Kowhai Heat iX Installation Manual

Step 1: DC Cables (PV Connection)

There is a common misconception that DC wiring must be multi-strand, while AC wiring must be solid core. In this application, **DC cables do not need to be multi-strand;** solid core or standard house wire will work effectively, provided the conductors are of a sufficient thickness (gauge) and the cable is rated for outdoor use, protecting it from sun and weather. However, multi-strand cable is often easier to bend and work with than solid core.

Proper solar cable is typically multi-strand and is recommended for its durability and performance.

1. Install MC4 connectors onto your chosen DC cables.

   o **Note:** The connector colours may appear reversed. The **red** wire should connect to the PV positive (+), which typically uses a **male** MC4 connector. The **black** wire should connect to the PV negative (-), which typically uses a **female** MC4 connector.

2. Double-check your polarity with a standard multimeter before connecting to the panels.

3. **Good Practice:** Install in-line fuses in the DC cables as close to the PV panels as possible. This ensures the fuse protects the circuit if a fault occurs midway along the cable or inside the Controller unit.

Disclaimer: This serves as a general guide. All installations must comply with New Zealand electrical installation rules and regulations.

Step 2: Thermostat Connection

It is not necessary to remove the existing thermostat from the Hot Water Cylinder (HWC) for this step.

1. Connect the new thermostat wires to the terminals of the existing HWC thermostat.

2. Adjust the thermostat dial to the client's required water temperature.

   o The thermostat itself remains the primary device that monitors and controls the water temperature by switching the element on and off.

3. If the HWC has a non-standard thermostat, connect the wires as you would if they were coming directly from the AC mains power supply.

4. Connect the other end of these thermostat wires to the corresponding terminals on the Controller unit.

At this point, the renewable energy (solar) side of the installation is complete. For off-grid installations, you may proceed to Step 4 to finish. Keep in mind that a protective earth (ground) wire must still be connected as per normal electrical safety standards.

Step 3: AC Power (Mains Connection)

1. Connect the Earth (Green/Yellow), Neutral (Blue/Black), and Live (Brown/Red) wires from your dedicated isolator switch and timer to the designated terminals inside the Controller unit.

Step 4: Finishing Up

Now that all connections are made:

- **Plug the thermostat into the HWC element.** Before doing so, inspect the element terminals for any signs of damage or corrosion. Repair or replace components if necessary, as the heating element draws considerable power and loose or hot connections can be very dangerous.

- **Connect the MC4 connectors to the PV panels.** Once connected, the element should start drawing DC power if conditions are suitable.

- **Switch on the AC power and set the timer.** For maximum energy savings, program the timer to supply AC power approximately one to two hours before the expected time of hot water use. Ideally, the timer should stop feeding AC power shortly before that time to maximise solar gain.

Note: When the HWC has reached its set temperature, AC power will be available at the Controller but will not be used by the element until the water cools down.

LED Indicator Guide

The LED on the Controller provides the following status information:

- **Solid Green:** The Controller is feeding **PV (DC) power** to the thermostat/element, and the water is cold enough that the thermostat is calling for heat.

- **Flashing Green:** The Controller is feeding **PV (DC) power** to the thermostat/element, but the water has reached the set temperature, and the thermostat has switched the element off.

- **Solid Red:** The Controller is feeding **AC (mains) power** to the thermostat/element, and the water is cold enough that the thermostat is calling for heat.

- **Flashing Red:** The Controller is feeding **AC (mains) power** to the thermostat/element, but the water has reached the set temperature, and the thermostat has switched the element off.

- **Alternating Red/Green:** The Controller is in a calibration or measurement mode (e.g., measuring PV power every 10 minutes to recalculate optimal weather conditions and maximise power harvesting).

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Technical Specifications	
Element Size	2,3,4 kW
Utility input	200 - 240Vac, 50-60Hz
PV MPPT	Yes, 15 Amp
PV input	90* - 350Vdc**
Max PV Power	320 Vmp @ 15 Amp
Power Sensor	0-15 Amp DC ±2.5% Tolerance
Dimensions	125 * 180 * 80mm 0.75 kg
Operating Temperature	-10 - 55° Celsius
MTBF	50,000h
Safety & Protection	
AC Disconnect	Yes
Reverse Polarity	Yes Require external fuse
Over Voltage Category 1	Yes
Transient Category 1	3-Way Surge Arrestor
EMC Compliant	EN-61326-1
Safety	IEC-60730-1

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Complies with: AS/NZS 3820:2009
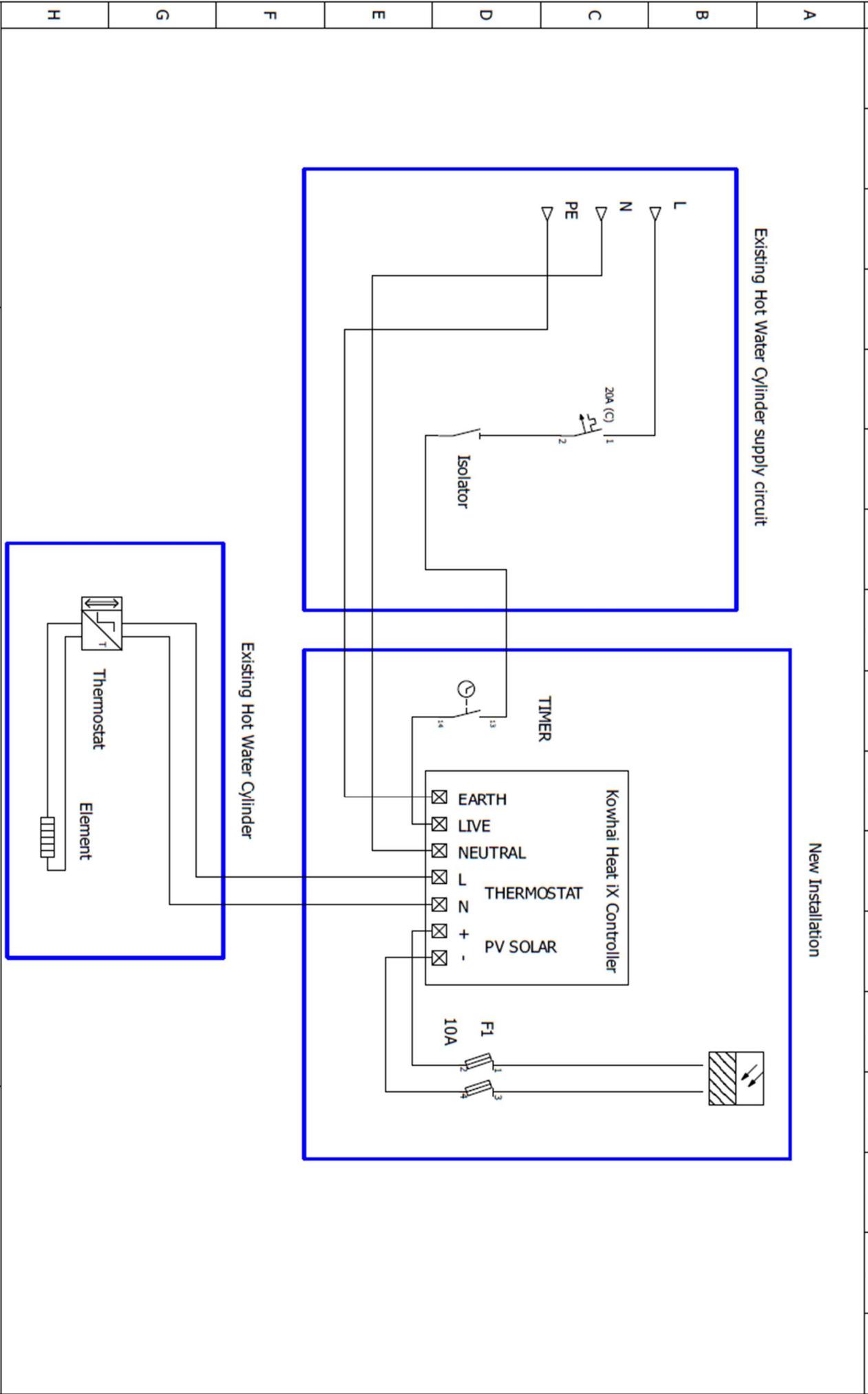
SDoC available on request.

Notes
* 90Vmp minimum recommended
** The element can only handle 320Voc Max, but the controller itself can withstand 350Voc

FAQ:

- The Kowhai Heat iX Controller includes terminals labelled "Thermostat." Does the controller have an internal thermostat, or are these terminals simply outputs intended for an external hot water cylinder thermostat? – **The latter, these terminals are used as an output, connected to the existing hot water cylinder thermostat.**

- Does the controller only switch the load (hot water cylinder) on and off, without providing any thermostat functionality? **- The unit does not switch the power on and off. It has no feedback on the temperature of the HWC. It will supply power from utility OR PV to the HWC. The thermostat will do the temperature control (switching).**

- Is the primary function of the controller to operate as a solar diverter? **- No, this is not the case.**

- **Operation in short:** If the is utility is ON the thermostat output will be ON (AC Pass through) regardless of the PV state. A timer is installed to switch the utility OFF. If there is sun, the unit will provide the available power from the PV to the thermostat terminals. The aim is to heat up the HWC during the day and save the electricity cost **and** only top-up water temperature at night if required.

Existing Hot Water Cylinder supply circuit

L
N
PE

20A (C)
Isolator

New Installation

TIMER

Kowhai Heat iX Controller

EARTH
LIVE
NEUTRAL
L
N   THERMOSTAT
+
-    PV SOLAR

F1
10A

Existing Hot Water Cylinder

Thermostat

Element

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Date: 23 Feb 2026

Kowhai Heat iX Controller Installation Wiring Diagram