Please read these instructions carefully before installing

This will ensure an easy start and a great first customer experience with TS4 installation

INTERACTIVE

INSTALLATION AND SAFETY MANUAL

FOR TS4: SMART MODULES AND RETROFIT

CLICK TO CONTINUE

It is highly recommended to view in full screen mode

THE INTERACTIVE MANUAL

This manual contains action buttons, designated to help you navigate around and find the most relevant information for your installation

	Next	Goes to the next page
	Back	Goes to the previous page
	Home	Goes to the product selection page

ON THIS SIDE:

You'll see clarification, additional information, and links for external pages

CLICK TO CONTINUE

READ THIS FIRST

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

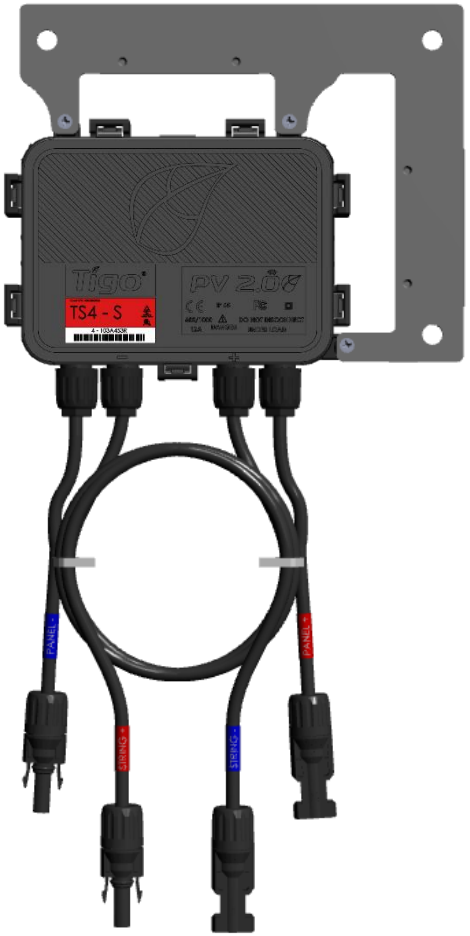
LETHAL VOLTAGE MAY BE PRESENT IN ANY PV INSTALLATION

- This manual contains important instructions for installation and maintenance of the Tigo Energy® product models TS4-L, TS4-O, TS4-S, TS4-M, TS4-R-M, TS4-R-S, TS4-R-O, ES-GTWY-020, Cloud Connect, Cloud Connect Advanced and related Tigo Energy software applications.
- Risk of electric shock, do not remove cover, disassemble, or repair, no user serviceable parts inside. Refer servicing to qualified service personnel.
- Before installing or using the Tigo Energy® System, please read all instructions and warning markings on the Tigo Energy products, appropriate sections of your inverter manual, photovoltaic (PV) module installation manual, and other available safety guides.
- Failure to adhere to these instructions may result in injury or death, damage to the system or voiding the factory warranty.
- To reduce risk of fire and shock hazard, install this device with strict adherence to National Electric Code (NEC) ANSI/NFPA 70 and/or local electrical codes. When the photovoltaic array is exposed to light, it supplies a DC voltage to the Tigo Energy® Module Maximizer™. The Module Maximizers and Smart Modules start in the “ON” state and their output voltage may be as high as the PV module open circuit voltage (Voc) when connected to the module. The installer should use the same caution when handling electrical cables from a PV module with or without the Tigo Energy Module Maximizer attached.
- Installation must be performed by trained professionals only. Tigo Energy does not assume liability for loss or damage resulting from improper handling, installation, or misuse of products.
- Remove all metallic jewelry prior to installing the Tigo Energy Module Maximizers or Smart Modules to reduce the risk of contacting live circuitry. Do not attempt to install in inclement weather.
- Do not operate the Tigo Energy Module Maximizers or Smart Modules if they have been physically damaged. Check existing cables and connectors, ensuring they are in good condition and appropriate in rating. Do not operate Tigo Energy Module Maximizers or Smart Modules with damaged or substandard wiring or connectors. Tigo Energy Module Maximizers must be mounted on the high end of the PV module back-sheet or racking system, and in any case above ground.
- Do not connect or disconnect under load. Turning off the Inverter and/or the Tigo Energy products may not reduce this risk. Internal capacitors within the inverter can remain charged for several minutes after disconnecting all power sources. Verify capacitors have discharged by measuring voltage across inverter terminals prior to disconnecting wiring if service is required.
- Service Personnel: Check the voltage of the array after activating the Tigo Energy® PV-Safe™ function on the MMU prior to performing service.
- Always assume Module Maximizers and Smart Modules are in “ON” state, or may turn on when restarting.

TS4 PLATFORM: BASE

This manual covers the installation steps for the Tigo TS4 family of products, both integrated and add-on versions.

Module integrated TS4



Add-on TS4-R

GUIDE:

- Long Strings
- Optimization
- Rapid Shutdown
- Monitoring

WHERE TO BUY:

CLICK HERE

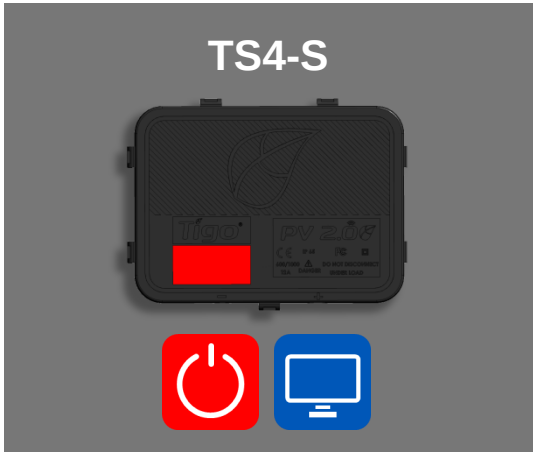
TS4 PLATFORM: COVER SELECTION

The TS4 covers contain your module level electronics:

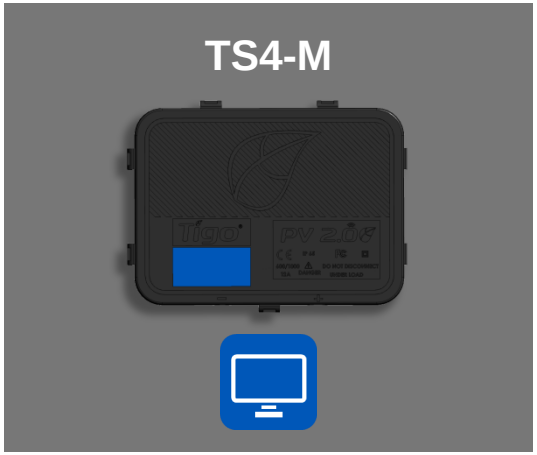
TS4-L*

TS4-O

TS4-S



TS4-M



*TS4-L is available only for the module integrated TS4

GUIDE:

- Long Strings
- Optimization
- Rapid Shutdown
- Monitoring

WHERE TO BUY:

CLICK HERE

COMMUNICATION

The Cloud Connect is your data logger and safety control unit.

The Gateway is an antenna that communicates with your smart modules or add-on devices.

It is always recommended to install communication accessories, to utilize the full potential of your TS4, however it is only mandatory in order to enable monitoring and safety features, such as Rapid Shutdown.

Select your model of Cloud Connect:

Cloud Connect and Gateway

Cloud Connect Advanced and Gateway

ORDERING INFORMATION:

Cloud Connect Kit comes with:

1 Gateway

1 Power supply: 2 different options:

1. Wall Outlet
2. DIN Rail

Additional Gateways available separately

WHERE TO BUY:

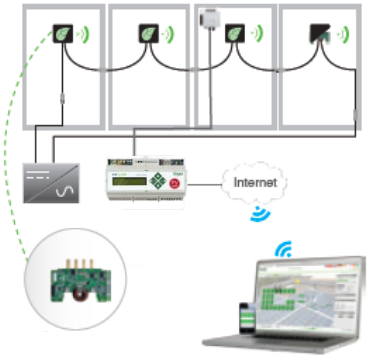
CLICK HERE

REMINDER:

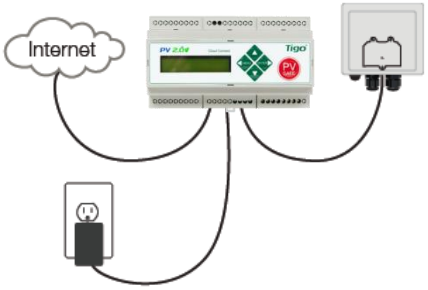
When using TS4-O and TS4 -L, Cloud Connect is only required where rapid shutdown and/or monitoring capabilities are needed

TABLE OF CONTENTS

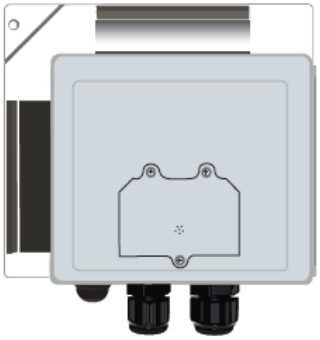
1. System Overview & Product Description



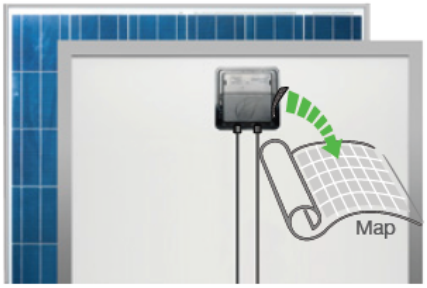
2. Installing Cloud Connect (CC)



3. Installing Gateways (GTWY)



4. Installing and Mapping



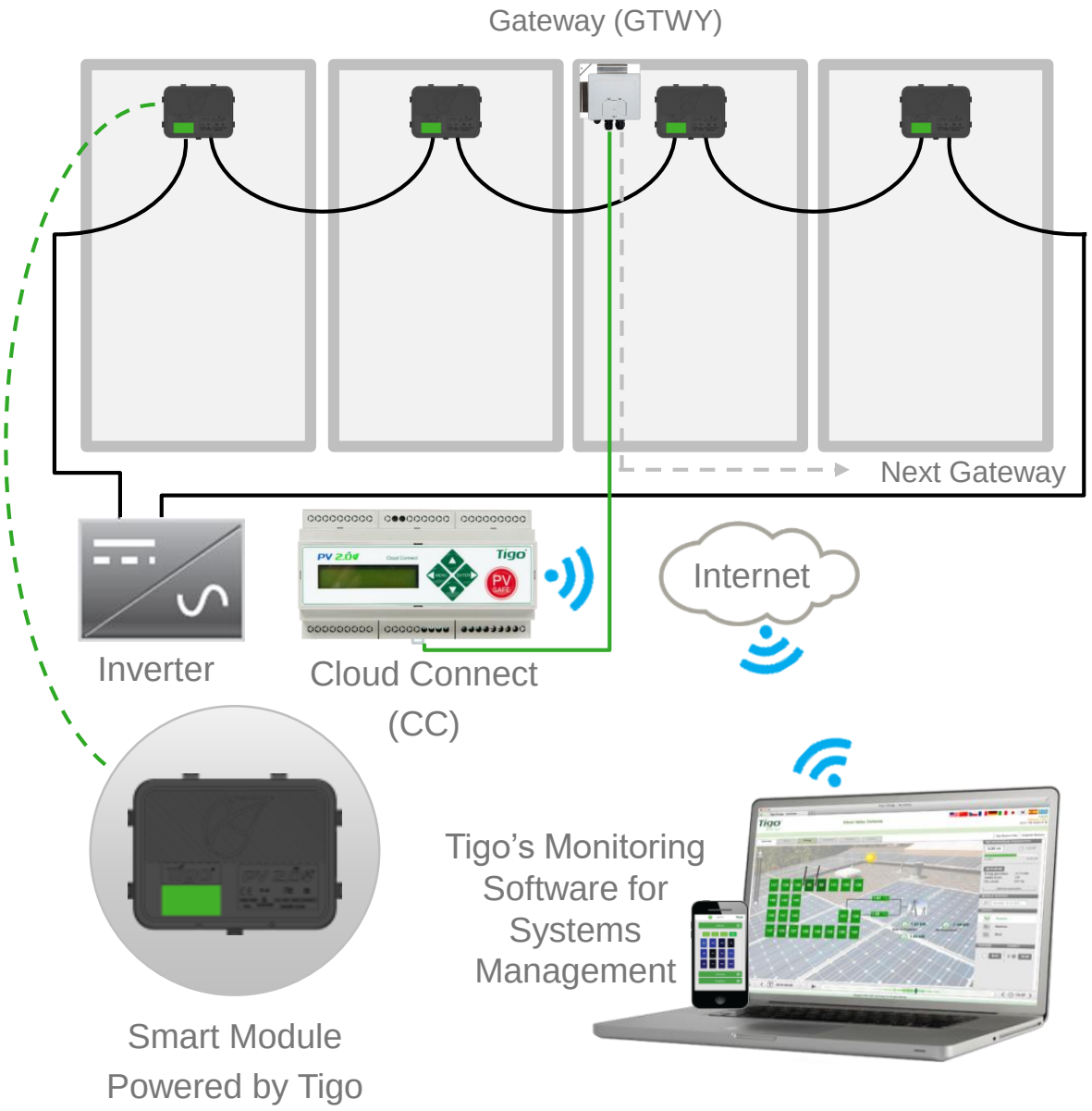
5. Configuring the System Online

6. Commissioning

7. Rapid Shutdown

8. Connecting Modbus Accessories

1. SYSTEM OVERVIEW: TS4-B (TS4 BASED MODULES)



DESIGN RULES:

1 CLOUD CONNECT:

- Up to 7 GTWYs and 360 PV modules
- All Smart Modules in the same string must be assigned to the same CC

1 GTWY:

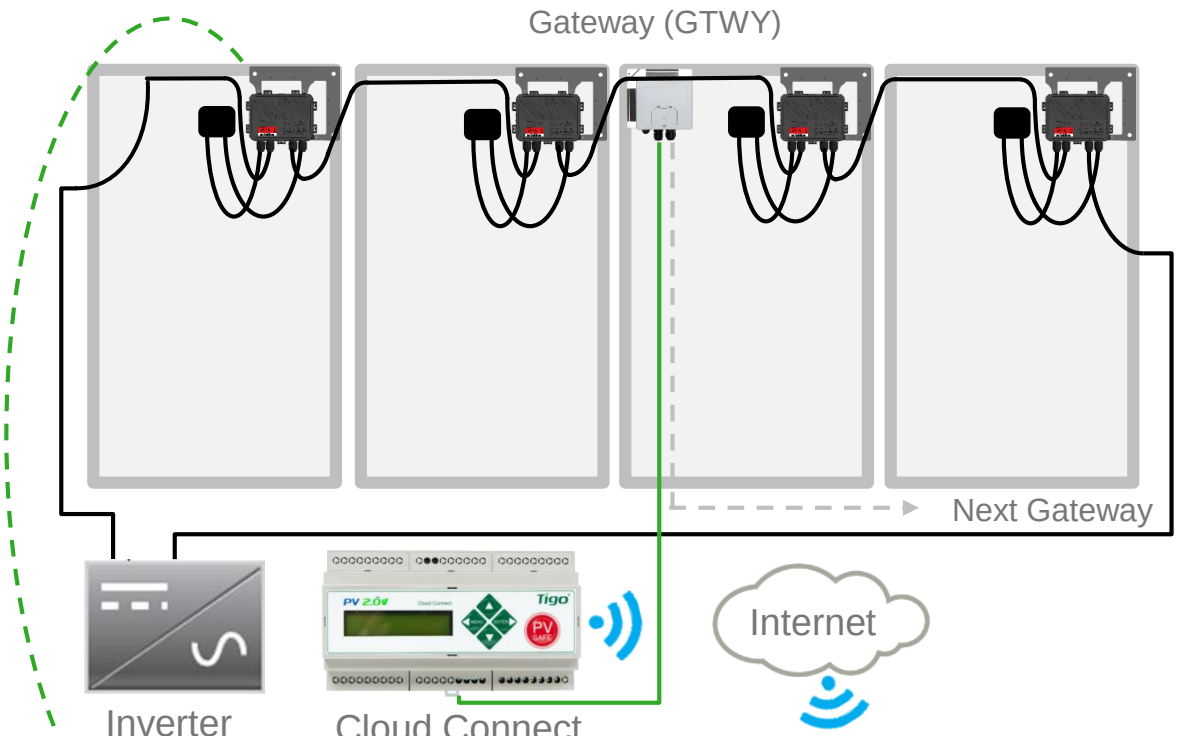
- Up to 120 PV modules
- Modules must be within 10m-15m (33-50 ft.) from the GW, depending on roof topology and material

For further information CLICK HERE

CC AND GTWY CALCULATOR:

For the number of CCs and GTWYs required for your project CLICK HERE

1. SYSTEM OVERVIEW: TS4-R



TS4-R with Monitoring, Safety and/or Optimization

Tigo's Monitoring Software for Systems Management

DESIGN RULES:

1 CLOUD CONNECT:

- Up to 7 GTWYs and 360 PV modules
- All Smart Modules in the same string must be assigned to the same CC

1 GTWY:

- Up to 120 PV modules
- Modules must be within 10m-15m (33-50 ft.) from the GW, depending on roof topology and material

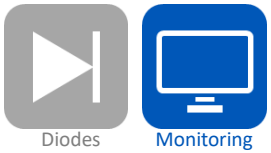
For further information CLICK HERE

CC AND GTWY CALCULATOR:

For the number of CCs and GTWYs required for your project CLICK HERE

1. SYSTEM OVERVIEW & PRODUCT DESCRIPTION

TS4-M: MONITORING: The TS4-M provides continuous system-wide monitoring for fleets to make customer support and fleet workflow on track



TS4-S: SAFETY: The TS4-S provides the necessary safety and monitoring services required by municipalities

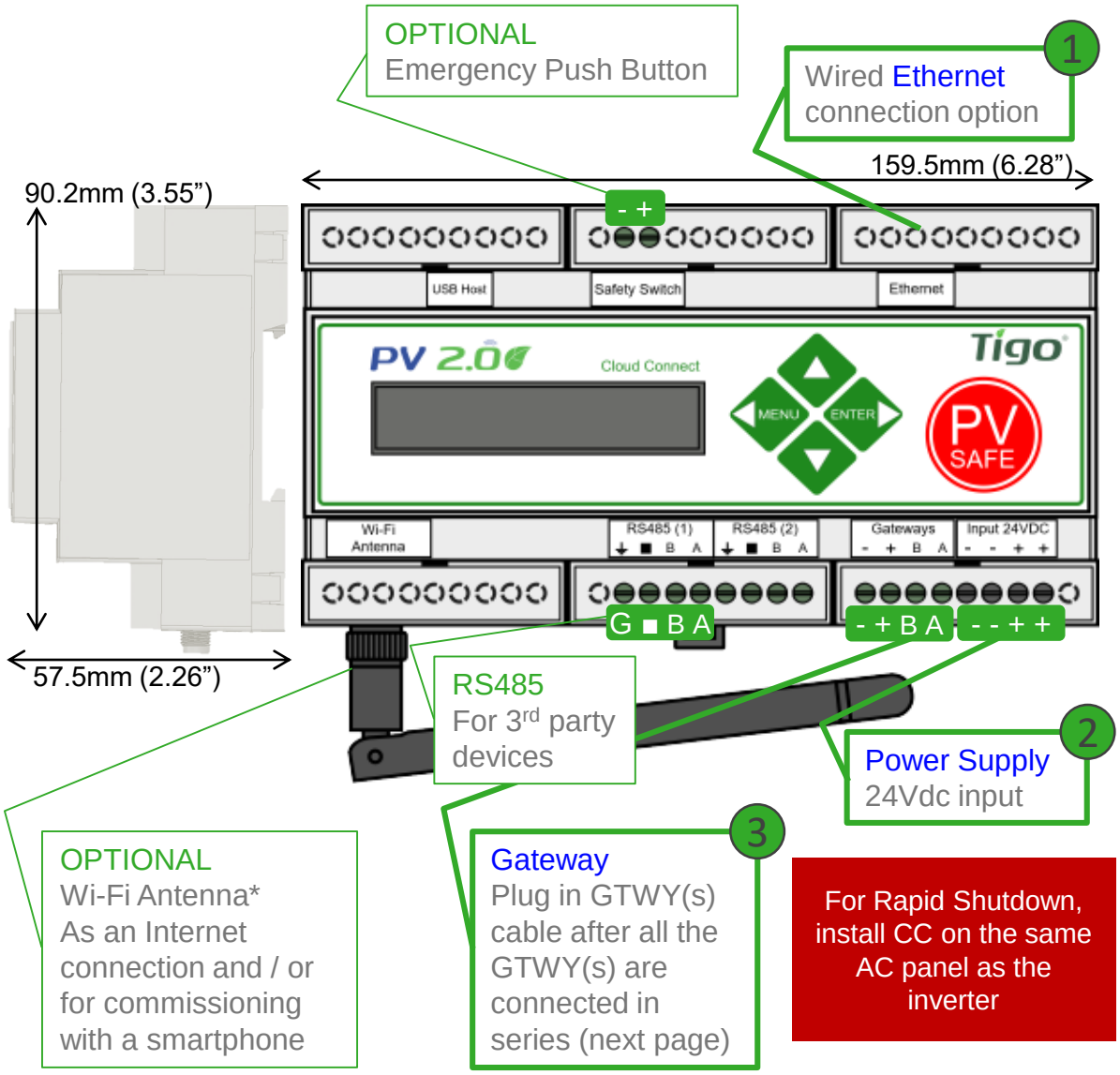
TS4-O: OPTIMIZATION: In addition to safety, monitoring, and PV2.0 synchronization, TS4-O optimizes each PV module when its performance is affected by shade or mismatch

TS4-L: LONG STRINGS: The TS4-L is the complete Smart Module solution. It is ideal for systems requiring fully optimized performance at the module level, monitoring, safety, and longer strings CLICK HERE to see the TS4-L string sizing info.

MORE INFORMATION:

Click here to learn more, watch a video and see the TS4 platform datasheet.

2. INSTALLING THE CLOUD CONNECT (CC)



*In case CC is mounted in a metal enclosure, extend this antenna out of the box in order to use Wi-Fi as an Internet connection

WHERE TO PLACE:

- On a wall or beam
- Next to the inverter
- Out of direct sunlight

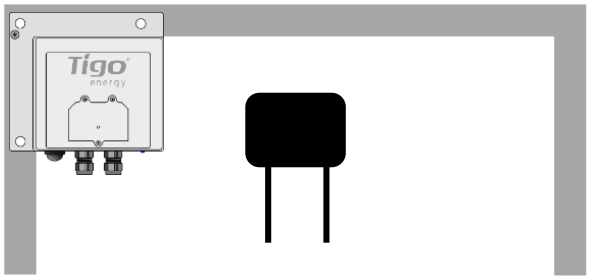
3 CONNECTIONS:

1. Internet connection, using one of the options:
    - Ethernet Port
    - Built in Wi-Fi
        - Wi-Fi connection is configured using the Tigo SMART app
2. Power supply: 2 options:
    - DIN Rail Power Supply
    - Wall Socket Power Supply
    - CLICK HERE for details
3. GTWY
    - More on RS485 cables in the next page

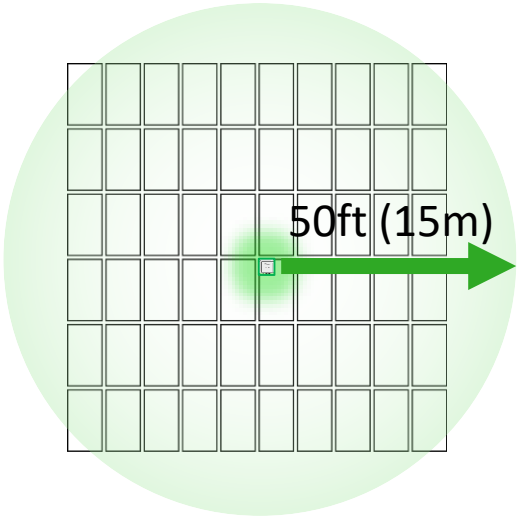
Complete CC menu options in 7. Commissioning

CLICK HERE for Tigo SMART app guide

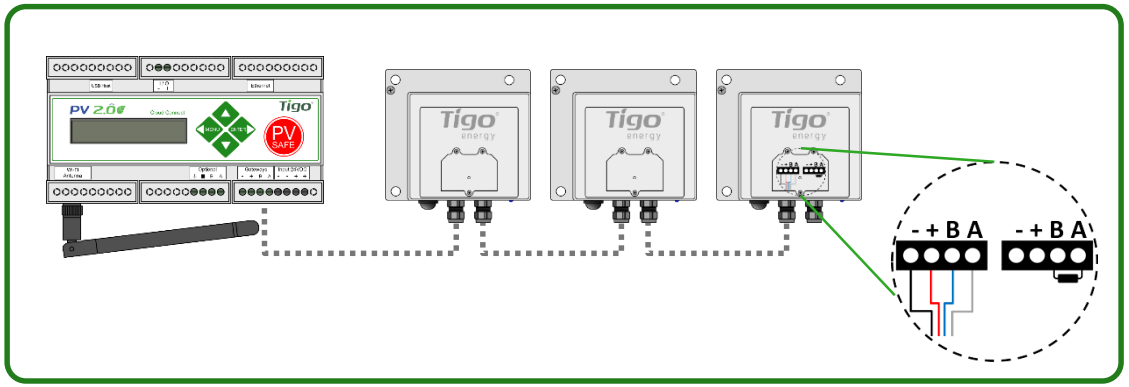
3. INSTALLING GATEWAYS (GTWY)



Gateway attaches to module frame using provided bracket



Locate Gateway near center of array or each sub-array



Connect multiple Gateways in series and leave terminating resistor only in final Gateway.

INSTALLATION:

1. Connect all GTWY cables before powering ON Cloud Connect
2. Mount GTWY on back of PV module using provided bracket, or bolt to the racking system
3. Powering ON Cloud Connect and preform GTWY test from the Tigo SMART App

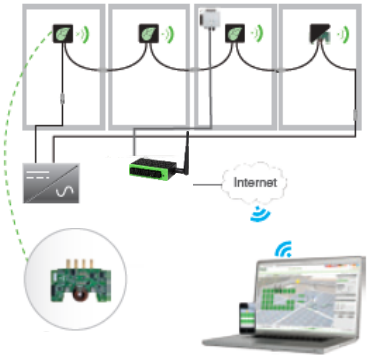
RS-485 communication cable is recommended: 2 x twisted pair, sunlight resistant of direct burial.

MORE INFORMATION

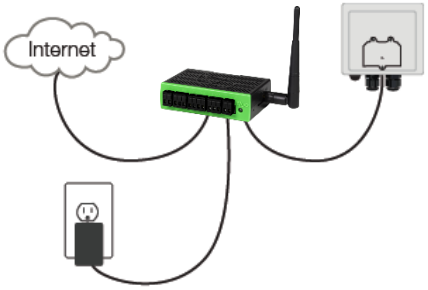
- Gateway Hardware Guide
- Gateway Placement Guide
- Communication Cable Guide

TABLE OF CONTENTS

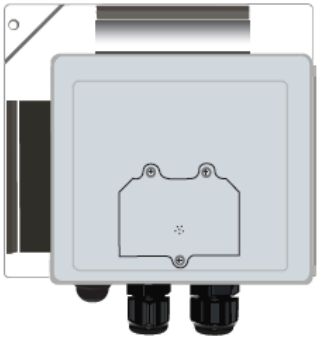
1. System Overview & Product Description



2. Installing Cloud Connect (CC)



3. Installing Gateways (GTWY)



4. Installing and Mapping

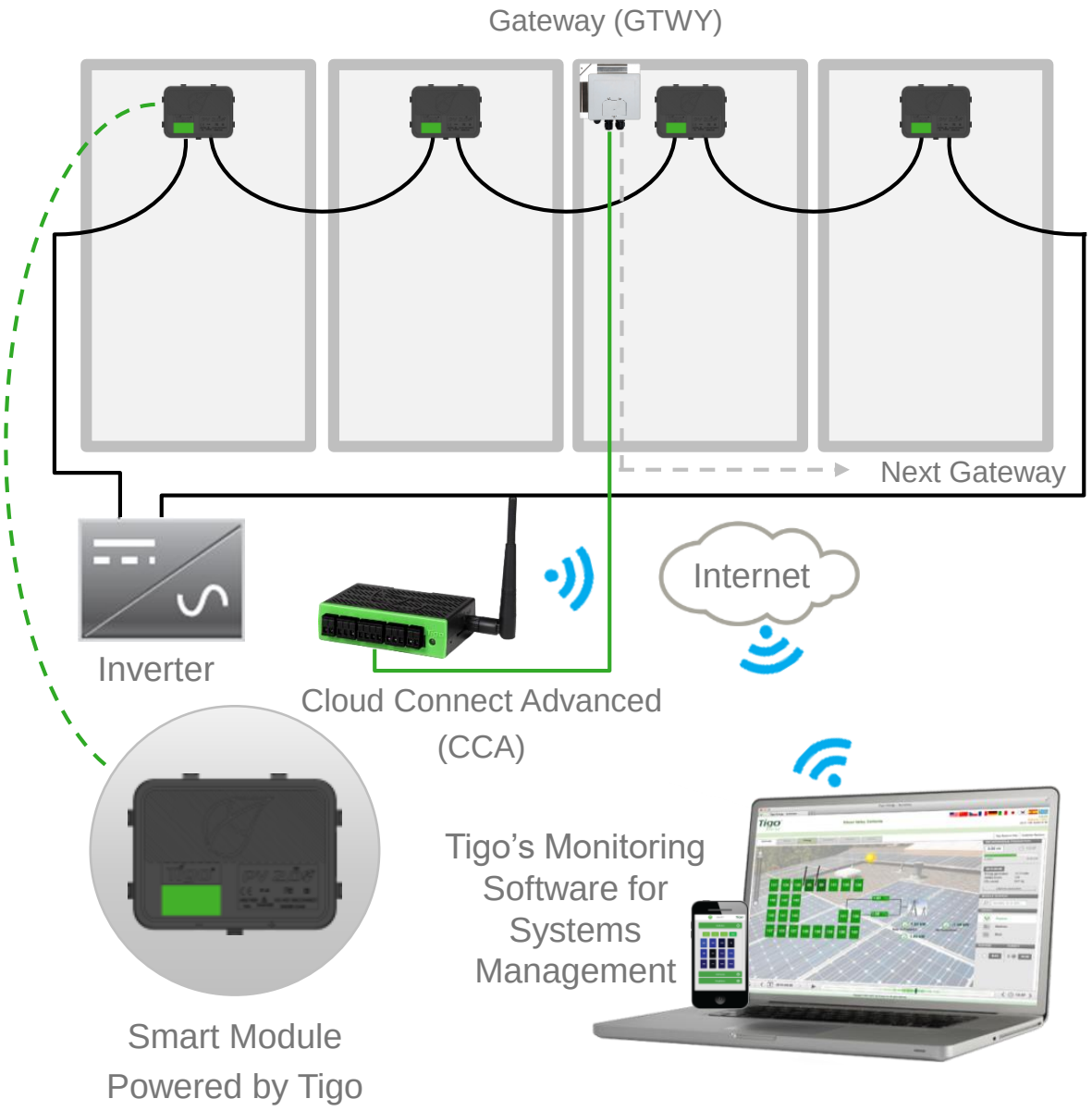
5. Configuring the System Online

6. Commissioning

7. Rapid Shutdown

8. Connecting Modbus Accessories

1. SYSTEM OVERVIEW: TS4-B (TS4 BASED MODULES)



DESIGN RULES:

1 CLOUD CONNECT:

- Up to 7 GTWYs and 360 PV modules
- All Smart Modules in the same string must be assigned to the same CC

1 GTWY:

- Up to 120 PV modules
- Modules must be within 10m-15m (33-50 ft.) from the GW, depending on roof topology and material

For further information CLICK HERE

CC AND GTWY CALCULATOR:

For the number of CCs and GTWYs required for your project CLICK HERE

1. SYSTEM OVERVIEW: TS4-R

DESIGN RULES:

1 CLOUD CONNECT:

- Up to 7 GTWYs and 360 PV modules
- All Smart Modules in the same string must be assigned to the same CC

1 GTWY:

- Up to 120 PV modules
- Modules must be within 10m-15m (33-50 ft.) from the GW, depending on roof topology and material

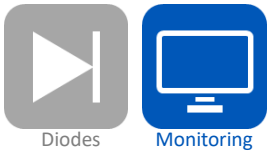
For further information CLICK HERE

CC AND GTWY CALCULATOR:

For the number of CCs and GTWYs required for your project CLICK HERE

1. SYSTEM OVERVIEW & PRODUCT DESCRIPTION

TS4-M: MONITORING: The TS4-M provides continuous system-wide monitoring for fleets to make customer support and fleet workflow on track



TS4-S: SAFETY: The TS4-S provides the necessary safety and monitoring services required by municipalities

TS4-O: OPTIMIZATION: In addition to safety, monitoring, and PV2.0 synchronization, TS4-O optimizes each PV module when its performance is affected by shade or mismatch

TS4-L: LONG STRINGS: The TS4-L is the complete Smart Module solution. It is ideal for systems requiring fully optimized performance at the module level, monitoring, safety, and longer strings CLICK HERE to see the TS4-L string sizing info.

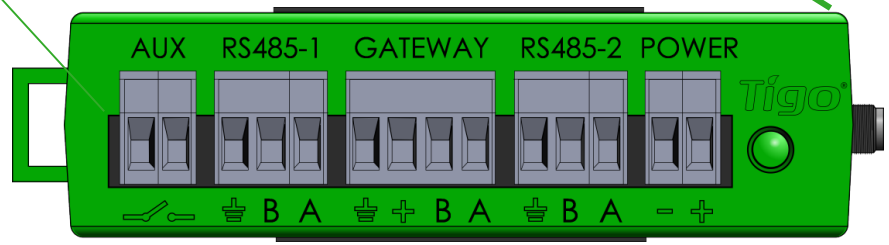
MORE INFORMATION:

Click here to learn more, watch a video and see the TS4 platform datasheet.

2. INSTALLING THE CLOUD CONNECT ADVANCED (CCA)

OPTIONAL
Connect an External Switch for PV-Safe

Network
Wired Ethernet and Wi-Fi connections



G B A

- + B A

G B A

- +

RS485
For 3rd party devices

RS485
For 3rd party devices

Power Supply
24Vdc input

Wireless Capabilities
Use Wi-Fi for your Internet connection and for commissioning with a smartphone

Gateway
Plug in GTWY(s) cable after all the GTWY(s) are connected in series (next page)

For Rapid Shutdown, install CC on the same AC panel as the inverter

*In case CC is mounted in a metal enclosure, extend this antenna out of the box in order to use Wi-Fi as an Internet connection

WHERE TO PLACE:

- On a wall or beam
- Next to the inverter
- Out of direct sunlight

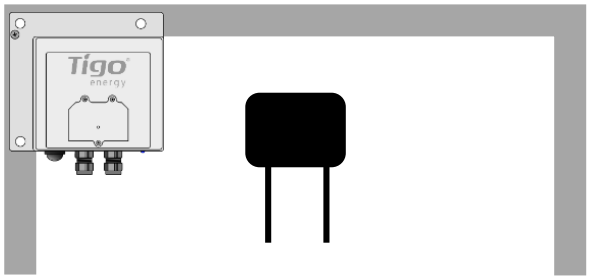
3 CONNECTIONS:

1. Internet connection, using one of the options:
    - Ethernet Port
    - Built in Wi-Fi
        - Wi-Fi connection is configured using the Tigo SMART app
2. Power supply: 2 options:
    - DIN Rail Power Supply
    - Wall Socket Power Supply
    - CLICK HERE for details
3. GTWY
    - More on RS485 cables in the next page

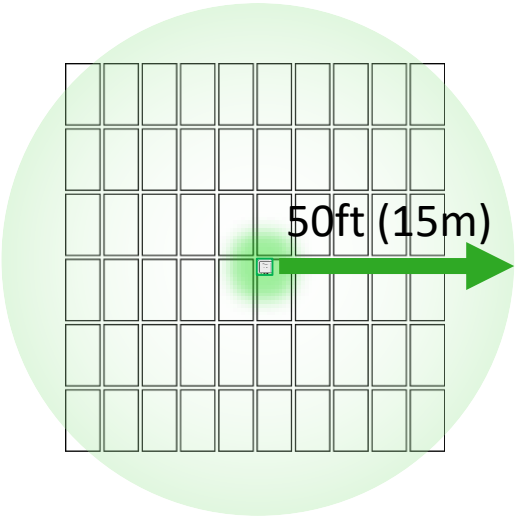
Complete CC menu options in 7. Commissioning

CLICK HERE for Tigo SMART app guide

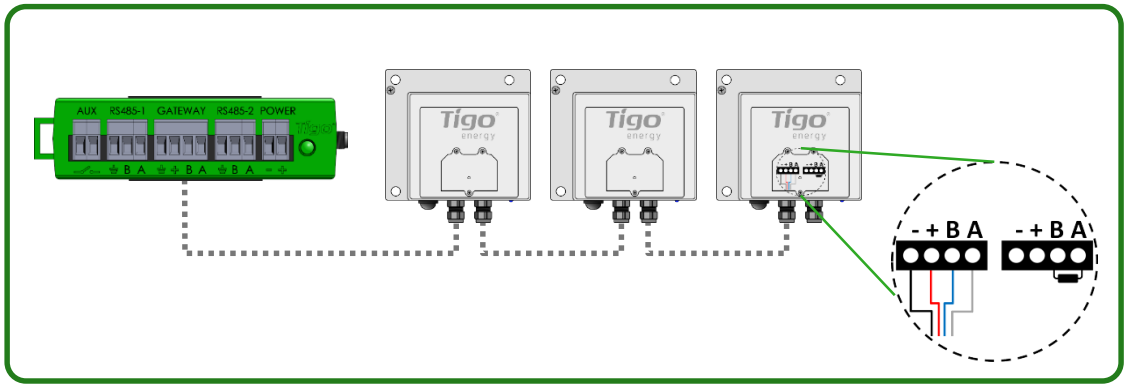
3. INSTALLING GATEWAYS (GTWY)



Gateway attaches to module frame using provided bracket



Locate Gateway near center of array or each sub-array



Connect multiple Gateways in series and leave terminating resistor only in final Gateway.

Installation:

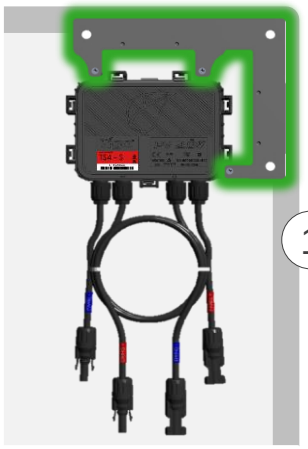
1. Connect all GTWY cables before powering on Cloud Connect
2. Install GTWY on back of PV module using provided bracket or bolt to the racking system
3. Power on Cloud Connect and perform Gateway test from Tigo SMART App

RS-485 communication cable is recommended.
2 twisted pair, sunlight resistant or direct burial

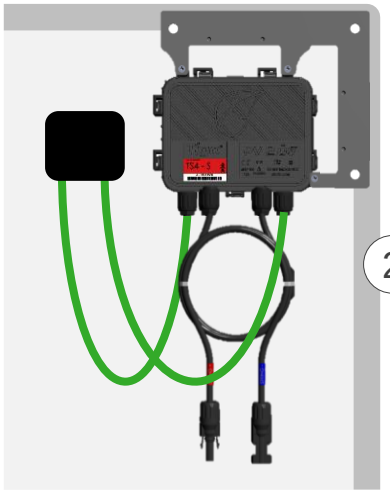
More Information:

- Gateway Hardware Guide
- Gateway Placement Guide
- Communication Cable Guide

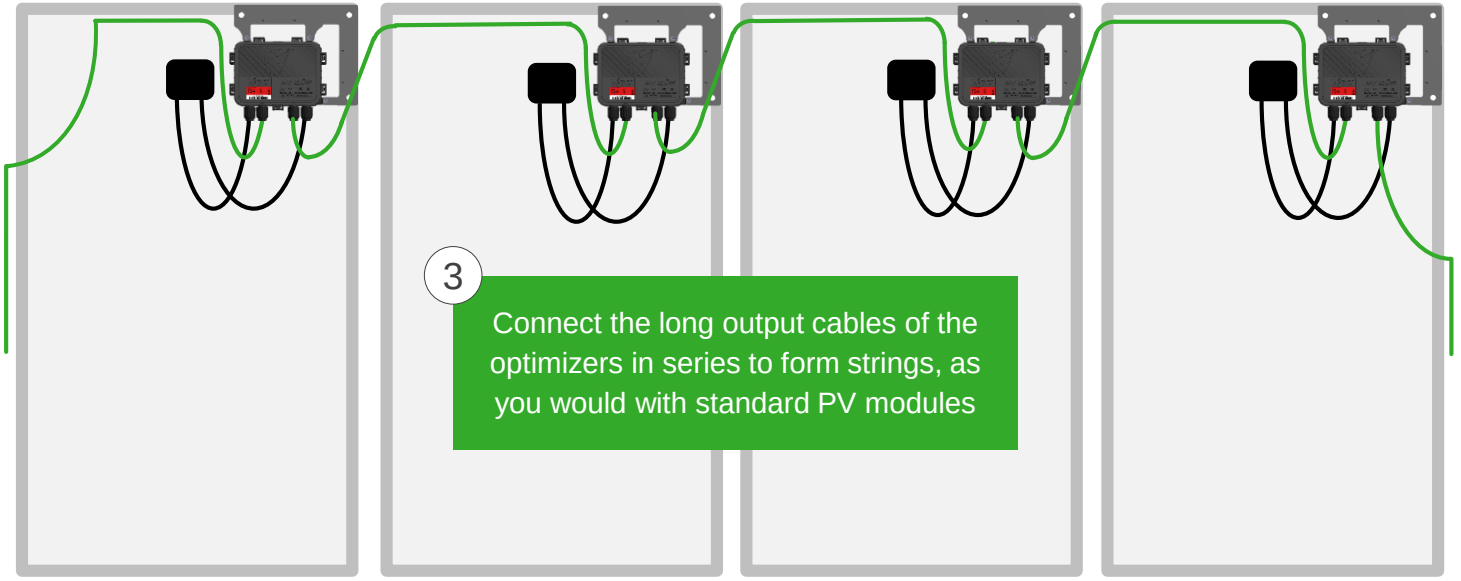
4. INSTALLING & MAPPING: TS4-R



1 Mount the optimizer on the top right corner of the PV module

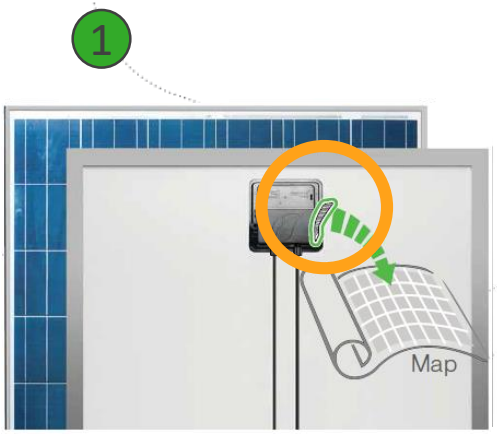


2 Connect the PV cables from the module to the short leads of the TS4-R

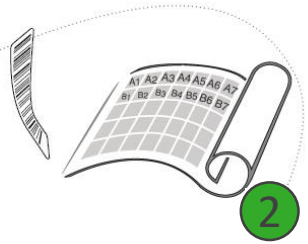


3 Connect the long output cables of the optimizers in series to form strings, as you would with standard PV modules

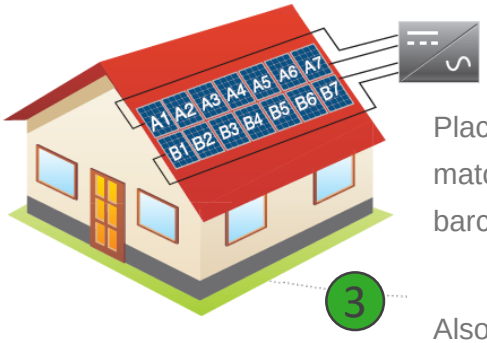
4. INSTALLING & MAPPING



Remove 1 barcode sticker from the TS4 junction box or add-on



Place the sticker on the map, string list or construction drawing, in the exact position you are going to place modules in the field or on the roof.



Place PV modules in a way matches the map you made using barcodes.

Also record the serial numbers of the GTWY(s)

TEMPLATES:

Create your site map using Tigo's string list template

To view and download, CLICK HERE

Another option is to first map your site online (see next page). At the end, you'll be able to download a physical map of your system to help map the barcodes

NOTE:

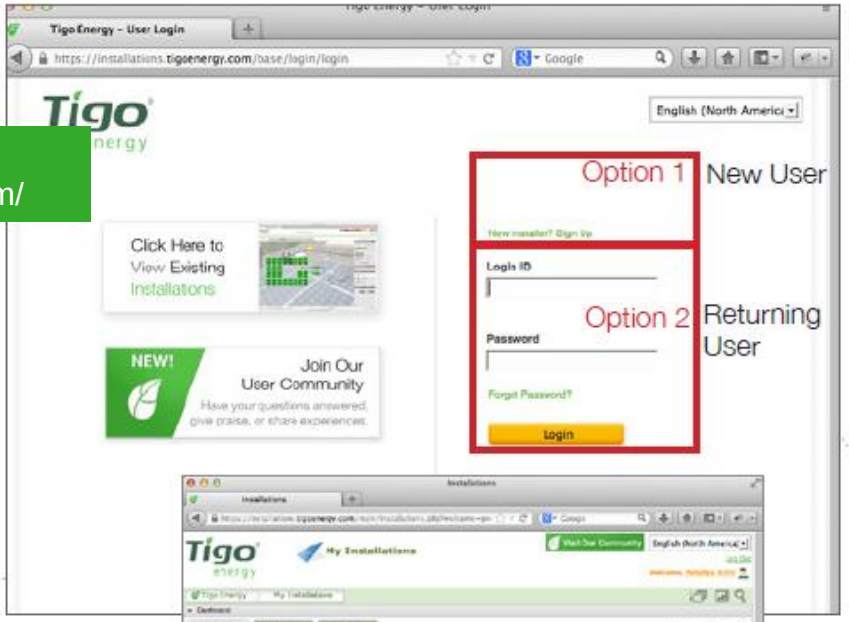
If you're installing 50 modules or less and don't need an exact physical position you may skip the mapping step and go straight to commissioning

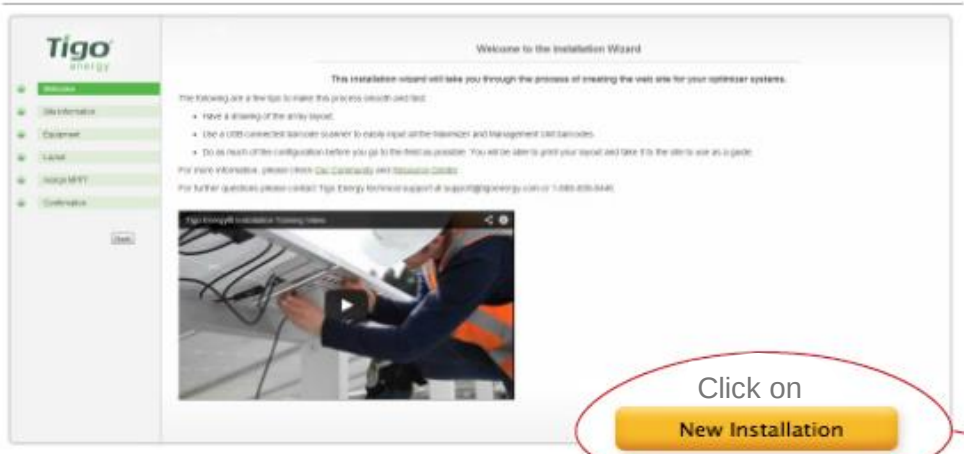
MAKE SURE you take the junction box's label or the TS4-R label, NOT the module's

5. CONFIGURE THE SYSTEM ONLINE

1

CLICK HERE
http://installations.tigoenergy.com/





Click on
New Installation

2

3

Follow the wizard instructions

** For smart module systems with less than 50 panels, this step can be done after the physical installation

6. COMMISSIONING

To commission the Tigo equipment there are 3 simple steps that need to be completed:

1. NETWORK TEST
2. GATEWAY TEST
3. DISCOVERY

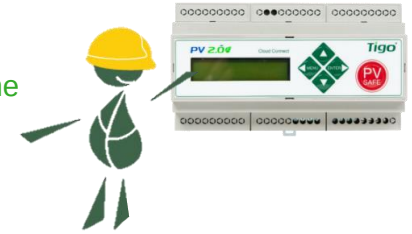
For systems with multiple Cloud Connect units, these tests need to be performed on each individual Cloud Connect .

Network and Gateway tests can run at the same time on different CCs. However, Discovery must be initiated on Cloud Connects one by one, making sure GTWY discovery stage is complete before moving to the next one.

This may take several minutes to several hours depending on the size of the system.

Note: The discovery process can be initiated for sites with more than 50 Smart Modules only after the online configuration of the system has been completed and downloaded by the Cloud Connect.

This step requires an Internet connection.



To Commission the system using your smartphone, download the Tigo SMART app and follow its instructions. CLICK HERE to view the manual.

VERIFY RAPID SHUTDOWN FUNCTIONALITY

Verify rapid shutdown functionality after the discovery process is completed.

Switch off the AC main and make sure voltage drops below 30V within 10 seconds. Power the system on after testing using:

2. Control -> 2.2. Modules ON

CC MENU:

1. Status
    - 1.1. Modules
        - 1.1.1. Signal
        - 1.1.2. Voltage
        - 1.1.3. Power
    - 1.2. Date / Time
    - 1.3. Unit ID
    - 1.4.Version
    - 1.5. Config (internal use only)
2. Control
    - 2.1. Discovery
    - 2.2. Modules ON
    - 2.3. Push Data
    - 2.4. Restart
    - 2.5. Gateway Test
    - 2.6. Replace GW
    - 2.7. H/W Test (internal use only)
3. Network
    - 3.1. Display IP
    - 3.2. Test
    - 3.3. Configure
    - 3.4. Set Proxy
    - 3.5. Renew

Click for description

7. RAPID SHUTDOWN

TS4-L, TS4-O, and TS4-S with Kaco Blueplanet Smart Inverter and Gateway are a solution to meet NEC 2014 690.12 Rapid Shutdown requirements, when combined with a DC disconnect at the inverter.

When Rapid Shutdown is initiated, the voltage across PV conductors will drop below 30V within 10 seconds at the module level.

Rapid Shutdown is activated by taking 2 simple actions.

To activate rapid shutdown (with most inverters order of actions doesn't matter):

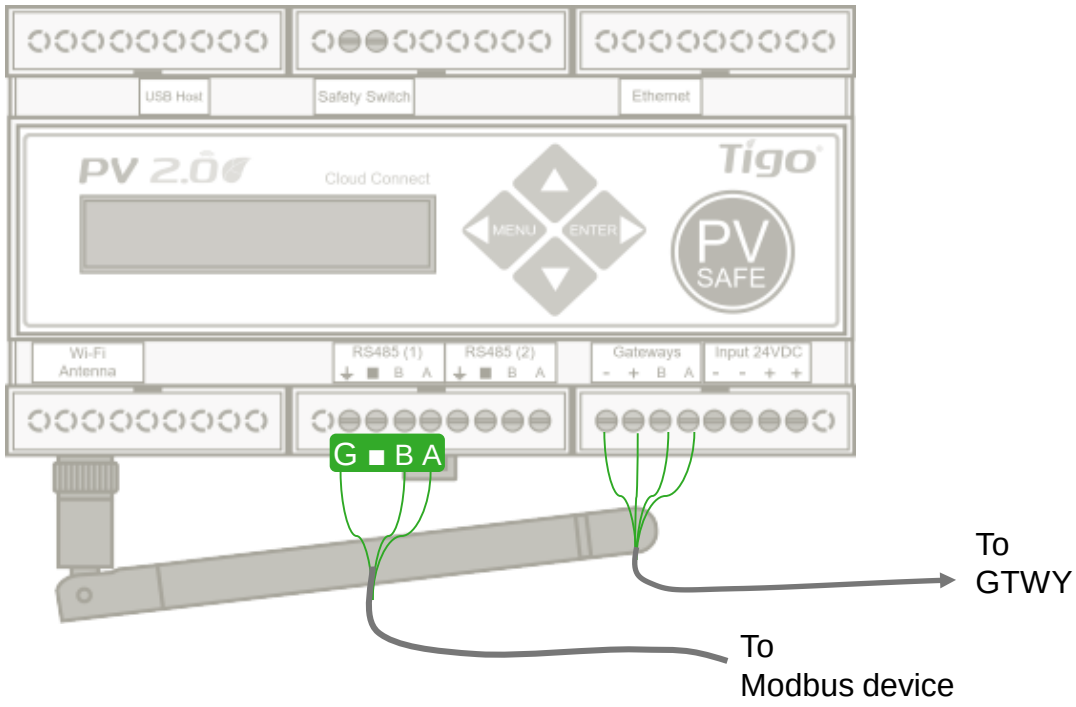
1. Switch off DC disconnect as well to disconnect capacitors.
2. Switch OFF AC main to deactivate system.

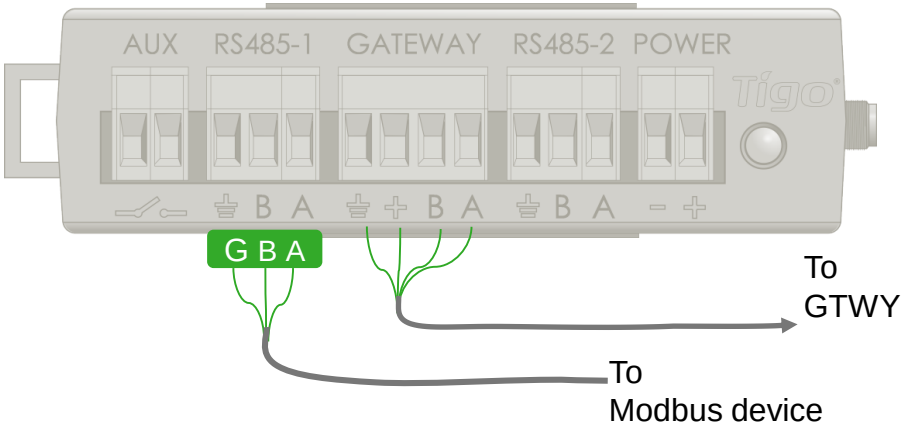
In the inverter's box you'll find 2 red labels to mark the Rapid Shutdown equipment. Place one sticker next to the inverter's DC switch and the other on the AC main breaker. **Both labels must be visible!**

Only a properly installed, configured, and tested system will perform Rapid Shutdown properly.

CLICK HERE for more info about Rapid Shutdown

8. CONNECTING MODBUS DEVICES (OPTIONAL)





INSTALLATION:

1. Verify device settings for AC meter, inverter, etc. in its own installation manual
2. Connect devices to RS-485 port on CC or CCA (note: similar devices can be connected in series)
3. Contact Tgo Tech Support to activate a connected device

1.408.402.0802 ext. 2
00800.CALL.TIGO(2255.8446)
support@tigoenergy.com

RECOMMENDED SETTINGS:

- 9600 baud rate
- 8 bits data
- 1 stop bit
- No parity

TECHNICAL SPECIFICATIONS – SMART MODULE WITH TS4-B1500 BASE

TS4 COVERS

DIODES
TS4-D

MONITORING
TS4-M

SAFETY
TS4-S

OPTIMIZATION
TS4-O

LONG STRINGS
TS4-L

ELECTRICAL RATINGS

INPUT @ STC					
Rated DC Input Power	375W	375W	375W	375W	375W
Maximum DC Input Voltage (V_{OC})	90V	52V	52V	52V	52V
Maximum Short Circuit Current (I_{SC})	12A	12A	12A	10A	10A
Operating Voltage	0-80V	16-48V	16-48V	16-18V	16-48V
OUTPUT					
Output Power Range	0-375W	0-375W	0-375W	0-375W	0-375W
Output Voltage Range	0-V_{OC}	0-V_{OC}	0-V_{OC}	0-V_{OC}	0-V_{OC}
Communication Type	N/A	802.15.4 2.4GHz	802.15.4 2.4GHz	802.15.4 2.4GHz	802.15.4 2.4GHz
Rapid Shutdown Verified (NEC 2014 690.12)	Need additional RS device	Need additional RS device	Yes	Yes	Yes
Impedance Matching Capability	No	No	No	Yes	Yes
Output Voltage Limit	No	No	No	No	Yes
Maximum System Voltage	1000/1500V	1000/1500V	1000/1500V	1000/1500V	1000/1500V
Maximum Series Fuse Rating	15A	15A	15A	15A	15A

TECHNICAL SPECIFICATIONS – RETROFIT UNIT WITH TS4-R1500 BASE

TS4-R

MONITORING
TS4-R-M

SAFETY
TS4-R-S

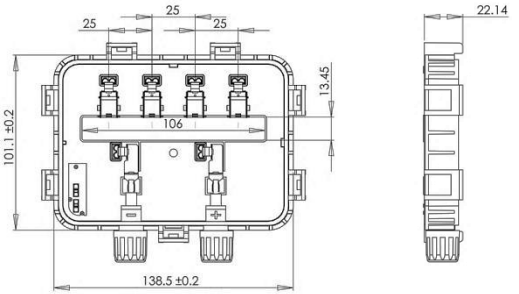
OPTIMIZATION
TS4-R-O

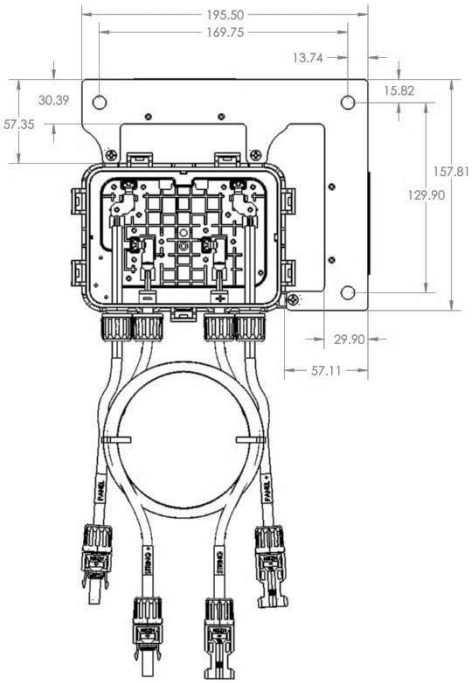
ELECTRICAL RATINGS

INPUT @ STC			
Rated DC Input Power	375W	375W	375W
Maximum DC Input Voltage (V_{OC})	52V	52V	52V
Maximum Short Circuit Current (I_{SC})	12A	12A	10A
Operating Voltage	16-48V	16-48V	16-18V
OUTPUT			
Output Power Range	0-375W	0-375W	0-375W
Output Voltage Range	0-V_{OC}	0-V_{OC}	0-V_{OC}
Communication Type	802.15.4 2.4GHz	802.15.4 2.4GHz	802.15.4 2.4GHz
Rapid Shutdown Verified (NEC 2014 690.12)	Need additional RS device	Yes	Yes
Impedance Matching Capability	No	No	Yes
Output Voltage Limit	No	No	No
Maximum System Voltage	1000/1500V	1000/1500V	1000/1500V
Maximum Series Fuse Rating	15A	15A	15A

MECHANICAL SPECIFICATIONS – TS4-B and TS4-R

Mechanical	
Ambient Temperature Range	-40ºC to +85ºC (-40ºF to +185ºF)
Storage Temperature Range	-40ºC to +85ºC (-40ºF to +185ºF)
Cooling Method	Natural Convection
Dimensions (with cover)	152.5 x 108 x 25 (mm)
Weight	550 g (1.20 lb.)
Environmental Rating	IP65/67, NEMA 3R
Cabling	
Cabling Type	PV1-F, PV wire
Cable Length	1.0 m/other lengths on request
Connector	MC4 compatible/MC4/H4
UV Resistance	500 hr with UBV light between 300-400nm @ 65C
Maximum String Voltage	1000V UL / IEC
Outer Cable Diameter	6.25 ± 0.25 mm (600V), 7.15 ± 0.25 mm (1000V)
Wire Cross Section	4.0mm2 (12AWG)





YOU'RE GOOD TO GO!

For more details on designing and installing solutions powered by Tigo, please visit:

- Tigo Academy
- Agora

Or contact us at:

- support@tigoenergy.com
- 1.408.402.0802 #2

GOOD LUCK!

Tigo Customer Care