

## Expansion IO Card Option 1

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### ETB003Z Instruction manual

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#### NOTICE

1. Make sure that this instruction manual is delivered to the end user of the expansion IO card option.
2. Read this manual before installing or operating the expansion IO card option. Keep it in a safe place for reference.
3. All information contained in this manual is subject to change without notice. Please confirm the latest information on our web site "[www.inverter.co.jp](http://www.inverter.co.jp)".



\*E6581339REV07\*

## Safety precautions

On the inverter and in its instruction manual, important information is contained for preventing injuries to users and damages to assets and for proper use of the device. Read the instruction manual attached to VF-AS1/PS1 along with this instruction manual for completely understanding the safety precautions and adhere to the contents of these manuals.

### Explanation of markings

| Marking   | Meaning of marking  |
|---|---|
|  Warning | Indicates that errors in operation may lead to death or serious injury.   |
|  Caution | Indicates that errors in operation may lead to injury (*1) to people or that these errors may cause damage to physical property. (*2) |

(\*1) Such things as injury, burns or shock that will not require hospitalization or long periods of outpatient treatment.

(\*2) Physical property damage refers to wide-ranging damage to assets and materials.

### Meanings of symbols

| Marking   | Meaning of marking  |
|---|---|
|  | Indicates prohibition (Don't do it).<br>What is prohibited will be described in or near the symbol in either text or picture form.                                  |
|  | Indicates something mandatory (must be done).<br>What is mandatory will be described in or near the symbol in either text or picture form.                          |
|  | Indicates danger or warning.<br>What is dangerous, or what the warning should be applied to will be described in or near the symbol in either text or picture form. |

■ Limitation of use

|  <b>Safety precaution</b>            |  |
|---|--|
| ▼ Never use this unit with any device other than TOSVERT VF-AS1/PS1 series inverters. Doing so may cause an accident. |  |

■ General Operation

|  <b>Warning</b>            |  |
|---|--|
| <br>Disassembly prohibited | ▼ Never disassemble, modify or repair.<br>Doing so could result in electric shock, fire and injury. For repairs, call your sales agency.   |
| <br>Prohibited             | ▼ Do not attach this option to any inverter other than the VF-AS1/PS1.<br>Doing so could result in electric shock or fire.<br>▼ Don't place or insert any kind of object into the ETB003Z (electrical wire cuttings, rods, wires).<br>Doing so could result in electric shock or fire.<br>▼ Do not allow water or any other fluid to come in contact with the ETB003Z.<br>Doing so could result in electric shock or fire. |
| <br>Mandatory             | ▼ If the inverter begins to emit smoke or an unusual odor, or unusual sounds, immediately turn off the VF-AS1/PS1.<br>If the equipment is continued in operation in such a state, the result may be fire. Call your local sales agency for repairs.<br>▼ Do not touch the sharp portions (such as leads of parts on the board, the corner of board, or etc.) on this option. It may lead to injuries.                      |
|  <b>Caution</b>          |  |
| <br>Mandatory            | ▼ This option is an electrostatic discharge sensitive device. Handle it, where the environment is protected against electrostatic electricity.<br>Otherwise, permanent damage to device will result.   |

■ Transportation & installation

|  <b>Warning</b> |   |
|--|---|
| <br>Prohibited  | ▼ Do not apply a dropping shock or other physical shocks.<br>Otherwise, damage or malfunction will result.<br>▼ Do not install or operate the inverter if it is damaged or any part of it is missing.<br>Operating a defective inverter may lead to electric shocks or fire.<br>For repairs, call your sales/repair agency.<br>▼ Do not put any flammable material near the product.<br>It may catch fire due to the product sparking in the case of a malfunction. |
| <br>Mandatory   | ▼ Use this product under the environmental conditions prescribed in the instruction manual.<br>Usage it under any other conditions may result in malfunction.<br>▼ An emergency stop device must be installed that fits with system specifications (e.g. shut off input power then engage mechanical brake).<br>Operation cannot be stopped immediately by the inverter or this unit alone, thus risking an accident or injuries.                                   |

## ■ Wiring

|  <b>Caution</b> |   |
|--|---|
| <br>Mandatory   | <ul style="list-style-type: none"> <li>▼ Electrical construction work must be done by a qualified expert.<br/>Installation or connection of input power by someone who does not have that expert knowledge may result in fire or electric shock.</li> <li>▼ Shut off power when installing and wiring this option.<br/>Wait at least 15 minutes and check to make sure that the charge lamp (VF-AS1/PS1) is no longer lit.</li> <li>▼ Tighten the screws on the terminal block to the specified torque (Refer to Section 2.2).<br/>If the screws are not tightened to the specified torque, it may lead to fire.</li> </ul> |

## ■ Operations

|  <b>Warning</b> |   |
|--|---|
| <br>Prohibited  | <ul style="list-style-type: none"> <li>▼ Do not pull on any cable itself.<br/>Doing so could result in damage or malfunction.</li> <li>▼ Do not touch switches when the hands are wet and do not try to clean the inverter with a damp cloth.<br/>Doing so could result in electric shock.</li> </ul>   |
| <br>Mandatory | <ul style="list-style-type: none"> <li>▼ Use this option under the environment specified in the instruction manual.<br/>Usage under the environment other than them may cause damages or malfunctions or an accident.</li> <li>▼ Use an additional safety device with your VF-AS1/PS1 or system to prevent a serious accident due to the unit malfunctions.<br/>Usage without an additional safety device may cause an accident.</li> </ul> |

## ■ Disposal

|  <b>Caution</b> |  |
|--|--|
| <br>Mandatory   | <ul style="list-style-type: none"> <li>▼ For safety's sake, do not dispose of the disused inverter yourself but ask an industrial waste disposal agent (*).<br/>If the collection, transport and disposal of industrial waste is done by someone who is not licensed for that job, it is a punishable violation of the law. (Laws in regard to cleaning and processing of waste materials)<br/>(* ) Persons who specialize in the processing of waste and known as "industrial waste product collectors and transporters" or "industrial waste disposal persons."</li> </ul> |

## ■ Notes on use

| <b>Notes</b>   |  |
|--|--|
| <br>Mandatory | <ul style="list-style-type: none"> <li>▼ Do not install the inverter where the temperature or the humidity will change rapidly.</li> <li>▼ Keep a distance of 20cm or more between the inverter's power cable and the data transmission cable.<br/>Or the inverter might malfunction because of noise.</li> <li>▼ Insert a magnetic contactor or similar device between the VF-AS1/PS1 and the power supply to ensure that power is turned off if an emergency stop command is entered through the network.</li> </ul> |



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# Contents

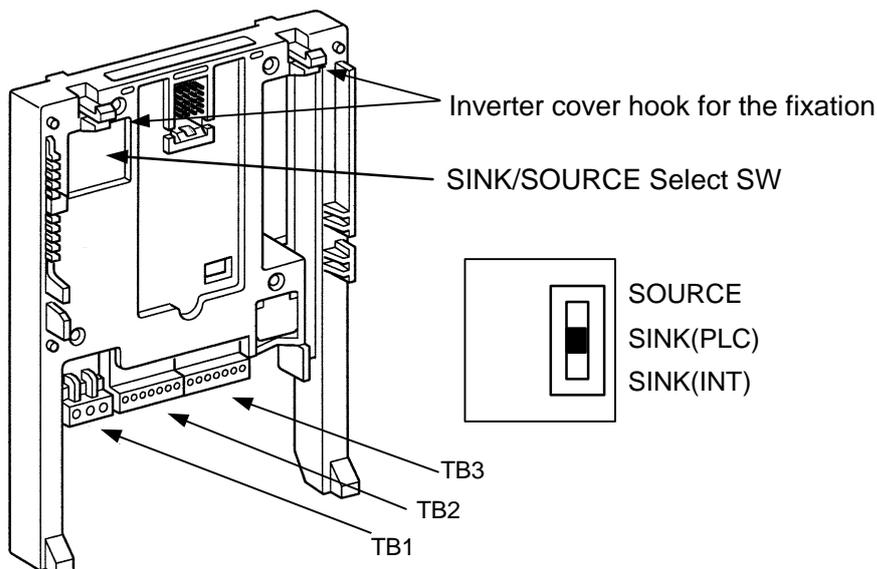
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## 1. Name and function of each section

Following figure shows appearance and name of each section of the expansion IO card option.

### 1.1 Appearance



### 1.2 Name of each section (terminal)

|             |     |                             |
|-------------|-----|-----------------------------|
| T<br>B<br>1 | R1A | Programmable relay output 1 |
|             | R1B | Programmable relay output 1 |
|             | R1C | Programmable relay output 1 |

|             |         |   |
|-------------|---------|---|
| T<br>B<br>2 | N10     | Analog input setting power output -10V      |
|             | P24/PLC | Common terminal of extension terminal input |
|             | LI1     | Extension terminal input LI1                |
|             | LI2     | Extension terminal input LI2                |
|             | LI3     | Extension terminal input LI3                |
|             | LI4     | Extension terminal input LI4                |
|             | CC      | Digital signal equipotential (0V)           |

|             |      |                                   |
|-------------|------|-----------------------------------|
| T<br>B<br>3 | TH1+ | PTC input terminal (+)            |
|             | TH1- | PTC input terminal (-)            |
|             | OUT3 | Extension terminal output OUT3    |
|             | OUT4 | Extension terminal output OUT4    |
|             | NO1  | Output 3 and 4 common terminal    |
|             | CC   | Digital signal equipotential (0V) |

## 2. Installing the IO card option in the VF-AS1/PS1

Install the IO card option to VF-AS1/PS1 as follows:

\*1 When this option is used together with the communication option, attach this option to the inverter side.

### 2.1 Connection to the inverter

(1) Turn off input power before installing.



Mandatory

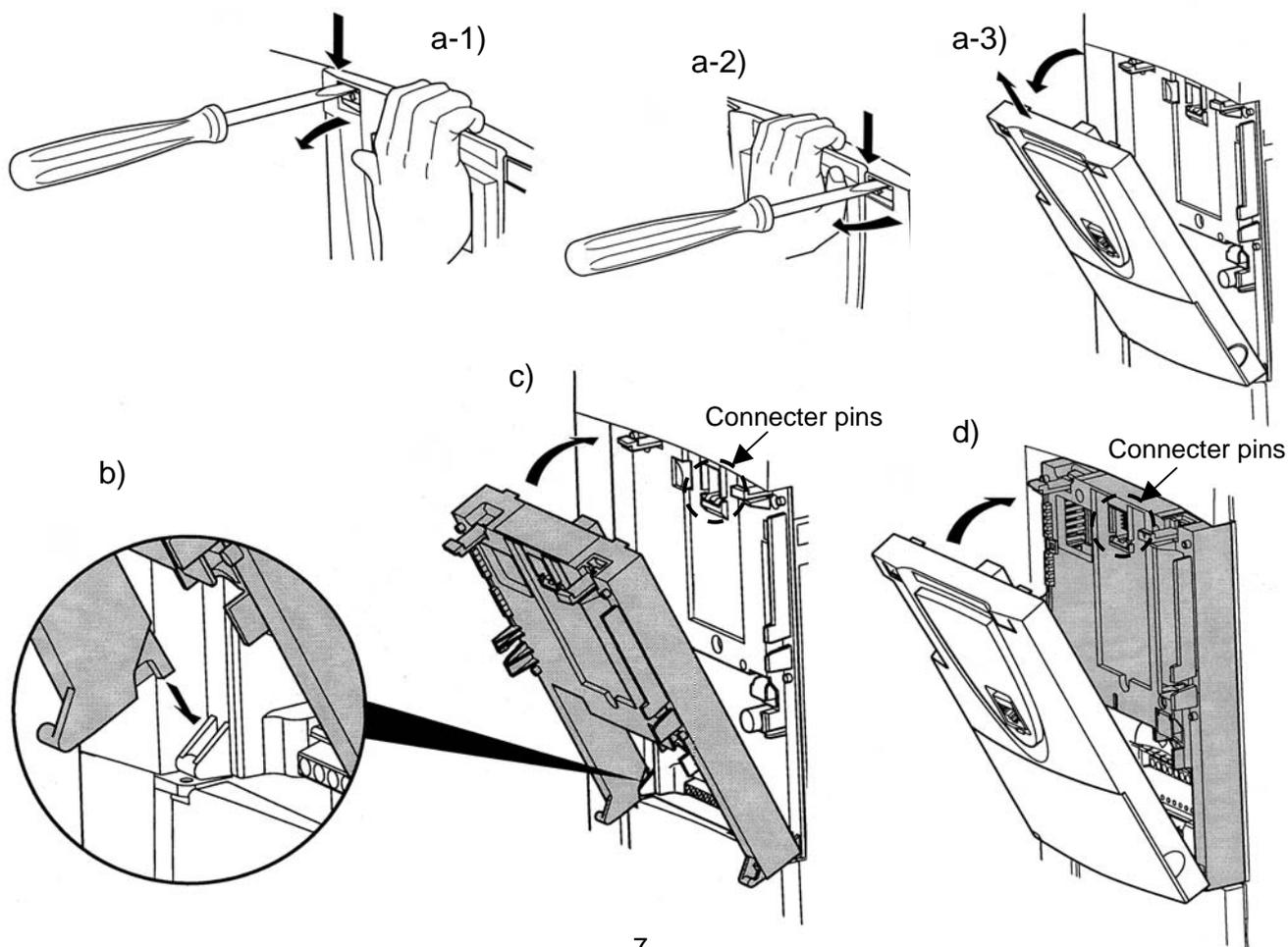
Turn off the input power of VF-AS1/PS1 and wait for at least 15 minutes and then check that the CHARGE lamp on VF-AS1/PS1 is no longer lit.

(2) Securing the option to the inverter

(A) For VFAS1/VFPS1 200V 45kW or less, 400V 75kW or less

- a) Insert a flat-blade screwdriver in each of the two holes at the upper part of the front panel, release the panel mounting tab by pushing the screwdriver down, and remove the front panel cover.
- b) Install the option in the inverter by fitting the tabs on the lower side of the option into the slots at the lower part of the inverter front panel. \*2
- c) Make sure the option is securely attached to the inverter. Then, check whether the plastic bosses on the inverter case have fitted in the holes at the upper and lower parts of the option.
- d) Insert the tabs at the lower part of the front cover into the slots at the lower part of the inverter to attach the front cover to the inverter. \*2

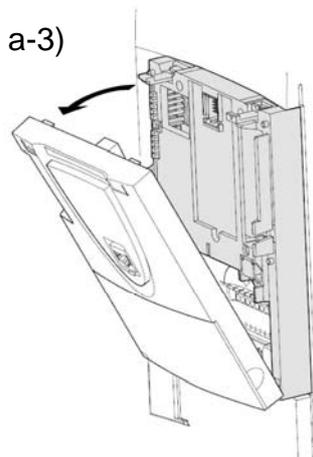
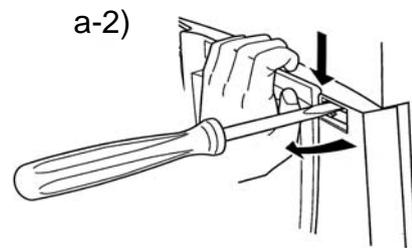
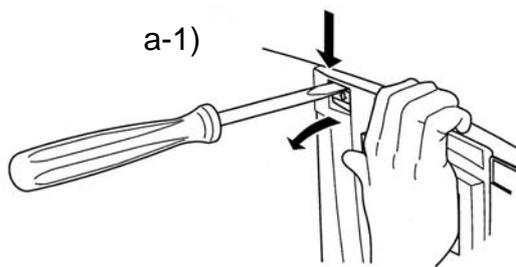
\*2 Do not bend the connector pins when you install the option card and panel.



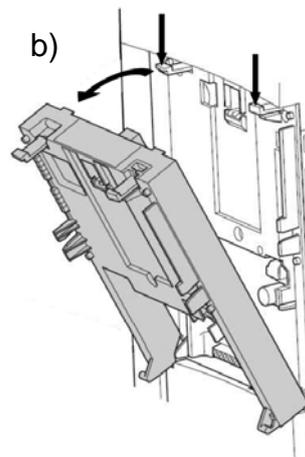
(B) For VFAS1/VFPS1 200V 55kW or more, 400V 90kW or more

- a) Insert a flat-blade screwdriver in each of the two holes at the upper part of the front panel, release the panel mounting tab by pushing the screwdriver down, and remove the front panel cover.
- b) Push the hooks pointed by the arrows and remove the standard option case.
- c) Install the option in the inverter by fitting the tabs on the lower side of the option into the slots at the lower part of the inverter front panel. \*1
- d) Make sure the option is securely attached to the inverter. Then, check whether the plastic bosses on the inverter case have fitted in the holes at the upper and lower parts of the option.
- e) Insert the tabs at the lower part of the front cover into the slots at the lower part of the inverter to attach the front cover to the inverter. \*1

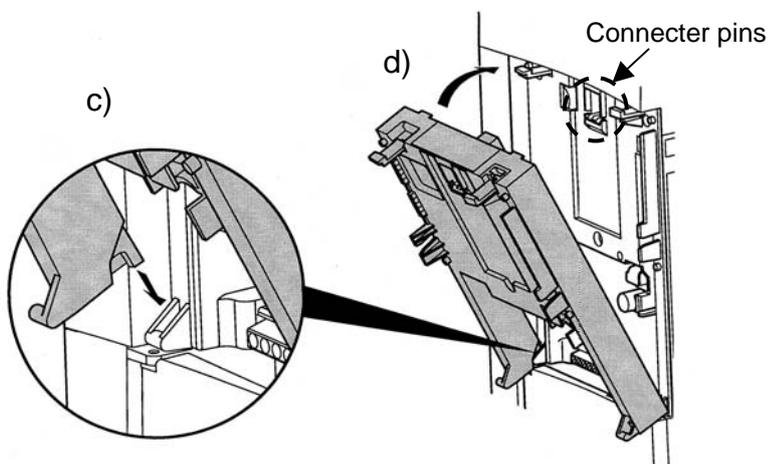
\*1 Do not bend the connector pins when you install the option card and panel.



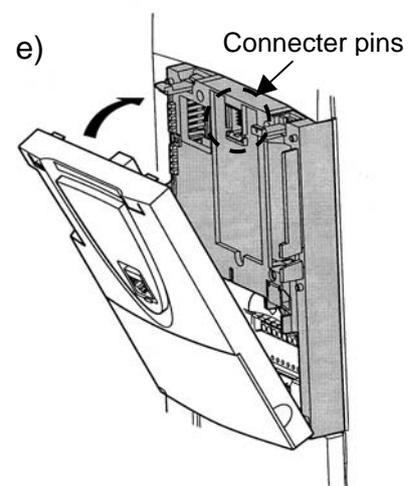
Detach the front cover



Detach the standard option case



Attach the option



Attach the front cover

## 2.2 Wiring

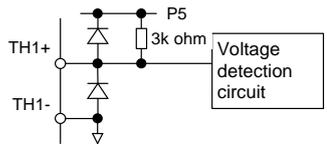
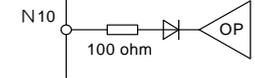
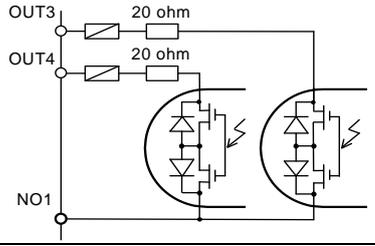
When conducting wiring, follow the instructions below.

- Use shield wire for control signal line and ground the unit with shield wire (Use twisted pair shield cable for wiring of the analog monitor output.)
- Never bind the signal line and main circuit connection wire together.
- Fix the communication cables after connected.

| Terminal Block | Applicable wire size       | The wire length of peel off the end | Using screwdriver (The blade tip) | Tightening torque |
|----------------|----------------------------|-------------------------------------|-----------------------------------|-------------------|
| TB1            | 0.2 to 2.5 mm <sup>2</sup> | About 7mm                           | 0.6mm thickness and 3.5mm width.  | 0.5 to 0.6 N·m    |
| TB2 and TB3    | 0.2 to 1.5mm <sup>2</sup>  | About 5mm                           | 0.4mm thickness and 2.5mm width.  | 0.22 to 0.25 N·m  |

### ■ < Input/output terminal interface >

| Terminal symbol      | Function   | Electrical specification  | Internal circuit  |
|----------------------|--|---|---|
| R1A<br>R1B<br>R1C    | Relay contact point output                       | Configuration of 1C contact point<br>250Vac - 2A (cos $\phi$ =1)<br>250Vac - 1A (cos $\phi$ =0.4)<br>30Vdc - 1A   |   |
| L1<br>L2<br>L3<br>L4 | Contact point input Changeover of sink or source | No voltage contact input<br>24Vdc - 5mA<br>Sink input (common voltage 24V)<br>ON : less than 10Vdc<br>OFF : 16Vdc or more<br>Source input<br>ON : 11Vdc or more<br>OFF : less than 5Vdc<br><br><b>Note:</b><br><u>Even when an external power supply is used (in sink logic mode i.e. when SINK(PLC) is selected), connect the reference potential-side (0V side) cable from the power supply to the CC terminal.</u><br><br>Lan current signal.<br>Chose low current contacts to avoid poor attaching. | <p>SINK Logic (SW=SINK(INT))</p> <p>SINK Logic (SW=SINK(PLC))</p> <p>SOURCE Logic (SW=SOURCE)</p> |
| PLC/<br>P24          | 24V power supply                                 | 24Vdc power output (when SW1 is in any position other than PLC)<br>24V internal output terminal<br>24Vdc - 60mA max   |   |
|                      | Common terminal for external power supply        | If SW1 is turned to the PLC position, this terminal can be used as a common terminal when an external power supply is used.   |   |

| Terminal symbol     | Function  | Electrical specification  | Internal circuit  |
|---------------------|---|---|---|
| TH1+<br>TH1-        | Thermal trip input                                | The resistance between TH1+ and TH1-<br>Tripping value: about under 70 ohm<br>or about over 2.5k ohm<br>Reset value: about 1.6k ohm   |  |
| N10                 | -10V power supply                                 | DC-10V - 10mA   |  |
| OUT3<br>OUT4<br>NO1 | Multifunction programmable open collector output. | Open collector output<br>Drive current<br>External power supply used: 50mA<br>Internal power supply used: 20mA<br>Drive voltage<br>12V min - 30V max<br>Isolated other circuit. |  |
| CC                  | Common to input/output                            | Digital signal equipotential (0V) terminal for the control circuit  |  |

## 3. Functional description

In this section, functions added by the installation of this expansion IO card option, on top of the standard inverter functions, are described.

\* If the software version of inverter is less than V104, when OUT3 or OUT4 terminals is set as negative logic, it may output a flash pulse at inverter reset.

### 3.1 Multi-function output terminal

Two output terminals and one relay output can be added. Function is similar to that of the output terminals of the inverter, so refer to the inverter instruction manual.

#### ■ Parameter

| Title        | Function                                    | Adjustment range | Default setting     |
|--------------|---|------------------|---------------------|
| <i>F 133</i> | Output terminal function selection 4 (OUT3) | 0 - 255          | 254<br>(Always OFF) |
| <i>F 134</i> | Output terminal function selection 5 (OUT4) | 0 - 255          | 254<br>(Always OFF) |
| <i>F 135</i> | Output terminal function selection 6 (R1)   | 0 - 255          | 254<br>(Always OFF) |

#### ■ Monitor

Refer to the description on status monitor mode of inverter's instruction manual.

The output terminal status can be monitored by the output terminal status parameter (*F E 0 7*), and the parameter can be monitor by the serial communication.

*F E 0 7*

| bit No. | 15  | 14  | 13  | 12  | 11  | 10  | 9   | 8  | 7        | 6        | 5  | 4        | 3        | 2  | 1        | 0        |
|---------|-----|-----|-----|-----|-----|-----|-----|----|----------|----------|----|----------|----------|----|----------|----------|
| Symbol  | --- | --- | --- | --- | --- | --- | --- | R2 | OUT<br>6 | OUT<br>5 | R1 | OUT<br>4 | OUT<br>3 | FL | OUT<br>2 | OUT<br>1 |

Note: The OUT5, OUT6 and R2 are the terminal function of the expansion IO card option 2.

### 3.2 Multi-function input terminal

Four output terminals can be added. Function is similar to that of the input terminals of the inverter, so refer to the inverter instruction manual.

#### ■ Parameter

| Title         | Function                                    | Adjustment range | Default setting |
|---------------|---|------------------|-----------------|
| <i>F 119</i>  | Input terminal selection 9 (LI1)            | 0 - 155          | 0               |
| <i>F 120</i>  | Input terminal selection 10 (LI2)           | 0 - 155          | 0               |
| <i>F 121</i>  | Input terminal selection 11 (LI3)           | 0 - 155          | 0               |
| <i>F 122</i>  | Input terminal selection 12 (LI4)           | 0 - 155          | 0               |
| <i>F 144*</i> | Input terminal 5~12 response time selection | 2 - 200ms        | 8               |

\* This parameter for VF-PS1 exists for V654 or more.

#### ■ Monitor

Refer to the description on status monitor mode of inverter's instruction manual.

The input terminal status can be monitored by the input terminal status parameter (*F E 0 5*), and the parameter can be monitor by the serial communication.

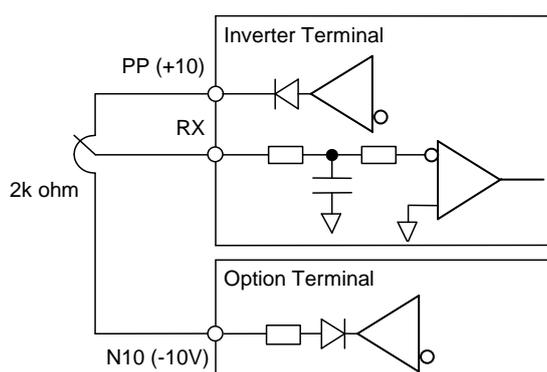
*F E 0 5*

| bit No. | 15  | 14  | 13  | 12  | 11  | 10  | 9   | 8   | 7  | 6  | 5  | 4  | 3   | 2  | 1 | 0 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|-----|----|---|---|
| Symbol  | LI8 | LI7 | LI6 | LI5 | LI4 | LI3 | LI2 | LI1 | S4 | S3 | S2 | S1 | RES | ST | R | F |

Note: The LI5 ~ LI8 are the terminal function of the expansion IO card option 2.

### 3.3 -10V power supply

The frequency command can be input from RX terminal with pulse and negative voltage using N10(-10V) and PP(+10V) power.



Potentiometer

Center position: 0V command

Pulse side position: +10V command

Negative side position: -10V command

The recommended wiring cable length is less than 1.5m with shielded cable.

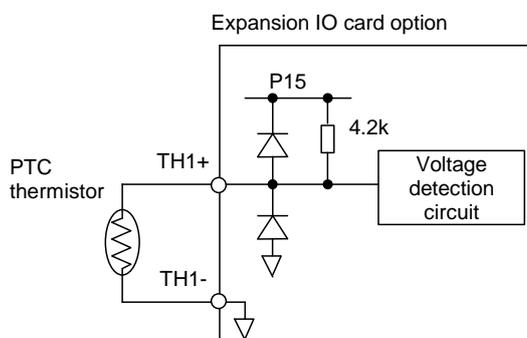
### 3.4 External thermal trip input (TH1+, TH1-)

By connecting the thermistor to TH1+ and TH1- terminal, when the thermistor value is unusual, the inverter can be trip.

| The resistor value between TH1+ and TH1- | Detect condition                  | Movement        |
|--|-----------------------------------|-----------------|
| about under 70 ohm                       | Thermistor short broken detection | <i>OH2</i> trip |
| about 70 - about 2.5k ohm                | Normal value                      | ————            |
| about 1.6k ohm                           | Thermistor fault reset            | ————            |
| about 3k ohm                             | Thermistor fault detection        | <i>OH2</i> trip |

#### ■ Parameter

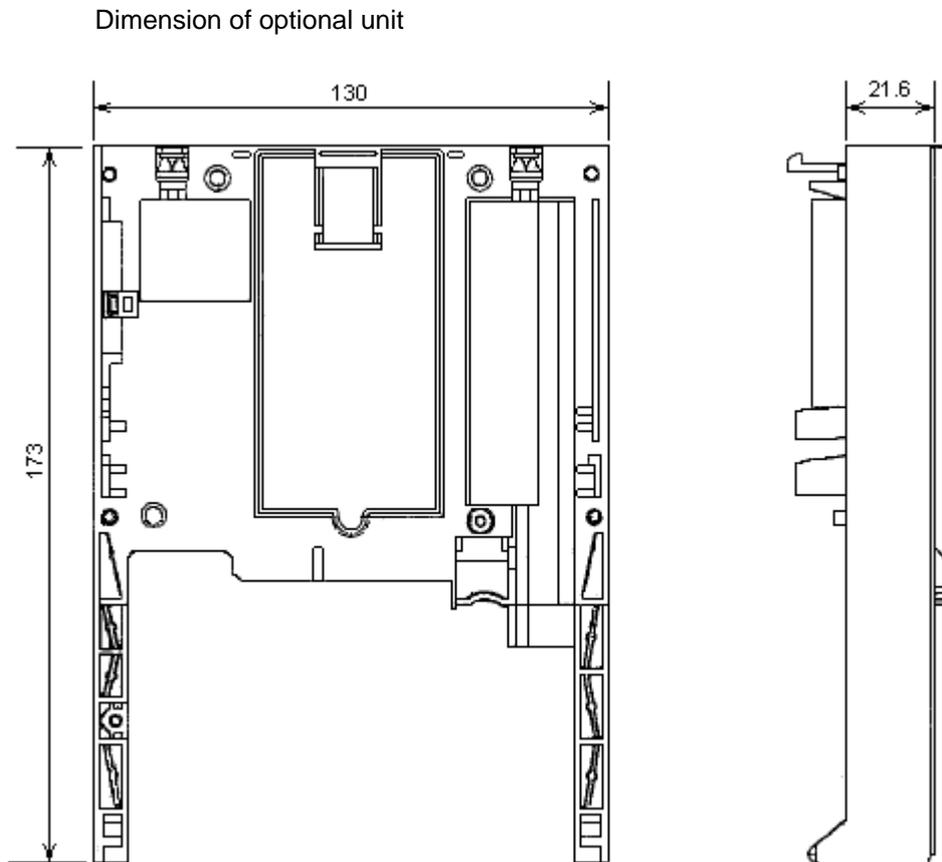
| Title       | Function              | Adjustment range         | Default setting |
|-------------|-----------------------|--------------------------|-----------------|
| <i>F537</i> | PTC thermal selection | 0: Deselect<br>1: Select | 0               |



## 4. External diagram

Do not forget to reserve the space for the options at time of installation.

### ■ External diagram of option (unit: mm)



The control panel depth increases about 21.6mm when the option is installed. Secure the front space from the inverter control panel fully. The space which is necessary for the option installation varies in the inverter capacity rate. Please refer to the inverter instruction manual.

## 5. Specification

### <Environment Specification>

| Item                | Specification  |
|---------------------|--|
| Use Environment     | Indoor, less than 3,000 m from the sea level.<br>No direct sunlight, corrosive or explosive gas, steam, cutting dusts or dusts, grinding solution, and grinding oil. |
| Ambient Temperature | -10 to +60°C   |
| Storage Temperature | -25 to +65°C   |
| Relative Humidity   | 20 to 93 % (No condensation)   |
| Vibration           | 5.9m/s <sup>2</sup> (0.6G) or less (from 10Hz to 55Hz)   |

### < Control specification >

| Function  | Specification  |
|---|--|
| Relay contact output<br>Multi-function programmable output                                | 1 circuits for output of 1C contact point<br>250Vac - 2A (cos $\phi$ =1)<br>250Vac - 1A (cos $\phi$ =0.4)<br>30Vdc - 1A  |
| Contact point input<br>(Changeover of sink / source)<br>Multi-function programmable input | 4 contact inputs<br>Sink input (24V common voltage)<br>ON : less than 10Vdc<br>OFF : 16Vdc or more<br>Source input<br>ON : 11Vdc or more<br>OFF : less than 5Vdc |
| 24V power supply  | DC24V - 60mA   |
| External thermal trip input   | 1 circuit. The detection level is below.<br>Tripping value : about under 70 ohm, or about over 2.5k ohm<br>Reset value : about 1.6k ohm                          |
| -10V power supply   | DC-10V - 10mA  |
| Open collector output<br>Multi-function programmable output                               | 2 circuit<br>Current : 50mA max with external power supply<br>20mA max with internal power supply<br>Voltage : min. 12V, max 30V                                 |

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## 6. Warranty

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TOSHIBA provides warranty with the product under the following conditions.

1. If and when a trouble occurs on the option unit properly installed and handled within one year of delivery, and if the trouble is clearly attributable to defects inherent in our design and manufacture, the product will be repaired free of charge.
2. The warranty covers only the delivered option unit.
3. Even in the term of the warranty, repair/adjustment service will be charged for the following cases.
  - 1) Fault or damage resulting from misuse, unauthorized modification or repair.
  - 2) Fault or damage resulting from falling down of the product or traffic accident during transportation.
  - 3) Fault or damage originating from fire, salt water/salty breezes, some kind of gas, earthquake, storm or flood, lightning, abnormal supply voltage, other natural disasters.
  - 4) Fault or damage caused by improper use of this option unit as it is used for a purpose out of its original function.
4. If there is another special warranty contracted for this option unit, the special warranty has priority over this warranty.