

For Installer Company Use

For Maintenance and Inspection Use

**TABUCHI
ELECTRIC**

Model

TPD-T250P6-US

Three-phase Inverter Unit

Installation Manual

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

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

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Important Safety Instructions

SAVE THESE INSTRUCTIONS!



This manual contains important instructions for the TPD-T250P6-US, therefore follow these instructions 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>Dangerous Voltage Warning</p> <p>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>CAUTION: Hot Surface</p> <p>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

- TPD-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. The installer has the responsibility for System grounding, as required by Sections 690.41 - 690.43 of the National Electric Code ANSI/NFPA 70

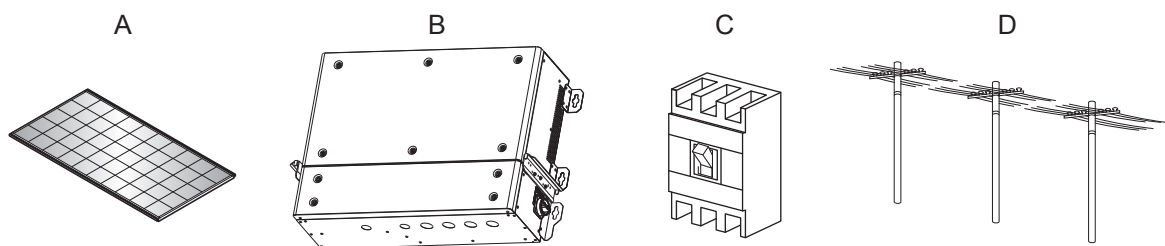
The inverter should only be connected to a dedicated branch circuit.

For models that do not include AC output overcurrent protection, the end user should 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 EneTelus TPD-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 specified in Section 690.35 of the National Electrical Code® ANSI/NFPA 70.

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 the ground may only be used if their coupling capacity does not exceed 3.5 μF .

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

- The AC output/neutral is not bonded to the 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°C (-4°F) or above $+60^{\circ}\text{C}$ ($+140^{\circ}\text{F}$). (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.

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 applied to 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. Due to contact with live components, they may cause death or serious injury.

- Ensure that there is no voltage 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 hot enough to cause burns when touched.

- Mount the inverter so that it cannot be touched accidentally.
- Do not touch hot surfaces.
- Wait 30 minutes until the surface is cooled 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%.

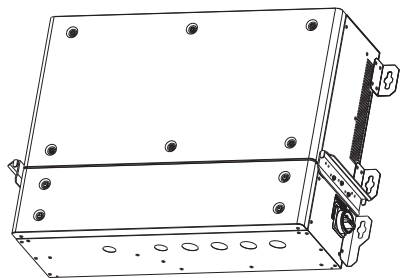
DANGER Risk of death or serious injury due to operating damaged equipment.

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

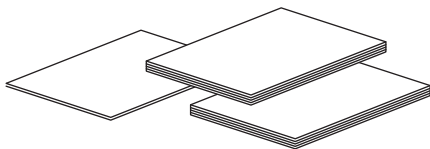
- Only operate the inverter when it is fully functional.
- Regularly check the inverter for visible damage.
- Ensure that all safety equipment is freely accessible at all times.

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.



A



B, C, D

Components included in the scope of delivery are as follows.

Item	Quantity	Designation
A	1	Inverter Unit
B	1	Installation Manual (English)
C	1	Installation Manual (French)
D	1	Production Test Report

4 Product Description

4.1 Inverter

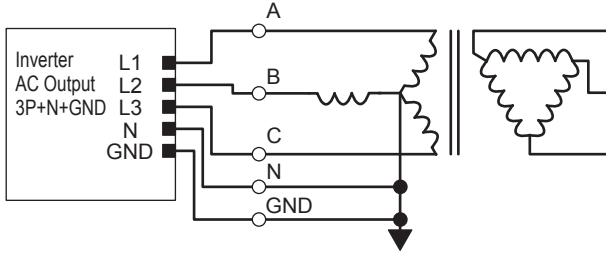
The TPD-T250P6-US is a transformerless PV inverter with 6 MPP trackers which converts the direct current of the PV array to grid-compliant three-phase current and feeds it into the utility grid.

This inverter can be connected to six PV strings.

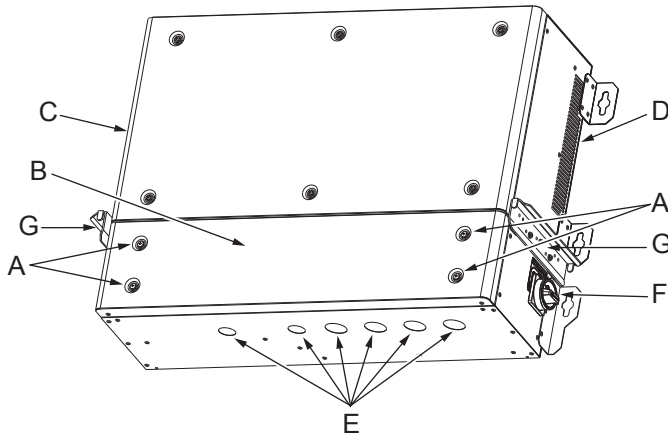
This inverter is equipped with a DC Switch-disconnector that serves as a DC disconnection unit.

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 the 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	Screws
B	Front Enclosure Lid
C	Type Label
D	Ventilation Net
E	Knockout Holes
F	DC Switch-disconnector
G	Handle

4.2 Type Label and Additional Label


TABUCHI ELECTRIC

Product name Utility Interactive
 Transformerless Inverter
 Model number TPD-T250P6-US
 Manufacturer TABUCHI ELECTRIC CO.,LTD.

DC RATING	
Max. input voltage	1000V
MPPT voltage range	500V to 800V
Max. input operating current	10A×6

AC RATING	
Power factor	>0.99
Rated AC voltage	480V (277V WYE)
Nominal AC voltage range	422.4V to 528V
Rated grid frequency	60Hz
Operating frequency range	59.5Hz to 60.5Hz
Max. output current	35A
Rated output power at 480V,60Hz	25000W
Max. output fault current	104A

Operating temperature range	-20°C to +60°C (-4°F to +140°F) Rated output until +40°C (+104°F)
Enclosure rating	Type 3
This device complies with part 15 of the FCC rules	





Intertek
5001828

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

Conforms to
UL STD.1699B and 1741
Certified to
CSA STD.C22.2 No.107.1-01

MADE IN THAILAND
No.DS1518-6001AT

⚠ 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.

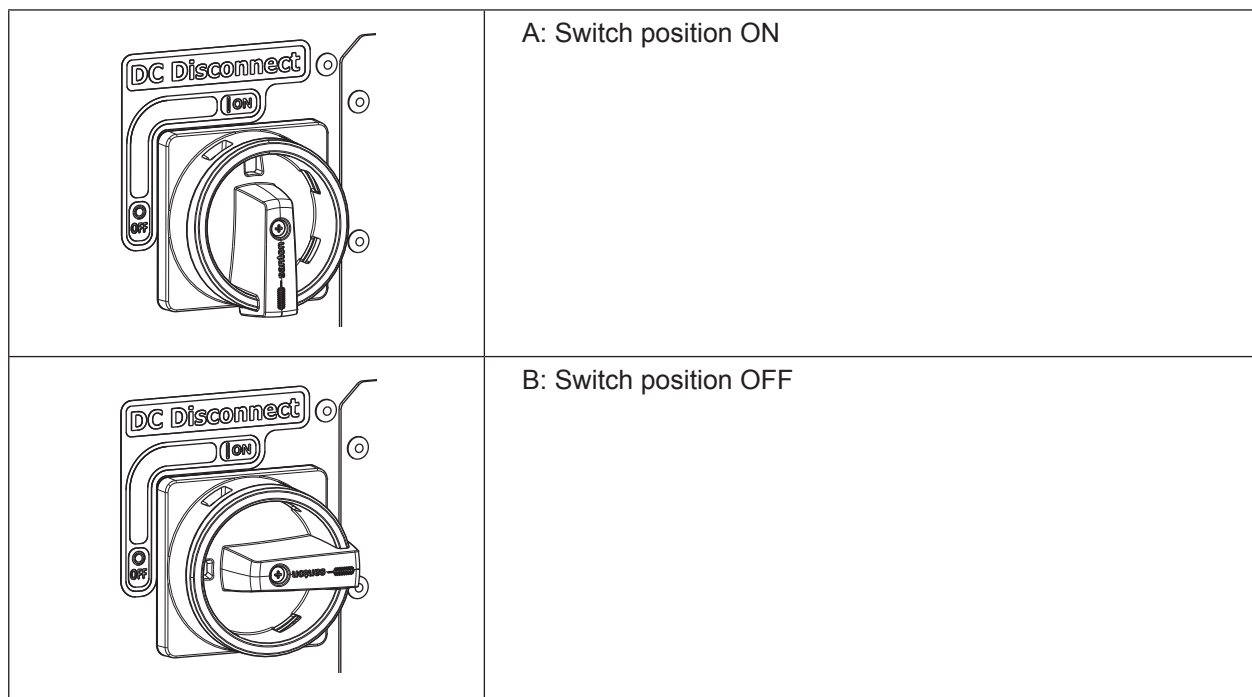
For customer support assistance from the TABUCHI ELECTRIC Service Line, the type label must remain permanently attached to the inverter.

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 disconnections are generated at all poles.



4.4 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 the test, 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.

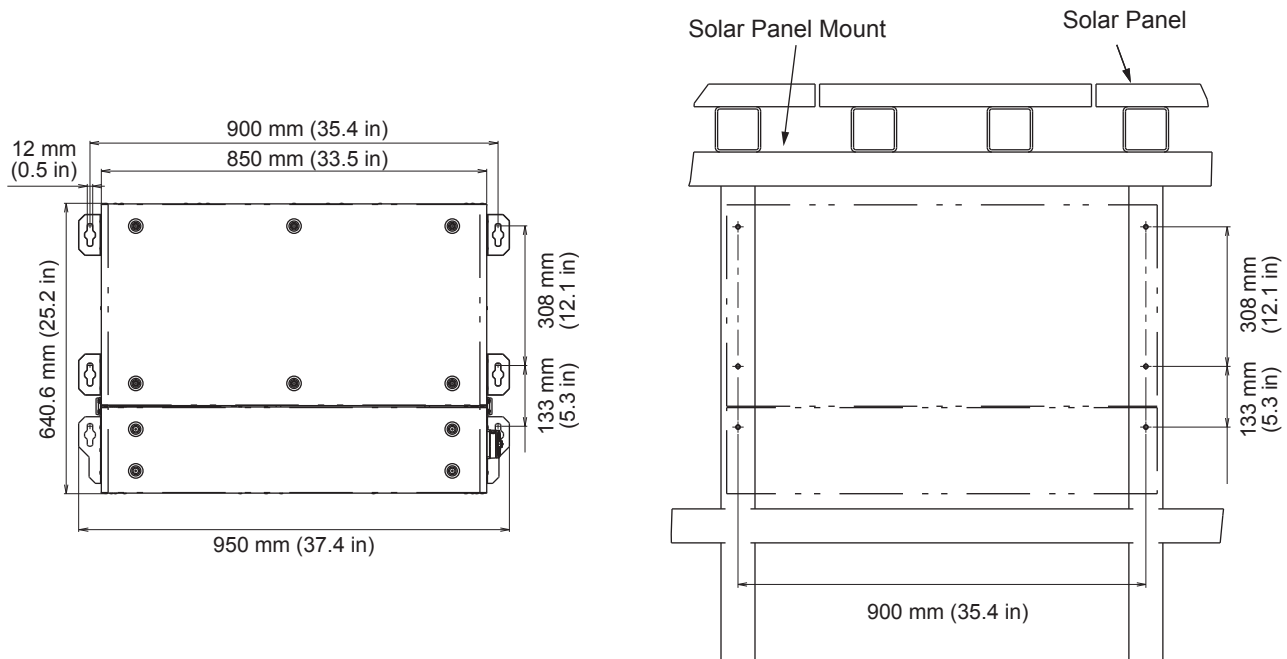
The ambient temperature must be between -20°C (-4°F) and $+60^{\circ}\text{C}$ ($+140^{\circ}\text{F}$) to ensure optimal operation of the inverter.

- 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 ($\leq 50 \text{ dB(A) } 1 \text{ m (39 in)}^{\ast 1}$) (for reference) from the inverter, do not install in rooms where people or animals reside.
- Do not install in places where there may be flammable gases or substances.

^{$\ast 1$} 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:

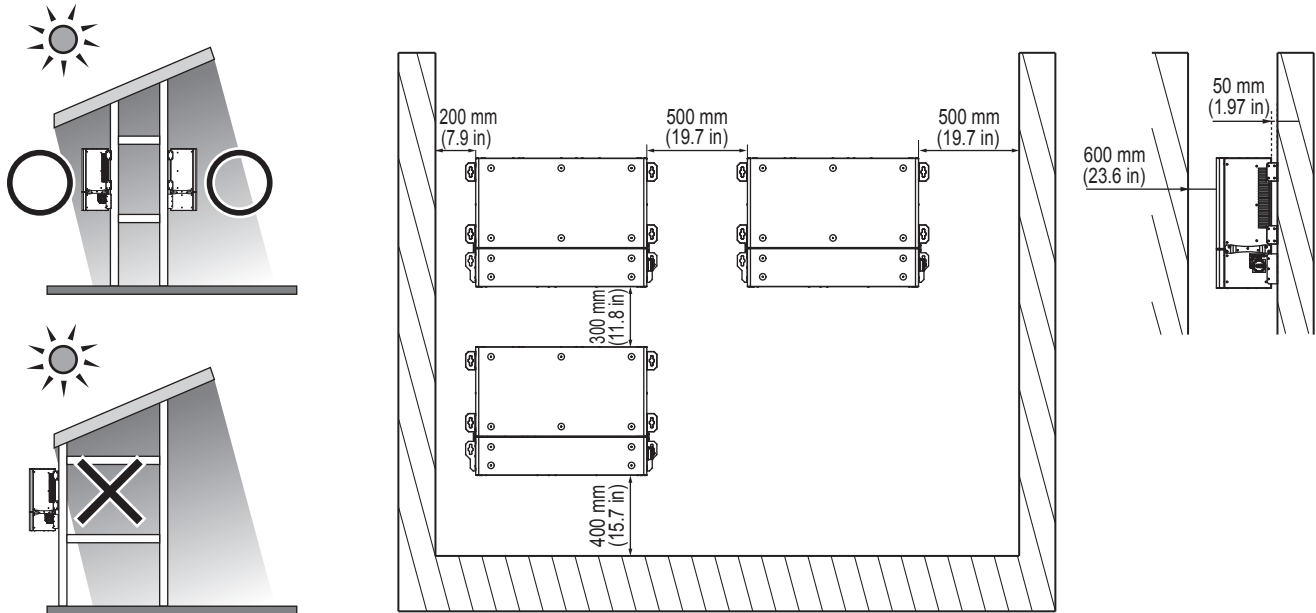
When choosing the location and position for the installation, adhere to the following conditions:

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

Be sure to secure the recommended clearance of the figure below.

This will allow for sufficient heat dissipation.

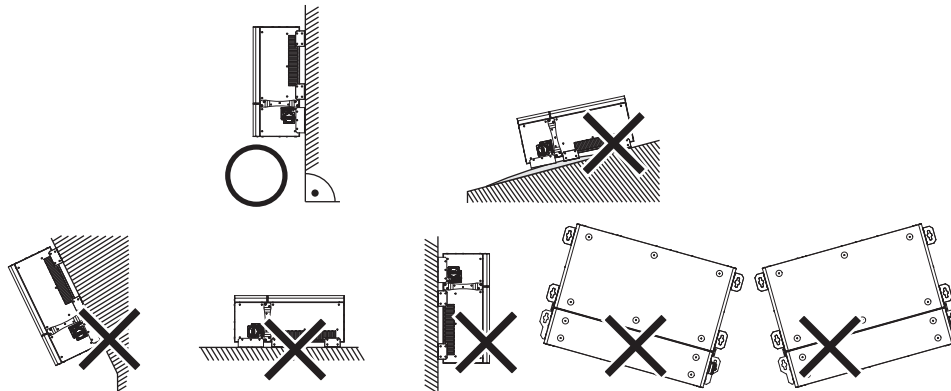
If multiple inverters are mounted in areas with high ambient temperatures, increase the clearance between the inverters and ensure sufficient ventilation. This will prevent a reduction in the amount of output power due to excessive temperatures.



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.



Permitted and prohibited mounting positions

5.2 Mounting the Inverter

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

- At least 6 screws that are suitable for the foundation.
- At least 6 washers that are suitable for the screws.
- At least 6 screw anchors that are suitable for the support surface and the screws.

CAUTION

Risk of injury when the inverter is lifted 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 it is attached or removed.

CAUTION

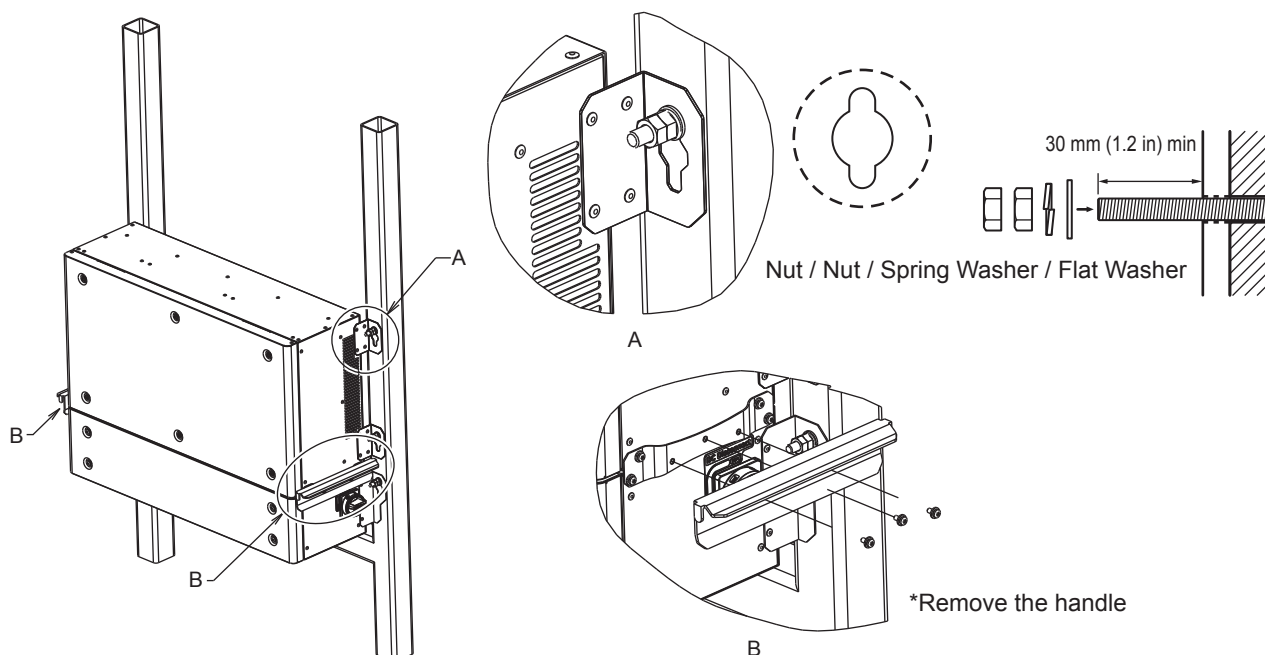
Risk of serious burn injuries from hot surfaces.

The inverter can heat up during operation.

- Mount the inverter to avoid touching accidentally during operation.

Procedure:

1. Drill six holes for the M10 (7/16 in) anchor bolt in the stand.
2. Put the M10 (7/16 in) anchor bolt into each hole.
3. Secure the M10 (7/16 in) anchor bolt horizontally using the nuts and washers.
4. Hook the inverter on the M10 (7/16 in) anchor bolt.
5. Carefully secure the main housing of the inverter into the M10 (7/16 in) anchor bolt.
6. Fix with a flat washer, spring washer, and double nut.
7. Confirm that the inverter is securely in place.
8. After the work is completed, remove the handles.



6 Electrical Connection

6.1 Safety during Electrical Connection

DANGER

Risk of electric shock while the inverter is in operation.

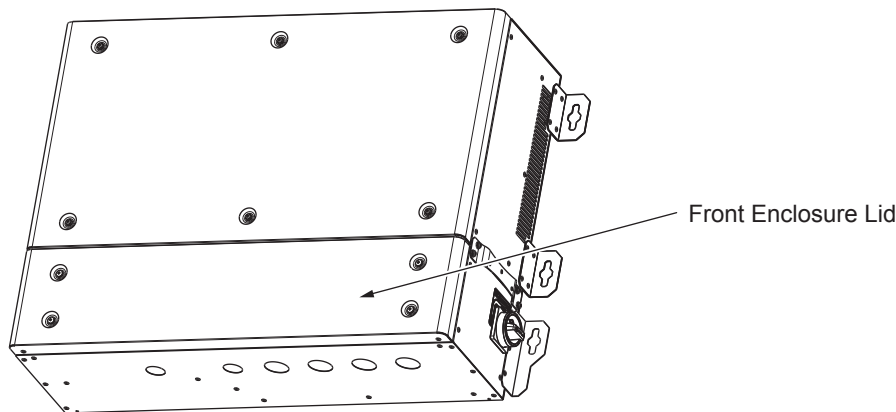
High voltage levels are applied to the inverter and its components. Death or serious injury may result from touching live components.

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. **Remove the front four screws of the Front Enclosure Lid.**
4. **Remove the Front Enclosure Lid.**



5. **Use a suitable measuring device to confirm that no voltage is present at the DC terminals.**
6. **Use a suitable measuring device to confirm that 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 applied, and 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 that the cables used for electrical connection are not damaged.

WARNING

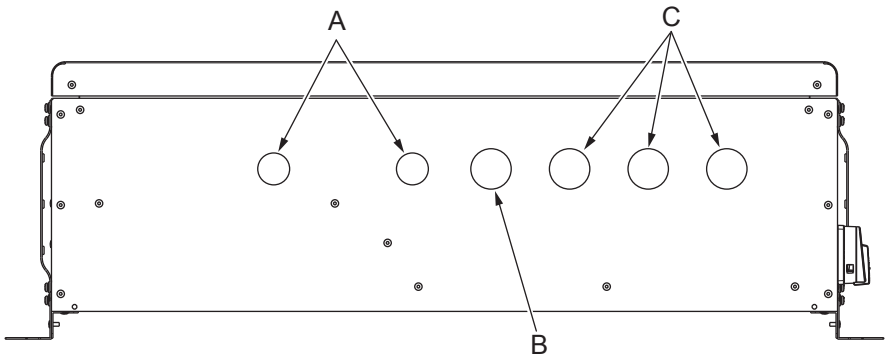
If a PV system using this inverter in North America is installed, verify that the selected PV module is listed for use in 1000Vdc systems in accordance with local electrical codes.

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.

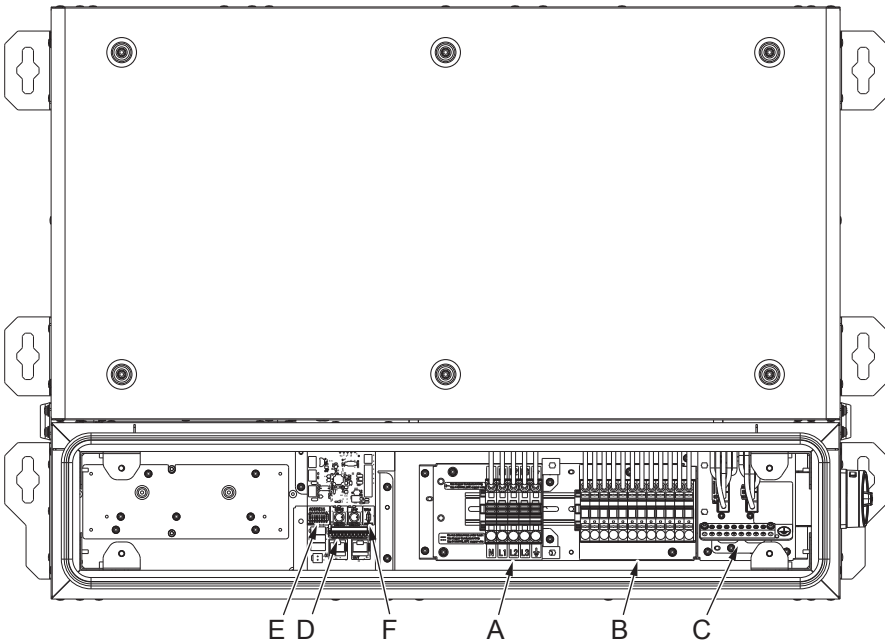
6.2 Overview of the Connection Area

6.2.1 View from Below



Item	Designation
A	Knockout Holes for Communication Connection (Diameter: 34.5 mm to 34.7 mm (1.36 in to 1.37 in))
B	Knockout Hole for AC Connection (Diameter: 43.7 mm to 43.9 mm (1.72 in to 1.73 in))
C	Knockout Hole for DC Connection (Diameter: 43.7 mm to 43.9 mm (1.72 in to 1.73 in))

6.2.2 Internal View (front side)



Item	Designation
A	Terminal Block for AC Connection, Equipment, Grounding (Screwless)
B	Terminal Block for DC Connection (Screwless)
C	Grounding Electrode Conductor
D	Terminal Block for Signal Connection
E	To address Switch SW5001
F	Switch of Terminal Resistance for RS-485 Communication SW5002

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 3 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 that all devices connected to the inverter are switched off and cannot be reconnected to the inverter (see the manual for the respective device).

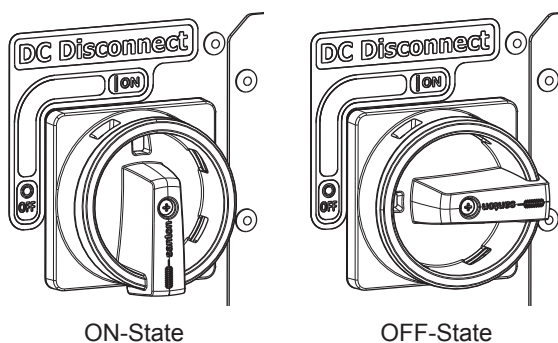
2. **WARNING** Moisture ingress may damage the inverter.

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

- Do not enlarge enclosure openings.

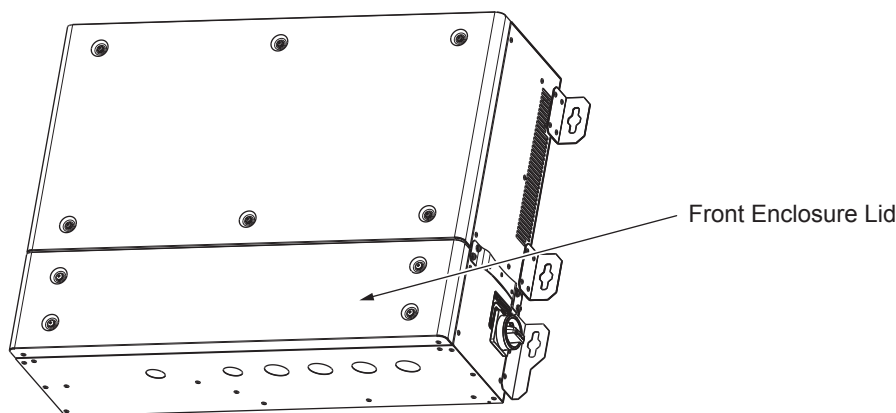
3. **Switch the DC Switch-disconnector to OFF.**

Turn the DC Switch-disconnector counterclockwise by 90°.



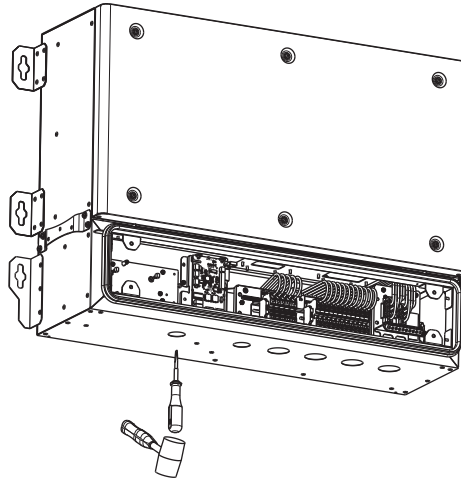
4. **Disassemble the front enclosure lid.**

Remove the front four screws of the Front Enclosure Lid.
Remove the Front Enclosure Lid.



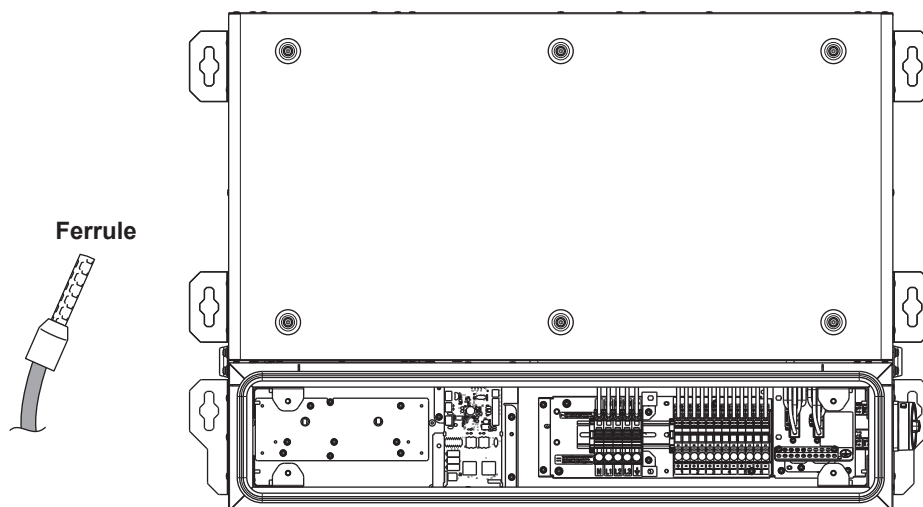
5. Open the knockout holes on the bottom of the inverter.

- Punch the knockout hole of the bottom.
- If the conduit is smaller than the knockout through, please use rigid conduit reducing washer.



- 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.**

6.4 AC Connection



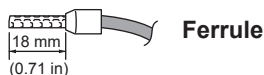
6.4.1 AC Connection Requirements

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

- ☐ 1 plastic threaded plug
- ☐ 1 UL-listed rain-tight conduit fitting for wet locations complying with UL514B: UL-listed type 3
- ☐ Ferrule (For stranded wires, a suitable UL listed wire ferrule must be used.)

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.
 - * For stranded wires, a suitable UL listed wire ferrule must be used.



- ☐ 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 applied at the corresponding cable after disconnection.
- ☐ Loads installed between the inverter and the circuit breaker must be fused separately.
- ☐ The overcurrent protection for the AC output circuit is to be provided by others.

6.4.2 Connecting the Inverter to the Utility Grid

Requirements:

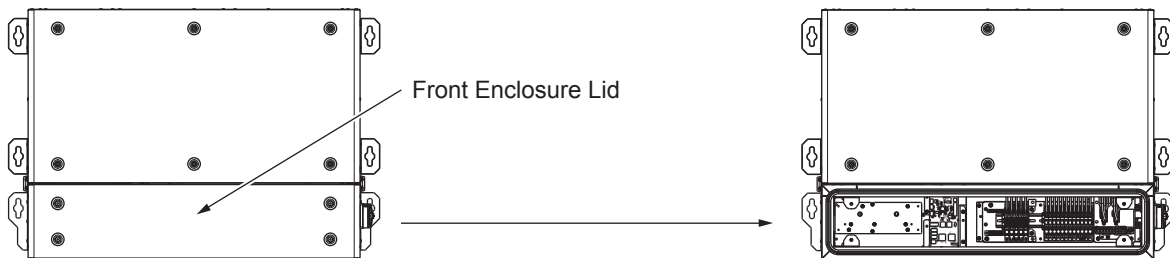
- All electrical installations must be carried out in accordance with the local standards and the National Electrical Code® ANSI/NFPA 70 or the Canadian Electrical Code® CSA C22.1.
- The DC input and AC output circuits are isolated from the enclosure and the system grounding, if required by Section 250 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:

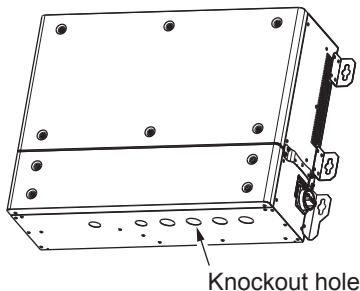
Type	Typical installations use a 3-pole/600V rated bi-directional thermal-magnetic circuit breaker, UL489 or equivalent.
Current/ Voltage	45A/600V

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. **Using a phillips screwdriver to remove the Front Enclosure Lid.**



3. **Open the knockout hole on the bottom of the inverter for the AC connection.**



4. **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.

5. Insert the conduit fitting into the opening and tighten from the inside using the counter nut.

6. Attach the conduit to the enclosure opening.

7. Attach the ferrule to the AC cable. (For stranded wires, a suitable UL listed wire ferrule must be used.)

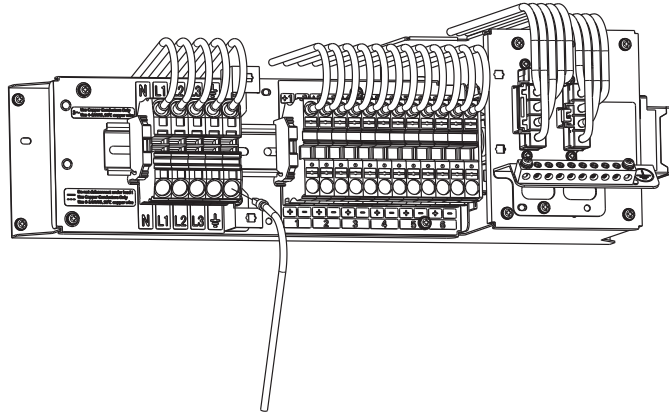
8. Insert the AC cable through the conduit into the inverter.

9. **DANGER – FIRE HAZARD** Connecting two conductors to one terminal is a fire hazard.

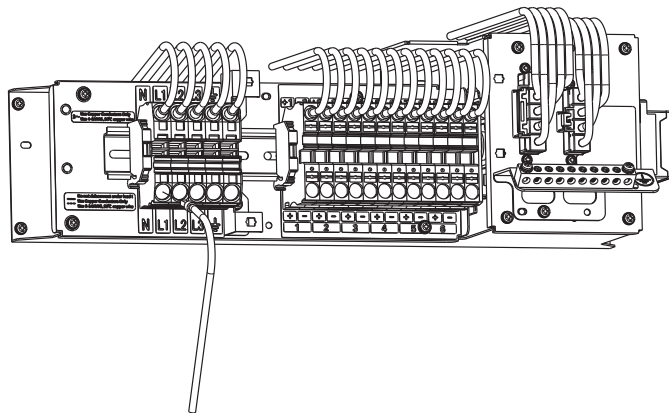
Connecting two conductors to one terminal may cause a fire to occur due to a bad electrical connection.

- Never connect more than one conductor per terminal.

10. Connect the equipment grounding conductor to the terminal \oplus .

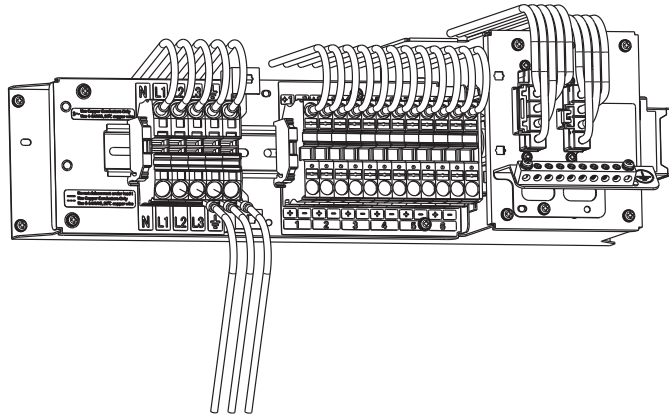


11. Connect Conductor N to Terminal N.



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

Confirm that the conductors are connected to the proper terminals.

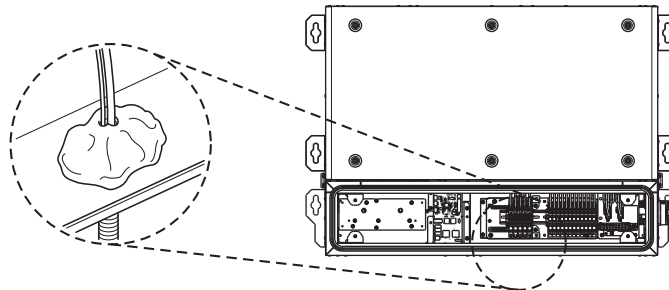


13. Confirm that the conductors are connected to all the proper terminals.

14. Confirm that all the conductors are tightly connected.

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”.

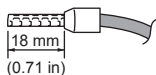
“3. [Sys/Set Value] Set MODE” - “Parameter Setting”

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

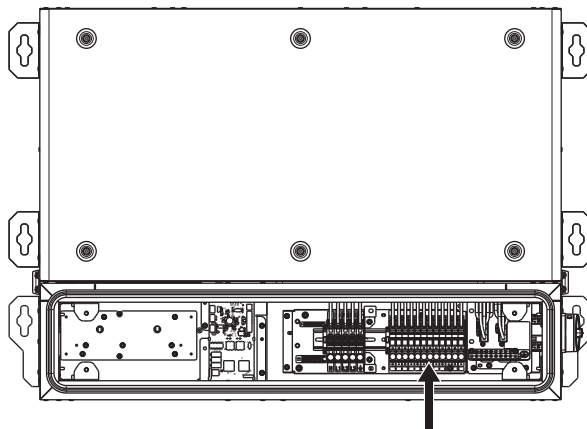
- Depending on the number of strings, One or Two plastic threaded plugs.
- Depending on the number of conduits, One or two UL listed rain-tight conduit fittings for wet locations complying with UL514B: UL-listed type 3.
- For closing unused enclosure openings: UL-listed type 3 filler plugs.

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. The installer should have the responsibility of the system grounding, if required by Section 250 of the National Electrical Code® ANSI/NFPA 70.
- The maximum cable length, which is dependent on the conductor cross-section, must be adhered to.
- Cable type: Copper wire
- Conductor cross-section: 14 AWG to 6 AWG
- DC cable must be made of solid wire or stranded wires.
 - * For stranded wires, a suitable UL listed wire ferrule must be used.



Ferrule



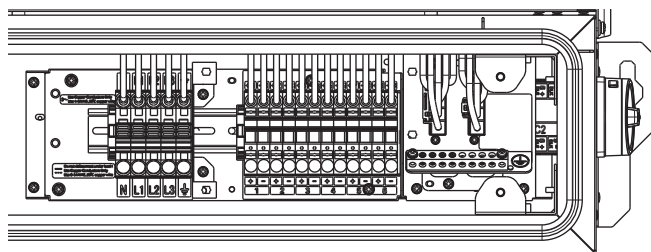
6.5.2 Connecting the PV Array

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.
- Open safety levers all the way.

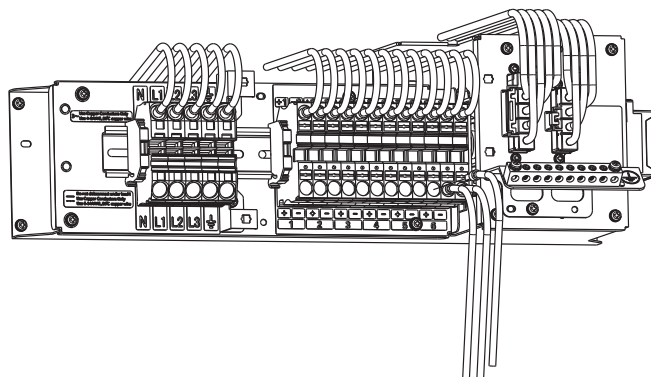


3. Insert one conduit fitting for each string into the opening and tighten from the inside using the counter nut.
4. Attach the conduit to the enclosure opening.
5. Lead the DC cables of the PV array through the connected conduits into the interior of the inverter.
6. Check the positive DC cables for correct polarity.

Peel back the sheath of DC cables about 18 mm (0.71 in)

Connect Conductors sign (+) to Terminals sign (+) according to the label.

Confirm that the conductors are connected to the proper terminals.



7. Check the negative DC cables for correct polarity.

Peel back the sheath of DC cables about 18 mm (0.71 in)

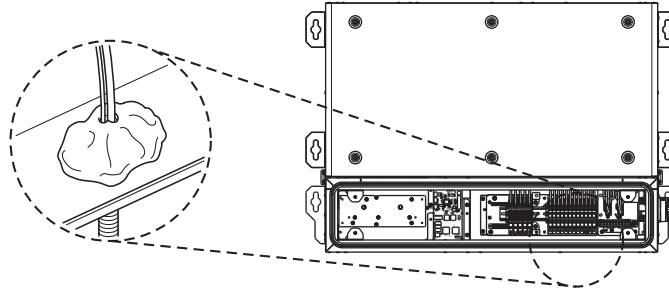
Connect Conductors sign (-) to Terminals sign (-) according to the label.

Confirm that the conductors are connected to the proper terminals.

8. Ensure that all conductors are securely in place and cannot be detached when pulled.

9. Close unused enclosure openings with UL-listed type 3 filler plugs.

10. Fill the inside of the wiring opening with putty.

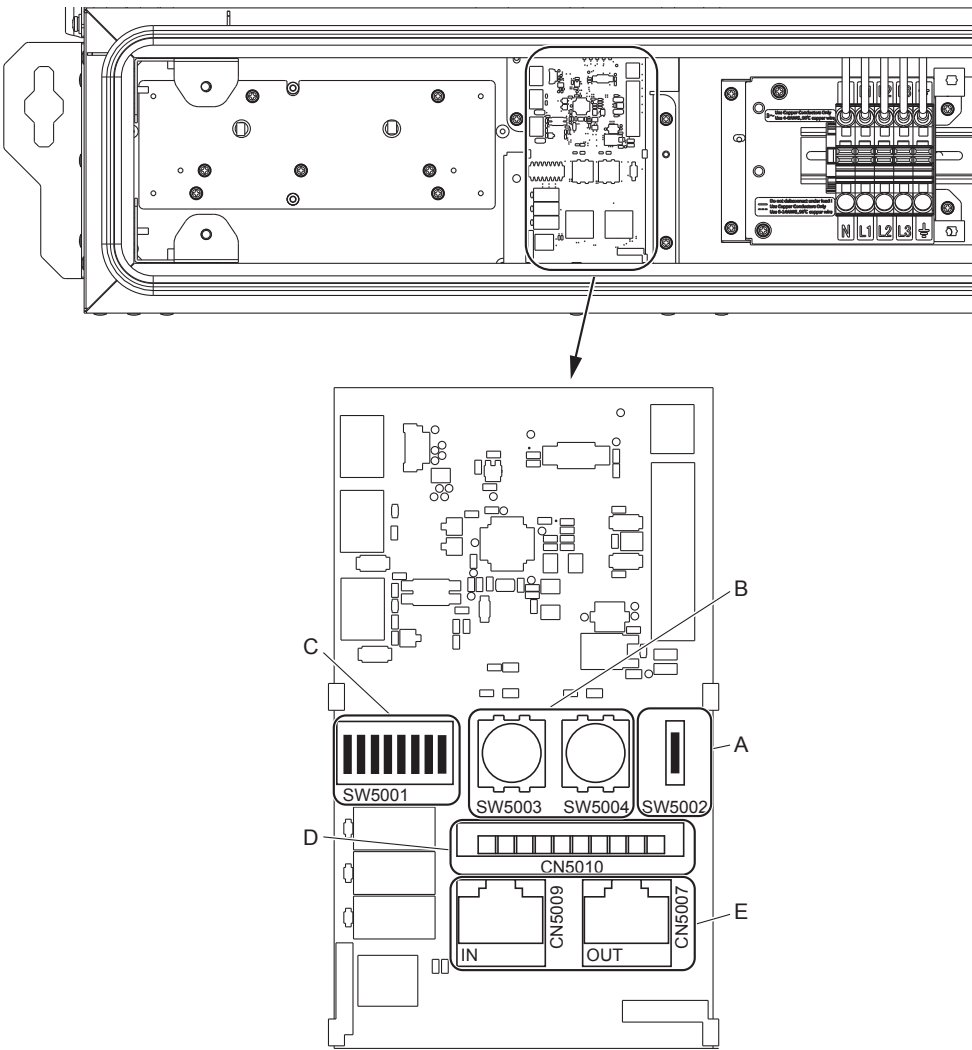


6.6 Communication Connection

Requirements

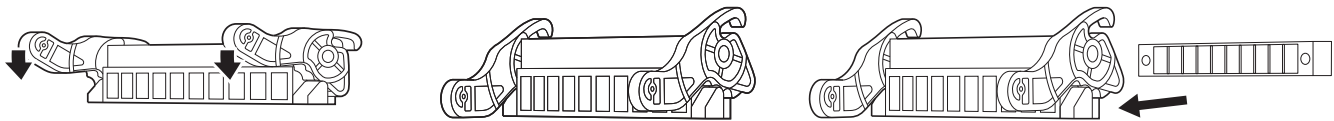
Additionally Required Materials (not included in the scope of delivery):

- 1 Plastic threaded plugs
- 1 UL-listed rain-tight conduit fitting for wet locations complying with UL514B : UL-listed type 3



Item	Loc	Designation
A	SW5002	Terminal Resistance
B	SW5003,SW5004	Debug Switch (Not available for customer use)
C	SW5001	To address Switch
D	CN5010	RS-485 and External Communication Terminal A
E	CN5007,CN5009	RS-485 and External Communication Terminal B

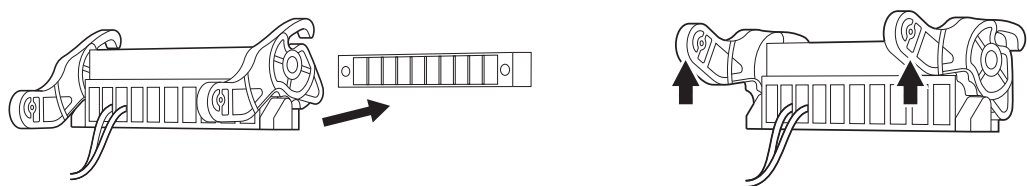
Disconnecting the plug:



Press down the orange lever for CN5010
Disconnect plug CN5010

Connect the communication signal wires, to the plug for CN5010, according to the following CN5010 descriptions. Use a minus screw-driver to connect the wires.

Inserting the plug:



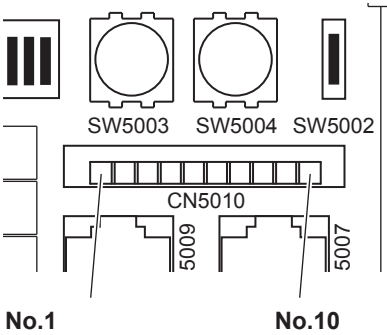
The plug has three positions of the lever. Pull up the orange lever at the position of the middle. Then, insert the plug.

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.

CN5010

No.	Descriptions	
1	OVGR_IN (REMOTE_IN)	A(+)
2		B(-)
3	STATE_A	A
4		COM
5	STATE_B	A
6		COM
7	RS-485	A
8		B
9		GND
10	N.C	-



Serial Communication (RS-485)

There are RS-485 communication lines on the inverter.
Connect communication port by using the terminal block (CN5010).

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).



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 the 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 the 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 pairs

Conductor size: 24 AWG or 16 AWG

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:

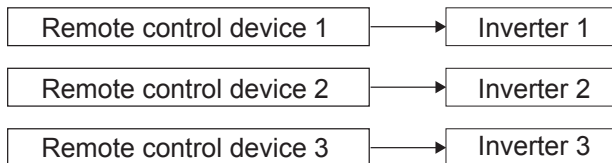
Do not use the parallel connection to the remote terminal of the other inverter.

Example:A

Dry contact

* Please prepare one for one.

* If you control some inverters with one remote control device, refer to the example B.

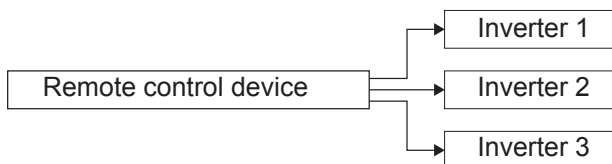


Example:B

Dry contact (In the case of 3 parallel)

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

Only use TPD-T250P6-US.



Cable Requirements:

Conductor size: 24 AWG to 16 AWG

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:

AC: Maximum Voltage: 125 Vac, Maximum Current: 0.5 A

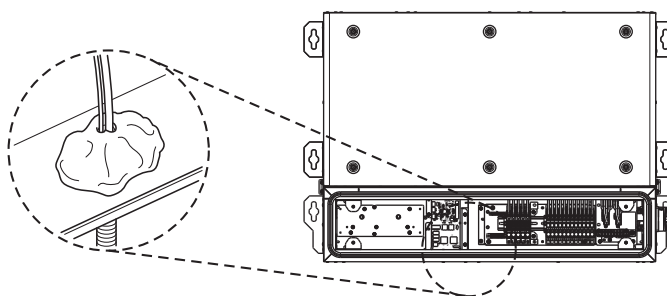
DC: Maximum Voltage: 30 Vdc, Maximum Current: 2.0 A

Cable Requirements:

Conductor size: 24 AWG to 16 AWG

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 CN5010:
 - 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 SW5002 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:

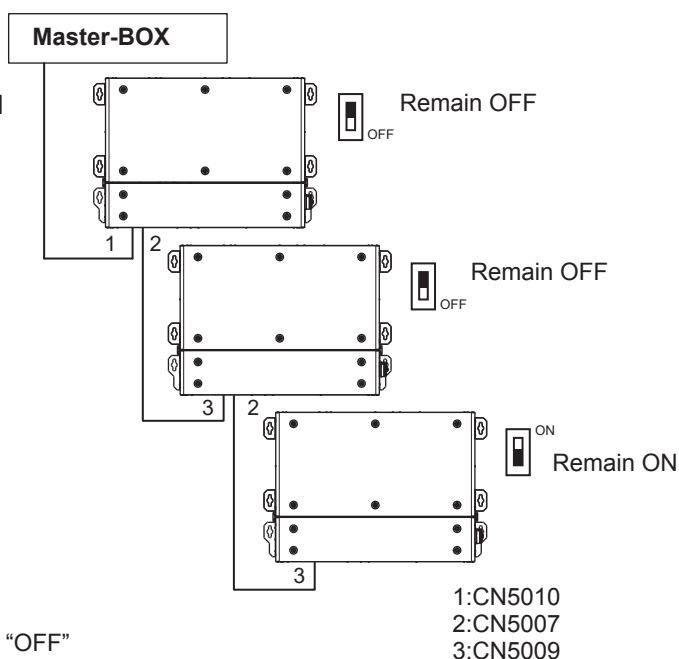
Terminal block CN5007 and CN5009 are internally paralleled to allow connection in a daisy chain configuration. Using the appropriate cable designed for use with RS-485 communications, connect all the RS-485 lines in series according to the daisy chain cabling method ENTER-EXIT.

For the last inverter in the daisy chain, or for a single inverter, activate the terminal resistance of the communication line by moving switch **SW5002** 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"



SW5002

⇒ RS485 Terminal
Resistance setting

Dip SW "OFF"

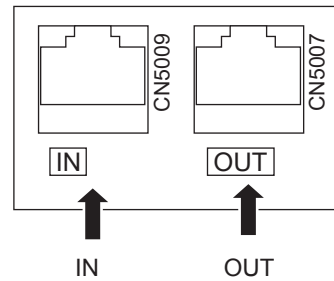


SW5002

⇒ RS485 relay setting
(Default Setting)

CN5007

No.	Descriptions		
OUT	1	OVGR_OUT (REMOTE_OUT)	A
	2		B
	3	SYNC_OUT	A
	4		B
	5	RS-485	A
	6		B
	7		GND
	8	N.C	-



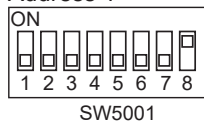
CN5009

No.	Descriptions		
IN	1	OVGR_IN (REMOTE_IN)	A
	2		B
	3	SYNC_IN	A
	4		B
	5	RS-485	A
	6		B
	7		GND
	8	N.C	-

Address Setting for Communication

<Relationship between addresses and Dip SW>

(Example)
Address 1



SW5001


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

← (Default Setting)

Set Pin#1,Pin#2,Pin#3 OFF

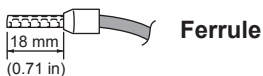
6.7 Additional Grounding of the Enclosure

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: (6 AWG to 4 AWG)
- The cable must be made of solid wire or stranded wires.
 - * For stranded wires, a suitable UL listed wire ferrule must be used.

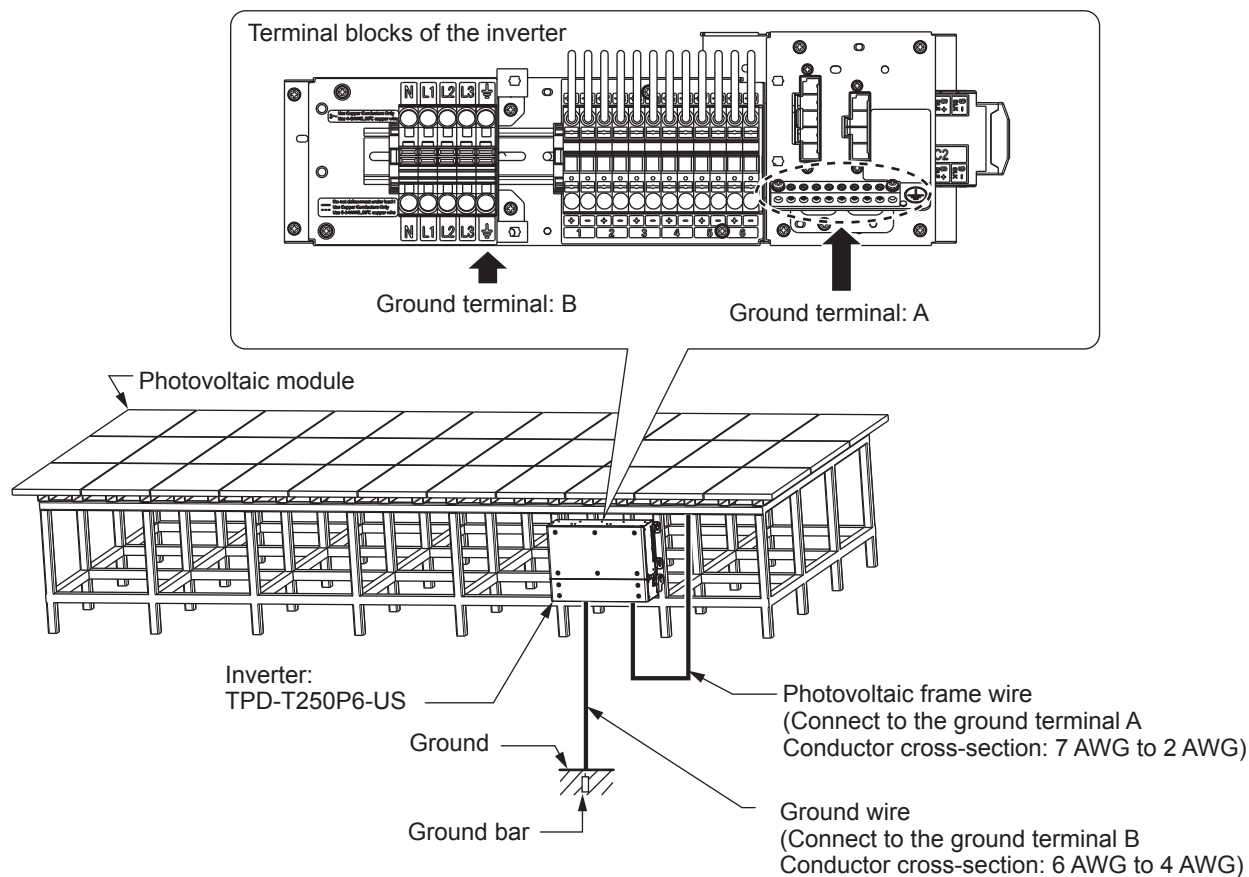


Requirement:

- The conduits must be correctly connected to the inverter.

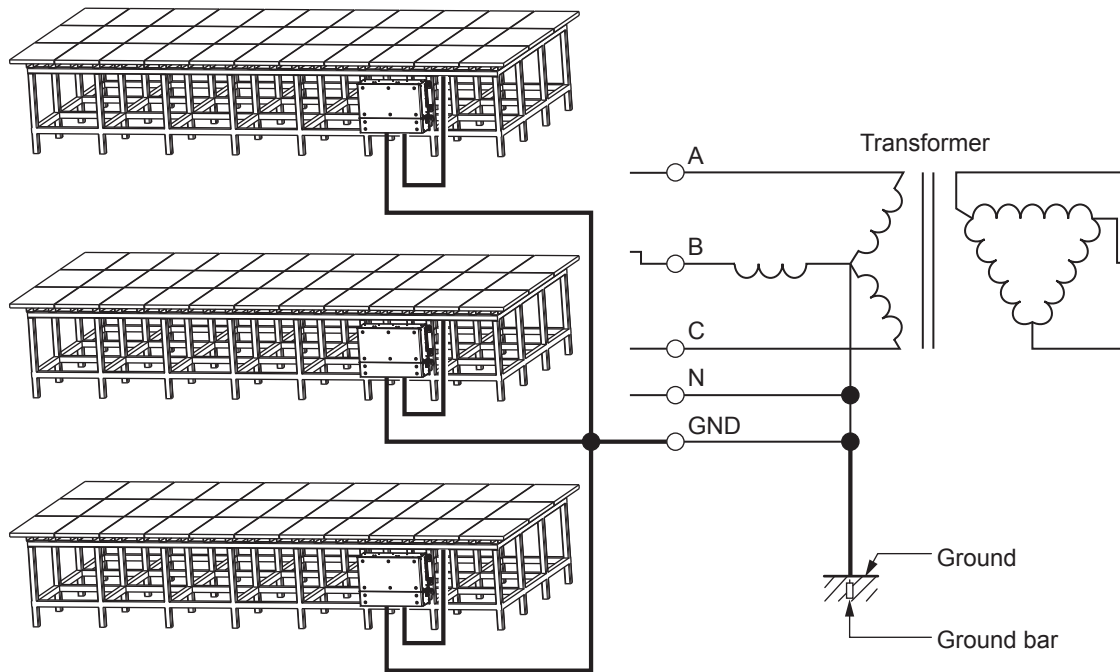
Important points for the ground work:

1. Please connect the photovoltaic frame wire to the ground terminal A of the inverter.
And, connect the ground terminal B 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 length of ground wire connecting between the transformer and the each inverter should be the shortest.



Recommendations:

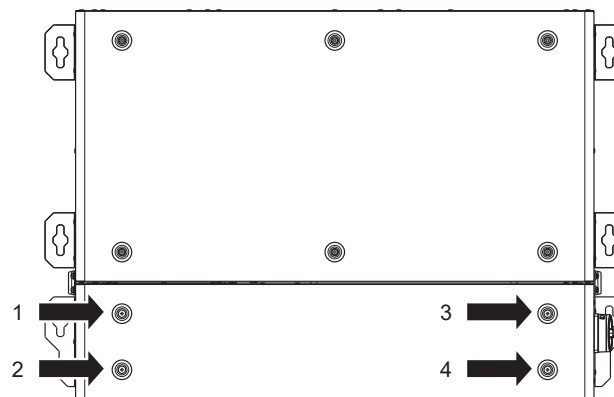
Make sure that the length of ground wire connecting between the transformer and the each inverter is the shortest.

6.8 Closing the Front Enclosure Lid

After finishing electrical connection, please close the front enclosure lid from above.

Insert the 4 screws and give them a few turns. Then tighten the screws, following the order and torque shown.

Torque 1.95 N·m (1.44 lb·ft)



7 Commissioning

Requirements:

- ☐ The circuit breaker must be correctly rated.
- ☐ There must be a means of disconnecting the inverter from the PV array.
- ☐ 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 3 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 only)**

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

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

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.**

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 exceeding 200 VDC (string voltage) of power is available.

The inverter will be shut down when the DC voltage falls below 190 VDC.

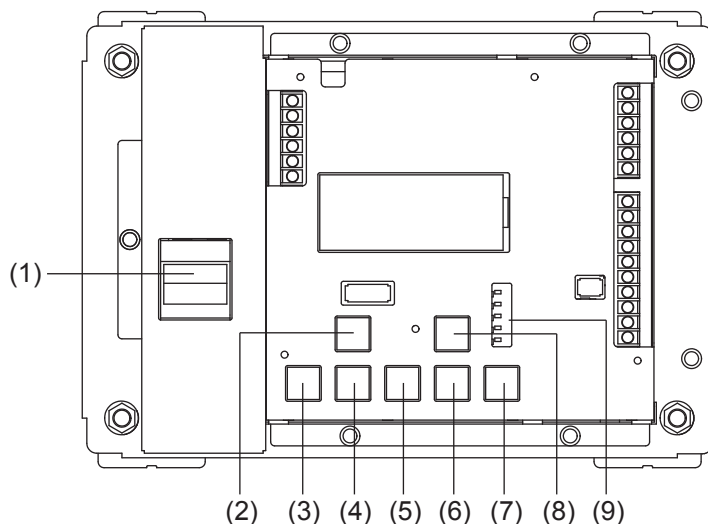
Turning Off the Inverter

1. Press the “START/STOP” button of the Master-BOX.
2. Confirm that the inverter stops.
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

- Master-BOX



Ref. No	Name	Description
(1)	Power SW	To start the Master Box
(2)	START/STOP Button	To operate the connected Inverter starts/stops
(3)	MODE Button	To switch the displayed modes
(4)	UP Button	To display and change the monitoring power-generating-status, System information, and each setting
(5)	DOWN Button	
(6)	BACK Button	
(7)	ENTER Button	
(8)	RE-START Button	To recover manually when a system abnormally 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

“Power Factor” 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>

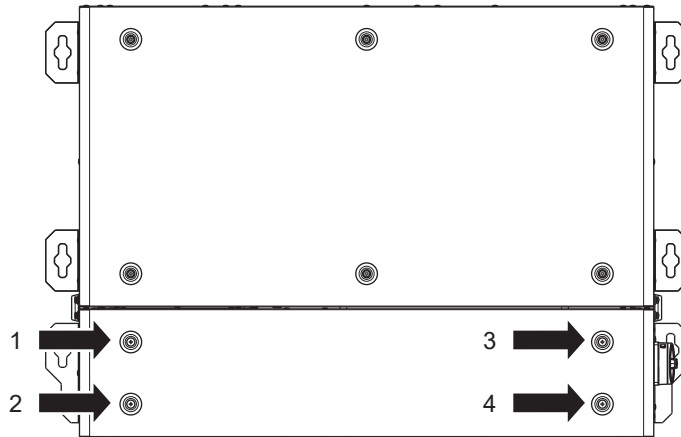
No.	Item	Numerical Range	Initial Value	Step Width
1	Over voltage 1 level	277 ~ 333[V]	333[V]	1
2	Over voltage 1 trip Time	0.10 ~ 0.16[s]	0.16[s]	0.01
3	Over voltage 2 level	277 ~ 333[V]	305[V]	1
4	Over voltage 2 trip Time	1 ~ 13[s]	1[s]	1
5	Under voltage 1 level	125 ~ 277[V]	125[V]	1
6	Under voltage 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]	2[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 that it cannot be reconnected.
 - Disconnect the inverter from the PV array and confirm that it cannot be reconnected.
2. Wait 15 minutes after disconnecting the inverter from the utility grid and the PV array.
3. Release the 4 screws of the front enclosure lid.



4. Remove the front enclosure lid.
5. Use a suitable measuring device to confirm that no voltage is present at the DC terminals.
6. Use a suitable measuring device to confirm that 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.

ERROR RED LED indicates that the inverter has detected abnormally.

Please press the “RE-START” button of the Master-BOX, as necessary, then inverter restarts.

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	Overvoltage at DC input This error may cause inverter fault. Corrective measures: <ol style="list-style-type: none"> 1. IMMEDIATELY DISCONNECT THE INVERTER from all voltage sources. 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 contacted the PV array installer. 3. If this message is repeated frequently, contact the TABUCHI ELECTRIC Service Line.
D-14 D-24 D-34 D-44 D-54 D-64	Over Temperature at DC input The inverter has detected over temperature at DC input. Corrective measures: <ol style="list-style-type: none"> 1. Confirm that the inverter has sufficient ventilation.
D-15 D-25 D-35 D-45 D-55 D-65	Circuit Fault The inverter has detected circuit fault of temperature sensor. Corrective measures: <ol style="list-style-type: none"> 1. If the inverter dose not restart automatically, contact the TABUCHI ELECTRIC Service Line.
D-16 D-26 D-36 D-46 D-56 D-66	Over Current at DC input The inverter has detected over-current. Corrective measures: <ol style="list-style-type: none"> 1. The inverter will restart automatically. 2. If this message is displayed frequently, confirm that the PV array is rated and wired correctly.
D-19	DC arc fault The inverter has detected an electric arc. The inverter interrupts grid feed-in and cannot connect to the utility grid. Corrective measures: Refer “10.3 Resetting the Operation Inhibition after Detection of an Arc Fault”.

Event Codes	Cause, and Corrective Measures
D-18	Circuit Fault The inverter has detected circuit fault of DC arc sensor. Corrective measures: <ol style="list-style-type: none"> 1. The inverter will restart once the fault is cleared with Master-Box “RE-START” button. 2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.
E-01 E-05	Auto Recovery The inverter corresponds to the abrupt change in the solar panel output. Corrective measures: <ol style="list-style-type: none"> 1. Observe for 10 minutes and see whether the message clears automatically. 2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line. Under voltage at DC input The inverter is waiting for sunshine. Corrective measures: <ol style="list-style-type: none"> 1. If this code is displayed frequently during sunshine, confirm that the PV array has been correctly rated and wired.
E-03	Circuit Fault The inverter has detected circuit fault inside the inveter. Corrective measures: <ol style="list-style-type: none"> 1. The inverter will restart once the fault is cleared with Master-Box “RE-START” button. 2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.
E-06 E-07 E-08 E-09	Leakage Current The inverter has detected high leakage current. Corrective measures: <ol style="list-style-type: none"> 1. The inverter will restart automatically.
E-10	Circuit Fault The inverter has detected circuit fault inside the inverter. Corrective measures: <ol style="list-style-type: none"> 1. The inverter will restart once the fault is cleared with Master-Box “RE-START” button. 2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.
E-13	Ground Fault 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. Corrective measures: <ol style="list-style-type: none"> 1. Check the PV system for ground faults.
E-21	Circuit Fault The inverter has detected circuit fault inside the inverter. Corrective measures: <ol style="list-style-type: none"> 1. The inverter will restart once the fault is cleared automatically. 2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.
E-25	Internal FAN Lock The inverter has detected the fan lock. Corrective measures: <ol style="list-style-type: none"> 1. The inverter will restart once the fault is cleared with Master-Box “RE-START” button. 2. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.

Event Codes	Cause, and Corrective Measures
E-41	Remote Stop The inverter is stopped by the remote signal.
E-86	Interference of Communication Operation Communication operation between the inverter and the Master-BOX is unstable. Corrective measures: <ol style="list-style-type: none"> 1. Observe for 10 minutes and see whether the message clears automatically. 2. Confirm that the Communication wiring is not damaged. 3. Confirm that the Communication wiring is correctly connected. 4. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.
E-90 E-93	Data fault Internal data error. Corrective measure: <ol style="list-style-type: none"> 1. If the inverter does not restart automatically, contact the TABUCHI ELECTRIC Service Line.
E-91	Over Temperature The inverter has detected over temperature. Corrective measures: <ol style="list-style-type: none"> 1. Confirm that the inverter has sufficient ventilation.
E-92	Under minimum operating temperature, The inverter will only recommence grid feed-in once the temperature has reached at least -20°C (-4°F). Corrective measure: <ol style="list-style-type: none"> 1. If the inverter does not restart automatically, contact the TABUCHI ELECTRIC Service Line.
E-95 E-96 E-97	Minor issue The inverter has detected minor issue. Corrective measures: <ol style="list-style-type: none"> 1. The inverter will restart automatically. 2. If this message is displayed frequently, contact the TABUCHI ELECTRIC Service Line.
E-98 E-99	Major issue The inverter has detected major issue. Corrective measures: <ol style="list-style-type: none"> 1. Contact the TABUCHI ELECTRIC Service Line.
G-01 G-08 G-20 G-21	Grid Fault Line voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid. Corrective measures: <ol style="list-style-type: none"> 1. Observe for 10 minutes and see whether the message clears automatically. 2. Verify Grid Voltage is within range. 3. Verify proper AC wiring. 4. If the error does not clear, contact the TABUCHI ELECTRIC Service Line.

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

10.2 Checking the PV System for Ground Faults

If the Error Code “E13” is displayed in the Master-BOX, this could indicate a ground fault. The electrical insulation from the PV system to the 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 following 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 the 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 the defective PV modules, cables, or plugs.

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

4. **Press the “RE-START” button.**

10.4 Notes during lightning

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

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

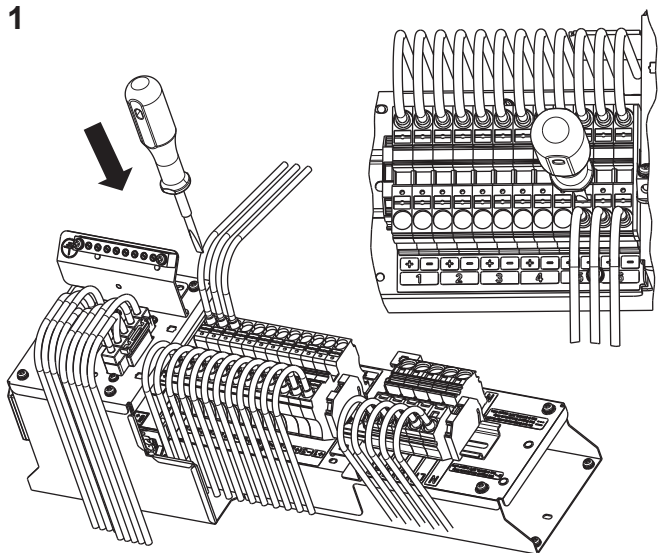
The inverter is heavy (see Section 12 “Technical Data”). Injury may occur if the inverter is lifted incorrectly or dropped while being moved, or when attaching it to or removing it from the wall mounting bracket.

Procedure:

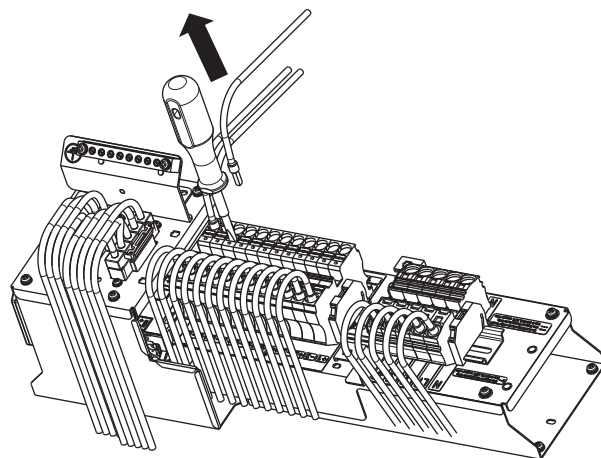
1. **DANGER** Risk of death or serious injury due to electric shock.
 - Disconnect the inverter from all voltage sources (see Section 9).
2. Disconnect the DC cables from the connecting terminal for the DC connection.
3. Completely disconnect of the connecting terminal for the AC connection and pull 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.

Procedure:
Remove DC cables

1

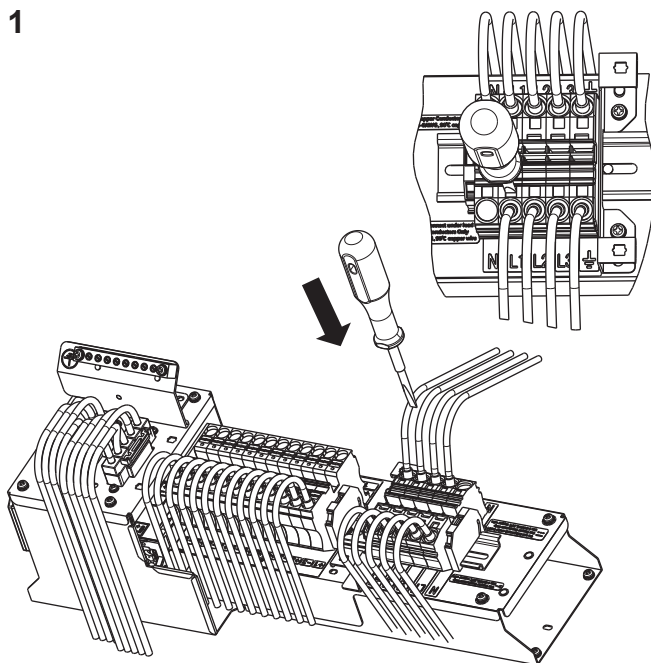


2

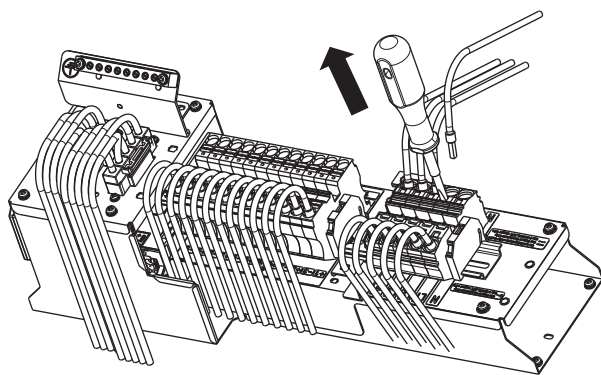


Procedure:
Remove AC cables, grounding cables

1



2



12 Technical Data

12.1 DC/AC Specifications (TPD-T250P6-US)

DC Input	
Max. input voltage	1000 V
MPPT voltage range	500 V to 800 V
Rated input voltage	700 V
Min. input voltage	200 V
Start voltage	200 V
Max. input operating current per string	10 A
Max. short-circuit current per string	12 A
Number of MPP tracker inputs	6
Max. usable input power per string	5,200 W
AC Output	
Rated output power at 480 V, 60 Hz	25,000 W
Max. apparent AC power	25,000 VA
Rated AC voltage	480 V (277 V WYE)
Normal AC voltage range	422.4 V to 528 V
Rated output current	30 A
Max. output current	35 A
Distortion rate of the output current	Total less than 5% Each of the following (Odd harmonic): $h < 10$: less than 4.0% $10 \leq h < 16$: less than 2.0% $16 \leq h < 22$: less than 1.5% $22 \leq h < 33$: less than 0.6% $33 \leq h$: less than 0.3% * Even harmonics are limited to 25% of the odd harmonic limits above
Rated grid frequency	60 Hz
Operating frequency range	59.5 Hz to 60.5 Hz
Power factor	0.99 or more (at rated output) 0.95 or more (at 1/2 rated output or higher)
Grid connection type	Three-phase, 4 wire + Ground
Overvoltage category in accordance with UL1741	IV
Efficiency	
Maximum efficiency	98.7% (at V_{mppt} 700 V, 3/10 rated output power)
CEC efficiency	97.5% (at V_{mppt} 700 V)

12.2 General Data

Dimensions (Body)	W 950 × H 640.6 × D 300 mm (37.4 × 25.2 × 11.8 in)
Weight (Body)	69.8 kg (153.9 lb)
Dimensions (Packaging)	W 1034 × H 751 × D 380 mm (40.7 × 29.6 × 15.0 in)
Weight (Packaging)	80 kg (176.4 lb)
Operating Temperature Range	−20 to +60°C *1 (−4 to +140°F)
Storage Temperature Range	−30 to +60°C (−22 to +140°F)
Humidity range	90% RH or less (provided there is no condensation)
Maximum operating altitude	2,000 m (6,562 ft)
Noise Emission (typical)	≤ 50 dB(A) 1 m *2 (for reference)
Internal consumption (night)	< 7 W
Topology	Transformer-less
Cooling concept	Forced air cooling
Enclosure type rating in accordance with UL50	Type 3
Protection class	I
Certification	ETL (UL 1741/1699B, CSA C22.2 No. 107.1-01, IEEE 1547a, CEC) FCC class A

*1 Temperature suppression operates at a temperature of 40°C (104°F) or more.

*2 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
Ground-fault monitoring	Insulation monitoring: R iso > 200 kΩ

12.4 Climatic Conditions

Extended temperature range	−20 to +60°C *1 (−4 to +140°F)
Extended humidity range	0% to 90%
Extended air pressure range	79.5 kPa to 106 kPa (11.5 psi to 15.4 psi)

*1 Temperature suppression operates at a temperature of 40°C (104°F) or more.

12.5 Equipment

DC connection	Terminal block Wire sizes 14 AWG to 6 AWG
Trade size of conduit for DC input wires	1-1/4"
AC connection	Terminal block Wire sizes 6 AWG 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 terminal for communication Connection	0.235 N·m (0.173 lb·ft)
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13 TABUCHI ELECTRIC Service Line

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 the 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]

MEMO

[illegible]

