CT200i MicroGrid Controller

Installation Guide

March 2021 v1.0 FINAL

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Introduction

Welcome!

The CT200i MicroGrid Controller is a carbonTRACK product that aims to provide homeowners and business owners with insights about their energy usage patterns and create smart and efficient energy management strategies to generate a positive impact on their energy bill.

In addition, the CT200i MicroGrid Controller includes load controlling features through hardwire and wireless relays offered by carbonTRACK.

The information can be accessed through a user dashboard (software) for home/building owners. The dashboard gives customers insights into their energy consumption and energy costs, as well as provides the user with the ability to control or automate their energy use remotely.

This manual describes the installation of the CT200i MicroGrid Controller.

Need help? For installation assistance please contact carbonTRACK by e-mail at support@carbontrack.com.au or by phone at 1300-288-648 (Australia).

Read Before Use

The CT200i MicroGrid Controller must be installed in close proximity to the Main Service Panel (MSP). If wireless smart devices are to be used, consider wall material and surroundings when deciding the installation location for reliable wireless communication.

Warnings

The CT200i MicroGrid Controller connects to dangerous voltages. The improper use or installation of the device can lead to serious or fatal injuries. Please observe the following safety precautions when installing the CT200i MicroGrid Controller:

- The product must be installed by a licensed electrician
- Review all the instructions before you start the installation
- Personal protective equipment should be worn when installing this product
- Do not use the product in any way other than its intended use
- Do not install or operate the product in extreme temperatures
- Do not open, attempt to access or touch any internal product parts
- Do not use the product if it is damaged or appears to be damaged
- Do not power the product with circuit breakers higher than 10 amps
- Adhere to all local and national safety regulations for installation and use

Installation Guidelines & Usage

- Product must be installed by a licensed professional who has undergone appropriate training for the relay.
- The CT200i MicroGrid Controller requires 110/240 V power supply. DO NOT exceed this voltage level.
- Examples of monitoring capabilities:
    - Single phase power systems
    - Three (3) phase power systems
    - Single phase solar generation systems
    - Three (3) phase solar generation systems
    - Single incoming phase + single phase solar generation
    - Three (3) incoming phases + single phase solar generation
    - Three (3) incoming phases + three (3) phase solar generation
    - Sub circuit monitoring
- Examples of controlling capabilities:
    - Circuit level ON/OFF switching (hot water systems, pool-pumps)
    - HVAC centralized and split systems
    - Solar Inverters and Storage Solutions (Batteries)
    - Energy Meters

Regulations

In Australia, all installations, maintenance, or modifications of any sub circuit MUST adhere to the AS/NZS-3000 wiring rules, as well as all other relevant regulations.
All cable insulator colors should correspond with their correct use.

- RED, WHITE OR BLUE for ACTIVE
- BLACK OR BLUE for NEUTRAL
- GREEN / YELLOW for EARTH
- RED + WHITE for SWITCHING SERVICES

All conductors and sub-circuits must be suitably rated and protected against overcurrent by use of circuit breakers or fuses.

Auditing

The safety of all installers and clients is carbonTRACK's top priority. Accuracy and reliability of our products is also critically important.
In the interest of quality control and safety, carbonTRACK may audit installations completed by third parties. This will consist of two components:

- **Live audit** – carbonTRACK employee will oversee a full installation by third party installers and generate a report based on install quality and safety.
- **Post Audit** – carbonTRACK employee will inspect a ratio of completed jobs by each installer and check for correct installation and safety hazards.

There are three categories for an Audit fail, CAT 1, CAT 2 and CAT 3:

Category 1

A CAT 1 non-compliance is a failure to meet NEC wiring rules which presents an immediate safety risk. This must be remedied immediately by the carbonTRACK auditor making it safe and rectifying the issue.
One CAT I non-compliance will require further investigation of previous installs by carbonTRACK. The installer will not be permitted to undertake further installations until advised by carbonTRACK.

Category 2

A CAT 2 non-compliance is an issue that renders the carbonTRACK unit inoperable or not able to function correctly but is not an immediate safety risk. This must be rectified as soon as possible by the third party and carbonTRACK must be notified via email with pictures once the issue is rectified.

Category 3

A CAT 3 non-compliance is a minor issue that does not impose an immediate safety risk or stops the carbonTRACK unit from functioning as normal. This consists of incorrect labelling, housekeeping, not informing customer, etc.
carbonTRACK reserves the right to immediately blacklist any installer from further installing any carbonTRACK product if an installation has been found to have an immediate CAT 1 safety risk, the installer fails a live audit

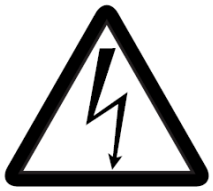
with a CAT 1 non-compliance, or the installer has had a number of CAT 2 or CAT 3 non-compliances or audit fails against them. This is entirely at carbonTRACK's discretion.

Safety Information

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

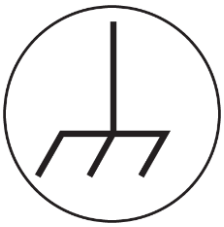
Use of warnings

Warning symbols are used as follows:



The electrical warning informs you about electrical hazards which can cause injury, death and/or damage to the equipment.

The general warning informs you about conditions, excluding those caused by electricity, which can result in injury, death and/or damage to the equipment.



The earth symbol informs you about specific terminals and components that must be connected to a grounding network, which can result in injury, death and/or damage to the equipment if not properly utilized.

Notes draw attention to important details concerning the product or installation

DANGER

Danger to life due to electric shock

- Disconnect the connection point from voltage sources during installation and make sure it cannot be reconnected.
- Before performing any electrical connection in the distribution board disconnect the grid side from all voltage sources using the installed disconnect switch.
- Ensure that the conductors to be connected are de-energized.
- Only install the carbonTRACK Smart Gateway in a dry environment and keep it away from moisture.
- In case of requiring an outdoor installation, you must use a certified carbonTRACK outside enclosure.
- Disconnect the CT200i MicroGrid Controller from voltage sources before cleaning. The CT200i MicroGrid Controller must be cleaned with a dry cloth only.

WARNING

Danger to life due to electric shock

Overvoltage (e. g. in the case of a flash of lightning) can be further conducted into the building and to other connected devices in the same network via the network cable if there is no overvoltage protection.

- Ensure that all devices in the same network are integrated in the existing overvoltage protection.

WARNING

Risk of fire due to dirty or oxidized contact surfaces of live aluminum conductors

Connecting dirty or oxidized contact surfaces with aluminum conductors reduce the ampacity of the live terminals, thereby increasing the transition resistances. This can cause components to overheat and catch fire.

- The contact surfaces are to be cleaned, brushed, and treated with acidic and alkaline substances (e.g., petroleum jelly or special thermal grease).

WARNING

Fire risk

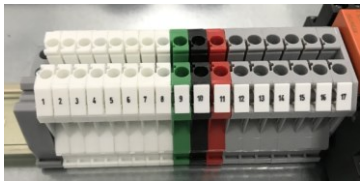
If a fuse is missing or incorrect and a fault occurs, a fire may be caused. This can result in death or serious injury.

- Protect the line conductors of the CT200i MicroGrid Controller with a dedicated circuit breaker, maximum. 10-Amps.

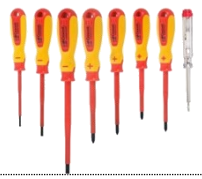
Pre-Installation Checklist

In order to warrantee the correct and successful installation of carbonTRACK's MicroGrid Controller a pre-installation check has been developed. The carbonTRACK MicroGrid Controller is an all-in-one Enclosure unit that is prewired and configured for a Smart Energy Management installation. It consists of the following elements included in the pre-installation check.

What You Get

		
CT200i Smart Gateway	4 x Current Clamps	1 x Grid Sensing Relay
		
Prewired Terminal Blocks	IP67 Rated Enclosure	

What You Need

					
Isolation Gloves	Safety Glasses	10A Circuit Breaker	Conduit Glands	Wire Puller	Conduit
					
Multi-Meter	Drill	Step Drill Bit	Wire (6 to 14 AWG)	Screw Drivers	Wire Cutters
					
Hole Saw (Ø25mm and Ø20mm)	Masonry Drills Bits	Phase Rotation Meter	Load Tester	Wall Plugs	M5 Self-Tapping Screws

- **Note:** Specific projects may require additional equipment.

Safety Inspection

Complete a site safety inspection.

- Stop and think about the potential dangers associated with the job.
- Look and identify any hazards.
- Assess the risk. Consider any possible threats of damage or injury.
- Manage controls. Implement suitable control measures to reduce risk.
- Safely complete the task.

Scope of work

It is important to understand which monitoring and controlling configuration that will be implemented at site.

carbonTRACK requires its partner distributors to provide installers with single line diagrams that detail the clamping points and the controlling connections relevant for the site installation.

Installation Steps

STEP 1. Identify gateway mounting location

Identify an appropriate location to mount the gateway and where to access the distribution board for AC power and clamp setup.

Note: The length of the corrugated conduit may vary for each install. The corrugated conduit needs to be fixed on the mounting surface using fastening clips.

STEP 2. Mounting the CT MicroGrid Controller Enclosure

The enclosure is supplied with four Stainless Steel mounting brackets.

Assemble all four brackets and mount them on a suitable wall that has been scoped out for the installation of carbonTRACK MicroGrid controller enclosure.

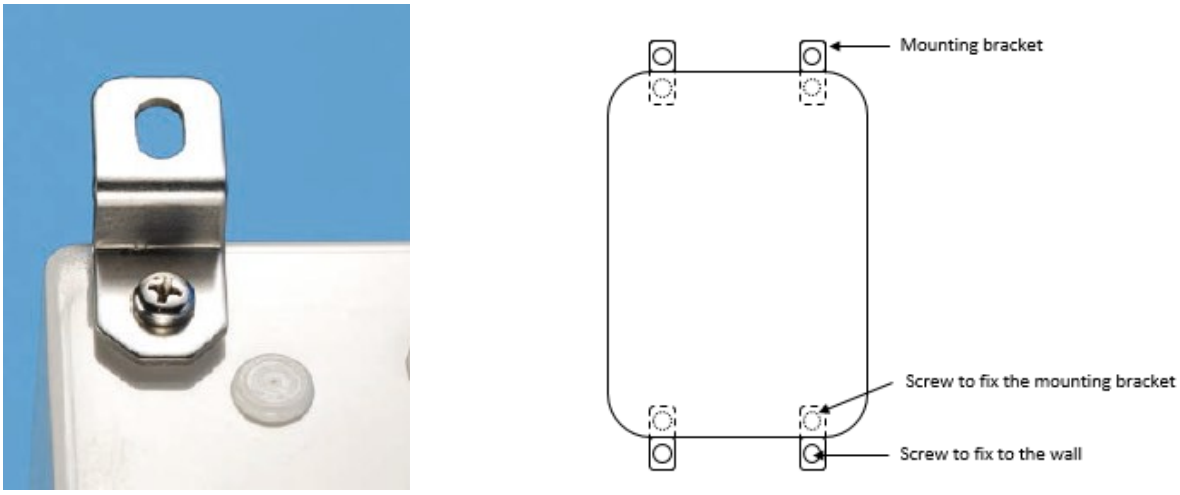


Figure 1. Mounting the brackets

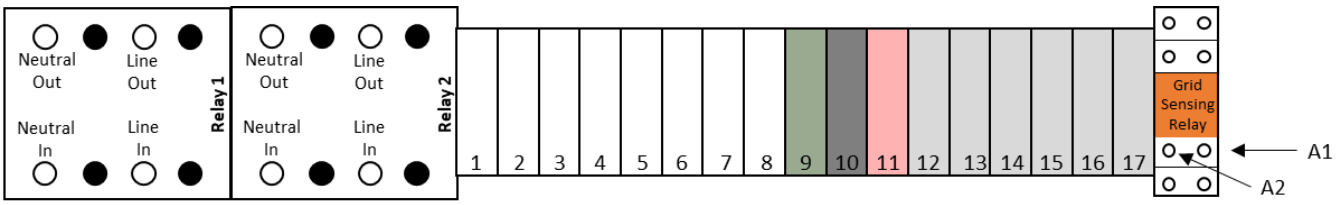
STEP 3. Wiring up the CT MicroGrid Controller

Each marker on the Terminal Block has been specifically pre-wired according to the below wiring code legend.

Please take note that the scope for each job is specific, therefore please confirm what needs to be installed for each customer before performing any connection.

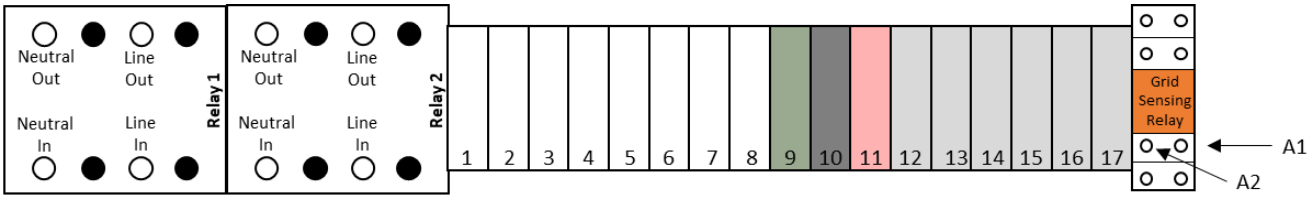
Some of the things to take note are: -

- Mains monitoring – Single or multiple phase supply
- Solar monitoring – Single or multiple phase generation
- Circuit controls
    - On Board Relays – circuit switching for appliances up to 30A (these relays do not provide energy monitoring of the appliance/ circuit been controlled.
    - Wireless Relays – circuit switching for appliances up to 50A (with energy monitoring)



ITEM NUMBER	DESCRIPTION
Relay 1 – Line In	Relay terminal block to connect the live cable from the circuit breaker at the DB.
Relay 1 – Line Out	Relay terminal block to connect the live cable from the relay to the load.
Relay 1 – Neutral In	Relay terminal block to connect the neutral cable from the neutral bus bar in the DB.
Relay 1 – Neutral Out	Relay terminal block to connect the neutral cable from the relay to the load.
Relay 2 – Line In	Relay terminal block to connect the live cable from the circuit breaker at the DB.
Relay 2 – Line Out	Relay terminal block to connect the live cable from the relay to the load.
Relay 2 – Neutral In	Relay terminal block to connect the neutral cable from the neutral bus bar in the DB.
Relay 2 – Neutral Out	Relay terminal block to connect the neutral cable from the relay to the load.
1	Terminal block to connect the white cable of current clamp #1.
2	Terminal block to connect the red cable of current clamp #1.
3	Terminal block to connect the white cable of current clamp #2.
4	Terminal block to connect the red cable of current clamp #2.
5	Terminal block to connect the white cable of current clamp #3.
6	Terminal block to connect the red cable of current clamp #3.

Figure 2. Wiring up the carbonTRACK MicroGrid Controller [From Relay 1 to Terminal block 6]



ITEM NUMBER	DESCRIPTION
7	Terminal block to connect the white cable of current clamp #4.
8	Terminal block to connect the red cable of current clamp #4.
9	Terminal block to connect the earth cable from the earth bus bar in the DB from the backed up side of the house.
10	Terminal block to connect the neutral cable from the neutral bus bar in the DB from the backed up side of the house.
11	Terminal block to connect the live cable from the 10 A circuit breaker that will power the CT200i in the DB from the backed up side of the house.
12	Terminal block to connect the live cable from the circuit breaker of the load to control with on-board relay #1.
13	Terminal block to connect the live cable from the relay to the load to be control with on-board relay #1.
14	Terminal block to connect the live cable from the circuit breaker of the load to control with on-board relay #2.
15	Terminal block to connect the live cable from the relay to the load to be control with on-board relay #2.
16	Terminal block to connect the live cable from the circuit breaker of the load to control with on-board relay #3.
17	Terminal block to connect the live cable from the relay to the load to be control with on-board relay #3.
Grid Sensing Relay – A1	Terminal block to connect the live cable from the non-backed up side of the distribution board to the grid sensing relay.
Grid Sensing Relay – A2	Terminal block to connect from the neutral bus bar in the DB.

Figure 3. Wiring up the CT MicroGrid Controller [From Terminal block 7 to Grid Sensing Relay A2]

STEP 4. Notes

1) Grid Sensing Relay – The 240V AC power to A1 and A2 relay coil must be supplied from the non-backed up power supply direct from the grid.
2) CT200i Gateway – The 240V AC power to terminal block 9, 10 & 11 must be supplied from the backed-up power supply from the distribution board. A 10A Circuit Breaker is used to protect this circuit.

Limited Manufacturer Warranty

The manufacturer undertakes a 2-year manufacturer's warranty from the date of supply and purchase of the products.

For further details on warranty terms, please visit: http://www.carbontrack.com.au/legal/warranty