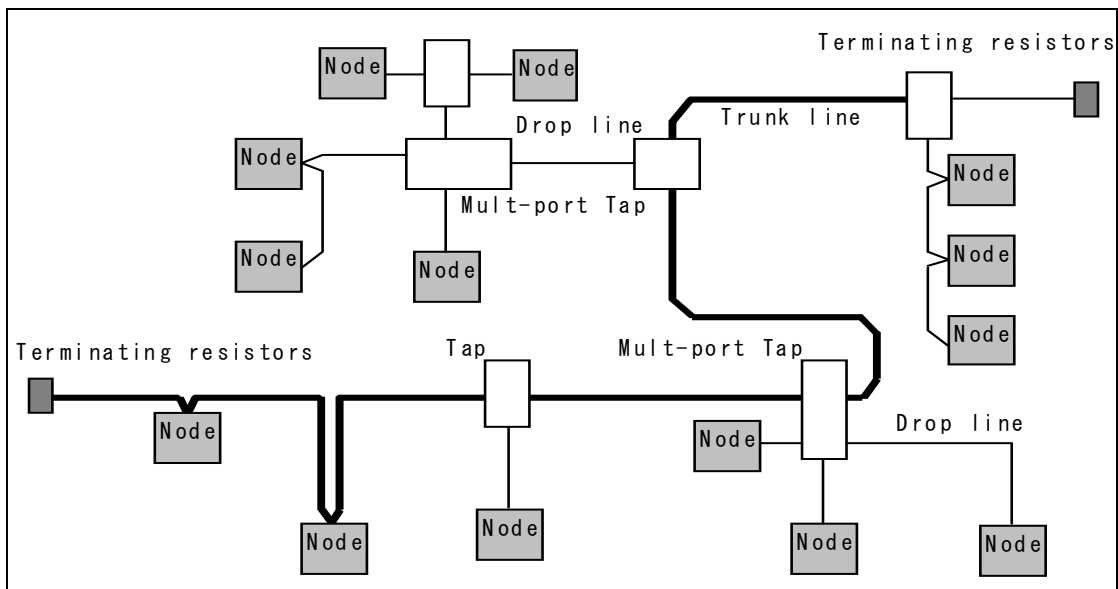


Figure 7.1

The total amount of trunk line allowable on the network depends upon the data rate and the type of cable (thick or thin) used. The cable distance between any two points in the cable system must not exceed the Maximum Cable Distance allowed for the baud rate. For trunk lines constructed of only one type of cable, refer to Table 7.1-a to determine the Maximum Cable Distance based on the data rate and the type of cable used.

Cable distance between two points includes both trunk line cable length and drop line cable length that exists between the two points.

Table 7.1-a

Data Rate	Maximum Cable Distance for 100 % Thick Cable	Maximum Cable Distance for 100 % Thin Cable
125k bps	500m (1640 ft.)	100m (328 ft.)
250k bps	250m (820 ft.)	
500k bps	100m (328 ft.)	

DeviceNet allows the use of either thick or thin cable to be used to construct trunk lines. DeviceNet also allows a combination of both types of cable to be used on the same network. To determine the maximum cable distance with a mix of both thick and thin cable, use Table 7.1-b.

Table 7.1-b

Data Rate	Computation expression
125k bps	$L_{\text{thick}} + 5 \times L_{\text{thin}} = 500\text{m}$
250k bps	$L_{\text{thick}} + 2.5 \times L_{\text{thin}} = 250\text{m}$
500k bps	$L_{\text{thick}} + L_{\text{thin}} = 100\text{m}$

L thick is length of thick cable. L thin is length of thin cable.

Drop line length is the longest cable distance of those measured from the tap on the trunk line to each of the transceivers of the nodes on the drop line. This distance includes any dropline cable which might be permanently attached to the device. The total amount of drop line allowable on the network depends upon the data rate. Refer to the following Table 7.1-c when determining the number and length of drop lines.

Table 7.1-c

Data Rate	Drop Length	
	Maximum	Cumulative
125k bps	6m (20ft.)	156m (512ft.)
250k bps		78m (256ft.)
500k bps		39m (128ft.)

## 7. 2 Cable

**Thick Cable** : This cable consists of two shielded pairs twisted on a common axis with a drain wire in the center covered with an overall braid shield and is commonly used as trunk line when length is important.

**Thin Cable** : Thin Cable is smaller and more flexible than Thick Cable. It is commonly used for drop lines, but can also be used, for shorter distances, as trunk line.

Listed below are general requirements for the DeviceNet Thick/Thin Cable. Other types of external insulation and/or jacketing are allowable provided that internal construction and electrical characteristics adhere to the cable specifications.

- One twisted signal pair {#18\*(Thick Cable)/#24\*(Thin Cable)} ; blue/white
- One twisted power pair {#15\*(Thick Cable)/#22\*(Thin Cable)} ; black/red
- Separate aluminized mylar shields around power pair and signal pair
- Overall foil/braid shield with drain wire {#18\*(Thick Cable)/ #22\*(Thin Cable)} ; bare\*\*
- High speed ( $V_p = 75\%$  min), low loss, low distortion, data pair (to keep propagation delays to a minimum)
- 8 amp (Thick Cable)/ 3 amp (Thin Cable) maximum current capacity

- PVC insulation on power pair
- Industrial temperature range
- High flexibility

\* #\*\* means AWG indication of a power size. #15 = 1.652mm<sup>2</sup>, #18 = 0.8233mm<sup>2</sup>, #22 = 0.3243mm<sup>2</sup>, #24 = 0.2047mm<sup>2</sup>

\*\* The drain wire connects the shields within the cable and serves as a means to terminate the shield into the connector.

### **7. 3 Terminating Resistors**

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DeviceNet requires a terminating resistor to be installed at each end of the trunk. The resistor requirements are:

- 121 ohm
- 1 % Metal Film
- 1/4 Watt

Important: Terminating resistors should never be included in nodes. Inclusion of this capability could easily lead to a network with improper termination (too high or too low an impedance) potentially causing failure. For example, removal of a node, which includes a terminating resistor, could result in network failure.

Important: Terminating resistors should not be installed at the end of a drop line, only at the two ends of the trunk line.

### **7. 4 Connectors**

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All connectors must support five conductors, which accommodate a signal pair, power pair, and a drain wire. DeviceNet supports the following types of connectors allowing both sealed and open media solutions:

#### **Open Connectors**

- Pluggable
- Hard wired

#### **Sealed Connectors**

- Mini-style connector
- Micro-style connector

**Important: All nodes attaching to DeviceNet with a connector must have male pins. This applies to sealed and unsealed connectors and all nodes whether they are consuming or providing power.**

**Important: Whatever connector solution is chosen it is mandatory that devices can be removed without severing or disturbing the network.**

## **7. 5 Device Taps**

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Device taps provide points of attachment onto the trunk line. Devices can be connected to the network either directly to the tap or with a drop line. Taps also provide easy removal of a device without disrupting network operation.

Taps are defined for:

- sealed (with and without drop lines)
- open (with and without drop lines)

## **7. 6 DeviceNet Communication function Setting**

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The Analog input (2) to the terminals on DNET66-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 DeviceNet communication function correctly, the correct VF66 Inverter parameter setting as mentioned below is required. Please see the VF66 Inverter instruction manual together. Furthermore, for the built-in PLC function, please see VF66 PC Tool manual.

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