

TS2301 Wi-Fi Electric Water Heater Controller

Installation Guide





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Welcome!

Thank you for choosing the TrickleStar® TS2301 Wi-Fi Electric Water Heater Controller™.

You are now ready to start saving money by maximizing energy savings with your electric water heater. You can remotely control your water heating timing and duration from anywhere. You can also monitor the energy usage from a summarized report found in your TrickleStar Portal account.

If you have any questions about TrickleStar products or need technical support, visit our website for tutorials, videos and Frequently Asked Questions (FAQ). You can also contact us by email or phone.

Website: www.tricklestar.com

Email: customer.service@tricklestar.com

Toll Free: 1-888-700-1098

Instruction Videos

If you want to see the Installation Instructions as videos, visit our YouTube channel:

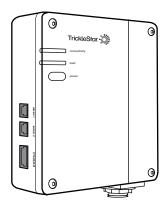
https://www.youtube.com/user/TrickleStarUS/



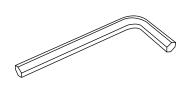


Preparation

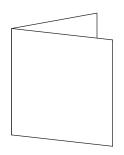
What's in the box?



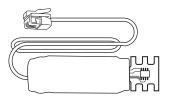
Wi-Fi Electric Water Heater Controller



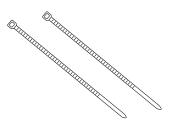
3 mm Allen Key



Quick Start Guide



Temperature Sensor

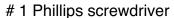


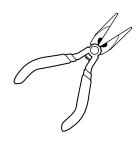
Cable Tie (2 pcs.)



Tools needed for installation





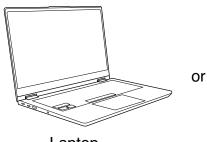


Needle nose pliers



Wire stripper and cutter

A mobile device with a 2.4 GHz Wi-Fi connection (to access to TrickleStar Portal):



Laptop



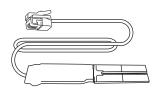
Tablet



Smartphone

Accessories (sold separately)

For more information on these accessories, visit our website at: www.tricklestar.com



TS1919 Flood Sensor (Optional)

lmage not available

TS3011 CTA-2045-B Cable (Optional)



Quick Start Guide for Contractor Installation

It is easy to install and set up the Water Heater Controller. For details on the installation, refer to the online Installation Guide at: www.tricklestar.com/Resources/TS2301-Wi-Fi-Electric-Water-Heater-Controller-Installation-Guide.pdf



Before you start:

- a. Please ensure that you have the homeowner's TrickleStar Portal account credentials, or assist the owners to create one on the TrickleStar Portal for the installation and configuration,
- b. You may also use your own contractor account to install and configure the device, and then transfer ownership of the device to the homeowner's account after completing the configuration.
- c. You can also create a new TrickleStar Portal account in the TrickleStar App. Be sure to sign out from your existing account first.



Scan this QR code to create Portal account

Installation Workflow



Controller.









Step 2Connect the TrickleStar

Water Heater Controller to Wi-Fi via the Portal/App and complete the Start-Up Configuration.



Step 5

Add the TrickleStar App on homeowner's smartphone. (Optional)



Step 3

Select your settings for the TrickleStar Water Heater Controller. (Optional)



Step 4

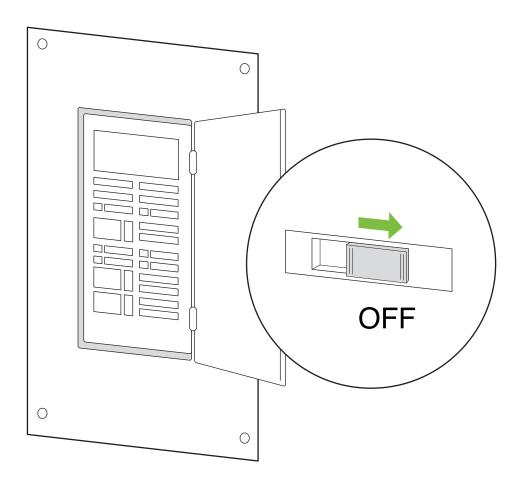
If contractor account is used for configuration, transfer ownership to home owner



Precautionary measures

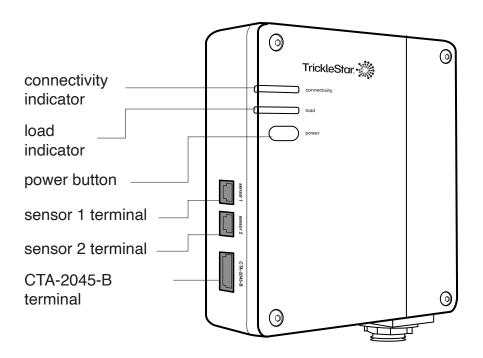
Before installing the Water Heater Controller, be sure to:

- Read all instructions carefully.
- Read your electric water heater's manual and understand the cautions and warnings when working with it.
- Turn off the power for your electric water heater either at the Circuit Breaker or at the Main Switch. Leave the power OFF until you have finished the installation.
- Turn off the incoming water supply at the shut off valve for your water heater or turn off the water supply to the building. Leave the water supply OFF until you have finished the installation.





Water Heater Controller Features



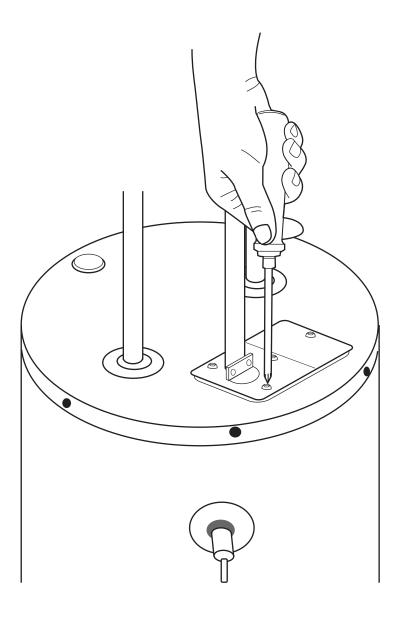


Installing the Water Heater Controller

Step 1: Unscrew electrical cover plate

Unscrew the electrical cover plate to remove it from your water heater.

Be sure to keep the screws at a safe place because you will reuse them later.

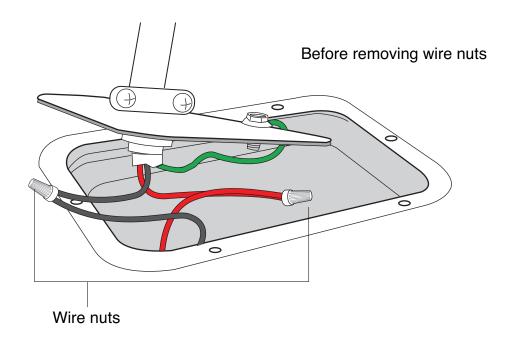


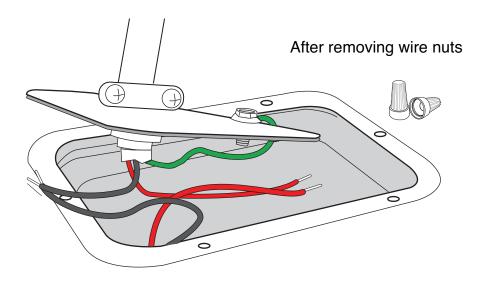


Step 2: Remove wire nuts

Before removing the wire nuts from the wires, we recommend that you take a photo of the wires. You may need to refer to this photo at a later stage.

After removing the wire nuts, separate the wires.

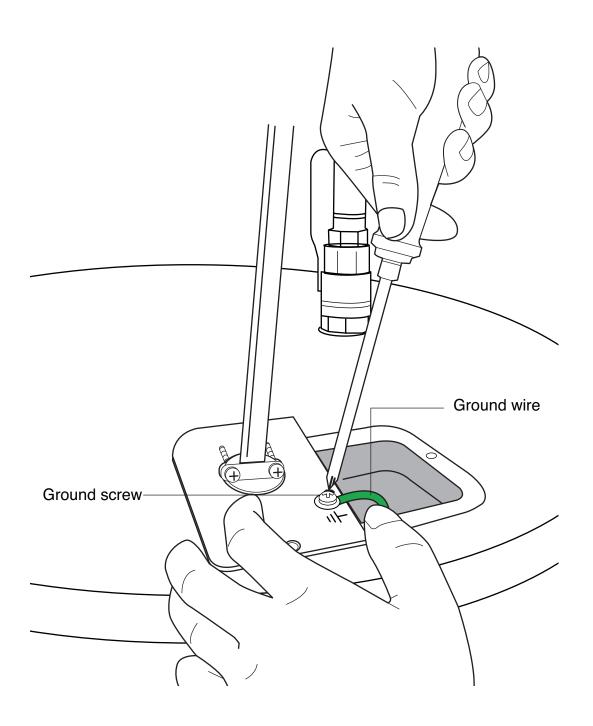






Step 3: Unscrew ground wire

Unscrew the ground wire from the ground screw.

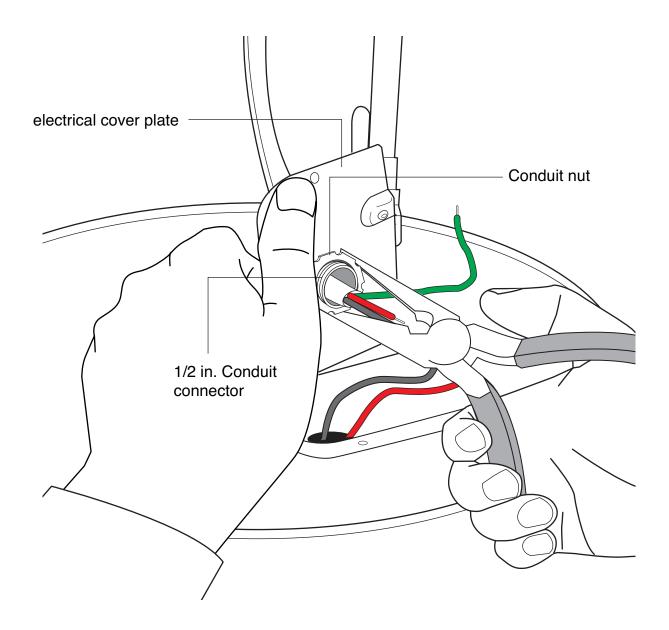




Step 4: Remove conduit nut and conduit connector from electrical cover plate

- Flip the electrical cover plate to see the bottom.
- Use a pair of needle nose pliers to remove the conduit nut from the conduit connector.
- Remove the conduit connector from the electrical cover plate.

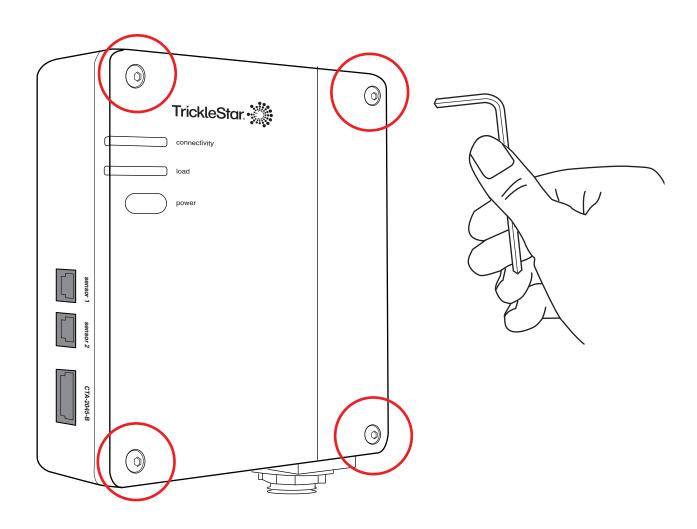
Be sure to keep the conduit nut at a safe place because you will reuse it later.





Step 5: Unscrew the front cover of your Water Heater Controller

Use the supplied Allen Key to unscrew the front cover of your Water Heater Controller. Then, remove the front cover.





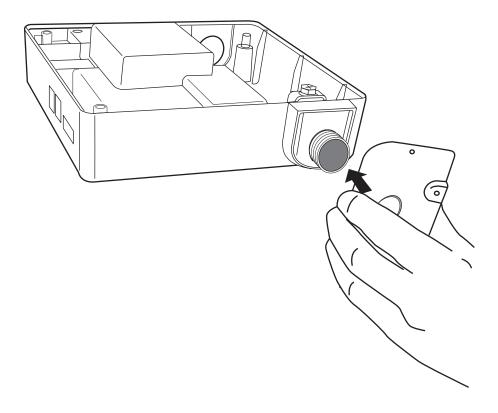
Step 6: Mount your Water Heater Controller onto the electrical cover plate

Before you mount your Water Heater Controller, be sure to remove the conduit nut fastened to the chase nipple at the bottom of the Water Heater Controller.

If you have a CTA-2045 Communication Port Adapter at the top of your water heater, you may need to install an additional 1/2 in. threaded coupling (not supplied).

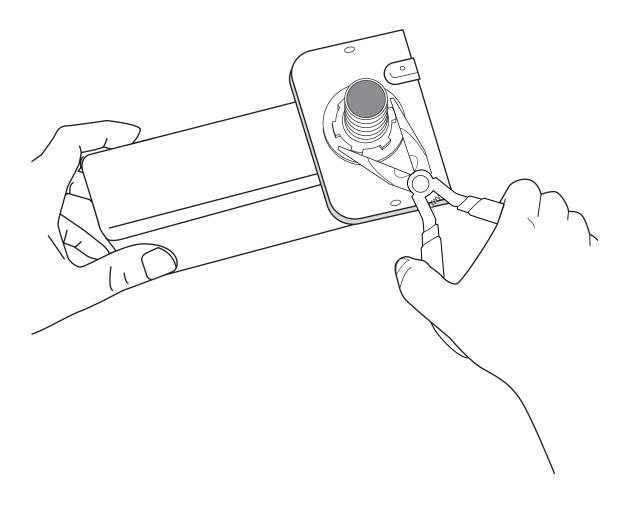
Step 6A: If your Water Heater Controller does not block the CTA-2045 Communication Port Adapter

 Insert the electrical cover plate to the threaded conduit at the bottom of your Water Heater Controller.





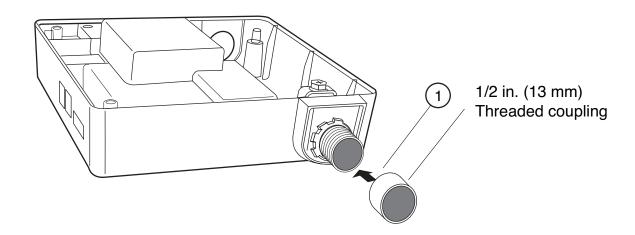
2) At the bottom of the electrical cover plate, use a pair of needle nose pliers to fasten the conduit nut from the Water Heater Controller to the chase nipple. Ensure that the electrical cover plate is securely in place and does not move.



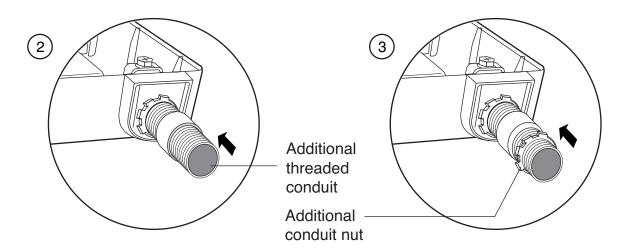


Step 6B: If your Water Heater Controller blocks the CTA-2045 Communication Port Adapter

1) Connect an additional ½ in. (13 mm) threaded coupling to the chase nipple.

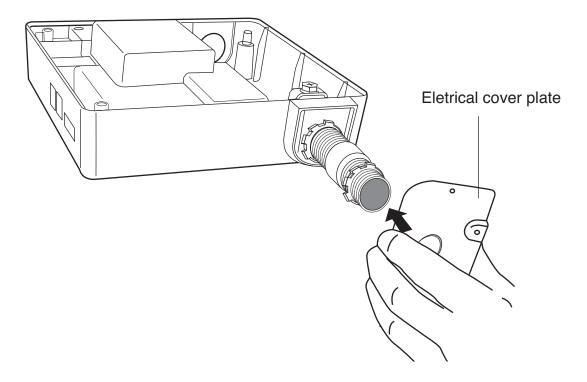


- 2) Connect an additional threaded conduit to the threaded coupling to extend the chase nipple.
- 3) Insert an additional conduit nut to the threaded conduit.

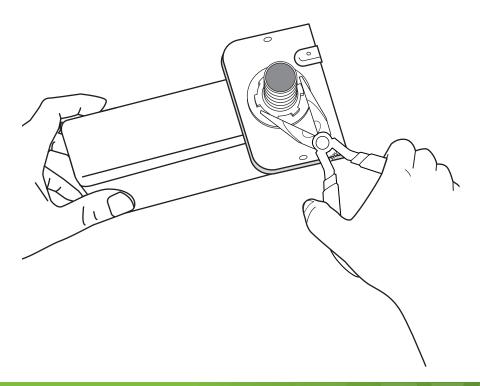




4) Insert the electrical cover plate to the additional threaded conduit at the bottom of your Water Heater Controller.

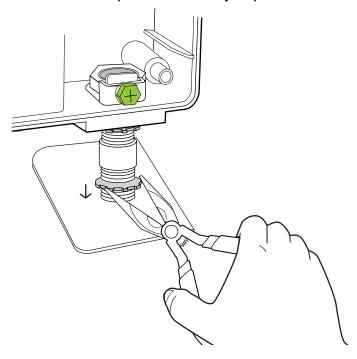


5) At the bottom of the electrical cover plate, use a pair of needle nose pliers to fasten the conduit nut from the Water Heater Controller to the threaded conduit.





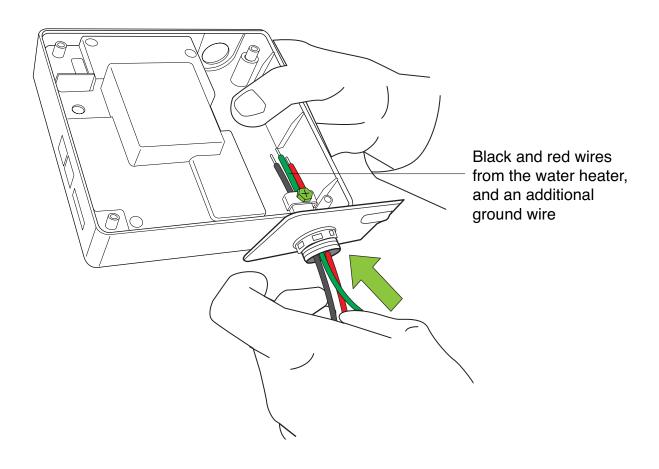
6) Use a pair of needle nose pliers to fasten the conduit nut in step 3 to the electrical cover plate. Ensure that the electrical cover plate is securely in place and does not move.





Step 7: Feed the wires through the conduit connector

Feed the black and red wires from the water heater as well as an additional ground wire through the conduit connector at the bottom of your Water Heater Controller.



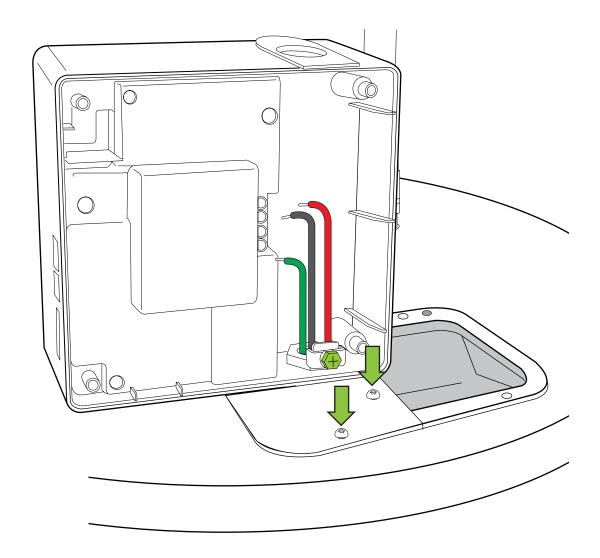
Note:

If your water heater contains more than 1 set of black and red wires, feed all wires to the Water Heater Controller.



Step 8: Screw the electrical cover plate onto your water heater

Place the electrical cover plate back to its original position. Then, screw the electrical cover plate onto your water heater.



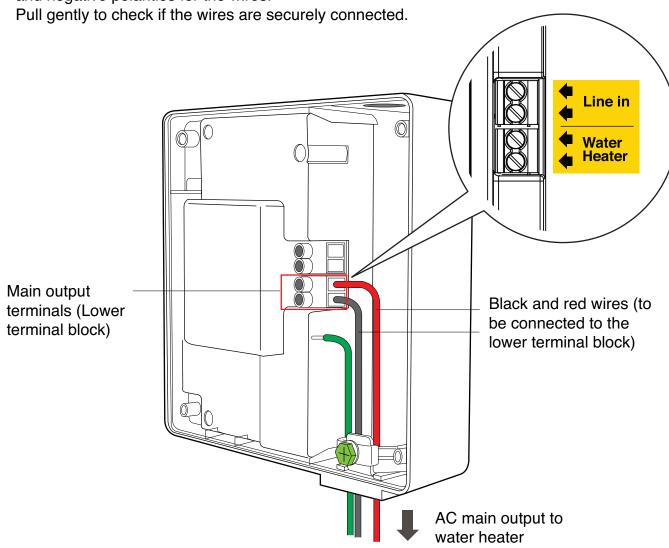


Note: Do not screw the other part of the electrical cover plate because you will be working on these wires later.



Step 9: Connect the wires to the lower terminal block

- Before you connect the wires to the lower terminal block, be sure to loosen the screws at the terminals so that the wires can be inserted into the terminal block.
- Insert the wires into the terminal block, and tighten the screws. Note that there are no positive and negative polarities for the wires.





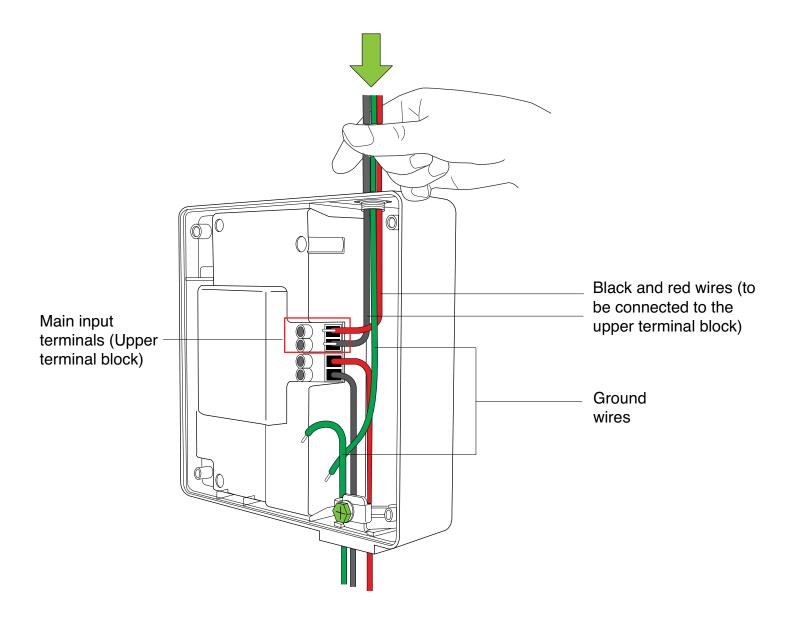
Note:

- 1. Ensure that the black and red wires are connected to the "Water Heater" terminal block as indicated on the yellow label.
- 2. Ensure that the wires are inserted fully and that the black and red wires do not touch each other.
- 3. If your water heater has more than 1 set of black and red wires, terminate all wires to the "Water Heater" terminal block.



Step 10: Feed the power supply wires through your Water Heater Controller

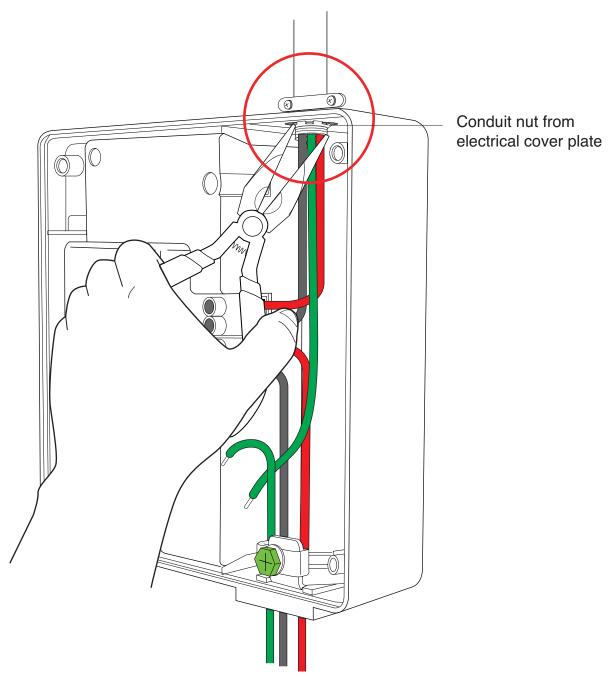
- Feed the power supply wires through your Water Heater Controller from the top.
- Make sure that the black and red wires can reach the upper terminal block and the ground wire can reach the ground screw at the bottom bracket. The ground wire should be approximately four inches longer than the black and red wires.





Step 11: Fasten conduit nut

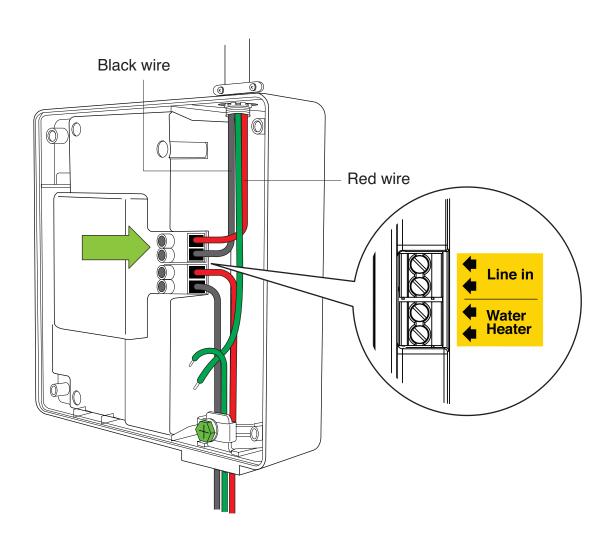
- Feed the power supply wires through the conduit nut from the electrical cover plate.
- Use a pair of needle nose pliers to fasten the conduit nut to the conduit connector at the top of your Water Heater Controller.





Step 12: Connect the wires to the upper terminal block

- Before you connect the wires to the upper terminal block, be sure to loosen the screws at the terminals so that the wires can be inserted into the terminal block.
- Insert the wires into the terminal block, and tighten the screws. Note that there are no positive and negative polarities for the wires.
- Pull gently to check if the wires are securely connected.





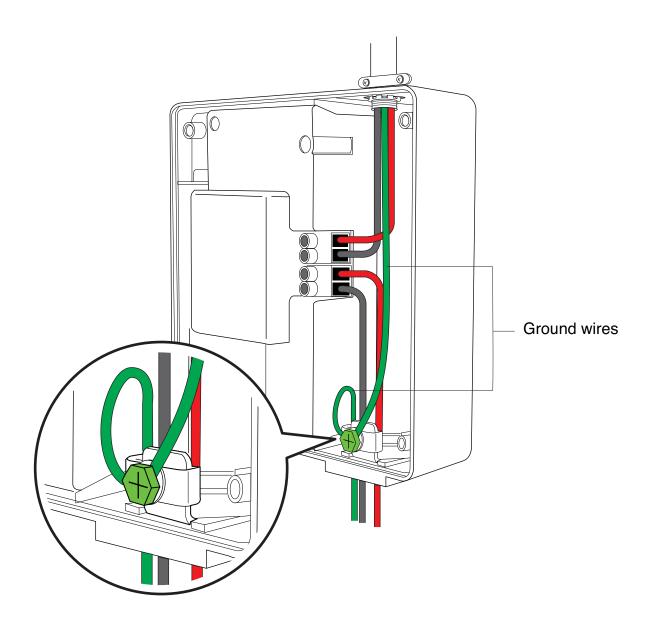
Note:

- 1. Ensure that the black and red wires are connected to the "Line In" terminal block as indicated on the yellow label.
- 2. Ensure that the wires are inserted fully and that the black and red wires do not touch each other.



Step 13: Screw ground wires

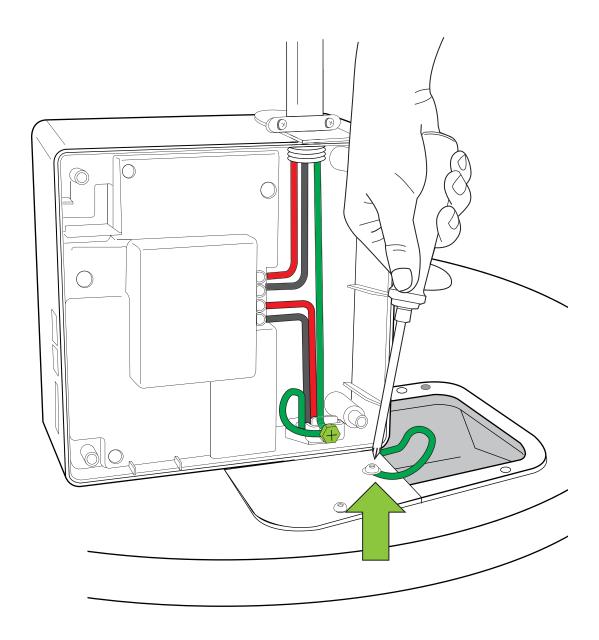
- Before you attach the ground wires, you need to loosen the ground screw from the bottom bracket.
- · Insert both ground wires and secure with the screw to the bottom bracket.
- Pull gently to check if the ground wires are securely connected.





Step 14: Screw the additional ground wire

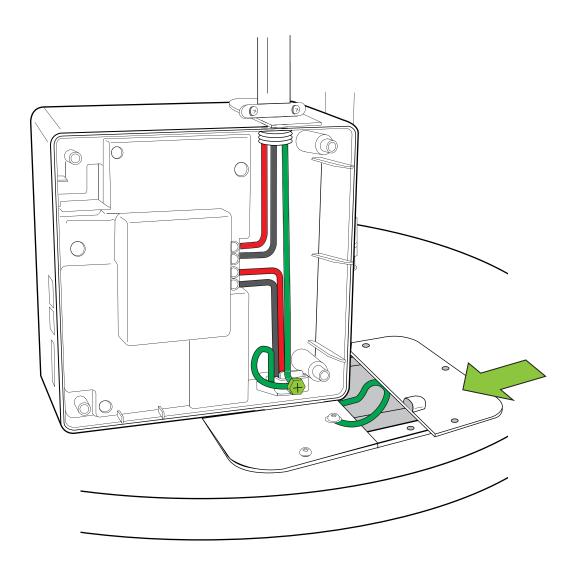
Screw the additional ground wire to the ground screw on the electrical cover plate.





Step 15: Screw the other part of electrical cover plate onto your water heater

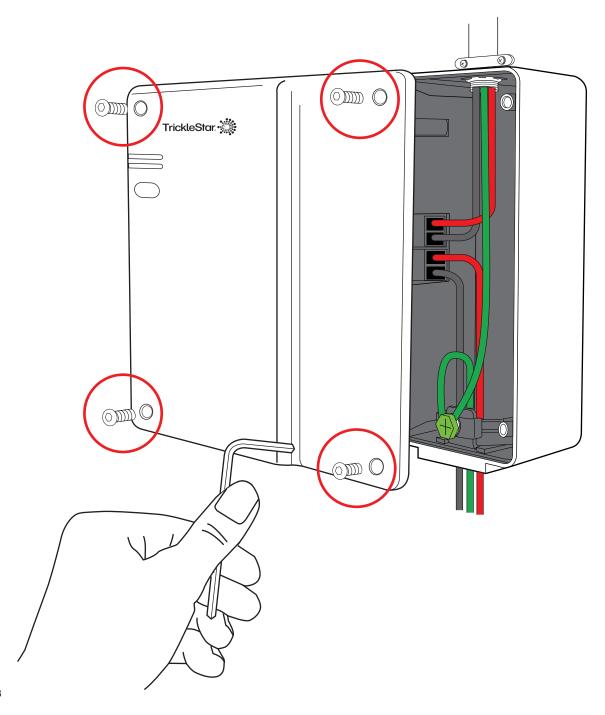
- Before you attach the other part of the electrical cover plate, be sure to insert all wires back into the water heater.
- Place the other part of the electrical cover plate back to its original position. Then, screw the electrical cover plate onto your water heater.





Step 16: Screw the front cover to your Water Heater Controller

Use the supplied Allen Key to screw the front cover to your Water Heater Controller.

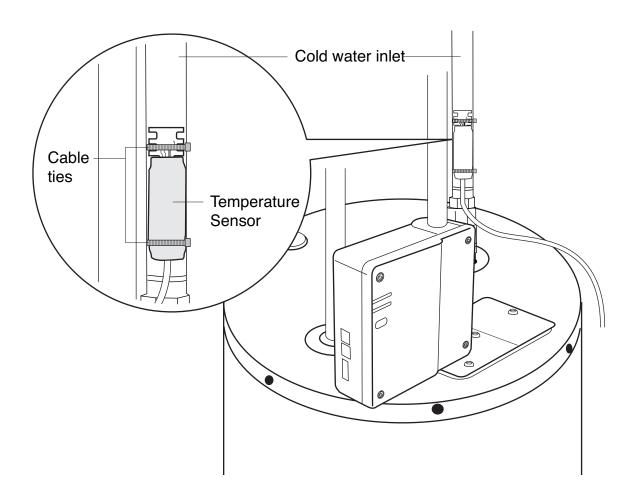




Installing the Temperature Sensor

Step 1: Tie Temperature Sensor to the cold water inlet

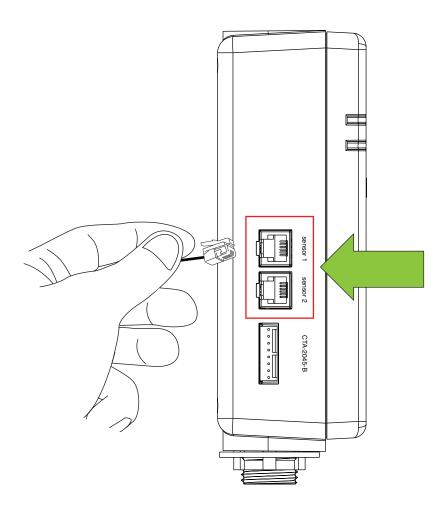
- Place the Temperature Sensor at the cold water inlet of your water heater. Make sure the
 Temperature Sensor is in contact with the metal part of the cold water inlet, and the sensor is
 located near the water heater.
- Use the supplied cable ties to secure the Temperature Sensor to the cold water inlet. Make sure one cable tie passes through the notches on the Printed Circuit Board (PCB), to have the best contact between the sensor and the cold water inlet. Then, secure another cable tie on the other end of the Temperature Sensor.
- Trim off the excess lengths of the cable ties.





Step 2: Connect Temperature Sensor to Water Heater Controller

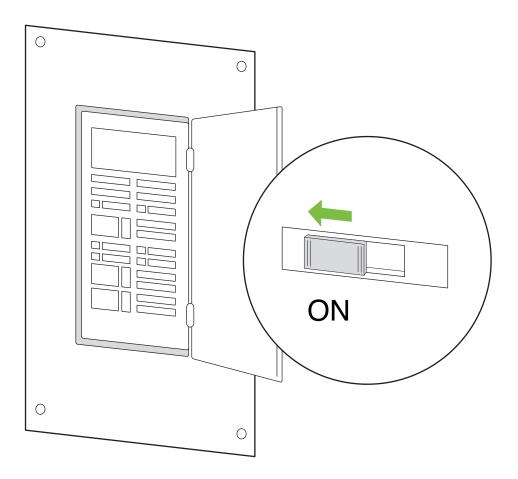
Connect the Temperature Sensor to either terminals of sensor 1 or sensor 2 on the Water Heater Controller.





Step 3: Turn on the power and water supply

- Turn the power back ON for your electric water heater either at the Circuit Breaker or at the Main Switch.
- Turn on the incoming water supply at the shut off valve for your electric water heater or turn on the water supply to the building.





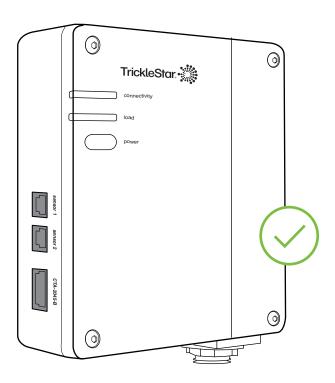
Note:

If you have a Flood Sensor or CTA-2045 Communication Port Adapter, proceed to "Other Installations" on page <u>33</u>.



Installation done!

Congratulations! You have completed your installation. Please proceed to page <u>36</u> for details on how to connect your Water Heater Controller to Wi-Fi via the Portal.



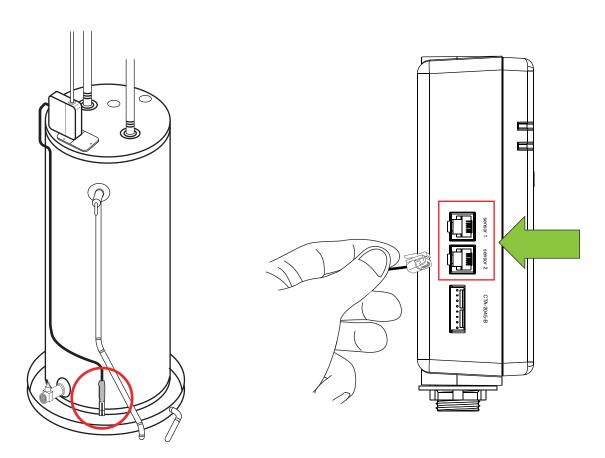


Other Installations

If you have a TS1919 Flood Sensor (sold separately)

The Flood Sensor is used to detect moisture levels and will alert you if your water heater is leaking. For more information on the TS1919 Flood Sensor, visit our website at: www.tricklestar.com

- Peel off the release liner from the double-sided tape attached to the Flood Sensor.
- When you attach the Flood Sensor at the bottom of your water heater, make sure that the metal probes:
 - are pointing down.
 - are not in contact with any metal parts.
 - are about 1/8 in. above the surface of the drain pan.
- Connect the Flood Sensor to either terminals of sensor 1 or sensor 2 on the Water Heater Controller.

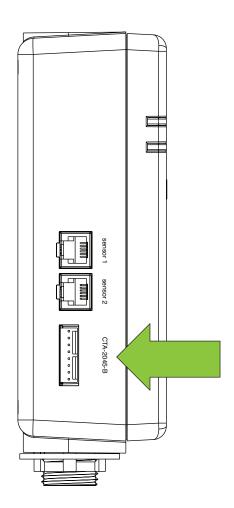




If you have a CTA-2045 Communication Port Adapter (available in H1 2022)

Before you connect your CTA-2045 Communication Port Adapter to the CTA-2045-B terminal on the Water Heater Controller, check your water heater's manual to determine if your water heater is a CTA-2045 enabled water heater. Connect your CTA-2045 Communication Port Adapter to the CTA-2045-B terminal on the Water Heater Controller.

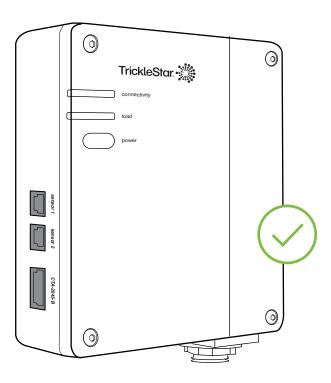
If your cable cannot fit the terminal, you can purchase the TS3011 CTA-2045-B cable, sold separately. For more information on the TS3011 CTA-2045-B cable, visit our website at: www.tricklestar.com.





Installation done!

Congratulations! You have completed your installation. Please proceed to page <u>36</u> for details on how to connect your Water Heater Controller to Wi-Fi via the Portal.





Connect your Water Heater Controller to Wi-Fi via TrickleStar Portal/App

Before you start:

- Please ensure that the homeowner has created a TrickleStar Portal account for installation and configuration,
- Contractors may use their own contractor accounts to install and configure the device, just be sure to transfer ownership of the device to the homeowner once configuration is done,
- You can create a new account via the TrickleStar App.





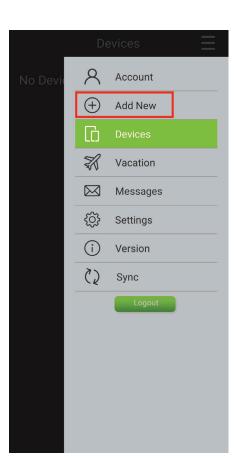


Once you have created the TrickleStar Portal account, follow these steps to connect your Water Heater Controller to Wi-Fi:

- 1. Launch the TrickleStar App, you should see the following screen if you do not have any devices added to your TrickleStar account.

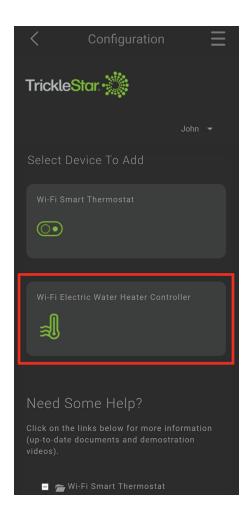


2. Tap on the Menu icon and tap on "Add New" to add a new device.

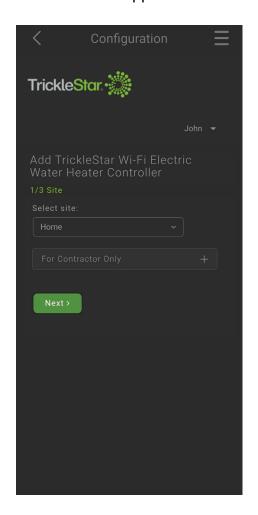




3. Select "Wi-Fi Electric Water Heater Controller".



4. Follow the instruction guide to connect your Water Heater Controller to Wi-Fi via the TrickleStar App.



Ready to use

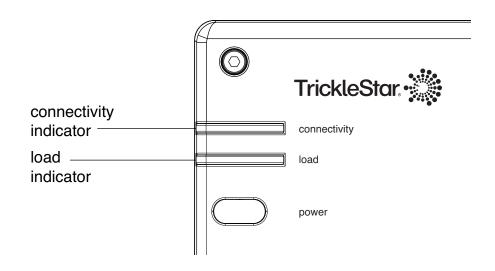
When you have connected your Water Heater Controller to Wi-Fi via the TrickleStar App, your Water Heater Controller is ready to use. The "connectivity" LED should light up in green.



LED Indicators

The LED indicators provide the following information:

Indicators	Status	Information
connectivity	Does not light up	There is no power to the Water Heater Controller.
	Lights up in green	The Water Heater Controller is connected to Wi-Fi but there is no demand response activity.
	Lights up in blue	The Water Heater Controller is connected to Wi-Fi and there is demand response activity.
	Flashes in green	The Water Heater Controller has not been connected to Wi-Fi via the Portal or there is a connectivity error.
load	Does not light up	The load is off; there is no power to your water heater.
	Lights up in red	The load is on; power is supplied to your water heater.
	Flashes in red	An error has been detected, and the load is turned off as a protective measure.





Troubleshooting

Symptom	Description
Your Water Heater Controller does not turn on after installation.	 Check that all wires are connected correctly to the terminal blocks on the Water Heater Controller. Pull the wires gently to ensure that they are connected securely. Check if you have turned the power back ON for your electric water heater, either at the Circuit Breaker or at the Main Switch.
Your Water Heater Controller cannot be registered via the TrickleStar Portal.	If the TrickleStar Portal requests for the DSN number, refer to the label at the back of the Water Heater Controller. You will find the DSN number on the label.

If the problem persists, you can refer to the Frequently Asked Questions (FAQ) section on our website, email or call our technical support:

Website: www.tricklestar.com

Email: customer.service@tricklestar.com

Toll Free: 1-888-700-1098



Legal

Approvals

This product was designed and built in accordance to RoHS directive 2002/95/EC and contains no hazardous substances as defined by this directive.

FCC Compliance Statement Compliance Notice:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of FCC rules. Operation is subject to the following two conditions:

- 1. This device may not cause harmful interference.
- 2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications that are not expressly approved by the manufacturer could void the user's authority to operate the equipment.



RF Exposure Information:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 8 inches during normal operation.

Industry Canada (IC) Compliance Notice:

This device complies with Industry Canada license-exempt RSS standard(s).

Operation is subject to the following two conditions:

- 1. This device may not cause interference.
- 2. This device must accept any interference, including interference that may cause undesired operation of the device.

This Class B digital apparatus complies with Canadian ICES-003.

RF Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This transmitter must be installed to provide a separation distance of at least 8 inches from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.

FCC ID: TBD
IC ID: TBD
CAN ICES-3 (B)/NMB-3(B)
Assembled in China.



Warranty

THREE-YEAR LIMITED PRODUCT WARRANTY

TrickleStar Inc. ("TrickleStar"), of 251 Little Falls Drive, Wilmington, DE 19808 warrants to the purchaser this TrickleStar TS2301 Wi-Fi Electric Water Heater Controller ("Product") will be free from defects in materials and workmanship for a period of three (3) years ("Warranty Period") from the date of purchase, under normal use and service, and provided the Product is installed and used according to manufacturer's instructions.

If the Product fails to conform to this Limited Warranty during the Warranty Period, TrickleStar at its sole discretion, will either:

- (a) repair or replace any defective Product or component. The repair or replacement may be made with a new or refurbished Product or components; or
- (b) accept the return of the Product and refund the money paid by the original purchaser for the Product.

If the Product or a component incorporated within is no longer available, TrickleStar at its sole discretion, may replace the Product with a similar product of similar function. This is your sole and exclusive remedy for breach of this Limited Warranty.

Any Product that has either been repaired or replaced under this Limited Warranty will be covered by the terms of this Limited Warranty for the longer of: (a) ninety (90) days from the date of delivery of the repaired Product or replacement Product; or (b) the remaining Warranty Period.

This Limited Warranty is transferable from the original purchaser to subsequent owners, but the Warranty Period will not be extended in duration or expanded in coverage for any such transfer. A proof-of-purchase is required from the owner for TrickleStar to provide a replacement and/or repaired Product.



HOW TO CLAIM UNDER THIS LIMITED WARRANTY

Before making a claim under this Limited Warranty, the owner of the Product must

- (a) notify TrickleStar of the intention to claim by visiting TrickleStar.com/support during the Warranty Period and providing a description of the alleged failure; and
- (b) comply with TrickleStar's return shipping instructions.

TrickleStar will have no warranty obligations to a returned Product if it determines, in its reasonable discretion after examining of the returned Product, that the Product is an Ineligible Product (defined below). TrickleStar will bear all costs of return shipping to owner and will reimburse any shipping costs incurred by the owner, except to any Ineligible Product, for which the owner will bear all shipping costs.

WHAT THIS LIMITED WARRANTY DOES NOT COVER

This Limited Warranty does not cover the following (collectively "Ineligible Products"):

- (i) Products that have been subject to: (a) modifications, alterations, tampering, or improper maintenance or repairs; (b) handling, storage, installation, testing, or use, not in accordance with the Installation Manual or other instructions provided by TrickleStar; (c) abuse or misuse of the Product; (d) breakdowns, fluctuations, or interruptions in electric power or telecommunications network; or (e) Acts of God, including but not limited to lightning, flood, tornado, earthquake, or hurricane;
- (ii) Any non-TrickleStar branded products, even if packaged or sold with TrickleStar Product.
- (iii) This Limited Warranty does not cover consumable parts, including batteries, unless damage is due to defects in materials or workmanship of the Product, or software (even if packaged or sold with the Product).
- (iv) Installation or dismantling costs.



DISCLAIMER OF WARRANTIES

EXCEPT AS STATED ABOVE IN THIS LIMITED WARRANTY, AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, TRICKLESTAR DISCLAIMS ALL EXPRESS, IMPLIED, AND STATUTORY WARRANTIES AND CONDITIONS WITH RESPECT TO THE PRODUCT, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, TRICKLESTAR ALSO LIMITS THE DURATION OF ANY APPLICABLE IMPLIED WARRANTIES OR CONDITIONS TO THE DURATION OF THIS LIMITED WARRANTY.

LIMITATION OF DAMAGES

In addition to the above warranty disclaimers, in no event will TrickleStar be liable for any consequential, incidental, exemplary, or special damages, including any damages for lost data or lost profits, arising from or relating to this limited warranty or the Product. TrickleStar's total cumulative liability arising from or related to this limited warranty or the Product will not exceed the amount paid for the Product by the original purchaser.

LIMITATION OF LIABILITY

The TrickleStar website, TrickleStar Portal, and/or TrickleStar App (iOS and Android) online services ("Services") provide information ("Product Information") on TrickleStar Products or other peripherals connected to your products ("Product Peripherals"). The type of Product Peripherals that may be connected to your product may change from time to time. Without limiting the generality of the disclaimers above, all Product Information is provided for your convenience, "as is", and "as available". TrickleStar does not represent, warrant, or guarantee that Product Information will be available, accurate, or reliable; or that Product Information or use of the Services or Product will provide safety in your premises. You will use all Product Information, Services, and the Product at your own discretion and risk. You will be solely responsible for (and TrickleStar disclaims) any and all losses, liabilities, or damages, including those to your wiring, fixtures, electricity, home, office, product, product peripherals, computer, mobile device, and all other items and pets in your home, resulting from your use of TrickleStar's Product Information, Services, or Product. Product Information provided by the Services is not intended to be a substitute for direct means of obtaining the information. For example, a notification provided through the Services is not intended to substitute the audible and visible indications in the premises and on the Product.



JURISDICTION

This Limited Warranty shall be governed by the laws of the state of Delaware.

YOUR RIGHTS AND THIS LIMITED WARRANTY

This Limited Warranty gives you specific legal rights. You may also have other legal rights that vary by state or jurisdiction. Likewise, some of the limitations in this Limited Warranty may not apply in certain states or jurisdictions. The terms of this Limited Warranty will apply to the extent permitted by applicable law.

CHANGES TO THIS POLICY

TrickleStar may revise this Policy from time to time. The latest version of the policy will govern our use of your information and will always be published on the TrickleStar website (www.tricklestar.com). By continuing to access or by using the TrickleStar website, TrickleStar Portal and/or TrickleStar App (iOS or Android) after those changes become effective, you agree to be bound by the revised Policy.

HOW TO CONTACT US IF YOU WISH TO DISCUSS THIS POLICY

If you wish to discuss any aspect of this policy, contact us by email at: customer.service@tricklestar.com.





For technical support, go to: Website: www.tricklestar.com

Email: customer.service@tricklestar.com

Toll Free: 1-888-700-1098

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