

**For Installer Company Use**

**For Maintenance and Inspection Use**

**TABUCHI  
ELECTRIC**

Model

**EPW-T250P6-US**

# Three-phase Inverter Unit

## Installation Manual

- The content in this Installation Manual is meant for installers.
- After installation/configuration, give this manual to the person responsible for maintenance and inspection and store it in a safe place.

- This product must be correctly installed in order for it to perform and function sufficiently, and to ensure safety.
- Be sure to read these instructions prior to installing the product. Be sure to read the section, "Safety."
- To ensure safety, have a qualified person perform installation wiring in accordance with laws and regulations.

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# Important Safety Instructions



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## SAVE THESE INSTRUCTIONS!

This manual contains important instructions for the EPW-T250P6-US.  
This manual contains important instructions that must be followed during installation and maintenance.  
The product is designed and tested in accordance with international safety requirements, however as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating this product.  
To reduce the risk of personal injury and to ensure the safe installation and operation of this product, carefully read and follow all instructions, caution statements, and warnings in this manual.

## Product Safety Warnings

The following symbols are used as safety indicators on this product. The meaning of these symbols is explained below.

<u>Symbol</u>	<u>Description</u>
	<p><b>Dangerous Voltage Warning</b> The symbol of a lightning bolt with an arrow inside of a triangle notifies the user that there is a risk of electric shock. This product uses high levels of voltage and the parts inside this product may cause personal injury due to electric shock. All work performed on this product must be as described in the documentation for this product.</p>
	<p><b>CAUTION: Hot Surface</b> This product heats up during operation. Do not touch the product while it is in operation. Observe all operating instructions.</p>

## General Warnings

All electrical installations must be made in accordance with the local and National Electrical Code® ANSI/NFPA 70 or the Canadian Electrical Code® CSA C22.1. This document does not and is not intended to replace any local, state, provincial, federal or national laws, regulations, or codes applicable to the installation and use of this product, including without limitation, applicable electrical safety codes.  
All installations must conform to the laws, regulations, codes, and standards applicable in the jurisdiction of installation.  
TABUCHI ELECTRIC assumes no responsibility for the compliance or non-compliance with such laws or codes in connection with the installation of this product. This product contains no user-serviceable parts. For all repairs and maintenance, always return the unit to an authorized TABUCHI ELECTRIC Service Center.  
Before installing or using this product, read all of the instructions, caution statements, and warnings in this manual. Before connecting this product to the utility grid, contact the local utility company. Only qualified technical persons are allowed to connect this product to the utility grid. Wiring of the product must only be performed by qualified technical persons. The safety precautions in this manual do not replace the safety regulations enforced in the country where this product is installed. Maintenance must be carried out according to the maintenance section of this manual.  
Do not use the equipment if any operational anomalies are found. Liabilities associated with commercial components are delegated to the respective manufacturers.

# 1 Information

## Validity

- EPW-T250P6-US

## Electrical Connection Warnings

This grid-tied inverter system operates only when properly connected to the AC utility grid. Before connecting this inverter to the AC utility grid, contact the local utility company to receive proper approval. Connection to the AC utility grid must only be made by qualified technical persons.

Wiring methods should conform to the National Electric Code ANSI/NFPA 70, and/or any prevailing local codes and regulations.

Output circuits must be isolated from the enclosure. System grounding, as required by Sections 690.41 - 690.43 of the National Electric Code ANSI/NFPA 70, is the responsibility of the installer.

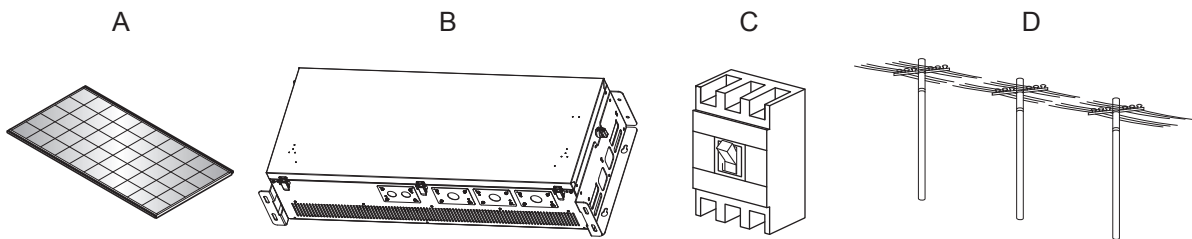
The inverter should only be connected to a dedicated branch circuit.

For models that do not include AC output overcurrent protection, it is the responsibility of the end user to provide protection for the AC output circuit.

Connect only to a circuit provided with the maximum branch overcurrent protection device (e.g., AC circuit breaker). Refer to Section 6.4.

# 2 Safety

## 2.1 Intended Use



Item	Designation
A	PV Modules
B	Inverter
C	Overcurrent Protection Device (e.g., AC Circuit Breaker)
D	Utility Grid

The EPW-T250P6-US is a transformerless PV inverter with 6 MPP trackers which converts the direct current of the PV array into a grid-compliant three-phase current and feeds it into the utility grid.

This inverter feeds power into a standard, three-phase commercial, industrial, institutional, or electrical utility facility's electrical system that is connected to the utility grid.

This inverter is suitable for indoor and outdoor use. It must only be used in ungrounded PV systems. Do not use grounded PV modules with this inverter. Ground only the mounting frame for the PV modules. All DC inputs of an ungrounded PV system must be equipped with overcurrent protection according to the National Electrical Code® NEC 690. This inverter must be installed per the requirements contained in Section 690.35 of the National Electrical Code® ANSI/NFPA 70.

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**WARNING**

This inverter has a transformerless design and requires connected array(s) to be floating with respect to ground.

Only use with PV modules that do not require one of the terminals to be grounded.

Do not use grounded PV modules with this inverter. Only ground the mounting frame for the PV module.

PV modules with a high capacity to ground may only be used if their coupling capacity does not exceed 3.5  $\mu\text{F}$ .

If the inverter is connected to grounded PV modules, error insulation resistance occurs.

- The AC output/neutral is not bonded to ground inside of the inverter.
- The DC and AC operating currents MUST NOT exceed the limits documented in the technical specifications.
- The inverter is certified for use only with PV arrays connected to its input channel(s).
- Do not connect batteries or other types of power sources.
- The inverter can only be used if all the technical requirements in this manual are observed and applied.

All components must remain within their permitted operating ranges at all times.

For safety reasons, modification of this product is prohibited along with the installation of components that are not specifically recommended or distributed by TABUCHI ELECTRIC for this product.

This product must only be used in countries for which it is approved or released by TABUCHI ELECTRIC and the grid operator.

Use this product only in accordance with the information provided in the enclosed documentation, and with the locally applicable standards and directives. Any other use may result in personal injury or property damage.

Do not install or connect the inverter as described below.

- Do not mount this product in salty regions (within 500 m (1640 ft.) of coast lines).
- Do not mount this product in locations where ambient temperature is below  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) or above  $40^{\circ}\text{C}$  ( $104^{\circ}\text{F}$ ). (Avoid direct sunlight.)
- Do not mount this product in highly humid areas.
- Do not mount this product in locations where the required installation space cannot be secured. (See "Prescribed Clearances" on Page 11.)
- Do not mount this product at elevations exceeding 2000 m (6562 ft.).
- Do not mount this product in locations where temperature fluctuates drastically (where condensing occurs).
- Do not mount this product in locations subjected to stringent noise regulations (Less than 51 dB).
- Do not install this product on flammable construction materials.
- Do not mount this product in locations where it may be exposed or possibly exposed to excessive steam, oily mist, smoke, dust, salt, corrosive materials, explosive/flammable gases, chemical agents, or fire.
- Do not mount this product in locations subjected to vibrations or impacts.

The enclosed documentation is an integral part of this product.

- Read and observe all safety warnings, precautions, and instructions in the documentation.
- Keep documentation in a convenient place for future reference.

## 2.2 Knowledge & Skills of Qualified Persons

The tasks described in this document must only be performed by qualified technical persons. Qualified technical persons must possess the following knowledge and skills:

- Knowledge of how an inverter works and is operated.
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and systems.
- Training in the installation and commissioning of electrical devices and systems.
- Knowledge of the applicable standards and directives.
- Knowledge of and adherence to this document and all safety precautions.



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## 2.3 Safety Precautions

This section contains safety precautions that must be observed at all times when working on or with this product. To prevent personal injury and property damage and to ensure long-term operation of this product, read this section carefully and follow all safety precautions at all times.

### **DANGER**

High voltage levels are used while operating this product and pose a risk of electric shock.

High levels of voltage that pose a risk of fatal or serious injury due to electric shock are present in the live components of this inverter.

- All work on the inverter must only be carried out by qualified technical persons.
- **DO NOT TOUCH** any live components.

Follow the steps below before working on the inverter:

1. Switch off all devices that are connected to the inverter and take precautions against the possibility of reconnection. The Overcurrent Protection device (e.g., AC circuit breaker)
2. Cover the PV modules.
3. Turn the inverter DC Switch-disconnector counterclockwise by 90° and set to **OFF**.

Prior to performing any work on the inverter, disconnect all voltage sources as described in this document (see Section 9), and wait 15 minutes.

- While operating the inverter, do not remove the sealing plugs.
- All work on the inverter should only be carried out as described in this document.

### **DANGER Risk of fatal or serious injury due to electric shock caused by a ground fault.**

If a ground fault occurs, parts of the system may still be live. Death or serious injury due to contact with live components may occur.

- Ensure that no voltage is present and wait 15 minutes before touching any part of the PV system or the inverter.

### **DANGER Risk of serious burn injuries from hot surfaces.**

The surface of the inverter can get very hot. Touching the surface of the inverter may cause burns.

- Mount the inverter so that it cannot be touched accidentally.
- Do not touch hot surfaces.
- Wait 30 minutes for the surface to cool sufficiently.

### **WARNING**

Damage due to intrusion of moisture and dust.

Intrusion of moisture and dust can damage the inverter and impair functionality.

- Tightly close all inverter enclosure openings.
- Never open the inverter when it is raining, snowing, or when the humidity is over 90%.

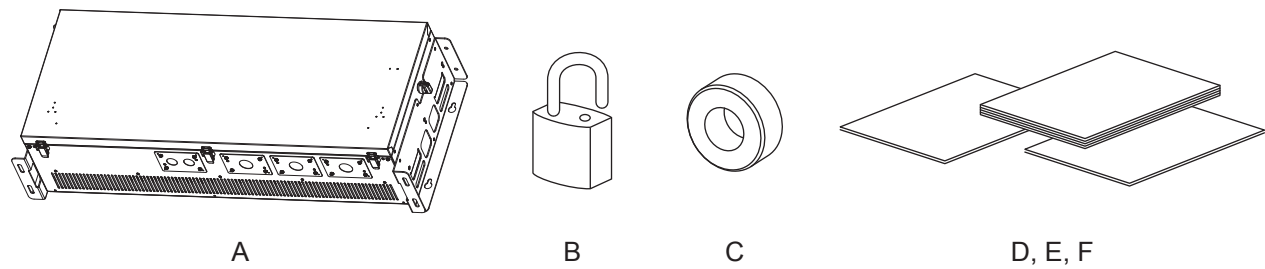
### **DANGER Risk of death or serious injury due to operating damaged equipment.**

Operating a damaged inverter can lead to fatal or serious injuries from electric shock.

- Only operate the inverter when it is fully functional.
- Regularly check the inverter for visible damage.
- Ensure that all safety equipment is freely accessible at all times.

# 3 Scope of Delivery

Check the scope of delivery for completeness and any externally visible damage.  
Contact your distributor if the inverter or any parts are missing or damaged.



Components included in the scope of delivery are as follows.

Item	Quantity	Designation
A	1	Inverter Unit
B	1	Padlock and Key
C	2	Ring Core
D	1	Installation Manual (English)
E	1	Installation Manual (French)
F	1	Production Test Report

# 4 Product Description

## 4.1 Inverter

The EPW-T250P6-US is a transformerless PV inverter with 6 MPP trackers which converts the direct current of the PV array to grid-compliant three-phase current and feeds it into the utility grid.

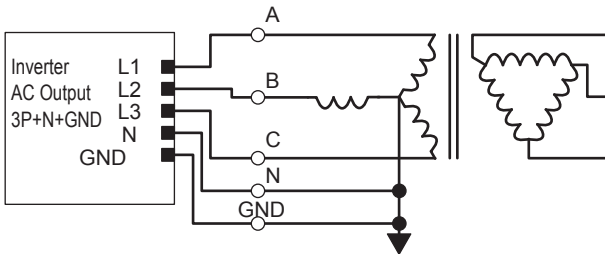
This inverter can be connected to six PV strings.

This inverter is equipped with a DC Switch-disconnector that serves as a DC disconnection unit.

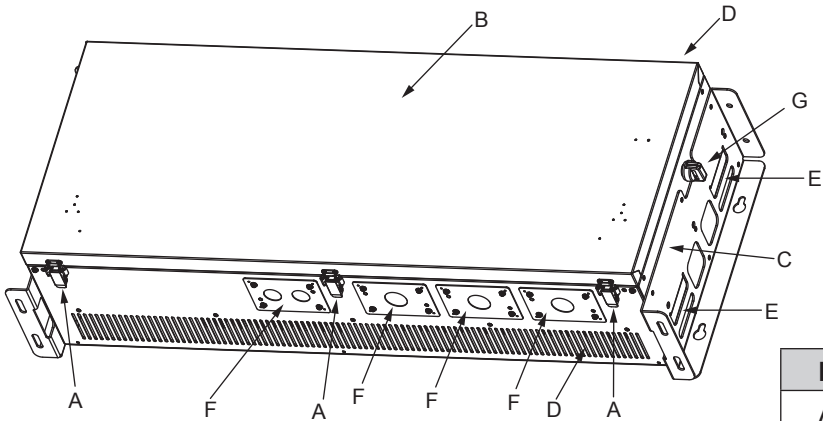
The integrated fuse holders are designed to be used with string fuses for overcurrent protection.

### No galvanic isolation

- This inverter is not equipped with a transformer, and therefore has no galvanic isolation.
- The AC output/neutral is not bonded to ground inside of the inverter.

Description	Configuration	
4 Wire WYE (3 phase+ Neutral + GND)	 <p>Transformer Requirements Primary side: delta wiring Secondary side: star wiring Transformer neutral grounding</p>	Compatible
Other Configuration	All other configurations not mentioned in this document, such as Corner Grounded Delta	Not compatible

### External view



Item	Designation
A	Toggle Latch
B	Front Enclosure Lid
C	Type Label
D	Ventilation Net
E	Recessed Grips (on both sides)
F	Knockout Hole
G	DC Switch-disconnector

## 4.2 Type Label and Additional Label

# TABUCHI ELECTRIC

Product name    Utility Interactive  
Transformerless Inverter

Model number    EPW-T250P6-US

Manufacturer    TABUCHI ELECTRIC CO.,LTD.

DC RATING	
Max.Input Voltage:	1000V DC
Range of Input Voltage (Full Power)	500-800V DC
Max.Input Current	10A DC x6


AC RATING	
Output Power Factor	>0.99
Operating voltage range (V AC)	422-528V~3Φ
MIN:244 NOMINAL:277 MAX:305	
Operating frequency range (Hz)	59.3(1)~60.5Hz(2)
Nominal Operating frequency	60 Hz
Max. Continuous Output Current	30A rms
Max. Continuous Output Power	25000W
Max. Output Fault Current	49A

Operating ambient temperature:    -20°C to 40°C  
(-4°F to 104°F)

Enclosure    Type 3R


This device complies with part 15 of the FCC rules

(1)Adjustable from 56Hz to 60Hz  
 (2)Adjustable from 60Hz to 64Hz





Intertek  
5001828  
MADE IN THAILAND

CANADA ICES-003,Class A  
CANADA NMB-003,Classe A



No.DS1402-6005CT

**⚠ WARNING**

**ELECTRIC SHOCK HAZARD**

Do not remove cover. Only qualified service personnel should service the inverter.



This is a transformerless device.  
The DC conductors of this photovoltaic system are normally ungrounded without indication when the inverter measures the PV array isolation.

- Both AC and DC voltage sources are terminated inside this equipment. Each circuit must be individually disconnected before servicing.
- When the photovoltaic array is exposed to light, it supplies a DC voltage to this equipment.

Disconnect AC and DC circuit individually and wait 15 minutes before servicing.  
Hazardous voltage remains for 15 minutes after disconnecting main power supply.

Hot surfaces – To reduce the risk of burns, do not touch.

**⚠ AVERTISSEMENT**

**DANGER D'ÉLECTROCUTION**

Ne pas ouvrir le couvercle. Seul le personnel d'entretien qualifié doit être autorisé à procéder à l'entretien de l'inverseur.

Il se agit d'un dispositif sans transformateur. Les conducteurs à courant continu de ce système photovoltaïque sont normalement mis à la terre sans indication lorsque le onduleur mesure l'isolement photovoltaïque.

- Cet équipement est alimenté par des sources de tension de courant alternatif (ca) et de courant continu (cc). Débrancher individuellement chacun des circuits avant de procéder à l'entretien.
- Quand le réseau de photopiles est exposé à la lumière, cet équipement est alimenté par une tension de courant continu.

Débranchez le circuit de courant alternatif (ca) et courant continu (cc) individuellement et attendez 15 minutes avant l'entretien.  
Tension dangereuse reste pendant 15 minutes après débrancher l'alimentation principale.




Surfaces chaudes – Pour réduire le risque de brûlure, ne pas toucher.

The type label uniquely identifies the inverter.

The information on the type label is required for safe use of the inverter.

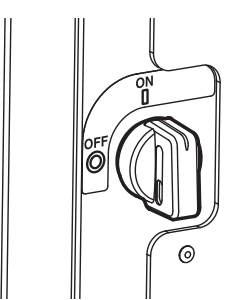
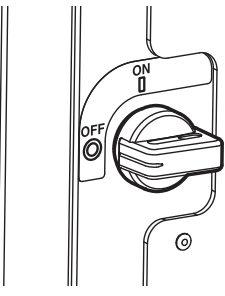
For customer support assistance from the TABUCHI ELECTRIC Service Line, the type label must remain permanently attached to the inverter.

### Symbols on These Labels

Symbol	Explanation
	Risk of fatal or serious injury due to electric shock from high voltage levels. This product uses high voltage levels for operation. All work on the product must only be carried out by qualified technical persons. Risk of burns from hot surfaces.
	This product can get hot during operation. Avoid contact with the inverter during operation. Allow the product to cool down sufficiently before carrying out any work. Wear personal protective equipment, such as safety gloves.
	Certification Mark UL1741 Standard for Safety for Inverters, Converters, Controllers and Inter-connection System Equipment for use with Distributed Energy Resources. CSA-C22.2 No. 107.1-01 - General Use Power Supplies.

## 4.3 DC Switch-disconnector

The DC Switch-disconnector enables disconnection of the inverter from the PV array. The disconnection takes place at all poles.

	<p>A: Switch position ON If the DC Switch-disconnector remain ON state, the Front Enclosure Lid does not open.</p>
	<p>B: Switch position OFF</p>

## 4.4 String Fuses

String fuses are used to protect wiring and equipment from excessive currents that can cause damage, heating, or in extreme cases, even fire. If the design of the string fuses is too small, they may open too early and cause interference. If the string fuses are too large, they do not provide the required protection as they open too late. In PV systems, the minimum and maximum size of the string fuse is determined by the electrical nominal sizes of the PV module as well as by UL and National Electrical Code® requirements. Contact the manufacturer of the PV modules in order to obtain the corresponding nominal sizes of the string fuses. The maximum nominal size for string fuses in the Connection Unit is 20 A.

The minimum size of the string fuses and cables is calculated by means of the short-circuit current rating (ISC) of the PV module. The National Electrical Code® stipulates that all string fuses and cables are designed to be at least 1.56 times as large as the ISC of the PV module being used. The correct size of the string fuse is determined by calculating the minimum size and then rounding it up to the nearest standard size for string fuses.

### Example: Calculating the Minimum Size of String Fuses

For example, if the ISC of the PV module equals 8.5 A, then the size of the string fuses is determined as follows:  
 $1.56 \times 8.5 = 13.26$  The nearest standard size for string fuses would be a 15 A fuse.

## 4.5 Arc fault detection (AFD): UL1699B

In accordance with the National Electrical Code®, Article 690.11, the inverter has a system for arc-fault detection and interruption.

The DC AFD module performs a self-test every time the system is started. If the inverter fails, an error code will be displayed and the inverter will not connect to the grid. If it passes, the inverter connects and works normally. If a DC arc fault is detected during normal operations, the inverter disconnects from the AC grid. The DC arc fault error is indicated on the Master BOX display, when lock out of inverter operation is initiated, manually reset the fault.

To operate without this function, the arc-fault circuit interrupter can be deactivated (see Section 3. [Sys/Set Value] Set MODE on Page34 / EOW-MBX03-US Installation Manual).

# 5 Mounting

## 5.1 Mounting Requirements

### Requirements for the Mounting Location:

#### WARNING

##### Environmental Check

- See Section 12 “Technical Data”, to check the environmental parameters to be observed (degree of protection, temperature, humidity, altitude, etc.).
- The maximum operational ambient air temperature **MUST** be considered when choosing the location for installing the inverter.

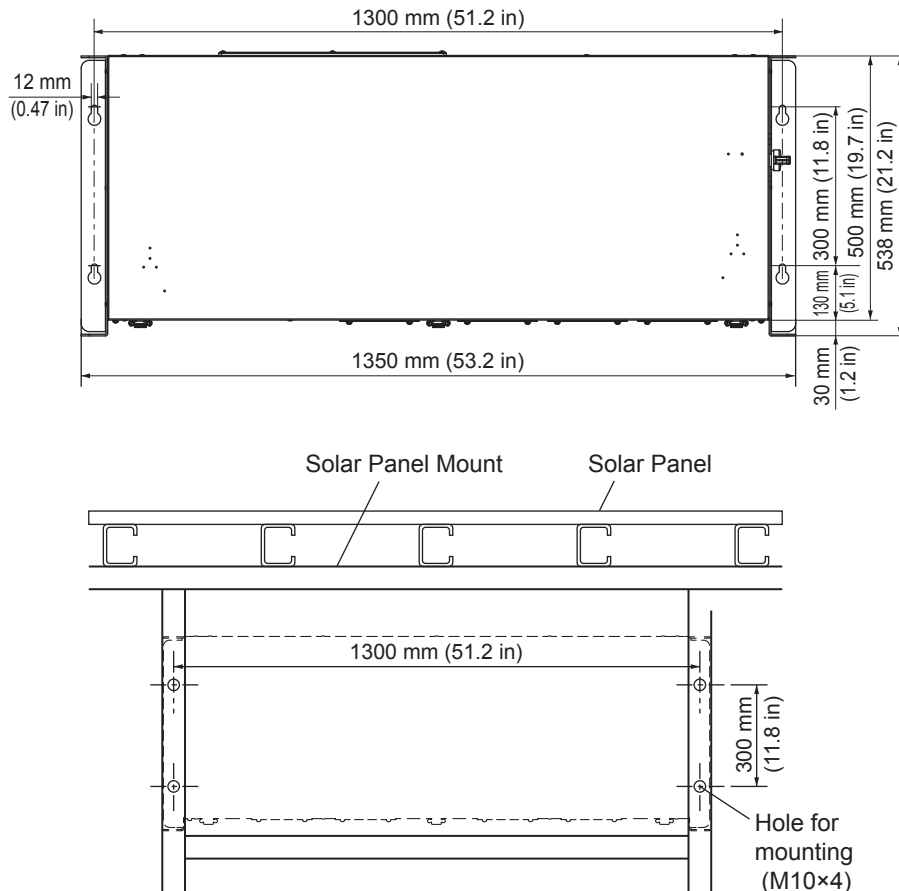
The ambient temperature must be between  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) and  $+40^{\circ}\text{C}$  ( $104^{\circ}\text{F}$ ) to ensure optimal operation of the inverter.

- Exposure to direct sunlight will increase the operational temperature of the inverter and may cause a reduction in the amount of power output by the inverter.
- Only install the inverter in well-ventilated areas. Do not install in small, closed spaces where air cannot circulate freely. To avoid overheating, always make sure the flow of air around the inverter is not blocked.
- Due to acoustical noise ( $\leq 50 \text{ dB(A)}$  1 m (39 in)) \*1 (for reference) from the inverter, do not install in rooms where people or animals reside.
- Do not install in places where flammable gases or substances may be present.

\*1 According to A characteristics of JIS C 1509-1, 1m away from the center of the solar inverter at 1m above the floor.

### Dimensions for Solar Panel Stand Mounting:

Mount with M10 bolts in the following mounting pitch to stand.



## Prescribed Clearances:

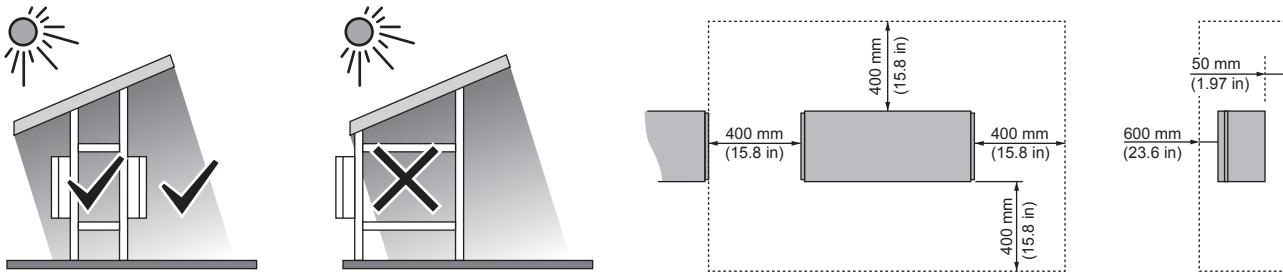
When choosing the location and position for the installation, adhere to the following conditions:

Observe the recommended clearances from the walls as well as to other inverters or objects.

Be sure to secure the recommended clearance of 400 mm (15.8 in).

This will allow for sufficient heat dissipation.

If multiple inverters are mounted in areas with high ambient temperatures, increase the clearance between the inverters and ensure sufficient ventilation. This will prevent a reduction in the amount of output power due to excessive temperatures.



## Installation Position:

When choosing the location and position for the installation, adhere to the following conditions:

- Install on a strong structure capable of bearing the weight of the inverter.
- Install vertically with a maximum incline of  $\pm 5^\circ$ . If the mounted inverter is tilted to an angle greater than the maximum angle noted above, heat dissipation may be inhibited. This may result in a reduction of output power.
- Install in a safe place where all switch handles remain easy to reach and meet height requirements of the applicable electrical code.
- Ensure sufficient work space in front of the inverter to allow removal of the wiring box cover and easy access for servicing of the inverter.
- During installation planning, maintain the clearance distances shown to allow normal control functionality and ease of maintenance.

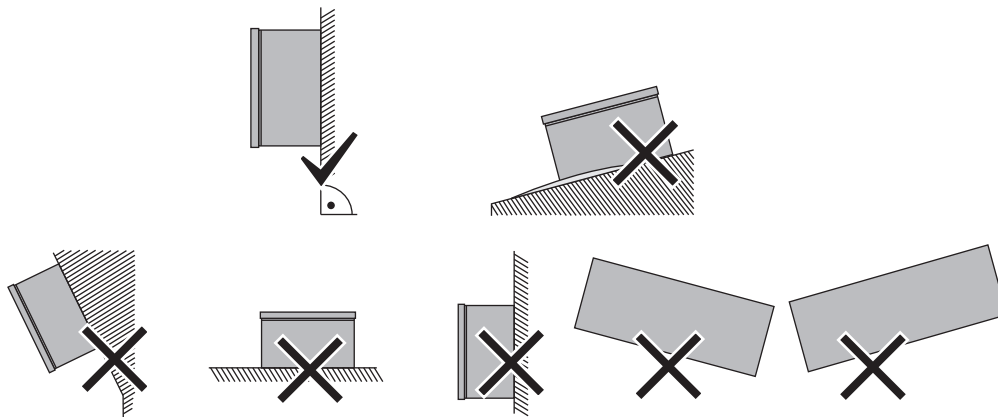


Figure 3: Permitted and prohibited mounting positions



## 5.2 Mounting the Inverter

### Additionally Required Mounting Materials (not included in the scope of delivery):

- At least 4 screws that are suitable for the foundation.
- At least 4 washers that are suitable for the screws.
- At least 4 screw anchors that are suitable for the support surface and the screws.

#### CAUTION

##### **Risk of injury when lifting the inverter or if the inverter is dropped.**

The inverter is heavy (see Section 12 "Technical Data"). Injury may occur if the inverter is lifted incorrectly or dropped while being moved, or when attaching it to or removing it.

#### CAUTION

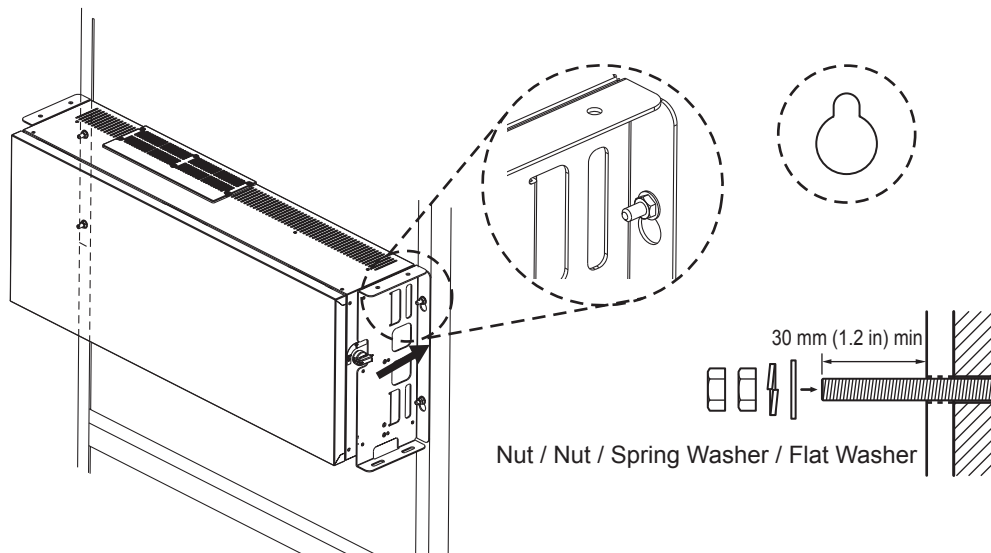
##### **Risk of serious burn injuries from hot surfaces.**

The inverter can heat-up during operation.

- Mount the inverter so that it cannot be touched accidentally during operation.

### Procedure:

1. **Drill four holes for the M10 anchor bolt in the stand.**
2. **Put the M10 anchor bolt into each hole.**
3. **Secure the M10 anchor bolt horizontally using the nuts and washers.**
4. **Hook the inverter into the M10 anchor bolt.**  
(Option 1) Lift Mounting:  
Attach the lifting eye bolts to the inverter.  
Use a sling rope or bar passed through the lifting eye bolts to mount the inverter to the M10 anchor bolt.  
(Option 2) Manually Lift:  
Two to four people will be required to lift the inverter from the bottom and manually mount the inverter to the M10 anchor bolt.
5. **Carefully secure the main housing of the inverter into the M10 anchor bolt.**
6. **Fix with a flat washer, spring washer, and double nut.**
7. **Confirm the inverter is securely in place.**



# 6 Electrical Connection

---

## 6.1 Safety during Electrical Connection

### **DANGER**

#### **Risk of electric shock while the inverter is in operation.**

High voltage levels are present in the inverter and its components. Death or serious injury may result from touching live components.

Do not touch any live components in or on the inverter.

Prior to performing any work on the inverter, disconnect all voltage sources as described in this section.

### **DANGER**

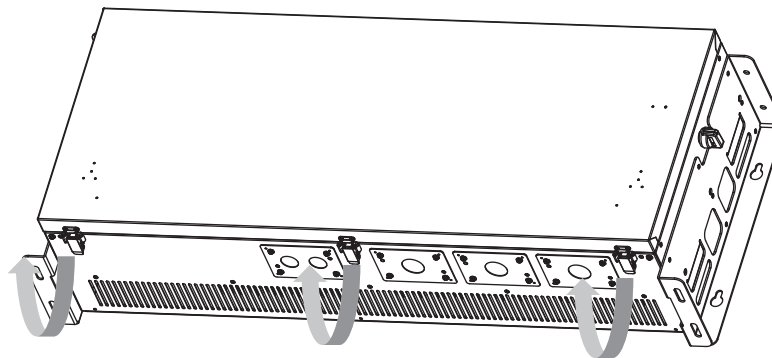
#### **1. Risk of death or serious injury due to electric shock.**

- Disconnect the inverter from the utility grid and ensure that it cannot reconnect.
- Disconnect the inverter from the PV array and ensure that it cannot reconnect.

#### **2. Wait 15 minutes after disconnecting the inverter from the utility grid and the PV array.**

#### **3. Release the padlock to the front enclosure lid using a key.**

#### **4. Lift and remove the front enclosure lid from below.**



#### **5. Use a suitable measuring device to confirm no voltage is present at the DC terminals.**

#### **6. Use a suitable measuring device to confirm voltage is present at the AC terminals.**

---

**DANGER****Risk of death or serious injury due to electric shock when a ground fault occurs.**

If a ground fault occurs, parts of the system may still be live. Death or serious injury may occur due to contact with live components.

- Ensure no voltage is present, wait 15 minutes before touching any part of the PV system or the inverter.

**DANGER – FIRE HAZARD**

- To reduce the risk of fire, connect only to a circuit provided with 50 A maximum branch circuit overcurrent protection device in accordance with the National Electrical Code® (NE, ANSI/NFPA 70).

**WARNING****Damage to the seal of the enclosure lid in sub-zero conditions.**

Opening the inverter when there is frost may damage the seal of the enclosure lid.

The ingress of water may damage the inverter.

- Do not open the inverter when the ambient temperature is below -5°C (23°F).  
If a layer of ice forms on the seal of the lid in sub-zero conditions, remove it prior to opening the inverter (e.g. by melting the ice with warm air). Observe the applicable safety regulations.

**WARNING****Moisture ingress during installation may damage the inverter.**

- Never open the inverter when it is raining or snowing, or when the humidity is over 90%.
- To attach the conduits to the enclosure, only use UL-listed rain-tight conduit fittings or UL-listed conduit fittings for wet locations complying with UL514B.
- Seal all unused openings tightly.

**WARNING****Electrostatic discharge may damage the inverter.**

Touching electronic components can cause damage to or destroy the inverter through electrostatic discharge.

- Ground yourself before touching any component.

**WARNING****Ground faults, unreliable and highly resistive connections due to Wire Nuts®.**

Potential damage to or failure of the inverter.

- Do not use Wire Nuts®.

**i Electrical Installations (Wiring Details)**

All electrical installations must be carried out in accordance with the local electrical standards and the National Electrical Code® ANSI/NFPA 70 or the Canadian Electrical Code® CSA C22.1.

- Before connecting the inverter to the utility grid, contact your local grid operator.  
The electrical connection of the inverter must be carried out by qualified technical persons only.
- Confirm the cables used for electrical connection are not damaged.

**WARNING**

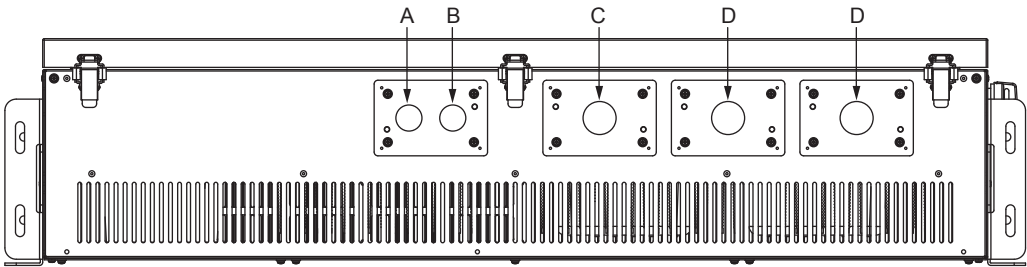
If installing a PV system using this inverter in North America, verify that the selected PV module is listed for use in 1000Vdc systems in accordance with local electrical codes.

It is the responsibility of the installer to provide external disconnect switches and overcurrent protection devices as required by National Electric Codes and other prevailing regulations.

- The overcurrent protection device (e.g., circuit breaker) must be installed between the inverter and the utility grid.

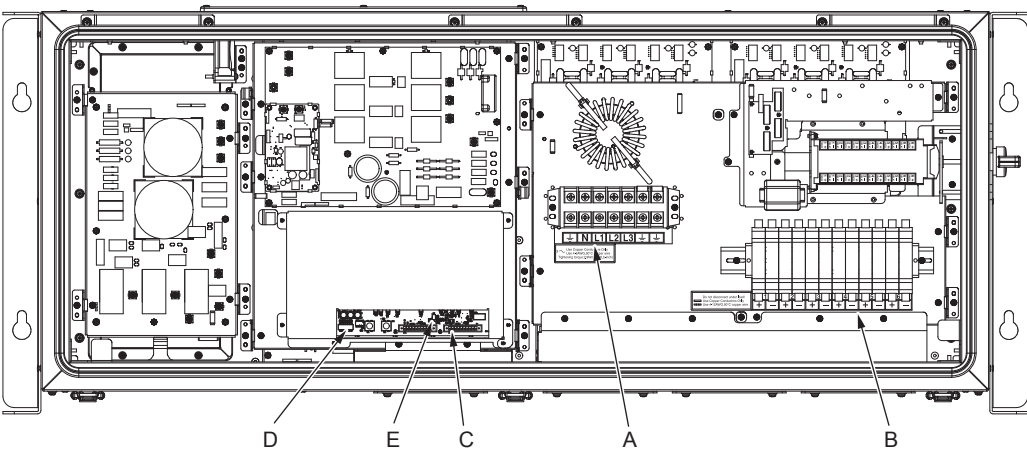
# 6.2 Overview of the Connection Area

## 6.2.1 View from Below



Item	Designation
A	Knockout Holes for Communication Connection (Diameter: 34.5 mm (1.36 in))
B	Knockout Holes for Communication Connection (Diameter: 34.5 mm (1.36 in))
C	Knockout Hole for AC Connection (Diameter: 43.7 mm (1.72 in))
D	Knockout Hole for DC Connection (Diameter: 43.7 mm (1.72 in))

## 6.2.2 Internal View (front side)



Item	Designation
A	Terminal Block for AC Connection, Equipment, Grounding, and Grounding Electrode Conductor
B	Terminal Block for DC Connection (Screwless)
C	Terminal Block for Signal Connection
D	Address Switch SW4005
E	Switch of Terminal Resistance for RS-485 Communication SW4001

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## 6.3 Connecting Conduits to the Inverter

### Additionally Required Materials (not included in the scope of delivery):

- Metal conduits that match the openings of the inverter.
- UL-listed rainproof or wet location conduit fittings that comply with UL514B that match the openings of the inverter.
- UL-listed type 3R filler plugs for closing unused output openings in the enclosure at the top of the inverter.

### Procedure:

1. **DANGER** Risk of death or serious injury due to electric shock.

- Confirm all devices connected to the inverter are switched off and cannot reconnect (see the manual for the respective device).

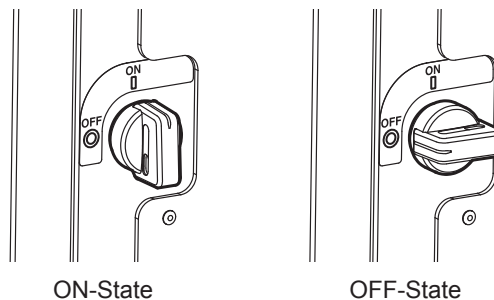
2. **WARNING** Moisture ingress may damage the inverter.

Moisture ingress can destroy or damage the electric components of the Connection Unit.

- Do not enlarge enclosure openings.

3. **Switch the DC Switch-disconnector to OFF.**

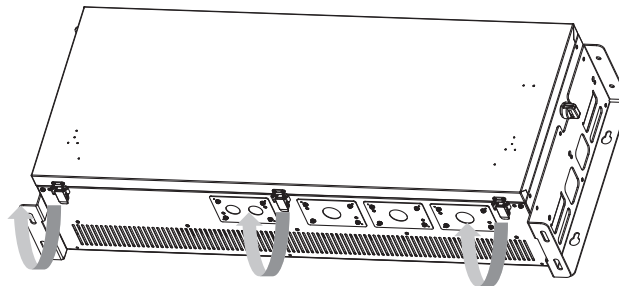
Turn the DC Switch-disconnector counterclockwise by 90°.



4. **Disassemble the front enclosure lid.**

Release the padlock of the lower enclosure lid using a key.

Loosen all toggle latches and remove the lid by lifting it from below.



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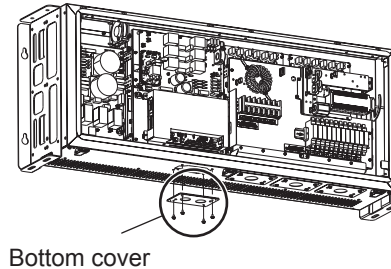
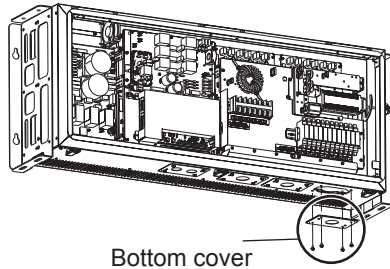
**5. Open the knockout holes on the bottom of the inverter.**

1) Remove the bottom cover for wiring which requires hole-making.

3 single-holed plates

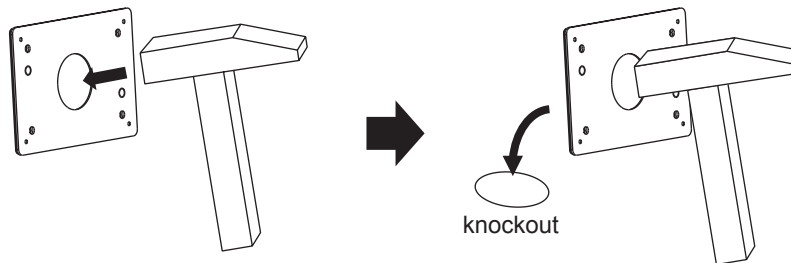
1 two-holed plate

\* Be sure not to remove the bottom covers which do not require hole-making.



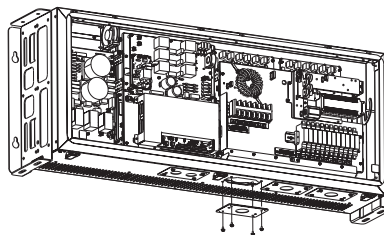
2) Punch the knockout hole of the bottom cover.

Place the bottom cover on the flat place and remove the hole part(s) by tapping with a hammer not to damage the bottom cover.



3) Attach the processed bottom covers to the original position by screws.

Torque 1.9 N·m (1.4 lb·ft)



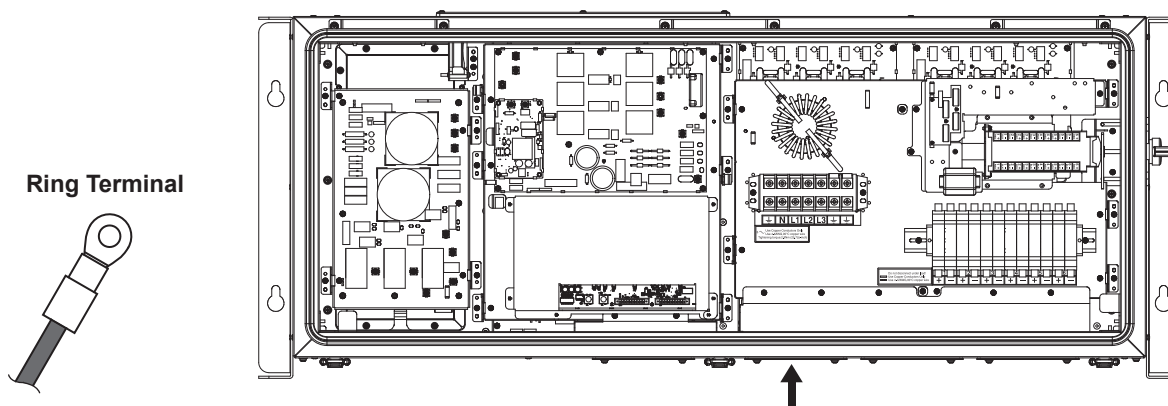
Lock down with the screws.

**6. Insert each conduit fitting into the corresponding enclosure opening and tighten from within using the counter nut.**

**7. Attach the conduit to the enclosure opening.**

**8. Close any unused opened knockout holes with UL-listed type 3R filler plugs.**

## 6.4 AC Connection



### 6.4.1 AC Connection Requirements

#### Additionally Required Materials (not included in the scope of delivery):

- 1 plastic threaded plug, Trade size (1-1/4 in)
- 1 UL-listed rain-tight conduit fitting for wet locations complying with UL514B: UL-listed type 3R
- Ring Terminals (Refer to Section 6.4.3)

#### Cable Requirements:

- The AC cable must be approved for temperatures of over +90°C (+194°F).
- The AC cable must be designed in accordance with the local installation requirements.
- The AC cable must be made of solid wire or stranded wires.
- Conductor cross-section: 6 AWG to 4 AWG
- Cable type: Copper wire
- The maximum cable length subject to conductor cross-section must be observed.

#### AC Protection:

##### **WARNING**

Using screw-type fuses as load-break switches may damage the inverter.

Screw-type fuses are not suitable as load-break switches.

- Do not use screw-type fuses as load-break switches.
- Use a circuit breaker as a load-disconnection unit.
- In PV systems with multiple inverters, protect each inverter with a separate three-phase circuit breaker. This will prevent residual voltage being present at the corresponding cable after disconnection.



## 6.4.2 Connecting the Inverter to the Utility Grid

### Requirements:

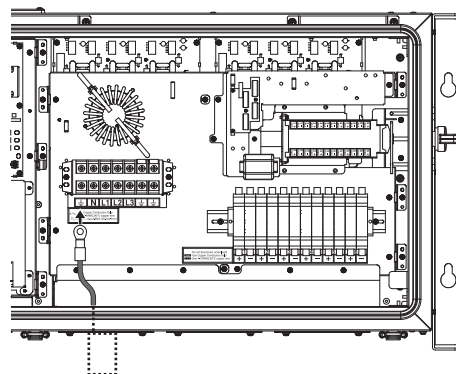
- All electrical installations must be carried out in accordance with the local standards and the National Electrical Code® ANSI/NFPA 70 or the Canadian Electrical Code® CSA C22.1.
- The DC input and AC output circuits are isolated from the enclosure and the system grounding, if required by Section 250 of the National Electrical Code® ANSI/NFPA 70, is the responsibility of the installer.
- The AC cable must be protected using a load-break switch or a listed circuit breaker (see National Electrical Code® ANSI/NFPA 70).
- The connection requirements of the grid operator must be met.
- The line voltage must be within the permissible range. The exact operating range of the inverter is specified in the operating parameters.

To protect the AC connection line of the inverter, TABUCHI ELECTRIC recommends the following characteristics when installing a device for protection against overcurrent:

Type	Typical installations use a 3-pole/600V rated bi-directional thermal-magnetic circuit breaker, UL489 or equivalent.
Current/ Voltage	45A/600V

### Procedure:

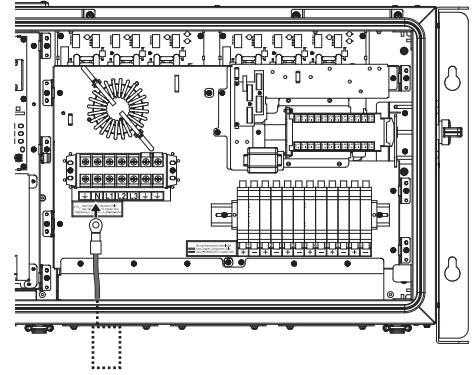
1. **DANGER** Risk of death or serious injury due to electric shock.
  - Ensure that the three-pole circuit breaker is switched **OFF** and cannot be reconnected.
2. Open the knockout hole on the bottom of the inverter for the AC connection.
3. **CAUTION** Intrusion of moisture or dust may damage the inverter.
  - The intrusion of moisture and dust can destroy or damage electric components in the inverter.
  - Do not enlarge the enclosure opening.
4. Insert the conduit fitting into the opening and tighten from the inside using the counter nut.
5. Attach the conduit to the enclosure opening.
6. Attach the ring terminal to the AC cable.
7. Insert the AC cable through the conduit into the inverter.
8. **DANGER – FIRE HAZARD** Connecting two conductors to one terminal is a fire hazard.
  - Connecting two conductors to one terminal may cause a fire to occur due to a bad electrical connection.
  - Never connect more than one conductor per terminal.
9. Connect the equipment grounding conductor to the terminal  $\perp$  and tighten with a screwdriver.  
Torque: 2.9 N·m (2.1 lb·ft)



## 10. Connect Conductor N to Terminal N.

Tighten with a screwdriver.

Torque: 2.9 N·m (2.1 lb·ft)

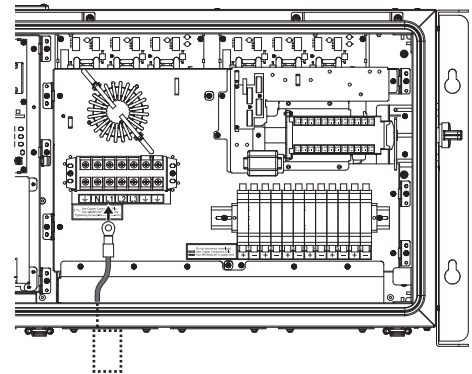


## 11. Connect Conductors L1, L2, and L3 to Terminals L1, L2, and L3 according to the label.

Tighten with a screwdriver.

Torque: 2.9 N·m (2.1 lb·ft)

Confirm the conductors are connected to the proper terminals.



## 12. Confirm the conductors are connected to all the proper terminals.

## 13. Confirm all the conductors are tightly connected.

### 6.4.3 Ring Terminals

Ring terminals must comply with the following requirements.

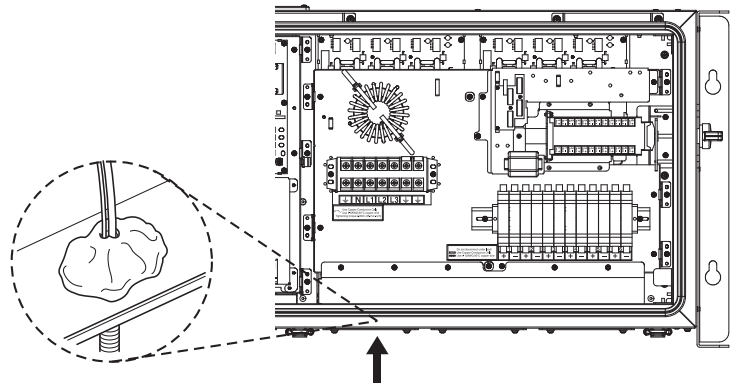
Size: A max = 16mm (0.63in)

B min = It is possible to put bis of M6 size



#### Note:

Fill the inside of the wiring opening with putty.



---

## 6.5 PV Array Connection

### 6.5.1 Cable Requirements

#### PV Module Requirements:

- All PV modules connected to one input must be of the same type.
- All PV modules connected to one input must be aligned identically.
- All PV modules connected to one input must have the same tilt angle.
- On the coldest day based on statistical records, the open-circuit voltage of the PV array must never exceed the maximum input voltage of the inverter.

#### Note:

##### Using the low-power panel

Please connect the panels of 5kW more in total.

If the inverter is connected to the panel of less than 800W per one string,

It takes time to start up the inverter.

Please set "Start PV level" to 400V that case.

Please refer to "Manual for Master Box" "EOW-MBX03-US".

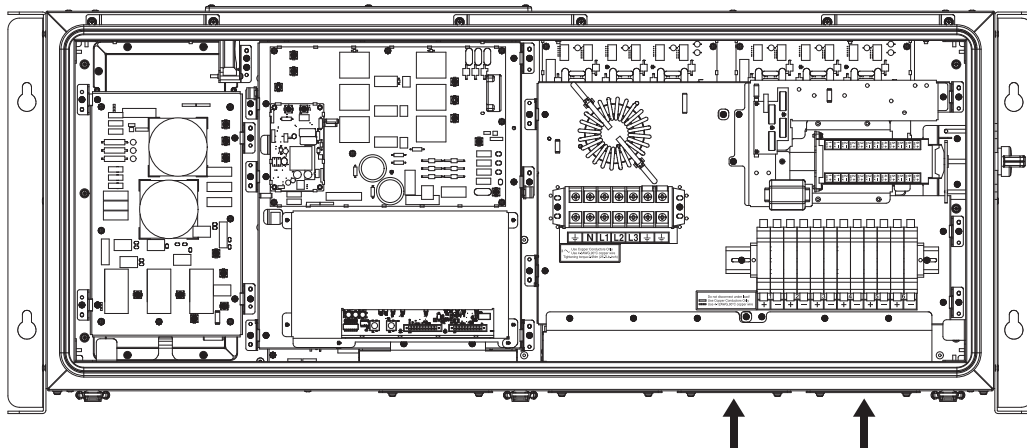
"3. [Sys/Set Value] Set MODE" - "2. Parameter Setting"

#### Additionally Required Materials (not included in the scope of delivery):

- Depending on the number of strings, One or Two plastic threaded plug, Trade size (1-1/4 in).
- Depending on the number of conduits, one or two UL listed rain-tight conduit fittings for wet locations complying with UL514B: UL-listed type 3R.
- For closing unused enclosure openings: UL-listed type 3R filler plugs.

#### Cable Requirements:

- DC cables of the PV array must be designed in accordance with the installation requirements applicable on site and for temperatures of +90°C (+194°F).
- DC input and output circuits are isolated from the enclosure and the system grounding, if required by Section 250 of the National Electrical Code® ANSI/NFPA 70, is the responsibility of the installer.
- The maximum cable length, which is dependent on the conductor cross-section, must be adhered to.
- Cable type: Copper wire
- Conductor cross-section: AWG 14 to AWG 6



## 6.5.2 Connecting the PV Array

### Requirements:

- The conduits must be correctly connected to the inverter.
- The DC Switch-disconnector must be switched OFF and the Front Enclosure lid must be dismantled.

### Procedure:

1. **DANGER** Risk of death or serious injury due to electric shock.

- Make sure that all devices connected to the inverter are switched off and protected against reconnection.
- Cover the PV modules.

2. **Open the knockout hole on the bottom of the inverter for the DC connection.**

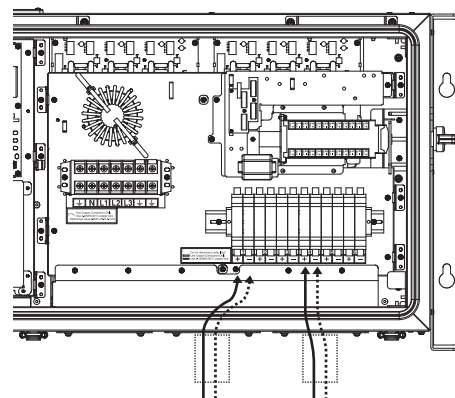
**CAUTION** Intrusion of moisture or dust may damage the inverter.

The intrusion of moisture and dust can destroy or damage electric components in the inverter.

- Do not enlarge the enclosure opening.

If there is reverse polarity of a PV string, there can be short-circuit current flowing when string fuses are inserted and string safety levers are closed.

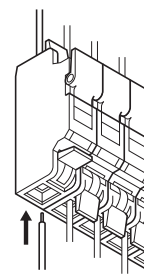
- Open safety levers all the way.



3. **Insert one conduit fitting for each string into the opening and tighten from the inside using the counter nut.**

4. **Attach the conduit to the enclosure opening.**

5. **Lead the DC cables of the PV array through the connected conduits into the interior of the inverter.**

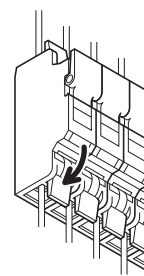


6. **Check the positive DC cables for correct polarity.**

Peel back the sheath of DC cables about 12 mm (0.47 in).

Pull up the lever of the fuse holder and insert them all the way into the square opening with the plus sign (+) on the bottom of the fuse holder.

Pull down the lever of the fuse holder.



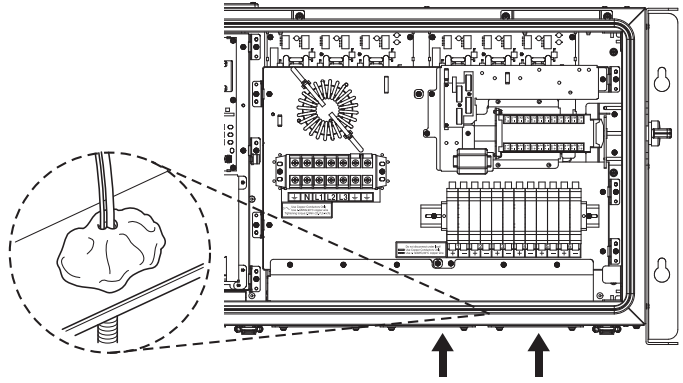
7. **Check the negative DC cables for correct polarity and completely insert them into the square opening with the minus sign ( - ) on the bottom of the fuse holder.**

Peel back the sheath of DC cables about 12 mm (0.47 in)

Pull up the lever of the fuse holder and insert them all the way into the square opening with the plus sign ( + ) on the bottom of the fuse holder.

Pull down the lever of the fuse holder.

- 
8. Ensure that all conductors are securely in place and cannot be detached when pulled.
  9. Close unused enclosure openings with UL-listed type 3R filler plugs.
  10. Fill the inside of the wiring opening with putty.

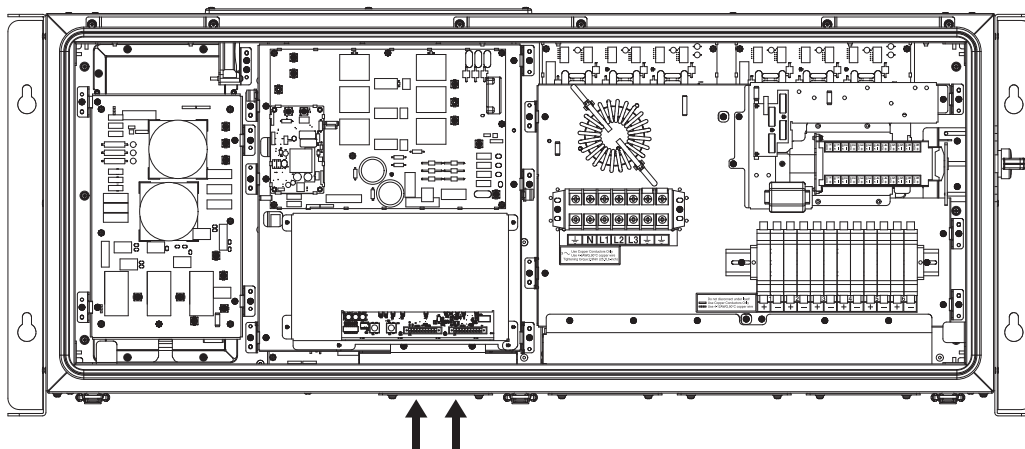


## 6.6 Communication Connection

### Requirements

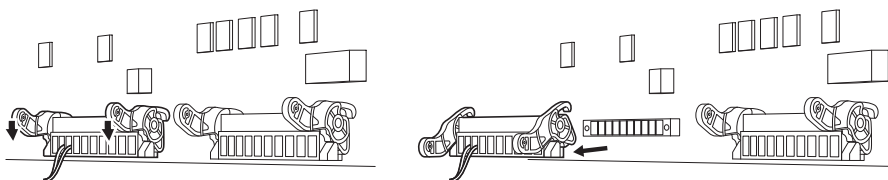
#### Additionally Required Materials (not included in the scope of delivery):

- 1 or 2 plastic threaded plugs, Trade size 25.4 mm (1 in)
- 1 or 2 UL-listed rain-tight conduit fitting for wet locations complying with UL514B: UL-listed type 3R



2 plugs for CN4001 and CN4002 are inserted at the time of shipment.

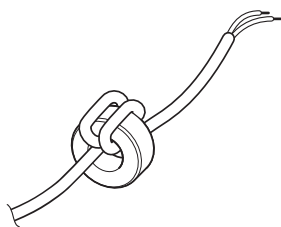
### Disconnecting the plug:



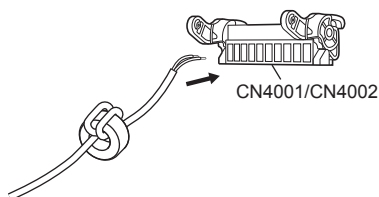
Press down the orange lever for CN4001/CN4002.

Disconnect plug CN4001/CN4002.

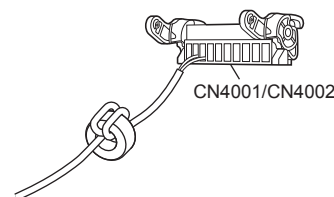
### Add the ring core to RS-485 communication line:



Attach by turning ring core twice as shown.  
Please use the supplied core.



Add the ring core to each RS-485 communication line for the radiation noise.

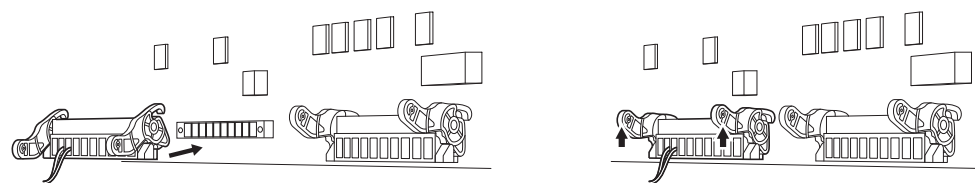


Connect the communication signal wires, to the plug for CN4001/CN4002, according to the following CN4001/CN4002 descriptions. Use a minus screw-driver to connect the wires.  
(Screw thread of CN4001/CN4002: M2)

### Note:

Peel back the sheath of cables connected to CN4001/CN4002 about 7 mm (0.28 in).

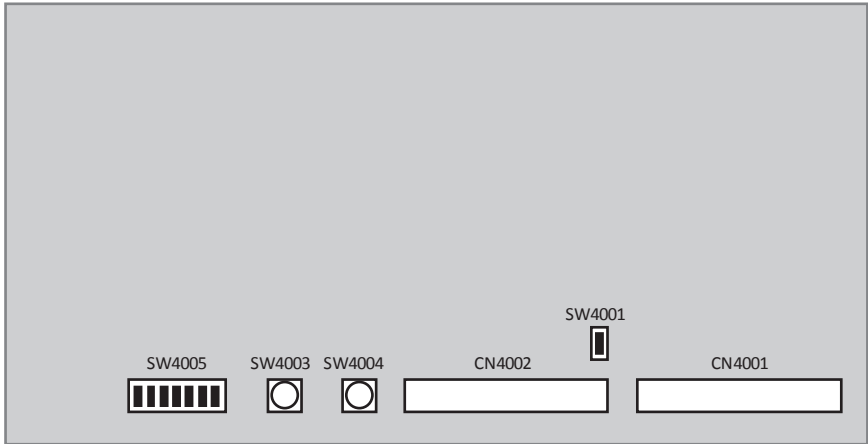
Inserting the plug:



The plug has three positions of the lever. Pull up the orange lever at the position of the middle. Then, insert the plug.

After inserting the plug, pull up the orange lever once more. Finally, be sure it is locked into place.

This inverter supports the industry standard RS-485 communication.



CN4001 · CN4002

No.	Descriptions	
1	RS-485	+
2		-
3		RS-GND
4	SH	
5	REMOTE	+
6		-
7	N.C.	
8	ALARM	N Open
9	ALARM	N Close
10	ALARM	COM

Terminal block CN4001 and CN4002 are internally paralleled.

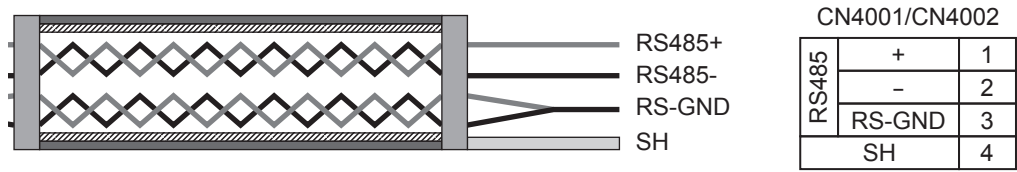
Serial Communication (RS-485)

There are two RS-485 communication lines on the inverter. Connect either communication port by using the terminal block (CN4001/CN4002).



**Cable Requirements:**

Use a cable designed for use with RS-485 communications, such as a Belden 3106A, which is a data cable wire with one twisted pair for the +/- signals, one ground conductor, and a shield with drain wire (equivalent). The table below shows connections for a dual twisted pair shielded cable.



Continuity of the shield in the RS-485 cable is important for low noise on the line. This is particularly true for large plants with multiple inverters. For the best results, the shield must be tied to ground at only one point on the line, typically at one end or the other.

The shield wiring must be continuous as it passes from one inverter to the next in a daisy chain, however it must not be tied to ground at these junctions.

The SH terminal is provided as a floating tie point for this purpose. It allows shields (drain wires) from incoming and out-going daisy chain cables to be secured together but not grounded.

**Cable Requirements:**

- Required RS485 Cable
- STP (Shielded Twisted Pair), 2 pair
- Conductor size: AWG20 or AWG22

**Remote+ Remote-GND**

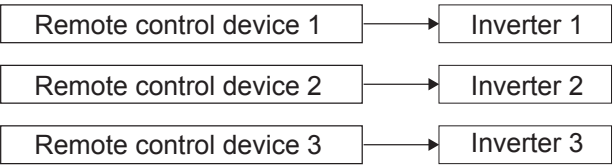
The connection and disconnection of the inverter to and from the grid can be controlled externally. When the "Remote+" signal is brought to the same potential as the "Remote-GND" signal (i.e. by making a short circuit between the two terminals of the connector), the inverter disconnects from the grid.

The remote control OFF condition is shown on the display. The connections of this control are made between the "Remote+" input and "Remote-GND". Since this is a digital input, there are no requirements regarding wire size.

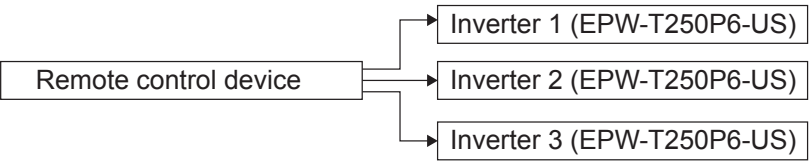
The devices to be connected to the output must comply with the following requirements:

Do not use the parallel connection to the remote terminal of the other inverter.

- Example:A
- Direct current: Maximum Reverse Voltage: 5 V, Maximum Current: 8 mA
- \* Please prepare one for one.
  - \* If control some inverters with one remote control device, refer to the example B.



- Example:B
- Direct current: Maximum Reverse Voltage: 5 V, Maximum Current: 24 mA (In the case of 3 parallel)
- \* Per 8mA necessary.
  - \* If 3 units parallel connection, 24 mA is necessary.
  - \* Do not use the parallel connection to the remote terminal of the other model inverter.
- Only use EPW-T250P6-US.



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## Cable requirements:

Conductor size: AWG24 to AWG16

## Alarm

The inverter has a relay (ALARM).

The relay can be wired by the user as a normally open contact (N Open).

Do not use a normally closed contact (N Close).

The devices to be connected to the relay can be of different types (light, sound, etc. For example, to activate a visual and/or audible alarm or for utilization by another control, such as a building control system.), but must comply with the following requirements:

Alternating Current: Maximum Voltage: 125 Vac, OV Category II

Maximum Current: 0.5 A

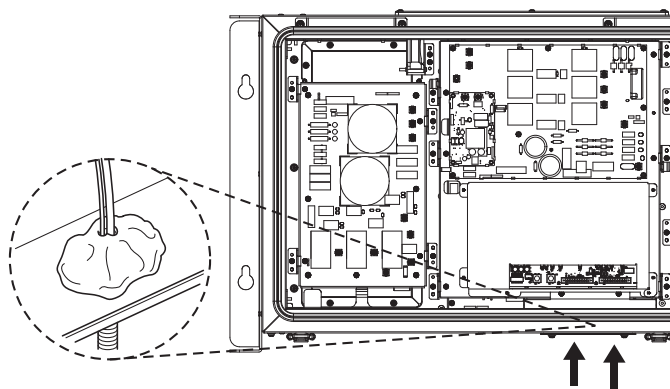
Direct Current: Maximum Voltage: 30 Vdc, Maximum Current: 0.8 A

## Cable Requirements:

Conductor size: AWG24 to AWG16

## Note:

Fill the inside of the wiring opening with putty.



## 6.6.1 Connecting the Inverter to the Master BOX

### Procedure:

1. **DANGER** Risk of death or serious injury due to electric shock.
  - Disconnect the inverter from all voltage sources (see Section 9).
2. Connect one end of the network cable directly to the Master BOX.
3. Connect the other end of the network cable to the inverter:
  - Remove the filler plugs from the network connection opening on the inverter.
  - Attach the conduit to the opening.
  - Lead the network cable through the conduit into the interior of the inverter.
4. Commission the inverter (see Section 7).

### Daisy Chain Units for Connection to the Master Box

Use a SW4001 Terminal Resistance for RS-485 communication (120Ω).

A 120Ω Resistor can be on or off for impedance matching for RS-485 communication.

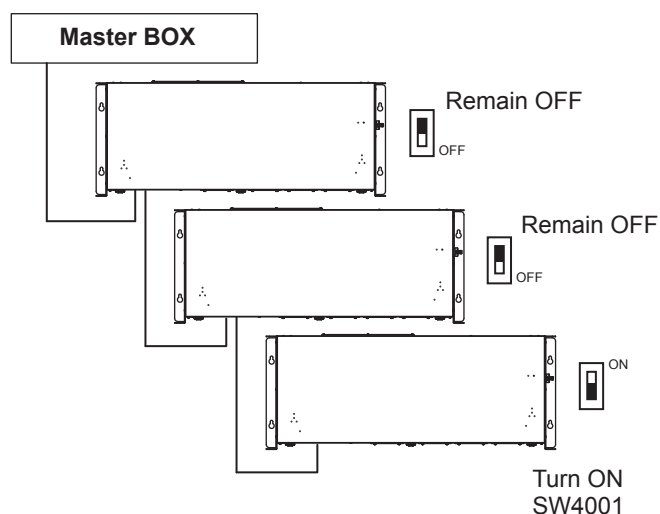
The RS-485 terminal block connectors can be used to connect a single inverter or implement a multi-unit wiring configuration, called a daisy chain.

### Note:

Terminal block CN4001 and CN4002 are internally paralleled to allow connection in a daisy chain configuration. Using the appropriate cable designed for use with RS-485 communications, connect all the RS-485 lines in series according to the daisy chain cabling method ENTER-EXIT.

For the last inverter in the daisy chain, or for a single inverter, activate the terminal resistance of the communication line by moving switch **SW4001** to the **ON** position.

For multiple inverters at one location it is possible to use one Master Box for up to 20 inverters.



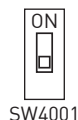
Maximum cable length:  
The maximum distance between the Master Box and the farthest inverter must be within 1.0 km (3280 ft).

Dip SW "ON"



⇒ RS485 Terminal Resistance setting

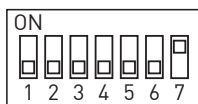
Dip SW "OFF"



⇒ RS485 relay setting (Default Setting)

## Address Setting for Communication

(Example)  
Address 1



SW4005

<Relationship between addresses and Dip SW>


Address	Pin #3	Pin #4	Pin #5	Pin #6	Pin #7
1	OFF	OFF	OFF	OFF	<b>ON</b>
2	OFF	OFF	OFF	<b>ON</b>	OFF
3	OFF	OFF	OFF	<b>ON</b>	<b>ON</b>
4	OFF	OFF	<b>ON</b>	OFF	OFF
5	OFF	OFF	<b>ON</b>	OFF	<b>ON</b>
6	OFF	OFF	<b>ON</b>	<b>ON</b>	OFF
7	OFF	OFF	<b>ON</b>	<b>ON</b>	<b>ON</b>
8	OFF	<b>ON</b>	OFF	OFF	OFF
9	OFF	<b>ON</b>	OFF	OFF	<b>ON</b>
10	OFF	<b>ON</b>	OFF	<b>ON</b>	OFF
11	OFF	<b>ON</b>	OFF	<b>ON</b>	<b>ON</b>
12	OFF	<b>ON</b>	<b>ON</b>	OFF	OFF
13	OFF	<b>ON</b>	<b>ON</b>	OFF	<b>ON</b>
14	OFF	<b>ON</b>	<b>ON</b>	<b>ON</b>	OFF
15	OFF	<b>ON</b>	<b>ON</b>	<b>ON</b>	<b>ON</b>
16	<b>ON</b>	OFF	OFF	OFF	OFF
17	<b>ON</b>	OFF	OFF	OFF	<b>ON</b>
18	<b>ON</b>	OFF	OFF	<b>ON</b>	OFF
19	<b>ON</b>	OFF	OFF	<b>ON</b>	<b>ON</b>
20	<b>ON</b>	OFF	<b>ON</b>	OFF	OFF

← (Default Setting)

Set Pin#1 and Pin#2 OFF

## 6.7 Additional Grounding of the Enclosure

The inverter is equipped with a grounding terminal with two connection points on the DC side for additional grounding (e.g. use of a grounding electrode).

- Equipment grounding terminal: Symbol 

### Cable Requirements:

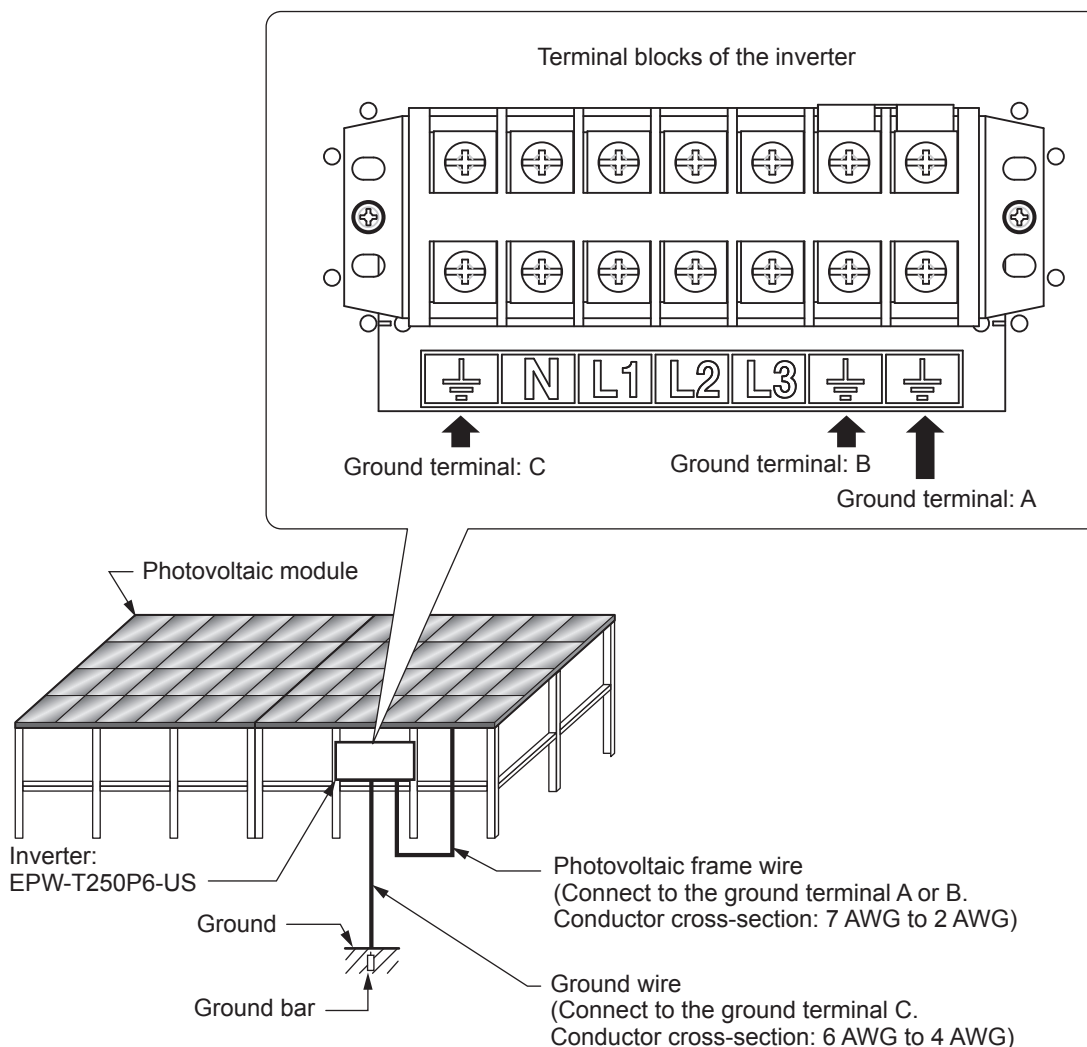
- The cable must be designed in accordance with the local installation requirements and for temperatures of over +90°C (+194°F).
- Cable type: Copper wire
- Conductor cross-section: (7 AWG to 2 AWG)
- Ring Terminals (Refer to Section 6.4.3)

### Requirement:

- The conduits must be correctly connected to the inverter.

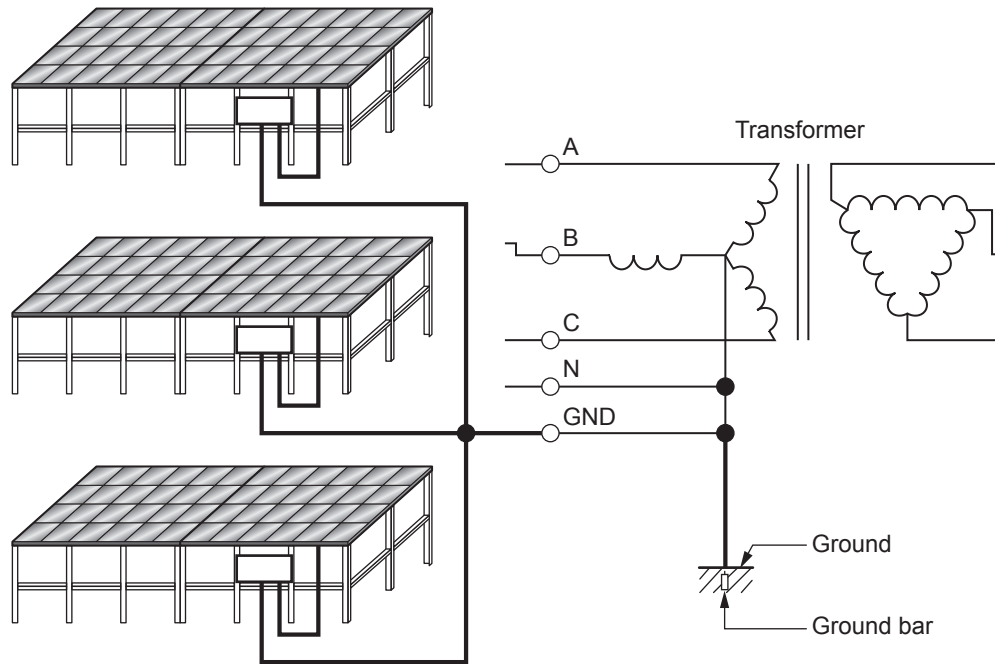
### Important points for the ground work:

1. Please connect the photovoltaic frame wire to the ground terminal A or B of the inverter.  
And, connect the ground terminal C of the inverter to the ground.



Make sure to connect the photovoltaic frame ground to the ground terminal of the inverter!

2. If the inverter is installed multiple units, It is recommended the ground wire connecting between the transformer and the each inverter is so that the shortest.

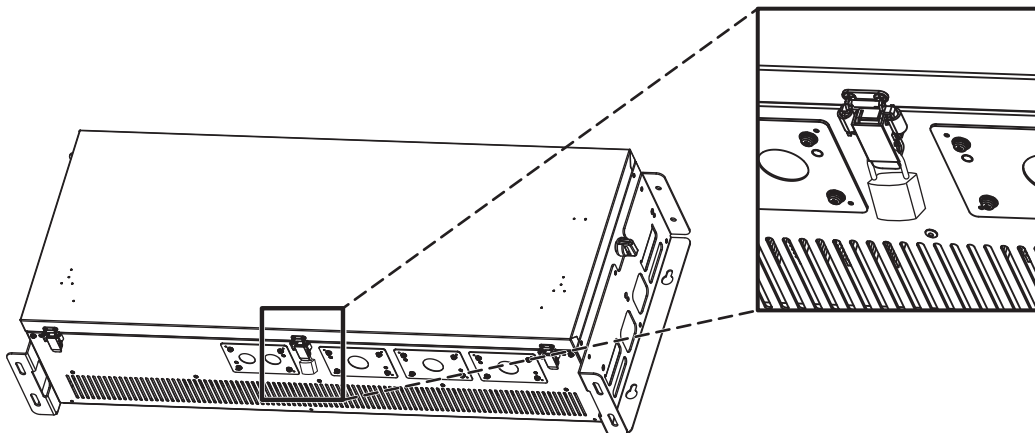


**Recommendations:**

The ground wire connecting between the transformer and the each inverter is so that the shortest!

## 6.8 Closing the Front Enclosure Lid

After finishing electrical connection, please close the front enclosure lid from above.  
Lock all toggle latches and fasten the center latch with a padlock.



# 7 Commissioning

## Requirements:

- The circuit breaker must be correctly rated.
- A means of disconnecting the inverter from the PV array must be present.
- The inverter must be correctly mounted and closed.
- All cables must be correctly connected to the terminals.
- Unused openings for the DC connection in the inverter enclosure must be closed with UL-listed type 3R filler plugs.
- Unused openings for the communication connection in the inverter enclosure must be sealed tightly.

## Procedure:

### NOTE:

Make sure all tools, parts, etc., are removed from the vicinity of the inverter before turning it on.

1. Make a final check of all AC and DC wiring to the inverter and in the system before turning them on.
2. Connecting the inverter to the utility grid must only be completed after receiving prior approval from the utility company. Installation must be performed only by qualified technical persons or licensed electrician(s).

## Turning On the Inverter

1. Turn ON the dedicated three-phase circuit breaker.
2. Turn ON DC Switch-disconnector of the inverter.

## Turning On the Master BOX

1. Turn ON the Power SW in Master BOX.
2. Setup the Time and Date.

Master BOX Display

[System Setup]
Time/Date ?
Nov/01/2015 -12:00:00
^^^

3. Press the “MODE” button of the Master BOX.

Master BOX Display

Nov 1 - 12:00:00	BOX 1
Status:	Conn
Power:	150.3kW
Stop INV:	Yes

4. Press the “START/STOP” button of the Master BOX.

Master BOX Display

Nov 1 - 12:00:00	BOX 1
Status:	Disconn
Power:	0.0kW
Stop INV:	Yes

## Operation

The inverter will connect to the utility grid when DC voltage first exceeds 200VDC (string voltage) of power is available.

The inverter will shut down when the DC voltage falls below 140VDC.



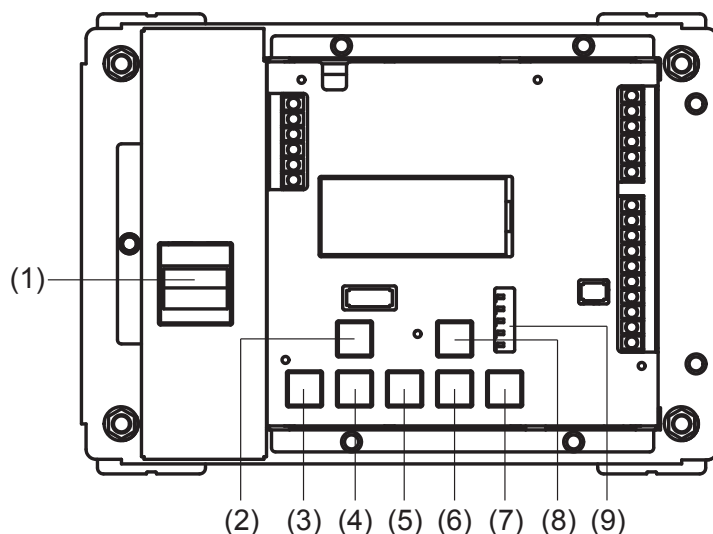
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### Turning Off the Inverter

1. Press the “START/STOP” button of the Master BOX.
2. The inverter will slowly ramp down the current and shutdown.
3. Turn OFF the DC Switch-disconnector of the inverter.
4. Turn OFF the dedicated three-phase circuit breaker.

# 8 Configuration

## 8.1 Master BOX



Ref. No	Name	Description
(1)	Power SW	Power switch to start the Master Box.
(2)	START/STOP Button	Start/stop operation of connected Inverter Units.
(3)	MODE Button	Switches between display and operation modes.
(4)	UP Button	Pressing this button changes the display of power status, system information, and each setting.
(5)	DOWN Button	
(6)	BACK Button	
(7)	ENTER Button	
(8)	RE-START Button	Used to manually recover when a malfunction has occurred.
(9)	ERROE RED LED	RED indicates that the inverter has detected an anomaly.

### Settings Menu

The inverter parameters can be adjusted by using commands in the Settings Menu.

Options such as Power ON/OFF, Date, Communications, and MPPT can simply be changed/set from the Settings Menu.

Refer to the “Master Box for Three-phase Inverter Installation and Operation Manual”.

### Power Factor

“PowerFactor” parameters can be set up through the Master BOX.

Refer to the “Master Box for Three-phase Inverter Installation and Operation Manual” (P.42).

Setting value “-0.2” means Power Factor “0.8 inductive”.

Setting value “0.0” means Power Factor “1.0”.

Setting value “0.2” means Power Factor “0.8 capacitive”.

### NOTE:

At sites with AC voltage above 105%, utility companies commonly like to modify the power factor to reduce the AC voltage at the point of common coupling. This can be done by setting the inverter to absorb vars. This can be achieved by setting the inverter to a negative value. For example, set the power factor to 0.95 inductive.

## 8.2 Adjustable Parameters

The Master BOX allows the following parameters to be changed.

### <Parameter Setting Items>

No.	Item	Numerical Range	Initial Value	Step Width
1	Over voltage 1 level	277 ~ 333[V]	333[V]	1
2	Over voltage 1 trip Time	0.10 ~ 0.16[s]	0.16[s]	0.01
3	Over voltage 2 level	277 ~ 333[V]	305[V]	1
4	Over voltage 2 trip Time	1 ~ 13[s]	1[s]	1
5	Under voltage 1 level	125 ~ 277[V]	125[V]	1
6	Under voltage 1 trip Time	0.10 ~ 0.16[s]	0.16[s]	0.01
7	Under voltage 2 level	125 ~ 277[V]	166[V]	1
8	Under voltage 2 trip Time	1 ~ 11[s]	1[s]	1
9	Under voltage 3 level	125 ~ 277[V]	244[V]	1
10	Under voltage 3 trip Time	1 ~ 21[s]	2[s]	1
11	Over frequency 1	60.5 ~ 64.0[Hz]	60.5[Hz]	0.1
12	Over frequency 1 trip Time	1 ~ 300[s]	62[s]	1
13	Over frequency 2	60.5 ~ 64.0[Hz]	62.0[Hz]	0.1
14	Over frequency 2 trip Time	0.10 ~ 10.00[s]	0.16[s]	0.01
15	Under frequency 1	56.0 ~ 59.5[Hz]	59.5[Hz]	0.1
16	Under frequency 1 trip Time	1 ~ 300[s]	2[s]	1
17	Under frequency 2	56.0 ~ 59.5[Hz]	57.0[Hz]	0.1
18	Under frequency 2 trip Time	0.10 ~ 10.00[s]	0.16[s]	0.01
19	Auto Recover Time	2 ~ 300[s]	300[s]	2
20	Regulation voltage level	304 ~ 332[V]	318[V]	2
21	Regulation voltage rate	0/50	50[%]	0/50
22	PF control rate	0.80 ind. ~ 0.80 cap.	1.00	0.01
23	DC component current	100 ~ 999[mA]	150[mA]	50
24	DC component current trip Time	0.1 ~ 9.9[s]	0.5[s]	0.1
25	Grid connection Time	5 ~ 300[s]	30[s]	5
26	Start PV level	200 ~ 500[V]	200[V]	10
27	Stop PV level trip time	5 ~ 360[s]	60[s]	5

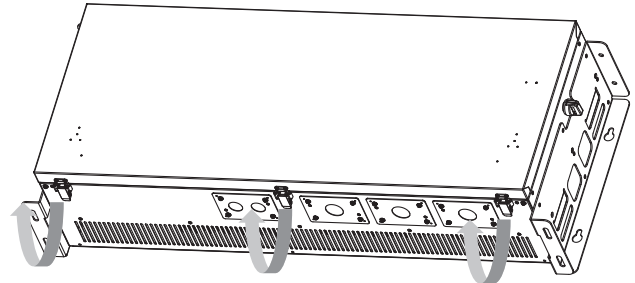
\* No.1, 3, 5, 7, 9, and 20: Line-to-neutral voltage

# 9 Disconnecting the Inverter from Voltage Sources

---

Prior to performing any work on the inverter, always disconnect it from all voltage sources as described in this section.

1. **DANGER** Risk of death or serious injury due to electric shock.
  - Disconnect the inverter from the utility grid and confirm it cannot be reconnected.
  - Disconnect the inverter from the PV array and confirm it cannot be reconnected.
2. Wait 15 minutes after disconnecting the inverter from the utility grid and the PV array.
3. Release the padlock of the front enclosure lid using a key.
4. Lift and remove the front enclosure lid from below.



5. Use a suitable measuring device to confirm no voltage is present at the DC terminals.
6. Use a suitable measuring device to confirm no voltage is present at the AC terminals.

# 10 Troubleshooting

## 10.1 Display Messages and Event Codes

The Master BOX displays the warnings and errors that apply to the inverter, the utility grid, or the PV array. The warning or error is identified by an event Code.

ERROE RED LED indicates that the inverter has detected an anomaly.

Please press the "RE-START" button of the Master BOX, if the inverter will restart.

Nov 1 - 12:00:00	INV 01
Status:	Stopped E-86
Power:	0.0kW
Bus Voltage:	0.0V

Example of Stop Operation  
Display for an individual Inverter  
"E-86" is Event Code

Event Codes	Cause, and Corrective Measures
D-12 D-22 D-32 D-42 D-52 D-62	<b>Overvoltage at DC input</b> This error may cause inverter fault. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. IMMEDIATELY DISCONNECT THE INVERTER from all voltage sources.</li> <li>2. Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum input voltage of the inverter, reconnect the DC connectors to the inverter. If the DC voltage is above the maximum input voltage of the inverter, ensure that the PV array has been correctly rated or contact the PV array installer.</li> <li>3. If this message is repeated frequently, contact the TABUCHI ELECTRIC Service Line.</li> </ol>
D-14 D-24 D-34 D-44 D-54 D-64	<b>Over Temperature at DC input</b> The inverter has detected over temperature at DC inputs. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Confirm the inverter has sufficient ventilation.</li> </ol>
D-15 D-25 D-35 D-45 D-55 D-65	<b>Circuit Fault</b> The inverter has detected circuit fault of temperature sensor. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. If the inverter dose not restart automatically, contact the TABUCHI ELECTRIC Service Line.</li> </ol>
D-16 D-26 D-36 D-46 D-56 D-66	<b>Over Current at DC input</b> The inverter has detected over current. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. The inverter will restart automatically.</li> <li>2. If this message is displayed frequently, confirm the PV array is rated and wired correctly.</li> </ol>
D-19	<b>DC arc fault</b> The inverter has detected an electric arc.The inverter interrupts grid feed-in and cannot connect to the utility grid. <b>Corrective measures:</b> Refer "10.3 Resetting the Operation Inhibition after Detection of an Arc Fault".
D-18 D-28 D-38 D-48 D-58 D-68	<b>Circuit Fault</b> The inverter has detected circuit fault of DC arc sensor. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. The inverter will restart once the fault is cleared.</li> <li>2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.</li> </ol>

Event Codes	Cause, and Corrective Measures
E-01 E-02 E-05	<b>Auto Recovery</b> The inverter corresponds to the abrupt change in the solar panel output. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Observe for 10 minutes and see whether the message clears automatically.</li> <li>2. If error does not clear, contact the TABUCHI ELECTRIC Service Line.</li> </ol> <b>Under voltage at DC input</b> The inverter is waiting for sunshine. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. If this code is displayed frequently during sunshine, confirm the PV array has been correctly rated and wired.</li> </ol>
E-03	<b>Circuit Fault</b> The inverter has detected circuit fault inside the inveter. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. The inverter will restart once the fault is cleared.</li> <li>2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.</li> </ol>
E-06 E-07 E-08 E-09	<b>Leakage Current</b> The inverter has detected high leakage current. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. The inverter will restart automatically.</li> </ol>
E-10 E-11	<b>Circuit Fault</b> The inverter has detected circuit fault inside the inveter. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. The inverter will restart once the fault is cleared.</li> <li>2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.</li> </ol>
E-12	<b>Low Insulation Resistance</b> The inverter has detected a ground fault in the PV array. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. The inverter will restart automatically.</li> </ol>
E-13	<b>Ground Fault</b> The leakage currents of the inverter and the PV array are too high. There is a ground fault, a residual current, or a malfunction. The inverter interrupts feed-in operation immediately after exceeding a threshold and then automatically reconnects to the utility grid. If this process happens five times a day, the inverter disconnects from the utility grid and terminates feed-in. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Check the PV system for ground faults.</li> </ol>
E-21 E-22 E-24	<b>Circuit Fault</b> The inverter has detected circuit fault inside the inveter. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. The inverter will restart once the fault is cleared.</li> <li>2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.</li> </ol>
E-25	<b>Internal FAN Lock</b> The inverter has detected the fan lock. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. The inverter will restart once the fault is cleared.</li> <li>2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.</li> </ol>
E-41	<b>Remote Stop</b> The inverter is stopped by the remote signal.

Event Codes	Cause, and Corrective Measures
E-61	<b>Waiting for DC start conditions. Start conditions not met</b> The feed-in conditions for the utility grid have not been met. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Wait for higher irradiation.</li> <li>2. If this message is displayed frequently in the morning, increase the voltage limit for starting grid feed-in. To do this, change the Minimum voltage input parameter.</li> <li>3. If this message is displayed frequently with medium irradiation, confirm the PV array is correctly rated.</li> </ol>
E-86	<b>Interference of Communication Operation</b> Communication operation between the inverter and the Master BOX is unstable. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Observe for 10 minutes and see whether the message clears automatically.</li> <li>2. Confirm the Communication wiring is not damaged.</li> <li>3. Confirm the Communication wiring is correctly connected.</li> <li>4. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.</li> </ol>
E-90 E-93	<b>Interference of device</b> The cause must be determined by the TABUCHI ELECTRIC Service Line. <b>Corrective measure</b> <ol style="list-style-type: none"> <li>1. Contact the TABUCHI ELECTRIC Service Line.</li> </ol>
E-91	<b>Over Temperature at AC output</b> The inverter has detected over temperature at AC output. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Confirm the inverter has sufficient ventilation.</li> </ol>
E-92	<b>Under minimum operating temperature</b> The inverter will only recommence grid feed-in once the temperature has reached at least -20°C (-4°F).
E-94	<b>Circuit Fault</b> The inverter has detected circuit fault of temperature sensor. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. If the inverter dose not restart automatically, contact the TABUCHI ELECTRIC Service Line.</li> </ol>
E-95 E-96	<b>Minor issue</b> The inverter has detected minor issue. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. The inverter will restart automatically.</li> <li>2. If this message is displayed frequently, contact the TABUCHI ELECTRIC Service Line.</li> </ol>
E-97 E-98 E-99	<b>Major issue</b> The inverter has detected major issue. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Contact the TABUCHI ELECTRIC Service Line.</li> </ol>
G-01 G-08 G-20 G-21	<b>Grid Fault</b> Line voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Observe for 10 minutes and see whether the message clears automatically.</li> <li>2. Verify Grid Voltage is within range.</li> <li>3. Verify proper AC wiring.</li> <li>4. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.</li> </ol>

Event Codes	Cause, and Corrective Measures
G-02 G-22 G-23	<b>Grid Fault</b> The utility grid has been disconnected, the AC cable is damaged, or the line voltage at the connection point of the inverter is too low. The inverter has disconnected from the utility grid. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Observe for 10 minutes and see whether the message clears automatically.</li> <li>2. Verify Grid Voltage is within range.</li> <li>3. Confirm the circuit breaker is switched ON.</li> <li>4. Confirm the AC wiring is not damaged.</li> <li>5. Confirm the AC wiring is correctly connected.</li> <li>6. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.</li> </ol>
G-03 G-04 G-24 G-25	<b>Grid Fault</b> The grid voltage frequency is not within the permissible range. The inverter has disconnected from the utility grid. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. If possible, check the power frequency and observe how often fluctuations occur.</li> <li>2. If fluctuations occur frequently and this message is displayed often, contact the grid operator.</li> <li>3. The grid operator must approve changes to the operating parameters of the inverter.</li> </ol>
G-05 G-06	<b>Grid Fault</b> The inverter has detected grid fault. The inverter has stopped feeding into the utility grid. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Observe for 10 minutes and see whether the message clears automatically.</li> <li>2. Check the grid connection for significant, short-term frequency fluctuations.</li> <li>3. If error does not clear, contact the TABUCHI ELECTRIC Service Center.</li> </ol>
G-10	<b>Grid Fault</b> The inverter has detected excessive DC component of output current. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Check the grid connection for direct current.</li> <li>2. If this message is displayed frequently, contact the grid operator and check whether the monitoring threshold on the inverter can be raised.</li> </ol>
G-11 G-26	<b>Output Over Current</b> The inverter has detected excessive output current. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. The inverter will restart automatically.</li> </ol>
G-13	<b>Installation Failure Grid Connection</b> The inverter has detected an error in the AC cabling. The inverter cannot connect to the utility grid. <b>Corrective measures:</b> <ol style="list-style-type: none"> <li>1. Confirm the AC connection is correct.</li> </ol>



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## 10.2 Checking the PV System for Ground Faults

If Error Code "E11", "E12" or "E13" is displayed in the Master BOX, this could indicate a ground fault. The electrical insulation from the PV system to ground is defective or insufficient.

**DANGER** Risk of death or serious injury due to electric shock.

In the event of a ground fault, high voltage levels can be present.

- Touch the cables of the PV array on the insulation only.
- Do not touch any parts of the board or frame of the PV array.
- Do not connect PV strings with ground faults to the inverter.

**WARNING** Destruction of measuring device due to overvoltage

- Only use measuring devices with a DC input voltage range up to 1,000 V.

Proceed as follows to check each string in the PV system for ground faults.

### Procedure:

1. **DANGER** Risk of death or serious injury due to electric shock.

- Disconnect the inverter from all voltage sources (see Section 9).

2. **Measure the voltages at the DC terminal:**

- Measure the voltages between the positive terminal and the ground potential.
- Measure the voltages between the negative terminal and the ground potential.
- Measure the voltages between the positive and negative terminals.

If the following results are present at the same time, there is a ground fault in the PV system.

- All measured voltages are stable.
- The sum of the two voltages to ground potential is approximately equal to the voltage between the positive and negative terminals.
- Determine the location of the ground fault via the ratio of the measured voltages.
- Eliminate the ground fault.

If there is no ground fault and the message is still displayed, contact the TABUCHI ELECTRIC Service Line.

## 10.3 Resetting the Operation Inhibition after Detection of an Arc Fault

If the message "D-19" is displayed in Master BOX, the inverter has detected an electric arc and interrupts feed-in operation.

### Procedure:

1. **DANGER** Risk of death or serious injury due to electric shock.

- Disconnect the inverter from all voltage sources (see Section 9).

2. **Confirm whether the PV modules and/or the connected cables or plugs are defective.**

- Repair or replace defective PV modules, cables, or plugs.

3. **Access the user interface of Master BOX.**

4. **Press the "RE-START" button.**

---

## 10.4 Notes of lightning occurs

When lightning occurs, there are cases that the inverter unit stops the output.

Please press the “RE-START” button of Master BOX.

The inverter unit will restart.

# 11 Decommissioning the Inverter

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**CAUTION** Risk of injury when lifting the inverter or if the inverter is dropped.

The inverter is heavy (see Section 12 "Technical Data"). Injury may occur if the inverter is lifted incorrectly or dropped while being moved, or when attaching it to or removing it from the wall mounting bracket.

## Procedure:

1. **DANGER** Risk of death or serious injury due to electric shock.
  - Disconnect the inverter from all voltage sources (see Section 9).
2. Disconnect the DC cables from the connecting terminal plate for the DC connection.
3. Completely open all locking levers of the connecting terminal plate for the AC connection and pull out all conductors from the terminals.
4. Remove all connected grounding cables from the grounding terminal.
5. Remove all connected communication cables.
6. Remove all conduits with cables from the inverter.
7. Close all enclosure openings.
8. **CAUTION** Risk of serious burn injuries due to high internal enclosure temperature.
  - Wait 30 minutes before disassembling the inverter. This will allow the enclosure to cool down and thus prevent burn injuries.
9. Remove the inverter by lifting it vertically up and off the M10 anchor bolt.
10. Release the M10 anchor bolt from the mount.
11. Dispose of the inverter in accordance with the locally applicable disposal regulations for electronic waste.

# 12 Technical Data

## 12.1 DC/AC Specifications (EPW-T250P6-US)

DC Input	
Max. input voltage	1000 V
Max Power Input Voltage Range (MPPT)	500 V to 800 V
Rated input voltage	700 V
Min. input voltage	140 V
Initial input voltage	200 V
Max. input current	10 A
Max. short-circuit current per string	12 A
Number of MPP tracker inputs	6
Maximum input power per string	4,400W *
AC Output	
Rated power at 480 V, 60 Hz	25,000 W
Max. apparent AC power	25,000 VA
Rated grid voltage	480 V (277 V WYE)
AC voltage range	422.4 V to 528 V
Nominal AC current at 480 V	30 A
Max. output current	31 A
Total harmonic distortion of the output current with total harmonic distortion of the AC voltage < 2%, and AC power > 50% of the rated power	≤ 5%
Max. residual output current	142.5 A pk
Duration of the Max. residual output current	0.0131 s
Line synchronization characteristics / In-rush current	Method 2
Rated power frequency	60 Hz
Operating range at AC power frequency 60 Hz	59.5 Hz to 60.5 Hz
Output power at +50°C (+122°F)	18000 W
Max. power operating ambient temperature	+40°C (+104°F)
Power factor at rated output power	≥ 0.99
Grid connection type	3φ/ 4W + Ground
Overvoltage category in accordance with UL1741	IV
Efficiency	
CEC efficiency	97.5%

\* By input the 6 string all 4200 W or more, can be rated output.

## 12.2 General Data

Dimensions	W 1350 × H 538 × D 300 mm (53.2 × 21.2 × 11.8 in)
Weight	90.5 kg (199 lb)
Dimensions of the packaging	W 1500 × H 620 × D 480 mm (59.1 × 24.4 × 18.9 in)
Transport Weight	110 kg (242 lb)
Operating Temperature	−20 to +50°C (−4 to +122°F)
Storage Temperature	−30 to +60°C (−22 to +140°F)
Operating Humidity	≤ 90% (Non-condensing)
Max. operating altitude above MSL	2,000 m (6,562 ft)
Noise Emission	≤ 50 dB(A) 1 m * (for reference)
Power loss in night mode	< 12 W
Topology	Transformerless
Cooling concept	Cooling fan
Enclosure type rating in accordance with UL50	Type 3R
Protection class	I
Grid configurations	480 V / 277 V WYE
Approvals and national standards, as per	UL 1741 UL 1699B CAN/CSA C22.2 No. 107.1-01

\* According to A characteristics of JIS C 1509-1, 1m away from the center of the solar inverter at 1m above the floor.

## 12.3 Protective Devices

AC short-circuit current capability	Current control
Max. permissible fuse protection (Overcurrent Protection device)	45 A
Ground-fault monitoring	Insulation monitoring: R iso > 200 kΩ

## 12.4 Climatic Conditions

Extended temperature range	−20 to +50°C (−4 to +122°F)
Extended humidity range	0 to 90%
Extended air pressure range	79.5 to 106 kPa (11.5 to 15.4 psi)

## 12.5 Equipment

DC connection	Terminals Fuse holders have terminals for wire sizes #14 AWG to #6 AWG
Trade size of conduit for DC input wires	1-1/4"
AC connection	Screw terminals Wire sizes #6AWG to #4 AWG
Trade size of conduit for AC output and ground wires	1-1/4"
Trade size of conduit for communication wires	1"

## 12.6 Torques

Screw for grounding	2.9 N·m (2.1 lb·ft)
Screw terminal for communication Connection	0.235 N·m (0.173 lb·ft)

# 13 TABUCHI ELECTRIC Service Line

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For technical problems concerning our products, contact the TABUCHI ELECTRIC Service Line.

**Please provide the following information in order to receive proper assistance:**

- Inverter device type
- Inverter serial number
- Inverter firmware version
- Special country-specific settings of the inverter (if applicable)
- Type and number of PV modules connected
- Mounting location and mounting altitude of the inverter
- Event code and error message of the inverter
- Optional equipment, e.g. communication products

# MEMO

[illegible]

