



Retrofit Tank Adapter

CET-HD-RT2-1



Product User Manual

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Safety Notices

1. Please read and follow the warning and instructions contained in this document carefully.
2. This product must not be operated outside of the specified Operating Temperature Range.
3. Do not connect this product to a power supply outside of the range specified in the Technical Specifications.
4. This device should be installed by technically qualified personnel. Failure to install in compliance with national and local electrical codes and according to recommendations provided by Combined Energy Technologies may result in electrical shock or fire hazard, unsatisfactory performance, or equipment failure.
5. Repair and maintenance of this product can be performed by qualified service personnel only. Do not attempt to repair the product if damaged. If the product is damaged or inoperable please contact Combined Energy.
6. This product is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience or knowledge, unless they have been given supervision or instruction concerning use of the product by a person responsible for their safety.
7. When installed, a readily accessible disconnect device (e.g. circuit breaker) must be incorporated external to this product.

Compliance with Local Wiring Rules and Network Requirements

The recommendations in this document do not relieve Installers of their responsibility to ensure that all wiring operations are performed in compliance with the latest version of AS/NZS 3000 and any additional requirements imposed by the DNSP (Distribution Network Service Provider). Specific DNSP requirements may include meeting higher levels of protection. Where there is conflict between the recommendations in this document and the requirements of AS/NZS 3000 and/or DNSP network connection rules, the latter should take precedence.

It is the responsibility of Installers to comply with the requirements of any other authority who has jurisdiction over the installation. It is also the responsibility of the Installer to ensure they are suitably qualified under relevant state and federal laws to legally carry out the installation works.

Care must be taken to ensure both mains (LV – Low Voltage) wiring and communications (i.e. Temperature sensors) cabling is installed strictly in accordance with AS/NZS 3000 (latest version) requirements for “Segregation of different voltage levels” and that AS/NZS 3000 (latest version) requirements of double insulation are met for LV **and** ELV wiring. Any further DNSP network connection requirements beyond those mandated by AS/NZS 3000 (latest version) must also be adhered to.

Introduction

The CET-HD-RT2 Retrofit Tank Adapter (“RT2”) is a load control adapter used to add monitoring and control of resistive electric storage water heaters to Combined Energy home energy management systems.

The CET-HD-RT2 is designed to be mounted onto an existing water heater and is inserted into the electrical circuit between the water heater appliance and its upstream disconnect device, allowing the Retrofit Tank Adapter to control the power supply to the water heater.

The CET-HD-RT2 accepts up to four NTC temperature sensors for monitoring the temperature of the water column and/or outlet pipe. An integrated power meter provides real-time monitoring of the power supply to the appliance.

Resistive water heaters rated up to 3.6kW (16A at 240VAC) are controlled by the CET-HD-RT2 by means of an integrated normally-open relay. The Retrofit Tank Adapter normally receives heating commands from a Combined Energy home energy management system, but will automatically apply power if the hot water amenity level falls below a preset threshold.

The CET-HD-RT2-1 communicates with other Combined Energy products at the site using HD-PLC powerline communications. A wired Ethernet interface provides an alternate communications option.

Technical Specifications

Type: Combined Energy Retrofit Tank Adapter

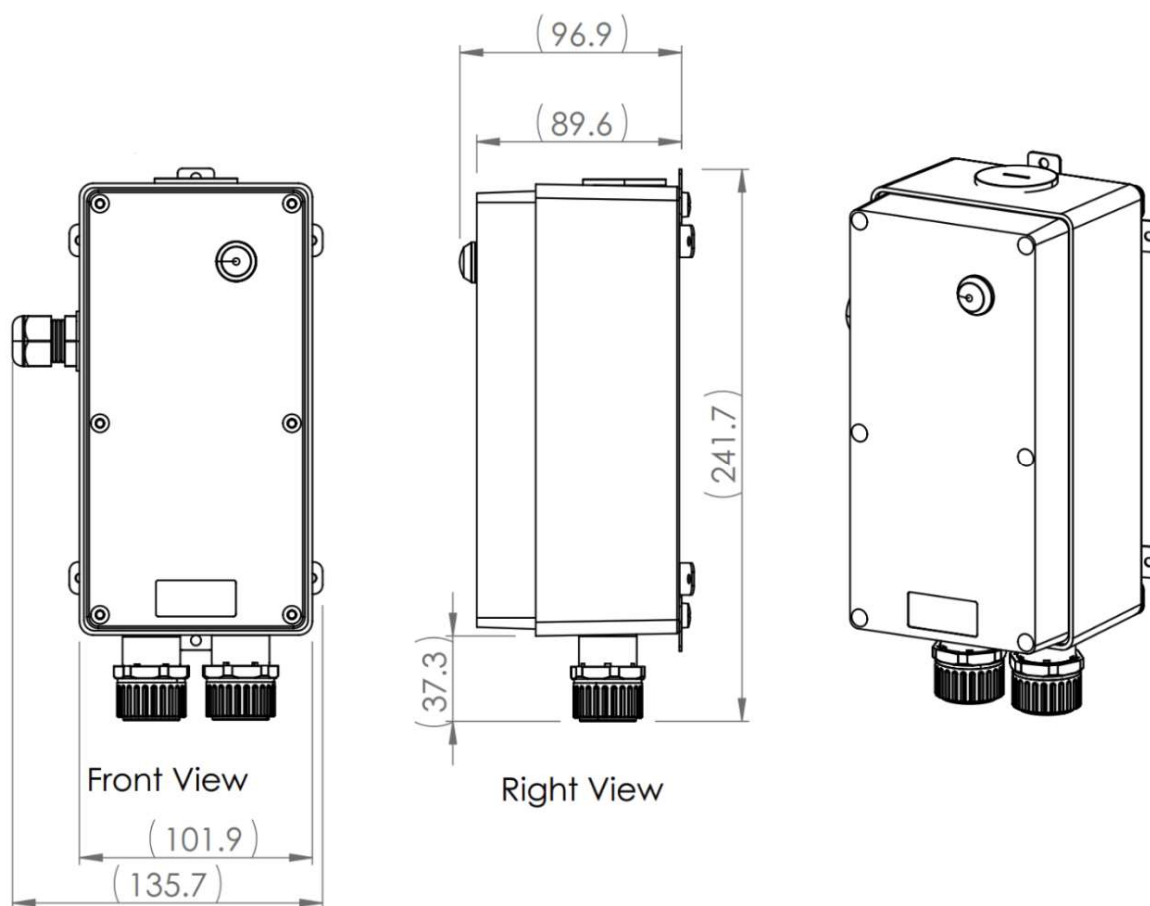
Model: CET-HD-RT2-1

Power Supply Input: 100 - 240VAC 1W + N 50/60Hz 80-30mA

Switched Output Rating: 240VAC 16A

Average power consumption: <8W

Dimensions: 242 x 135 x 97mm



Mass: 0.95kg

Operating Temperature Range: -10C to +50C

IP Rating: IP56 (when installed according to the instructions in this User Manual)

Standards:

- IEC 60950-1, AS/NZS 60950-1 - Information Technology Directive
- EN 50561-1 – Electromagnetic Compatibility for PLC products

Product Features

Power Metering:

- Voltage (L-N), Current, Frequency, Power Factor, Active/Reactive Power, Active/Reactive Import/Export Energy
- Class 1 accuracy

Communications Interfaces:

- 1 x Power-Line Communications (PLC) modem
- 1 x Wired Ethernet (RJ45, 10/100 Base-T)

Inputs:

- 4 x NTC temperature sensor input

Outputs:

- 1 x 16A 240VAC relay switched output

Human Interfaces:

- 1 x Front panel button for manual network reset and diagnostics view
- 2 x LED status indicator (built into front panel button)

Included Accessories:

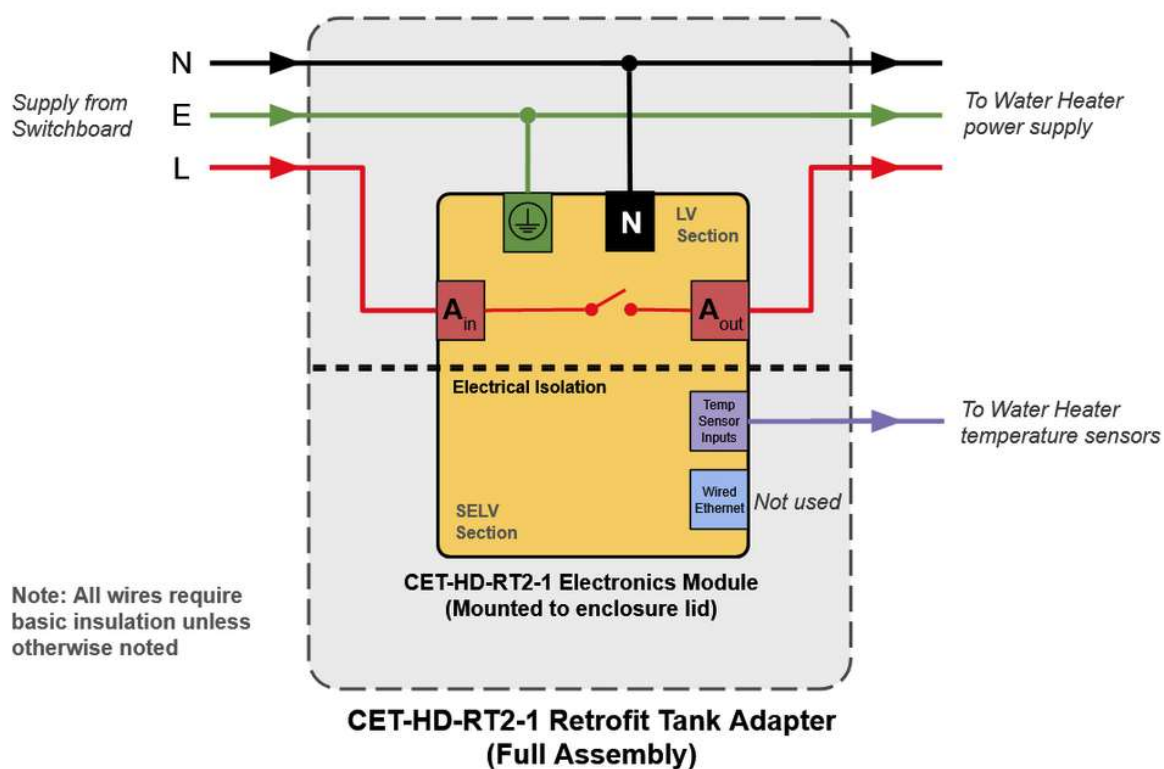
- Enclosure mounting accessories
- Flexible conduit (31cm)
- Load Twin-and-Earth Cable Assembly

Optional Accessories:

- KIT SENSOR POWERSTORE 250-400L REMOTE (Rheem Australia PN 299321)

Wiring Diagram

The CET-HD-RT2-1 is inserted into the electrical circuit of the water heater and controls power to the appliance by means of an integrated normally-open relay:



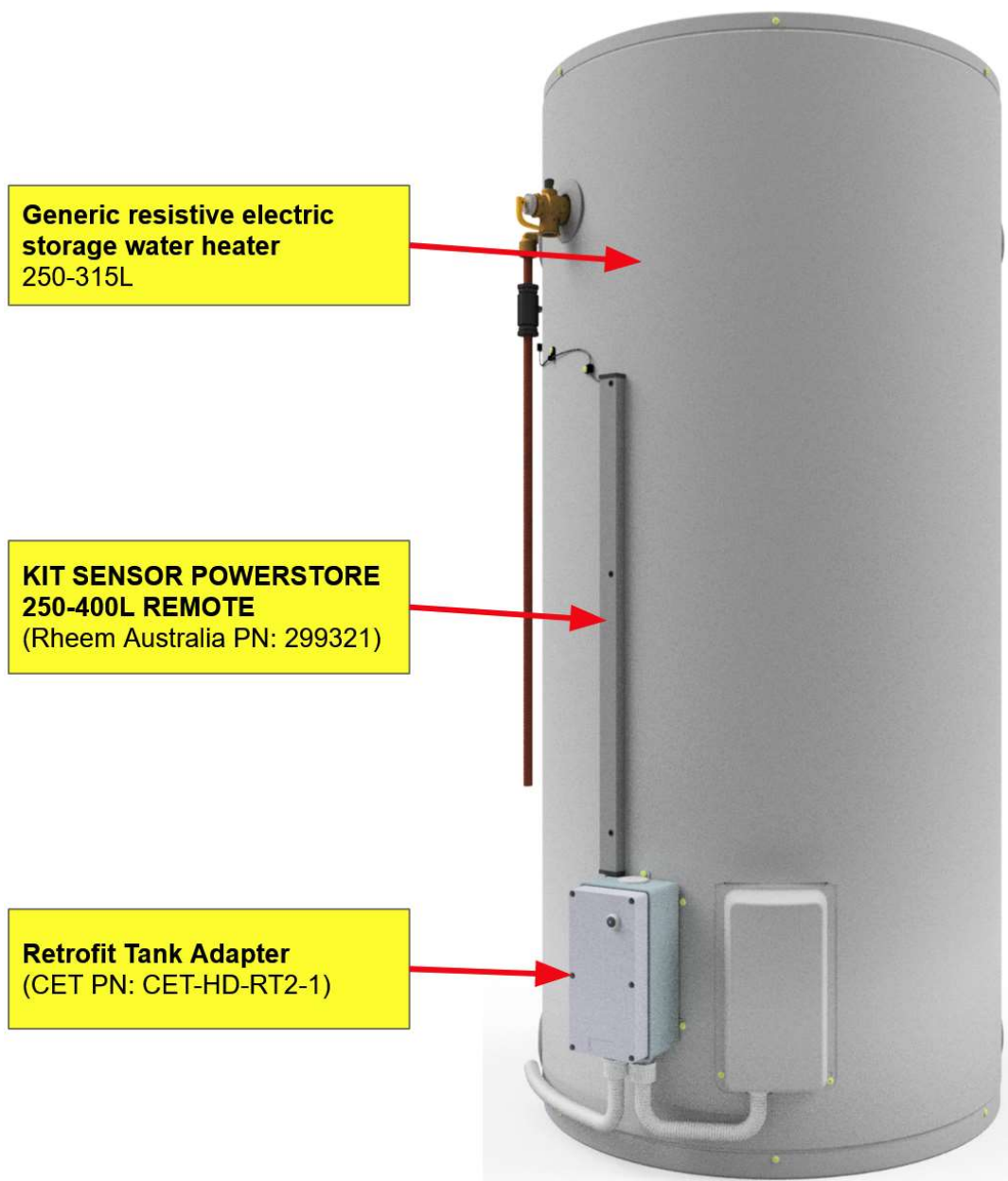
The CET-HD-RT2-1 must be protected by an upstream protection device (or a combination of devices) with a trip current of 32A or less and an earth-leakage trip current of 30mA or less. Note that this protection device must also be selected to protect the water heater appliance connected to the output of the CET-HD-RT2-1.

The CET-HD-RT2-1 must be installed with a disconnect device. The disconnect device can be the same as the protection device.

Installation Guide

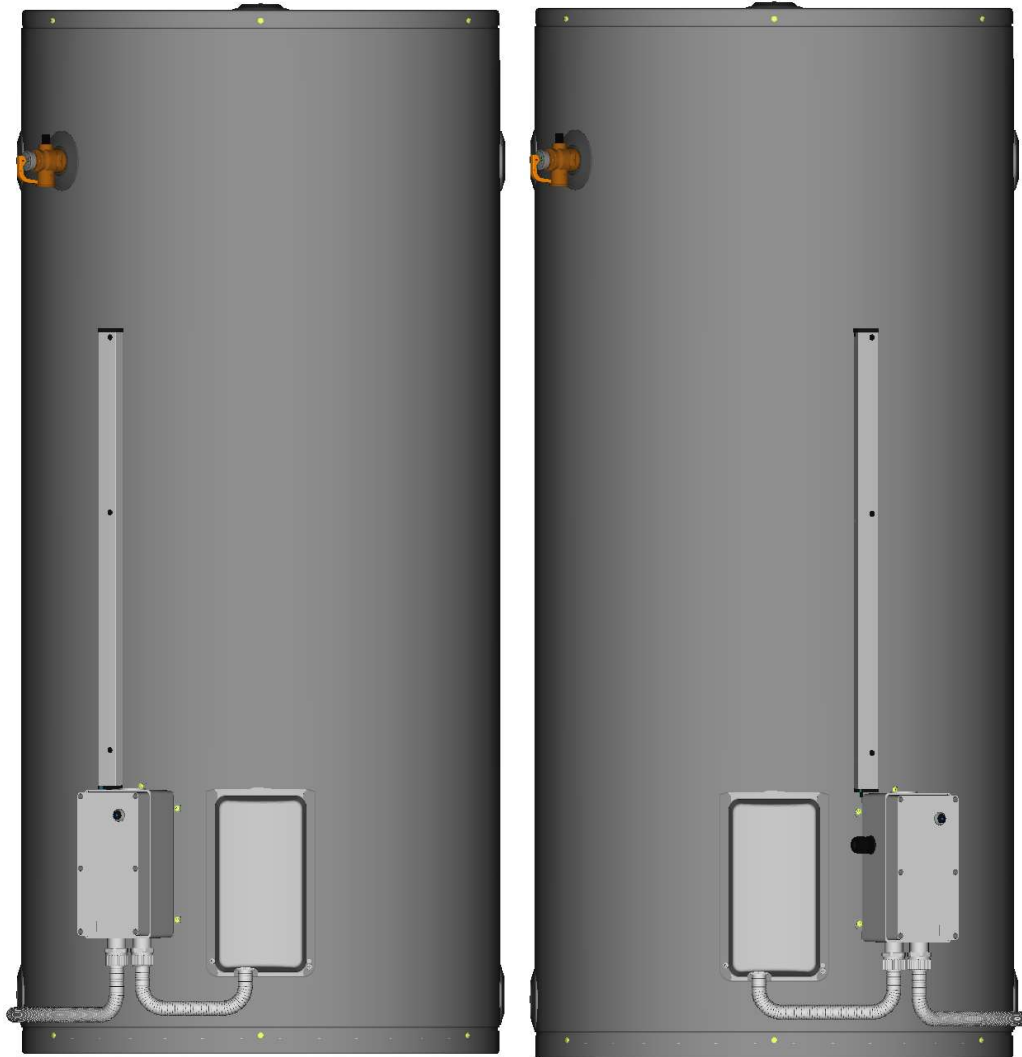
Overview

The CET-HD-RT2-1 is designed to be mounted adjacent to the bottom element opening on the water heater that is being controlled / monitored. The base CET-HD-RT2-1 product performs control and power monitoring functions out of the box, and an additional temperature sensor harness accessory can be added to monitor the temperature of the water column:



Retrofit Tank Adapter Installation

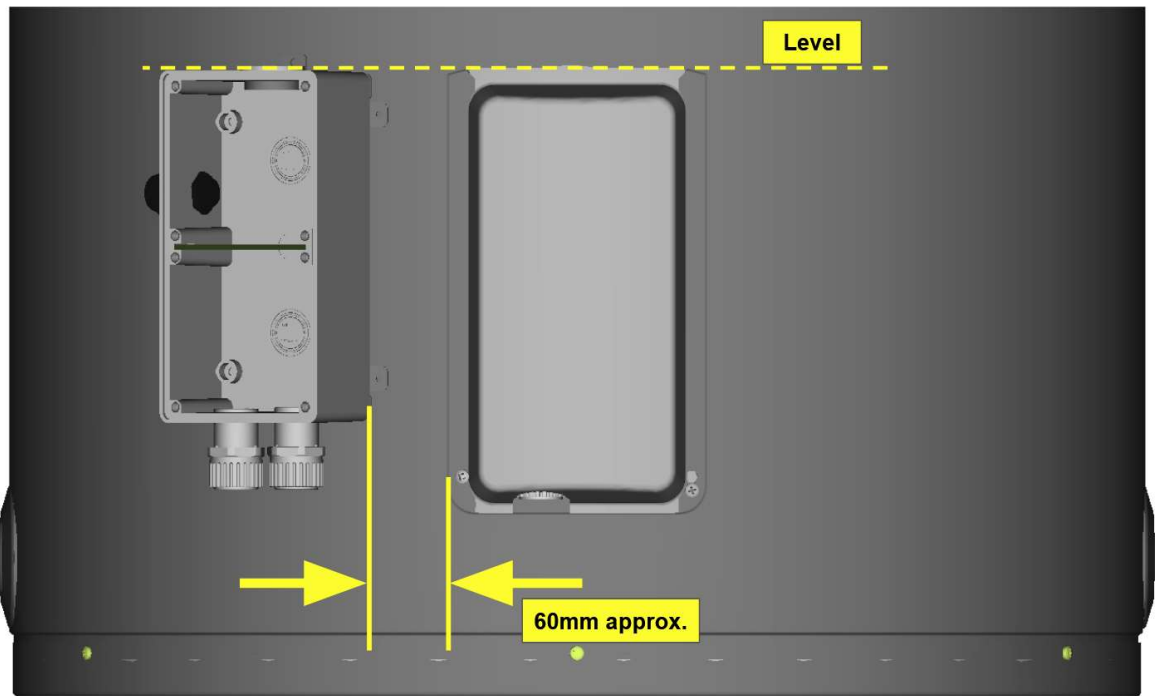
1. Select the preferred mounting location for the CET-HD-RT2. The Retrofit Tank Adapter can be mounted on the left-hand or right-hand side of the element cover depending on which direction the existing LV cable conduit approaches from:



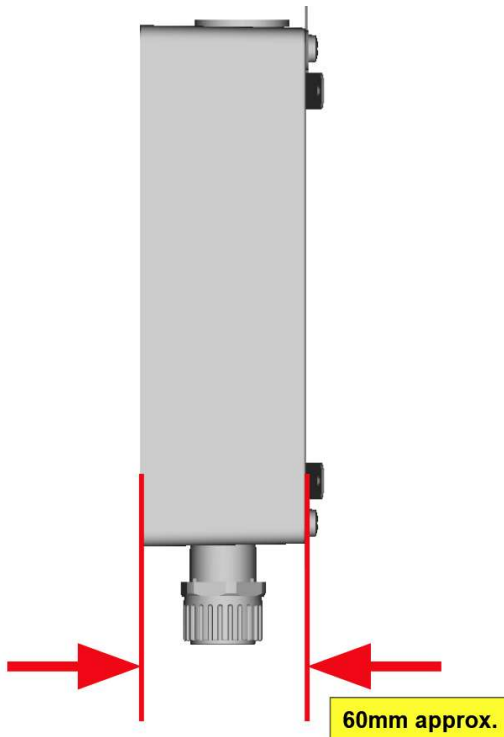
Left-hand

Right-hand

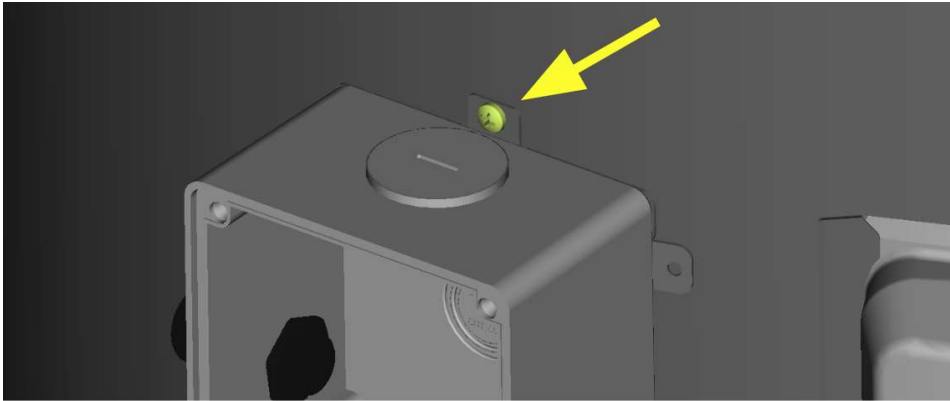
2. Locate the CET-HD-RT2-1 enclosure base on the water heater. The top edge of the enclosure base should be level with the top of the element opening cover, with a gap of approximately 60mm between the element opening cover and the CET-HD-RT2-1:



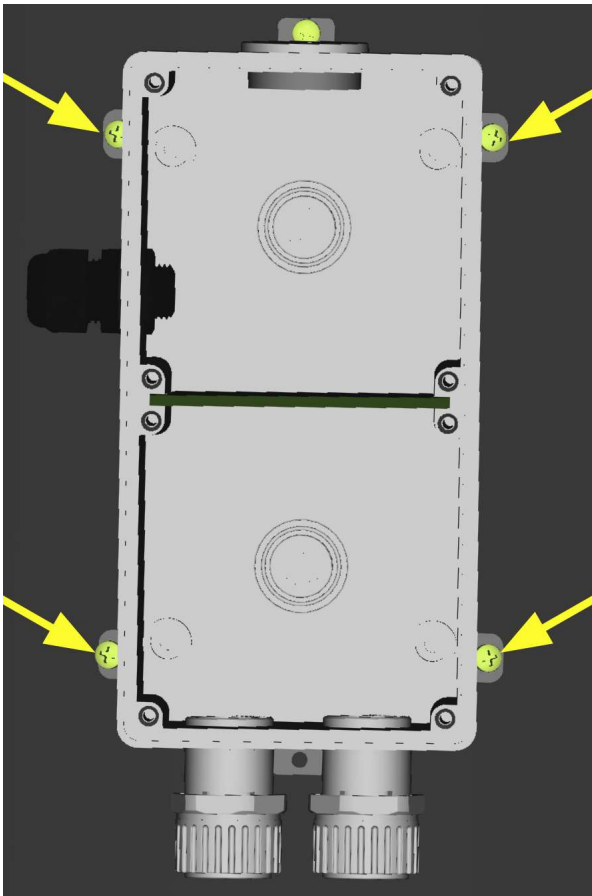
The depth of the CET-HD-RT2-1 enclosure base (63mm) can be used as a guide for marking the required distance between the element opening and CET-HD-RT2-1 enclosure:



3. Fix the top bracket of the enclosure to the water heater jacket using one of the included self-piercing mounting screws once it is in the desired location:



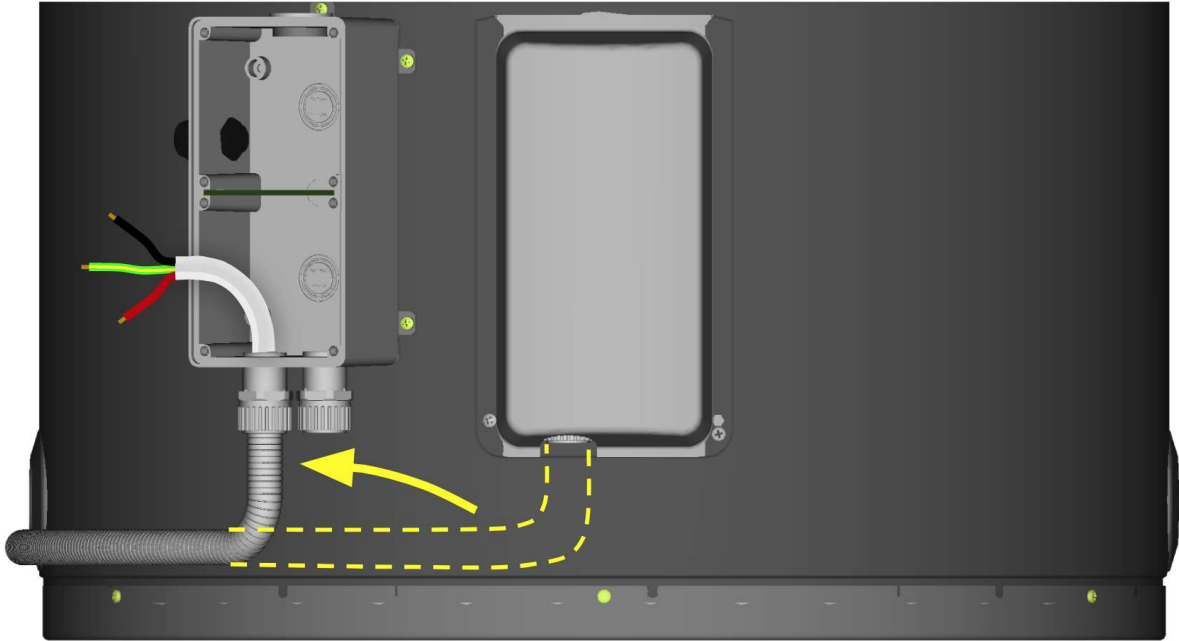
4. Use the four remaining self-piercing screws to fix the enclosure to the water heater jacket:



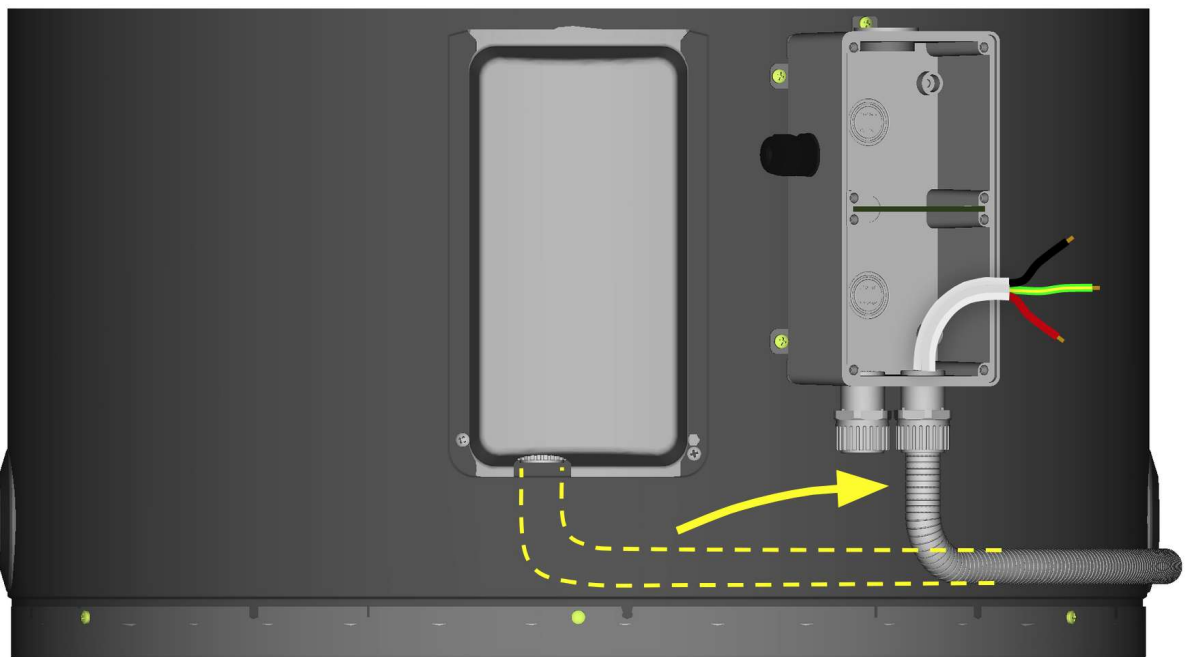
5. **Warning – Risk of Electric Shock:** switch off the electrical supply at the water heater isolation switch in the switchboard or at the isolation switch at the water heater (if installed) before removing the lower front cover of the water heater.

Disconnect the power cable from the water heater and re-route the existing flexible conduit and power supply cable for the water heater to the first port on the bottom face of the enclosure base, cutting the flexible conduit to length as required.

For left-hand installations, use the left port on the CET-HD-RT2-1:



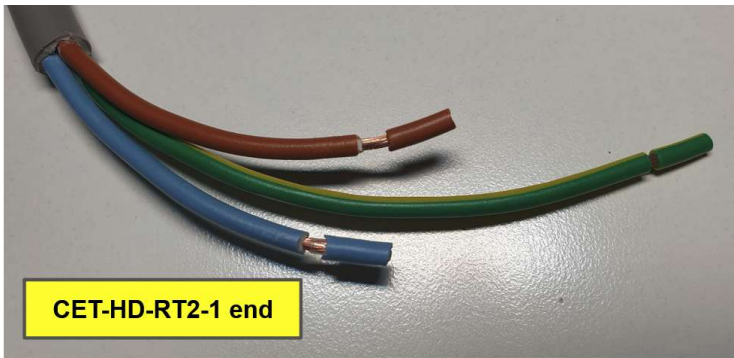
For right-hand installations, use the right port on the CET-HD-RT2-1:



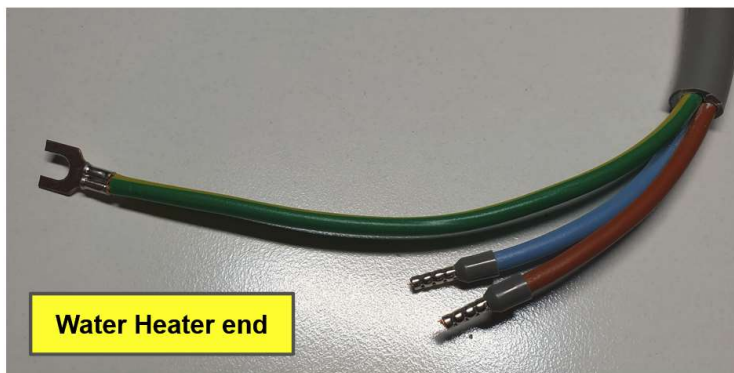
6. A length of **flexible conduit** and pre-made **Load Twin-and-Earth Cable Assembly** are supplied with the CET-HD-RT2-1:



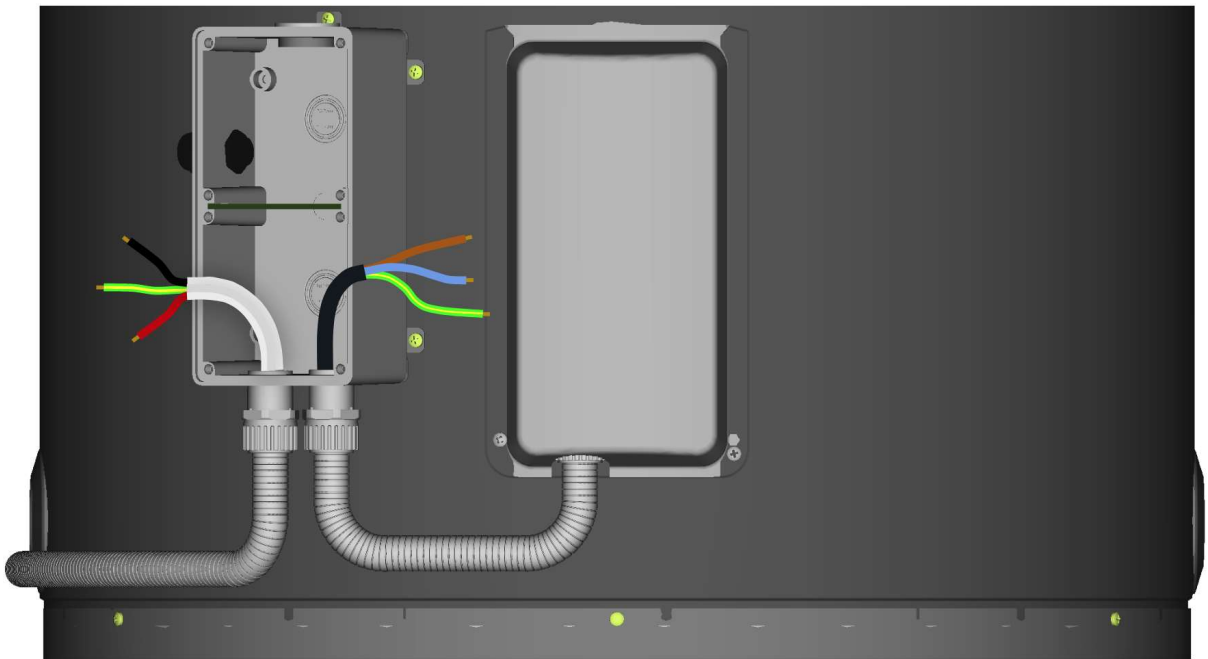
The stripped end of the cable assembly should be terminated at the CET-HD-RT2-1:



The end of the cable assembly should be terminated at the water heater in accordance with the water heater manufacturer's installation instructions:



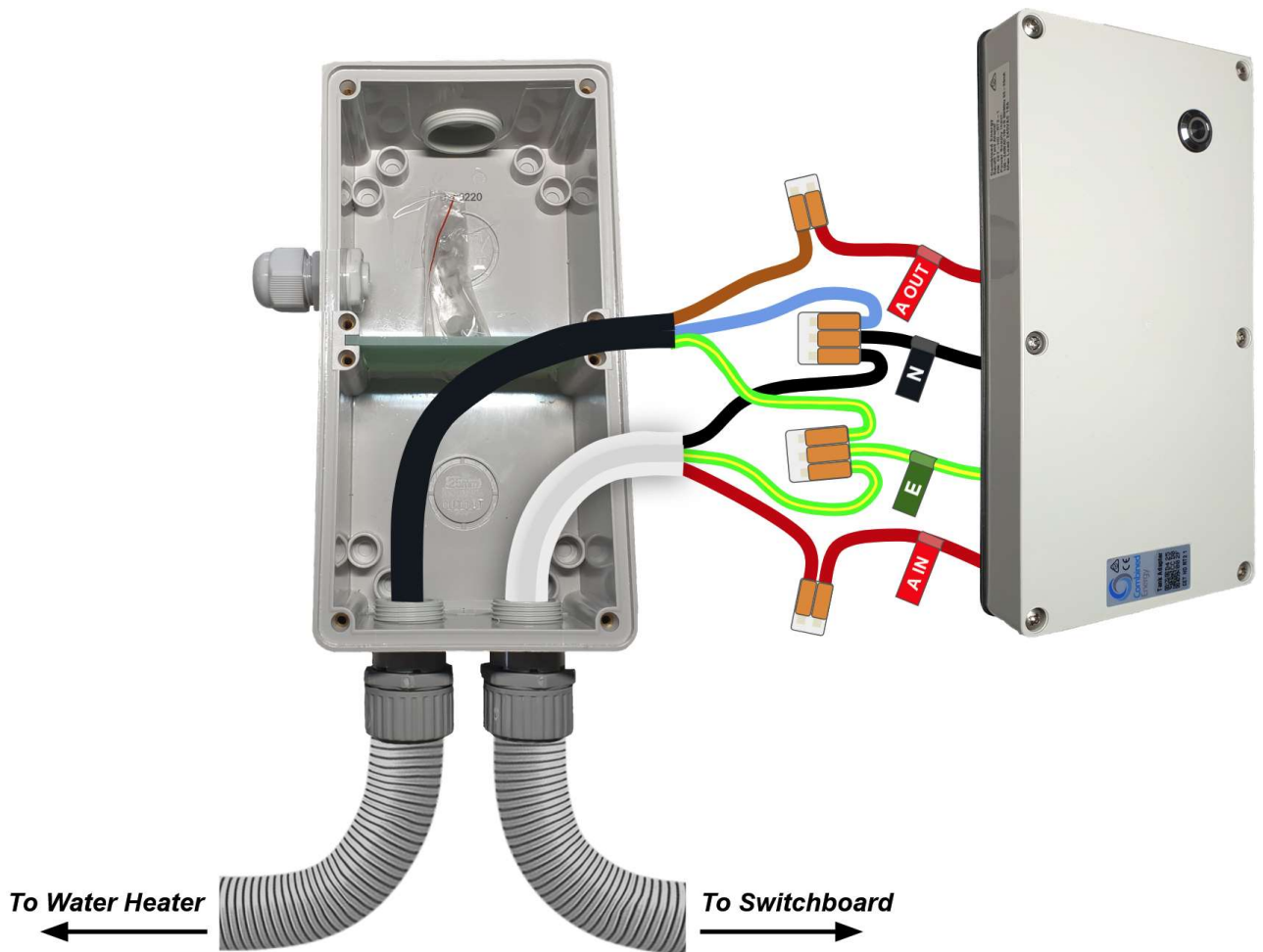
Install the conduit and load cable assembly between the CET-HD-RT2-1 enclosure base and water heater element opening:



7. The CET-HD-RT2-1 is installed in-line with the Active (L) supply wire to the water heater. The appliance Neutral and Earth wires are shared with the CET-HD-RT2-1, and are star connected using the included Wago connectors.

Connect the power supply cable from the switchboard to the Active In ("**A IN**"), Neutral ("**N**") and Earth ("**E**") lines of the CET-HD-RT2-1 lid module.

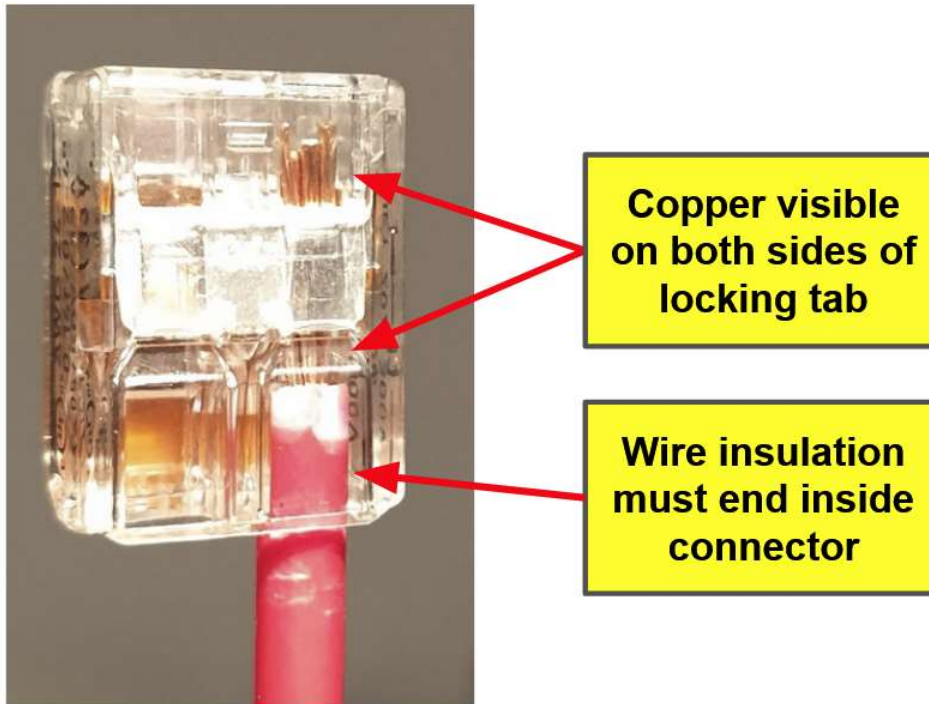
Connect the Load Twin-and-Earth Cable Assembly from the water heater to the Active Out ("**A OUT**"), Neutral ("**N**") and Earth ("**E**") lines of the CET-HD-RT2-1 lid module.



- Important note when using Wago wire splice connectors:** always check the back of the connector to ensure that the locking tab is in contact with the copper strands, and that it is not clamping the wire insulation.

Wires should be stripped 11mm.

Check that copper is visible on both sides of the locking tab, and ensure that the wire insulation enters the body of the connector:



Temperature Sensor Harness Installation

The following installation instructions relate to the **KIT SENSOR POWERSTORE 250-400L REMOTE (Rheem Australia PN 299321)** temperature sensor harness.



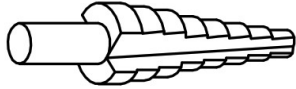
Note: this accessory is not included with the CET-HD-RT2-1 and must be ordered separately.

This accessory measures the temperature of the water column using three spring-loaded sensors that are inserted through the jacket and insulation of the appliance, and which are held against the cylinder by means of an external metal bracket. A fourth sensor is fitted to the water heater outlet pipe to measure the temperature of water leaving the cylinder and to detect water draw off.

Required equipment

The following equipment is required to install the retrofit sensor harness:

1. **KIT SENSOR POWERSTORE 250-400L REMOTE (Rheem Australia PN 299321)**
2. **KIT DRILL POWERSTORE RETROFIT (Rheem Australia 299323A)**
Required to drill the water heater jacket and to remove foam for installation of the temperature sensors

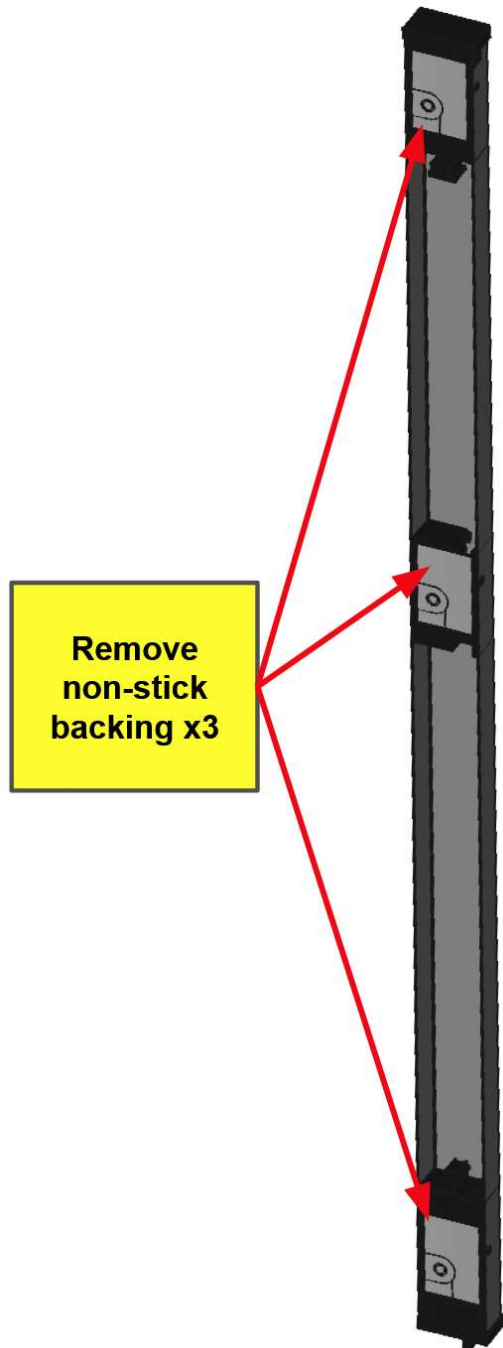


3. **Can of compressed air**
Required to clear foam debris from drilled holes before installing the temperature sensors

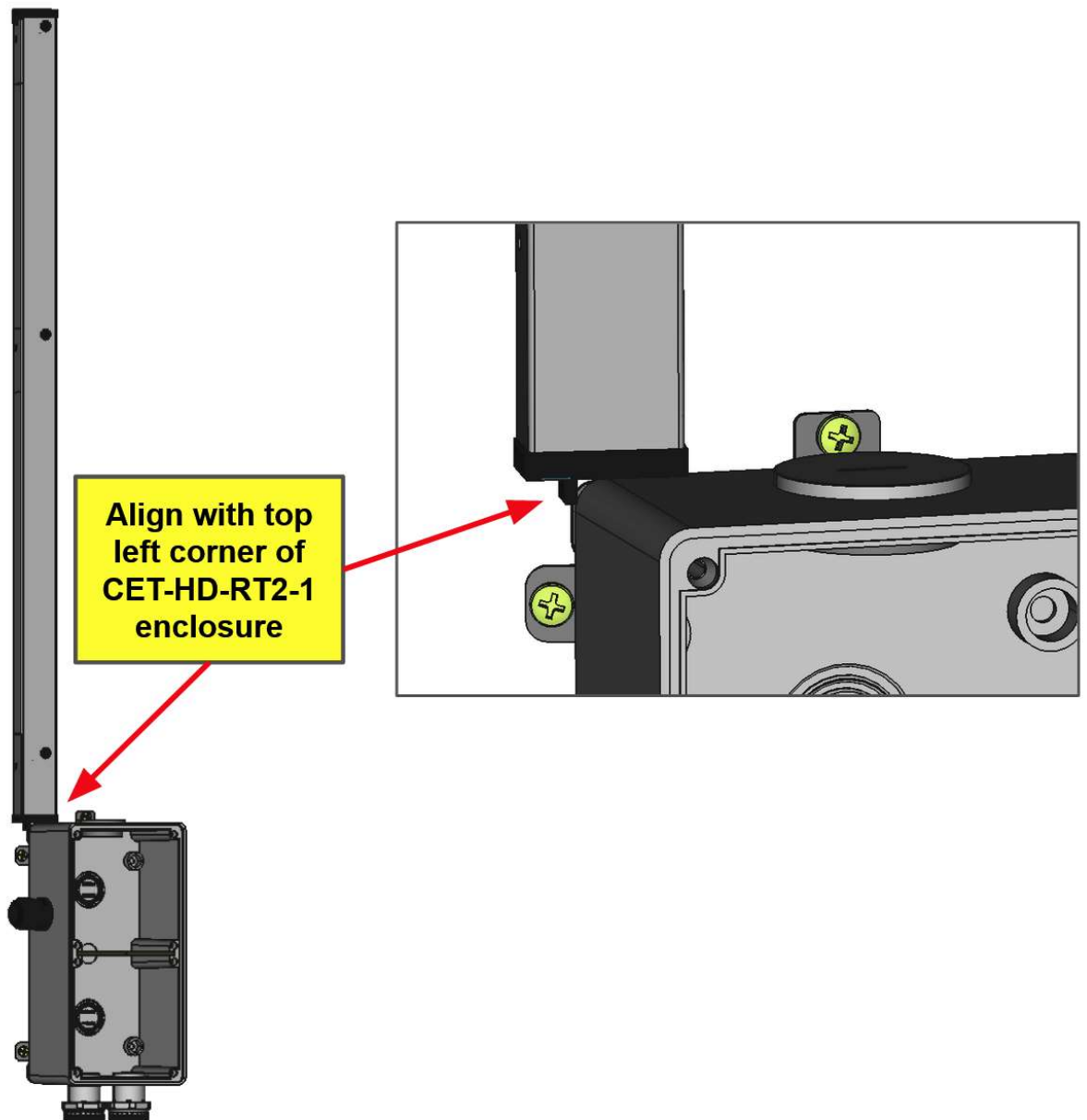


Installation Procedure

1. Remove the non-stick backing from the self-adhesive pads on the back of the three plastic temperature sensor brackets:



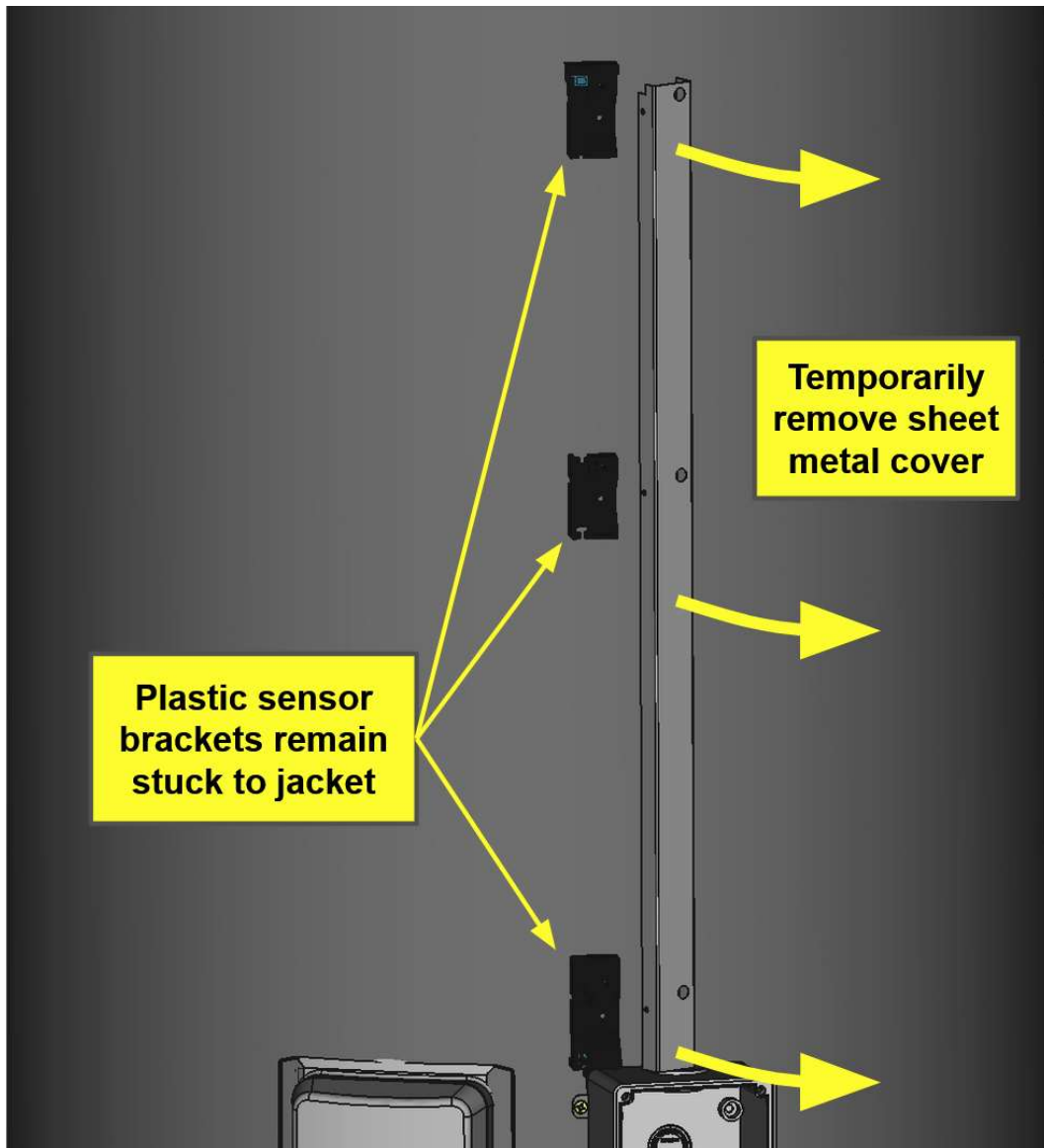
2. Align the sensor harness bracket assembly with the top left corner of the CET-HD-RT2-1 enclosure base:



3. Press the sensor harness bracket firmly against the water heater jacket so that the self-adhesive pads make good contact with the jacket.

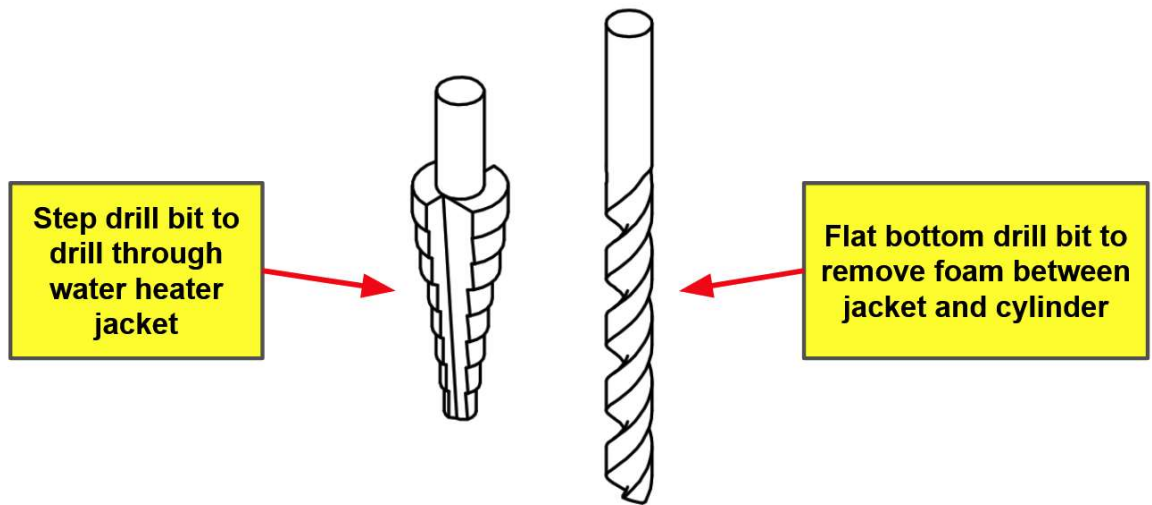
The self-adhesive backing is used to temporarily hold the sensor harness bracket in place while the temperature sensors are installed.

- Carefully remove the sheet metal cover from the three plastic sensor brackets that are now stuck to the jacket of the water heater:



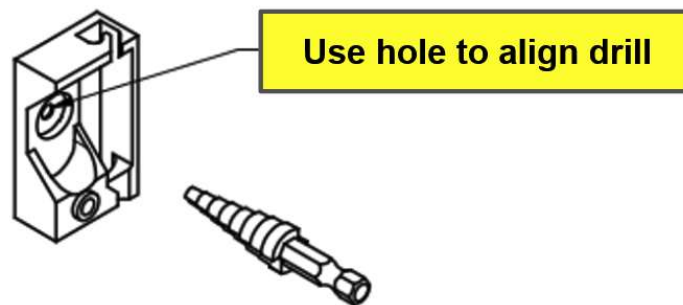
5. Drill the holes for the temperature sensors by following the steps below.

The following two drill bits are included in the KIT DRILL POWERSTORE RETROFIT (Rheem Australia 299323A):

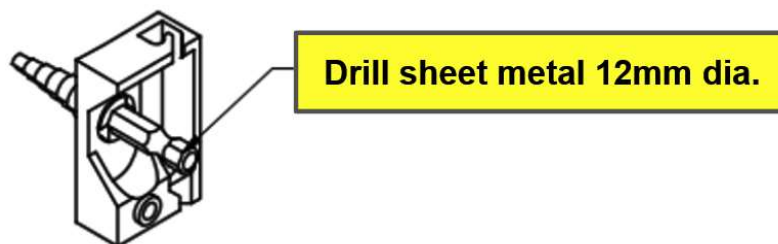


The following operations should be repeated for each of the three plastic temperature sensor brackets:

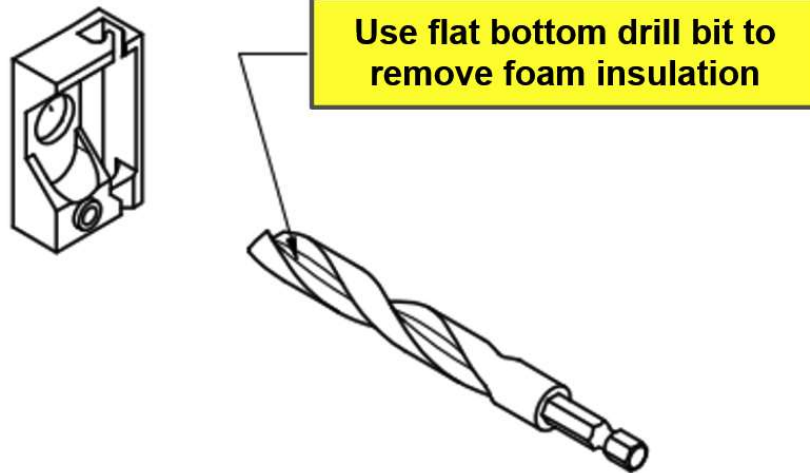
- a. Use the step drill bit to drill through the water heater jacket:



Drill to the full depth of the step drill bit:

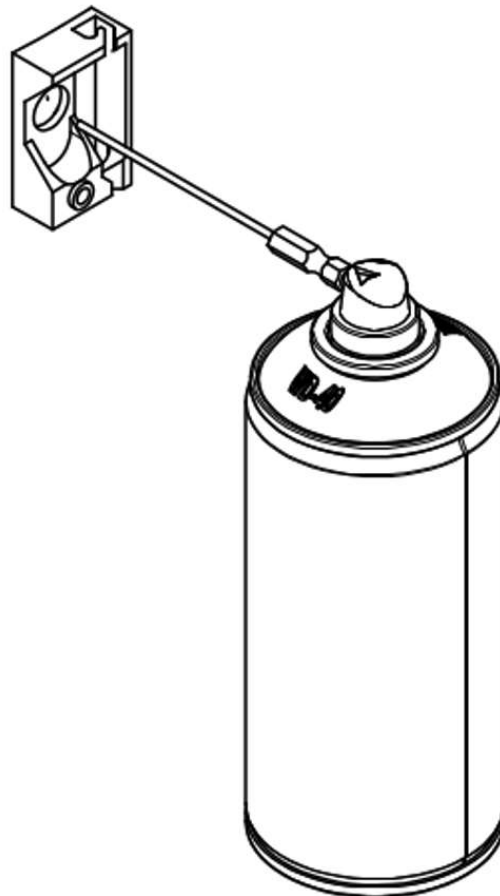


- b. Use the flat bottom drill bit to remove the insulation material all the way to the surface of the water cylinder:

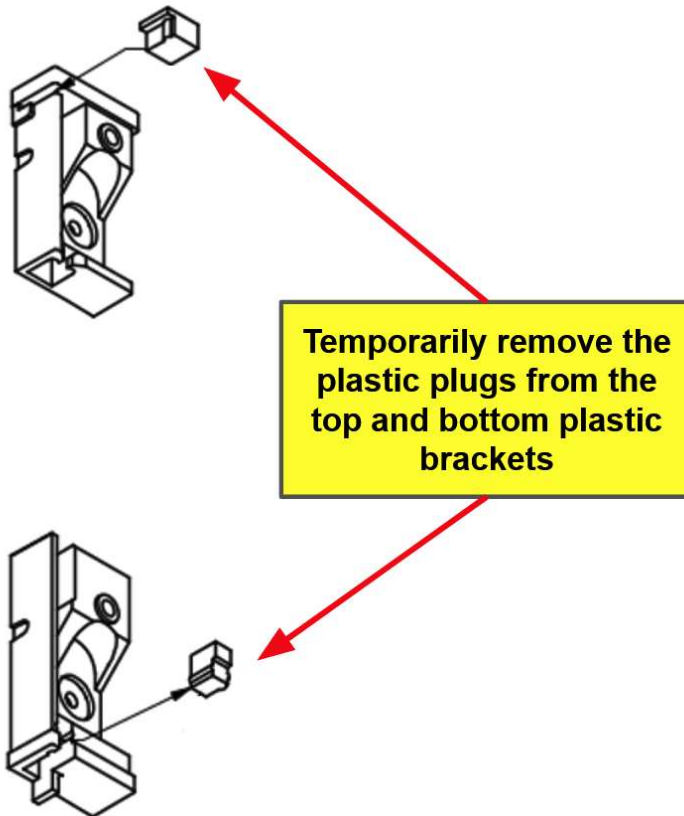


The drill should be pressed against the wall of the cylinder while drilling to ensure that all insulation material is removed. It is not possible to pierce the water heater cylinder with the flat bottom drill bit.

- c. Use compressed air to clear the holes of debris before inserting the temperature sensors:

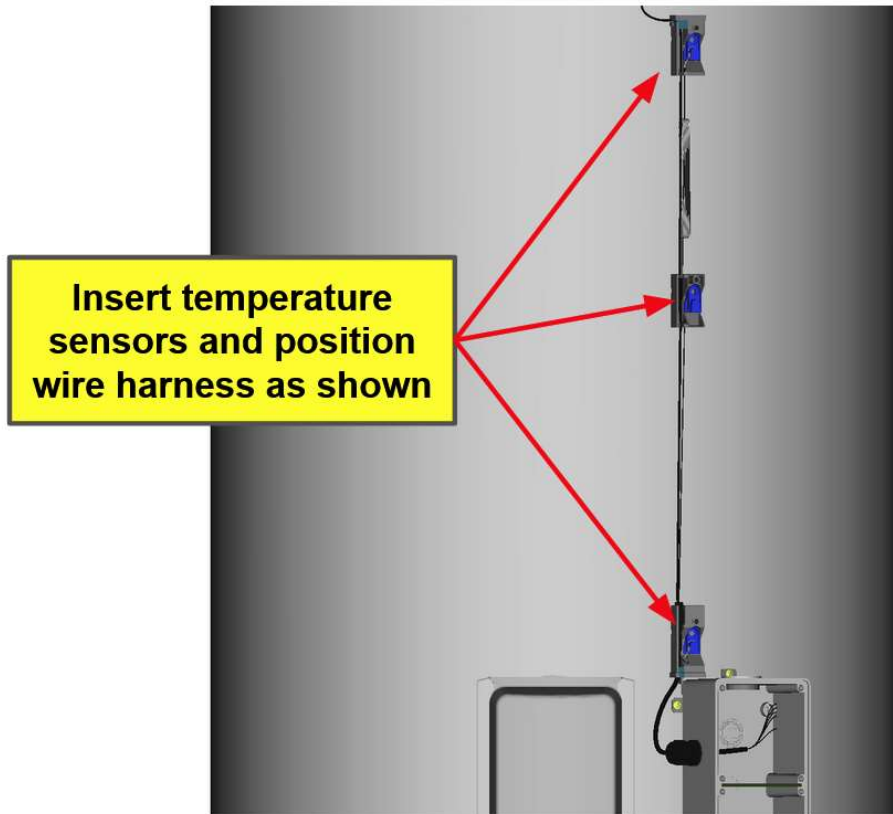
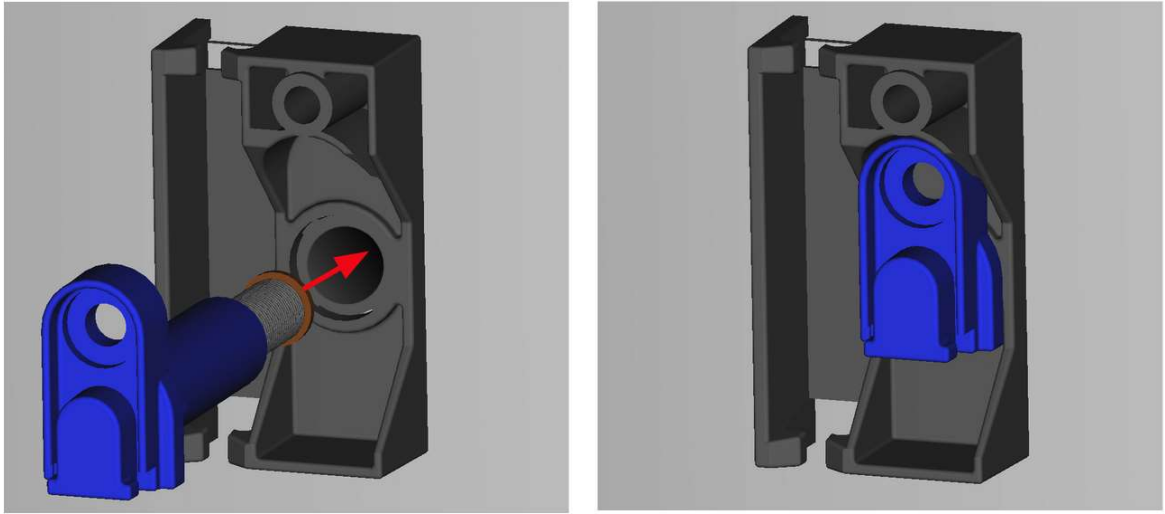


6. Temporarily remove the plastic plugs from the top and bottom plastic temperature sensor brackets:

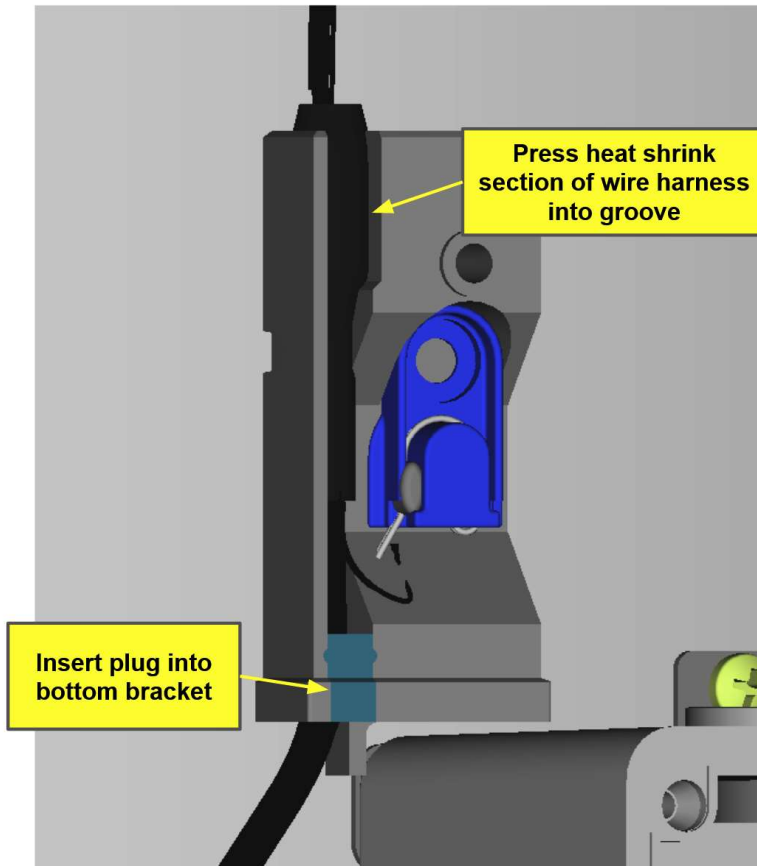


These plugs will be reinserted once the temperature sensor wire harness has been installed.

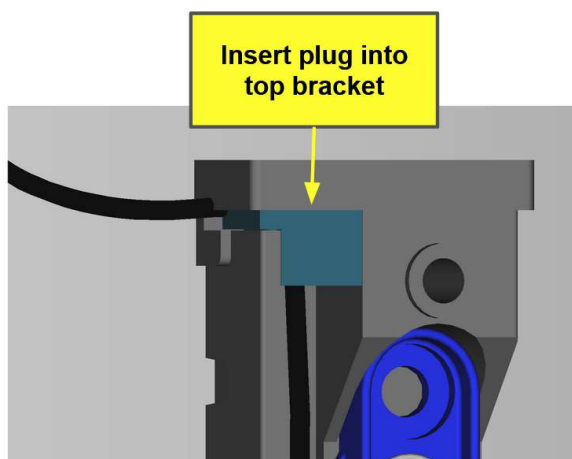
7. Insert the three spring-loaded temperature sensors into the plastic brackets and position the sensor wire harness as shown below:



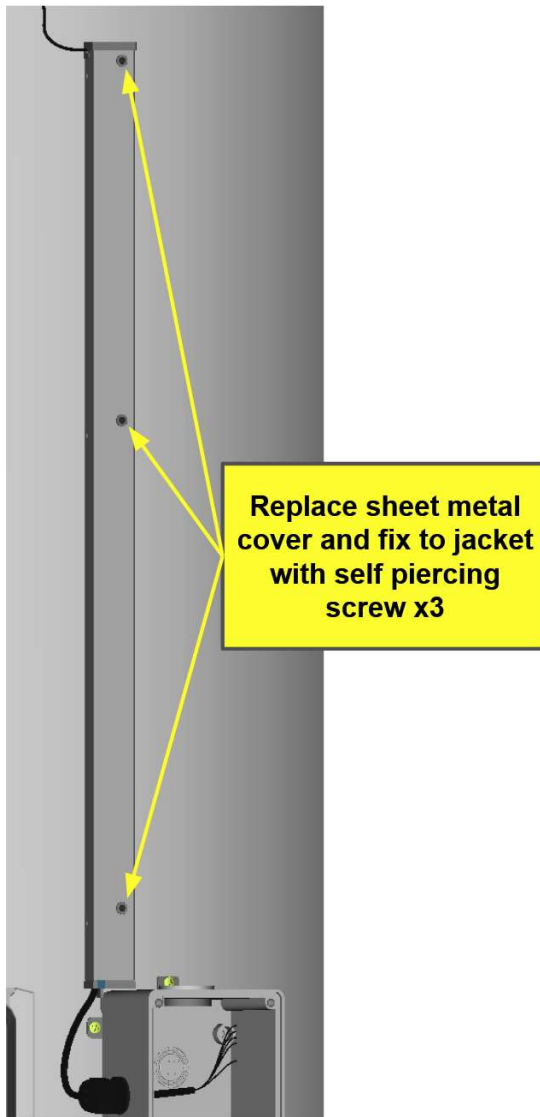
- At the point where the temperature sensor wire harness enters the bottom mounting bracket, replace the removable plastic plug to hold the wire in place and press the thick heat shrink section of the wire harness into the groove in the bracket as shown:



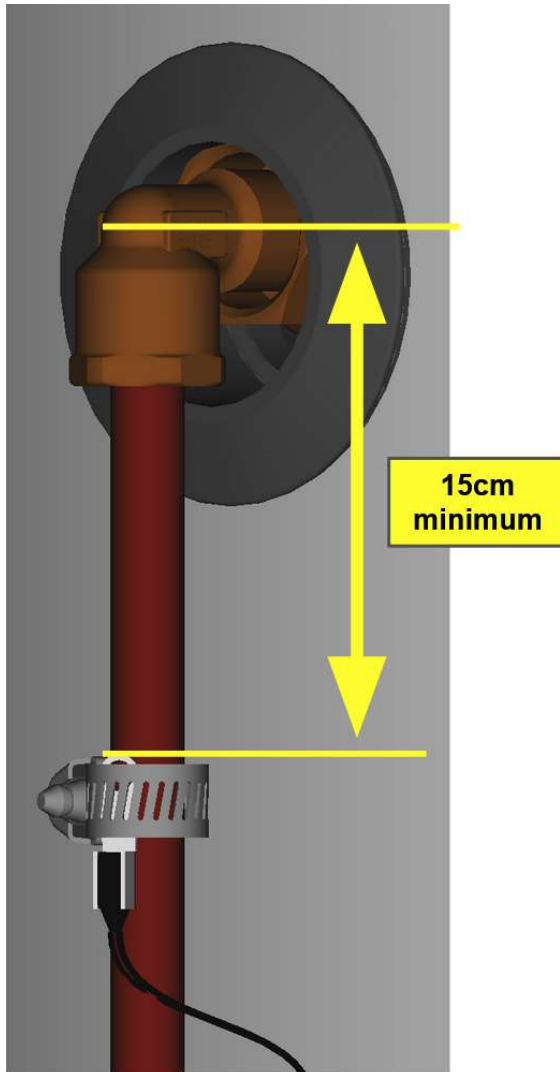
- At the point where the outlet sensor wire exits the top mounting bracket, replace the removable plastic plug:



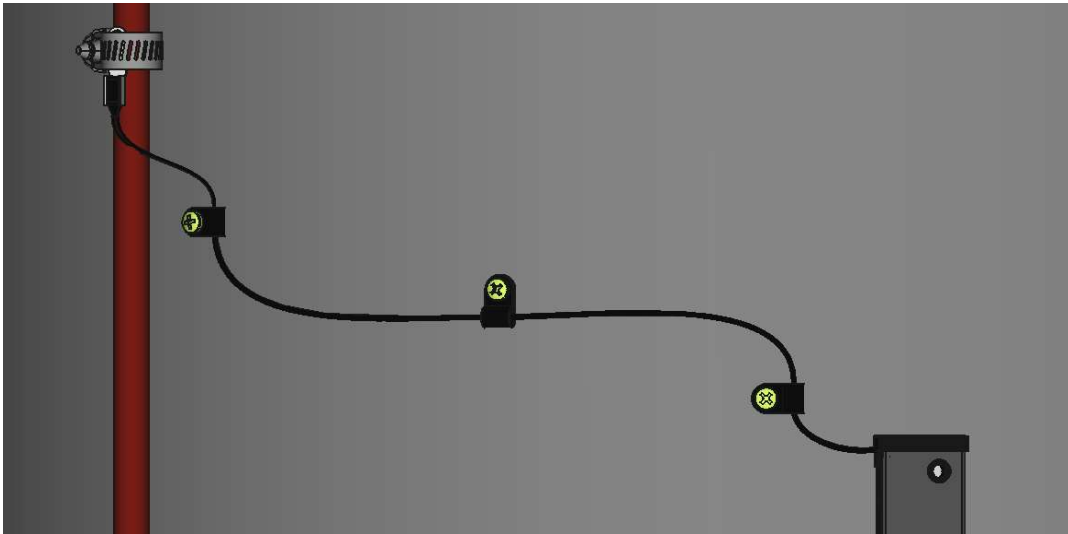
10. Place the sheet metal cover back onto the plastic temperature sensor brackets and fix the cover to the water heater jacket using the three included self piercing screws:



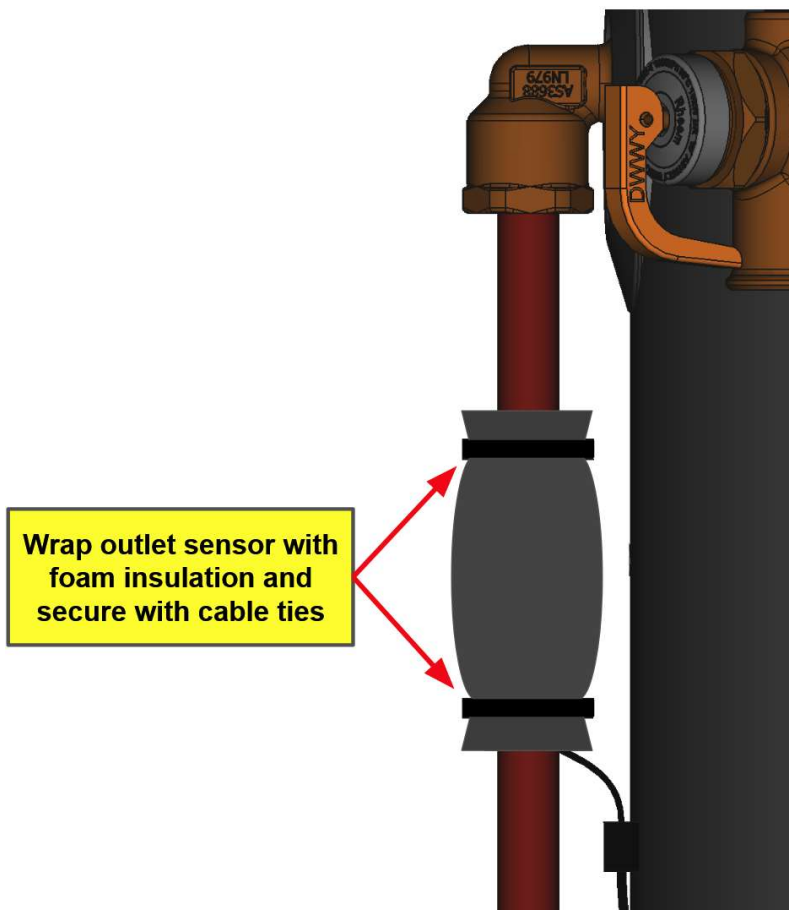
11. Attach the outlet temperature sensor to the outlet pipe using the included hose clamp, at least 15cm from the outlet (if possible).



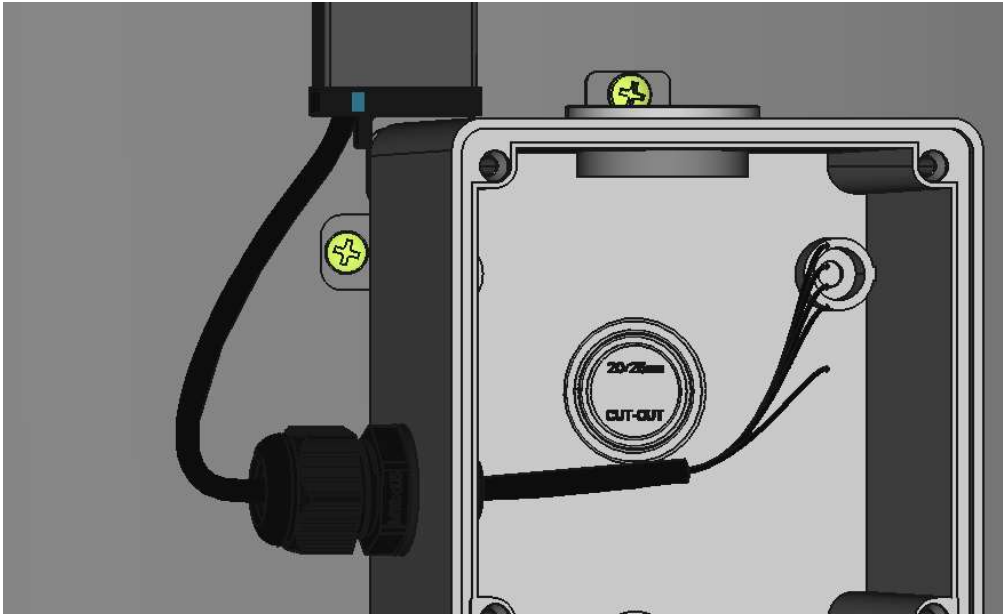
12. Secure the outlet sensor cable to the water heater jacket using the included p-clips:



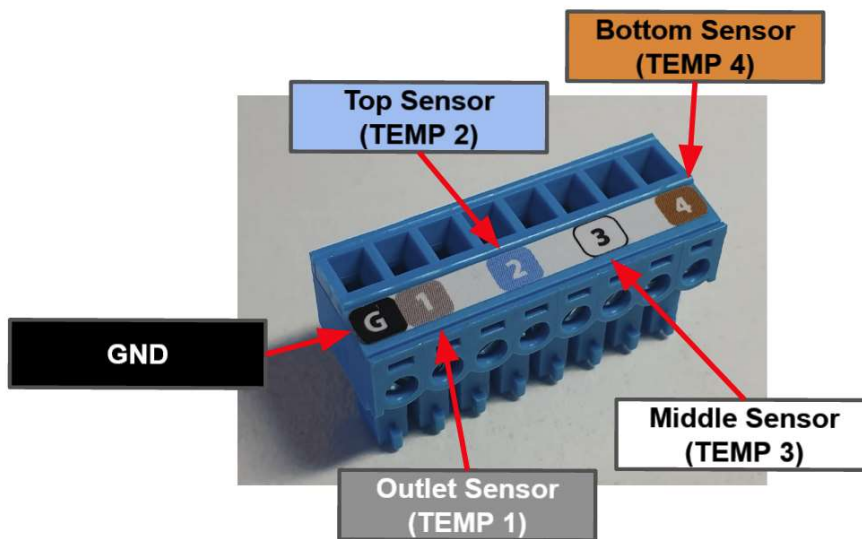
13. Wrap the outlet pipe sensor with the included black foam insulation material, and secure with cable ties:



14. Insert the temperature sensor harness cable through the cable gland in the CET-HD-RT2-1 enclosure base:



15. Terminate the temperature sensor harness at the 8 position screw terminal block, matching the harness colours with the labeled sensor terminals:



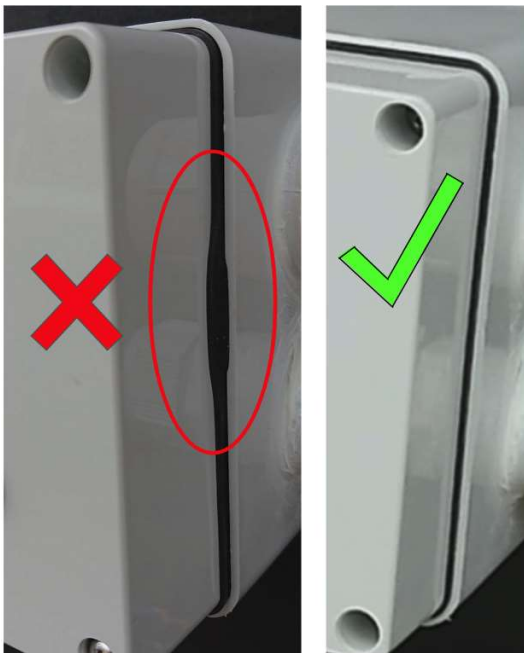
16. Connect the temperature sensor terminal block to the socket on the CET-HD-RT2-1.

Assemble Enclosure and Perform Functional Tests

1. Secure the CET-HD-RT2-1 enclosure lid to the base using the 6 supplied screws:

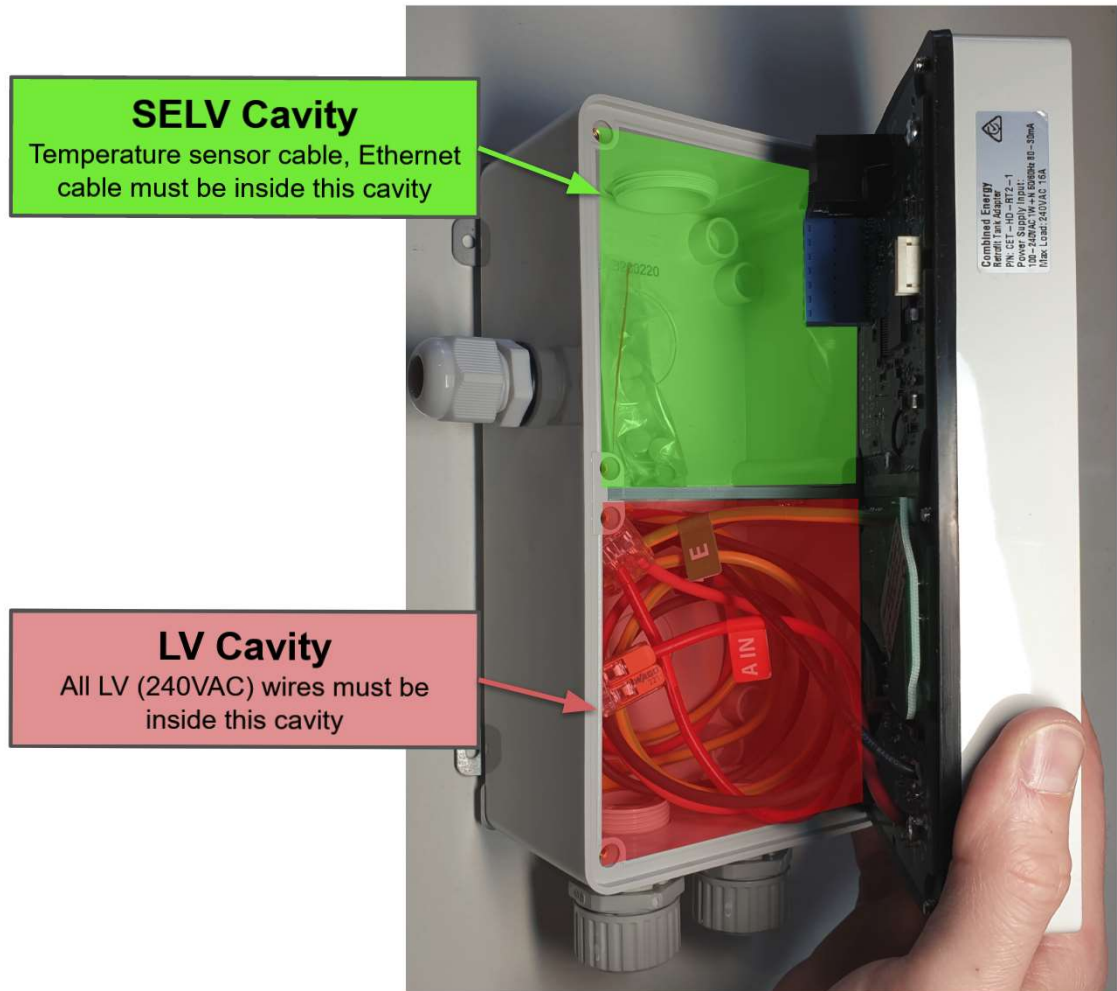


Check that the rubber gasket is properly seated on the enclosure lid and does not get pinched or fouled by the enclosure:



Check that there are no debris or tears on the gasket prior to assembly which could compromise the waterproof seal.

2. **Important:** Ensure all LV wires are contained entirely in the LV section of the enclosure once the lid is seated:



A vertical insulator in the enclosure base separates the SELV and LV cavities. Ensure that wires are not pinched between the insulator panel and the CET-HD-RT2-1 PCB.

3. Perform an Earth bond test on the water heater.

Important: 'Do not megger between active and neutral'.

4. Once the lid has been secured, apply power to the CET-HD-RT2-1 and check it is operating correctly. The button will illuminate when power is applied and turn red (if there is no EMU in range) or green (if the site EMU is installed and communicating with the CET-HD-RT2-1 correctly):



5. Contact CET Support through the *onSite* web app (<https://onesite.combined.energy/>) to perform a functional test of the CET-HD-RT2-1.

6. Once the functional test is complete, insert the 6 plastic screw caps.

Important: these plastic caps must be fitted to ensure the product remains weatherproof.



7. Increase the thermostat temperature on the tank to at least 65°C if it is safe to do so. This will ensure the CET-HD-RT2-1 has sufficient headroom to maximise solar self-consumption while maintaining customer amenity.
8. Use the *onSite* web app to upload a photo of the completed assembly.

Button

Show Connection Status

Pressing the front panel button once will turn the LED connection status display on for 2 minutes:

- **Green** means the CET-HD-RT2-1 is connected to an HD-PLC network (i.e. there is an EMU present)
- **Red** means the CET-HD-RT2-1 can not see, or is not able to join, a PLC network.

After 120 seconds have elapsed the LED connection status display will turn off, and the connection status will instead be represented with a 100ms blink (green or red) every 10 seconds.

Network Reset

In some cases it may be necessary to manually reset the Powerline Communications (PLC) network. This can be done by pressing and holding the tactile push button on the front panel of the CET-HD-RT2-1 for at least 20 seconds and releasing the button when the light begins blinking fast.

After holding the button for 15 seconds the LED will blink slowly to indicate that the reset is about to happen, and after 18 seconds the LED will blink fast to indicate that the button should be released to complete the reset.

Identify Blink

During installation the product can be put into an 'Identify' mode using the Combined Energy *onSite* Installation app. In identify mode the LED will blink for at least 10 seconds with the following pattern:

GREEN - OFF - GREEN - OFF - RED - OFF - RED - OFF