



Keep these instructions in a safe place for future reference









## **Thermino® ePV & Thermino® iPv Heat Battery Installation and User Manual**



# Safety Notice

## Symbols and Notices Used and Their Meanings

Symbols			
			
Warning	Electric Hazard	Take note	Cross reference
Warning Notices	Consequences	Likelihood	
 <b>WARNING</b>	Death/serious injury (irreversible)	Potential risk	
 <b>CAUTION</b>	Damage/minor injury (reversible)	Potential risk	



DO NOT install outdoors. This product is for indoor use only.

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury and death.

ONLY competent persons who are suitably qualified to carry out plumbing and electrical work and have successfully completed product training by Sunamp Ltd or an authorised training partner may undertake installations, repairs or relocations.

The system must be earthed correctly and have its own independent electrical supply with correct voltage and circuit breakers.

The point of connection to the mains should be readily accessible and adjacent to the Heat Battery installation. Connection must allow isolation of the electrical supply. Disconnection must be achieved in accordance with the wiring rules.

Only use this product for the intended purpose described in this manual.

There are no user serviceable, adjustable, or settable parts in this product.

**Read the full Safety Instructions in Section 1 of this manual  
before you install this product.**



# Document Purpose

To instruct competent persons on how to safely install **Thermino® ePV & Thermino iPV Heat Batteries**. Competent persons are those suitably qualified to carry out plumbing and electrical work. Product training on the full range of Thermino Heat Batteries by Sunamp Ltd or an authorised training partner, is available.

## Contents

<b>1</b>	<b>Safety Instructions</b> .....	<b>4</b>
1.1	Intended Use .....	4
1.2	Pre-installation Safety Advice.....	5
1.3	Mechanical Safety .....	5
1.4	Electrical Safety.....	6
1.5	Water Safety .....	6
1.6	User Competence, Qualification, and Approval.....	7
1.7	Compliance with Safety Laws and Regulations .....	7
1.8	Post-Installation Safety .....	7
1.9	Repair and Relocation .....	8
<b>2</b>	<b>Thermino ePV &amp; Thermino iPV Heat Battery Overview</b> .....	<b>9</b>
2.1	Introduction .....	9
2.2	Product Overview.....	10
2.3	Product Identification .....	12
2.4	Accessories and Parts .....	14
2.5	Technical Specifications .....	15
2.6	Pressure Loss Characteristics.....	20
<b>3</b>	<b>Installation</b> .....	<b>24</b>
3.1	Installation Process .....	24
3.2	Water Supply Requirements.....	28
3.3	Location and Space Requirements .....	29
3.4	Hydraulic Requirements .....	30
3.5	Temperature and Insulation Requirements.....	31
3.6	Electrical and Wiring Requirements .....	31
3.7	Wiring - Thermino ePV .....	36
3.8	Wiring - Thermino iPV .....	39
3.9	Wiring Setup of Solar Power Diversion Controller.....	43
<b>4</b>	<b>Commissioning</b> .....	<b>45</b>
4.1	Preparation .....	45
4.2	Process.....	45
<b>5</b>	<b>Operation</b> .....	<b>47</b>
5.1	Switch On/Off.....	47
5.2	LED Indicators and Status.....	47
5.3	Troubleshooting.....	48
<b>6</b>	<b>Maintenance</b> .....	<b>50</b>
6.1	Removal of Lids .....	50
6.2	Cleaning .....	50
6.3	Warranty .....	51
<b>7</b>	<b>Recycling and Disposal</b> .....	<b>51</b>

# 1 Safety Instructions



Sunamp Ltd is not responsible for the failure of components not specified in this manual and/or supplied by other manufacturers.

## 1.1 Intended Use



The intended use of the **Thermino ePV & Thermino iPV** range of products is for the provision of hot water for domestic purposes, using surplus solar PV energy. This Thermino range of products is intended to be used with AC Solar Power Diverters and must **NOT** be used with DC modulating Solar Power Diverters. There are two product types in this manual.

**Thermino ePV** functions by electric charging of the Heat Battery, using AC power supply for the electric heater supplied from a PV system, via an external PV power diverter controller and grid electricity when surplus solar PV energy is unavailable. It is not intended for use with other charging methods or in applications other than the provision of domestic hot water.

**Thermino iPV** functions by means of using an external heat source (i.e. boiler) as a main heat source, the Heat Battery can also be electrically charged using the electric heater, with the AC power supply for the electric heater supplied from a PV system, via an external PV power diverter controller. It is not intended for use with other charging methods or in applications other than the provision of domestic hot water.



- For the **Thermino iPV** combination with a **Boiler**, the Boiler must have a **flow temperature of 75°C**. Using a Boiler with a flow temperature lower than 75°C will result in the Heat Battery not being fully charged.
- For the **Thermino iPV** combination with a **High Temperature Heat Pump**, the High Temperature Heat Pump must achieve a **flow temperature greater than 65°C (HP only mode)**. Using a High Temperature Heat Pump with a flow temperature lower than 65°C will result in the Heat Battery not being fully charged.



## 1.2 Pre-installation Safety Advice

- Sunamp Ltd is not responsible for the selection, specification or effectiveness of equipment, unless stated in writing. Responsibility lies with customers and any experts or consultants involved in design and/or installation.
- Where applicable, this manual should be read in conjunction with manufacturer documentation for any components specified in the installation requirements of this manual.
- Where necessary, refer to the Sunamp website ([www.sunamp.com](http://www.sunamp.com)) for contact and support information.

## 1.3 Mechanical Safety

### **⚠️WARNING**

- DO NOT install outdoors. This product is only suitable for installations indoors in a frost-free environment, to avoid weather damage.
- DO NOT tilt the product more than **45 degrees** during the transportation or installation process.
- Install the product on a **hard, solid and level surface** that can support its weight.
- DO NOT use **detachable hose-sets** to connect the system to water mains.
- All hot works (such as soldering, welding or brazing) must be performed on tubes detached from the Heat Battery (minimum 1 metre away).
- This product is NOT suitable for tank fed hot water system.
- DO NOT immerse this product in water or any other liquid.
- DO NOT use any sharp objects in proximity of the Vacuum Insulation located at the side of the Heat Battery.



- DO NOT stack the Heat Batteries with internal controller directly on top of each other, if using multiple Heat Batteries.

## 1.4 Electrical Safety

### **⚠️ WARNING**

- The product must be earthed correctly and have its own independent electrical supply (with correct voltage and circuit breakers).
- The point of connection to the mains should be readily accessible and adjacent to the Heat Battery installation.
- Connection must allow isolation of the electrical supply. The means of isolation must be accessible to the end user after installation.
- All electrical wiring should be carried out by a competent person and be in accordance with the latest IET Wiring Regulations.
- Each circuit must be protected by a suitable fuse and double-pole isolating switch with a contact separation of at least 3mm in both poles.
- Ensure that there is water in the appliance before switching on electrical supply.
- All models are fitted with an integrated electric heater, with can be powered by PV use or grid electricity.

## 1.5 Water Safety

### **⚠️ WARNING**

- **Minimum** working pressure of Heat Battery is **0.15 MPa / 1.5 Bar**. **Maximum** working pressure of Heat Battery is **1.0 MPa / 10 Bar**. See section 2.5.2 for detailed specifications.



## 1.6 User Competence, Qualification, and Approval

### **⚠️WARNING**

- ONLY competent persons who are suitably qualified to carry out plumbing and electrical work, may undertake installations, repairs or relocations. Product training on the full range of Thermino Heat Batteries by Sunamp Ltd or an authorised training partner, is available.
- DO NOT allow children or any other unqualified or unapproved persons to install, repair, clean, relocate, interfere or tamper with the product.
- This product is not designed for use by children, or persons with reduced physical, sensory or mental capabilities, and should not be used by such persons unless they can do so safely. Where necessary, such persons (or anyone with lack of experience or knowledge) should first be given supervision or instruction concerning use of the product by a person responsible for their safety.

## 1.7 Compliance with Safety Laws and Regulations

### **⚠️CAUTION**

- Installations, repairs and relocations must comply with all relevant local laws and regulations ('statutory obligations'), particularly concerning electrics, water supplies, building regulations and Manual Handling Operations, as issued by the Government *Health and Safety Executive* ('HSE'). Water distribution and central heating installations ('systems') must comply with all statutory obligations.
- Statutory obligations always override manufacturer documentation where there is a conflict.

## 1.8 Post-Installation Safety

- All goods are sold subject to Sunamp Ltd's 'Conditions of Sale', as listed on our website.



- As Sunamp Ltd continuously improves products, they may be modified without notice. In such circumstances this manual and other relevant documentation should be disregarded. Updated documentation will be produced, supplied with new product ranges and made available on request.
- Once installed:
  - Perform a test run to ensure normal operation.
  - Explain all safety precautions to the end user.
  - Provide a copy of this manual to the end user.
- It is the responsibility of the end user to supply this manual to any other subsequent users.

## 1.9 Repair and Relocation

### **⚠WARNING**

- DO NOT attempt to carry out repairs or maintenance before the system components – including the **Thermino ePV & Thermino iPV Heat Batteries** - have cooled down to ambient room temperature. To speed up the process, disconnect power supply and open hot water taps in the dwelling to draw off hot water and cool system down.
- DO NOT attempt to move an assembled system without using appropriate lifting equipment.
- There are no user serviceable, adjustable or settable parts in this product.

**SAVE THESE INSTRUCTIONS AND  
PROVIDE A COPY TO THE END USER.**





## 2 Thermino ePV & Thermino iPV Heat Battery Overview

### 2.1 Introduction

Thank you for choosing a Sunamp Ltd **Thermino** Heat Battery, our innovative, super-compact heat storage system based on Plentigrade® phase-change materials (PCM). We are sure you will be delighted with the performance, compactness, ease of installation and quality of our product.

Sunamp Ltd's decade-long history of research and innovation in PCM technology has made it the world-leading manufacturer in Heat Battery technology – developed, designed and manufactured in the UK.

Sunamp Ltd has a wide portfolio of Heat Batteries for different applications. Please visit our website ([www.sunamp.com](http://www.sunamp.com)) or look at our catalogue for more information about our portfolio for:

- Water heating
- Space-heating
- Combined space- and water-heating
- Cooling

The Sunamp Ltd **Thermino ePV & Thermino iPV** Heat Batteries are:

- Designed to produce domestic hot water heating by using grid electricity and surplus PV energy for the **Thermino ePV** models, meanwhile **Thermino iPV** uses an external heating source (i.e. Boiler or High Temperature Heat Pump) as a main source of heat, and surplus PV energy to provide an AC power supply, which is supplied to the electric heater inside the Heat Battery.
- Equivalent to direct electrically heated solar hot water cylinders.
- Equivalent to indirectly heated hot water cylinders and hot water only thermal stores.
- Able to replace indirect vented and unvented hot water cylinders for external heating sources.
- Classified as a *Primary* Thermal store. By transferring heat from the PCM to the mains water flowing through the heat exchanger, they produce hot water instantaneously and on demand.

- Class I stationary appliances that use a single-phase electrical supply.



See the [downloads section](#) of our website ([www.sunamp.com](http://www.sunamp.com)) for other useful information on Sunamp Ltd products.

## 2.2 Product Overview

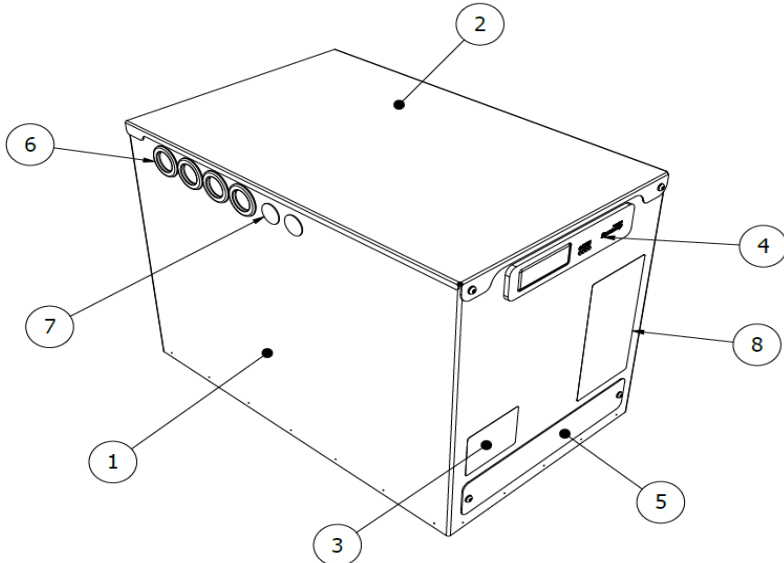


Figure 1: Heat Battery (external)

Item	Description
1	Heat Battery - main body
2	Heat Battery - lid
3	Data badge / serial number
4	Controller interface
5	Terminal cover plate
6	Tube entries (3 sides)
7	Cable entries (3 sides)
8	Energy label - to be applied by installer (if applicable)

Table 1: Product overview (external)

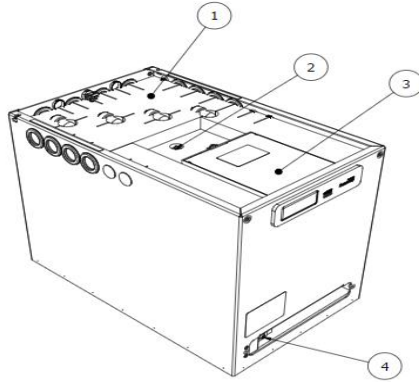


Figure 2a: Heat Battery (internal) Thermino iPv & Thermino 300 ePv (note: dual port)

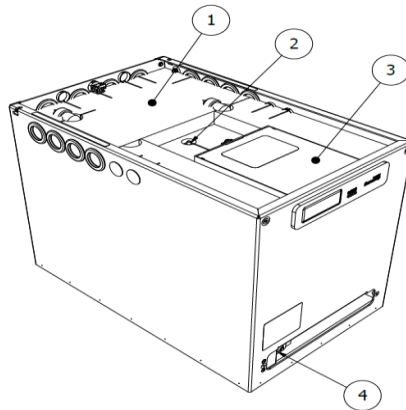


Figure 2b: Heat Battery (internal) Thermino ePv (note: single port)

Item	Description
1	Insulation layers - to be cut to suit copper tube and cable entries
2	Temperature sensor
3	Electrical control box - PCB, relays, terminal block
4	Non-self-resetting overhear thermostat (OHT)

Table 2: Product overview (internal)

## 2.3 Product Identification

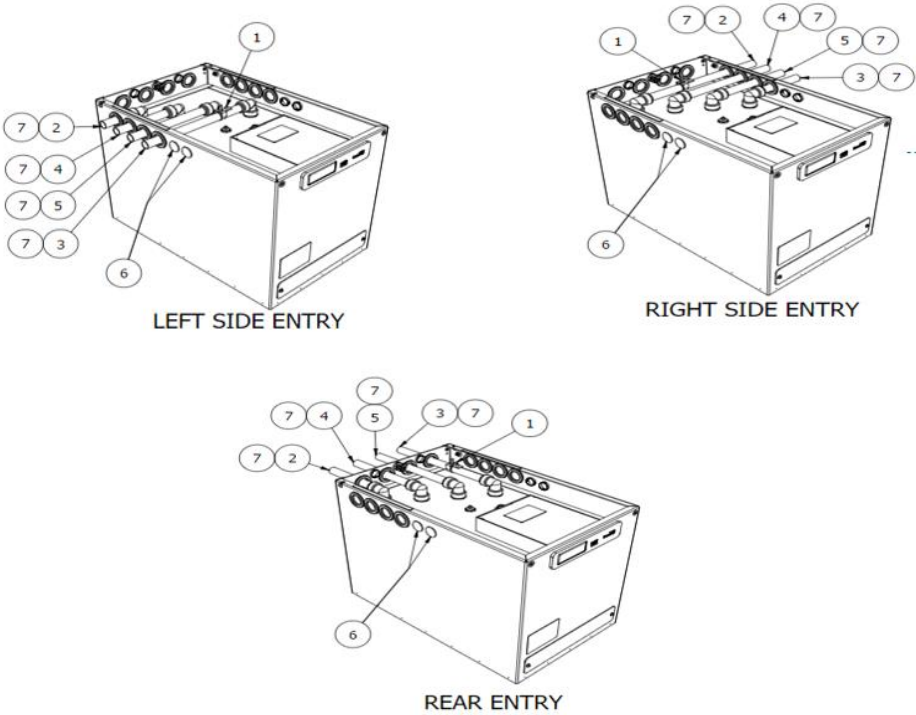


Figure 3a: Thermino iPV & Thermino 300 ePV views showing the three tube exits


Item	Description	Item	Description
1	Earth Clamp (supplied) - to be clamped to Ø22mm copper tube	5*	External heat source Flow- 'C' - Ø22mm elbow - rotatable 360 degrees
2*	Cold Water Inlet - 'A' - Ø22mm elbow - rotatable 360 degrees	6	Cable Entry via Gland - supplied but not fitted
3*	Hot Water Outlet - 'D' - Ø22mm elbow - rotatable 360 degrees	7	Ø22mm Copper Tube to BSEN1057 - Suitable for installation (not supplied).
4*	External heat source Return - 'B' - Ø22mm elbow - rotatable 360 degrees		Tube and cable entries are used depending on installation location
<p>* Note: For Thermino 300 ePV, Ports A&amp;B and C&amp;D, require to be connected to create a single inlet and outlet to match Table 3b.</p>			

Table 3a: Product installation options Thermino iPV & Thermino 300 ePV

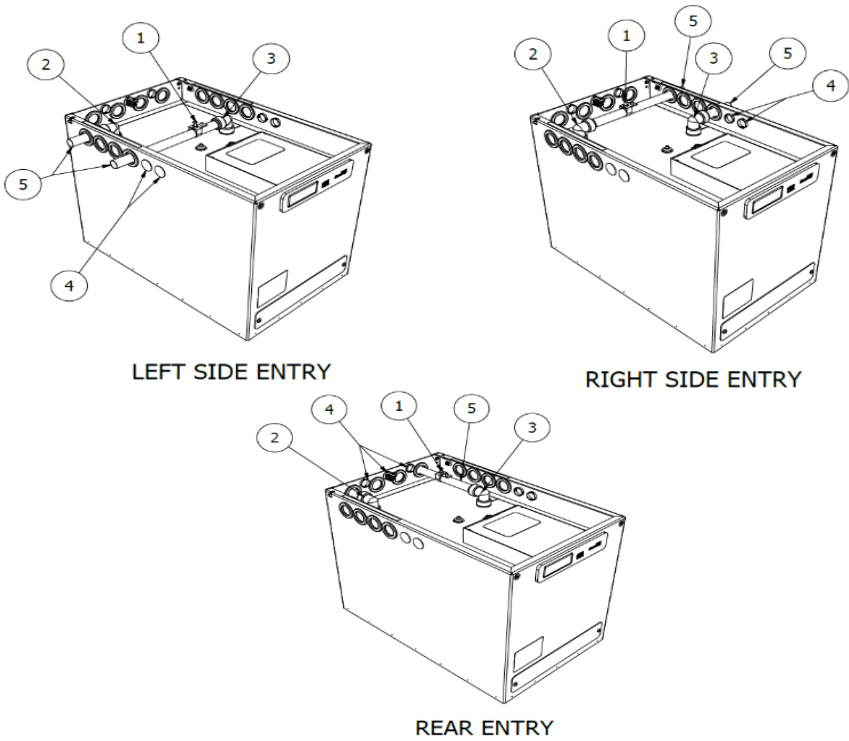


Figure 3b: Thermino ePV views showing the three tube exits


Item	Description	Item	Description
<b>1</b>	Earth Clamp (supplied) - to be clamped to Ø22mm copper tube	<b>4</b>	Cable Entry via Gland - supplied but not fitted
<b>2</b>	Hot Water Outlet - 'A' - Ø22mm elbow - rotatable 360 degrees	<b>5</b>	Ø22mm Copper Tube to BSEN1057 - suitable for installation (not supplied)
<b>3</b>	Cold Water Inlet - 'D' - Ø22mm elbow - rotatable 360 degrees	 Tube and cable entries are used depending on installation location	

Table 3b: Product installation options Thermino ePV

### 2.3.1 LED Interface

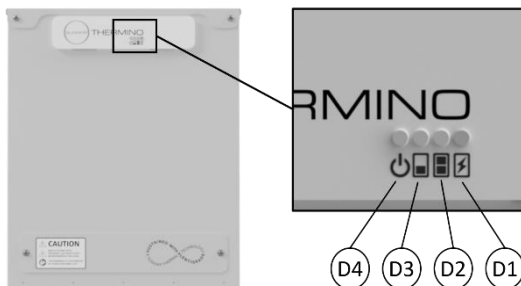


Figure 4: LED interface

Item	Description
D4	Mains power LED
D3	Charge level status LED
D2	Charge level status LED
D1	Heater 'Active' LED

Table 4: LED interface

## 2.4 Accessories and Parts

Part Number	Description
C5388	Tempering Valve
C5407	Expansion Vessel 0.5L
C5381	Water conditioner
C5377	22mm Tectite Pro Elbow TX12 65524 (see note)
C5379	22mm Tectite Pro Tee TX24 65676
C5412	Conex BM8090 0220000 22mm >B<Push elbow

Table 5: Accessories.



**Note:** 4 x C5377/ C5412 are supplied with the product as standard for Thermino IPV & Thermino 300 ePV. Thermino ePV are supplied with 2 x C5377/C5412. Visit our website ([www.sunamp.com](http://www.sunamp.com)) for all the latest accessories and spare parts.

## 2.5 Technical Specifications

### 2.5.1 Basic Specifications

Battery Model	Height (mm)	Depth (mm)	Length (mm)	Gross Weight (kg)	Net Weight (kg)
Thermino 150 iPV* <sup>1</sup>	640	365	575	136	129
Thermino 210 iPV* <sup>1</sup>	870			186	176
Thermino 300 ePV* <sup>1</sup> Thermino 300 iPV* <sup>1</sup>	1050			233	220
Thermino 70 ePV * <sup>2</sup>	440			79	75
Thermino 150 ePV* <sup>2</sup>	640			139	136
Thermino 210 ePV* <sup>2</sup>	870			178	172
Note:- *1 refers to dual port Heat Battery *2 refers to single port Heat Battery					

Table 6: Thermino ePV & Thermino iPV Heat Battery models. **Net Weight** refers to an **empty Heat Battery** (i.e. no water in the tubes); **Gross Weight** refers to tubes being filled with water.

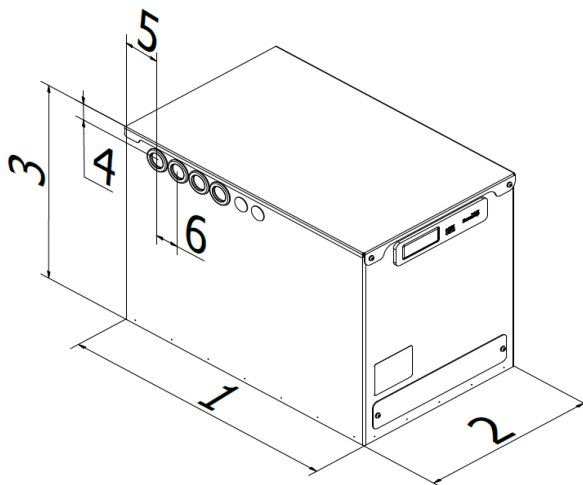


Figure 5: Additional Sunamp Ltd Thermino ePV & Thermino iPV Heat Battery dimensions



Item	Description	Item	Dimensions
<b>1</b>	Length: See Table 6	<b>4</b>	Tube Entry: 37mm
<b>2</b>	Depth: See Table 6	<b>5</b>	Tube Entry: 78mm
<b>3</b>	Height: See Table 6	<b>6</b>	Tube Entry: 50mm

Table 7: Additional product dimensions





## 2.5.2 Detailed Specifications

Specification – Thermino iPV	Thermino 150 iPV	Thermino 210 iPV	Thermino 300 iPV	See Note	
Water Content (L)	Primary Circuit	3.8	5.1	6.4	<b>1</b>
	Secondary Circuit	3.9	6.1	6.4	
Equivalent Hot Water Cylinder Size (L)	142	212	284	<b>2</b>	
V <sub>40</sub> , Volume of Hot water available at 40°C (L)	185	300	370	<b>3</b>	
Standby heat loss rate (kWh / 24h (W))	0.67 / (28.1)	0.77 / (32.1)	0.84 / (34.9)		
Energy efficiency rating class	A+			<b>5</b>	
Recommended HW flow rate (L/Min)	15	20	25		
Minimum heat source flow temperature (°C)	65			<b>6</b>	
Maximum heat source flow temperature (°C)	80			<b>7</b>	
Minimum mains supply pressure at inlet of Heat Battery (MPa / (Bar))	0.15 / (1.5)				
Maximum working pressure (MPa / (Bar))	1.0 (10)				
Pressure loss characteristics K <sub>v</sub> Values	(Refer to Section 2.6, Figures 6.2 & 6.3)				
Hot water outlet temperature at design flow rate (°C)	45-55			<b>4</b>	
Connected load at ~ 230 V, 50Hz (W)	2,800				
Power supply / Standby consumption (W)	1 PH ~ 230 V / 7				

Table 8a: Detailed specifications for Thermino iPV Heat Battery models



Specification – Thermino ePV		Thermino 70 ePV	Thermino 150 ePV	Thermino 210 ePV	Thermino 300 ePV	See Note
Water Content (L)	Single port	3.2	3.2	5.9	N/A	<b>1</b>
	Dual Port (Combined)	N/A	N/A	N/A	12.8	<b>1</b>
Equivalent Hot Water Cylinder Size (L)		74	140	212	306	<b>2</b>
V <sub>60</sub> , Volume of Hot water available at 40°C (L)		105	199	301	436	<b>3</b>
Standby heat loss rate (kWh / 24h (W))		0.48 / (20)	0.67 / (28.1)	0.77 / (32.1)	0.84 / (34.9)	
Energy efficiency rating class		C				<b>8</b>
Recommended HW flow rate (L/Min)		6	15	20	25	
Minimum mains supply pressure at inlet of Heat Battery (MPa / (Bar))		0.15 / (1.5)				
Maximum working pressure (MPa / (Bar))		1.0 (10)				
Pressure loss characteristics K <sub>v</sub> Values		(Refer to Section 2.6, Figure 6.1)				
Hot water outlet temperature at design flow rate (°C)		45-55				<b>4</b>
Connected load at ~ 230 V, 50Hz (W)		2,800				
Power supply / Standby consumption (W)		1 PH ~ 230 V / 7				
Electrical efficiency (η <sub>elecwh</sub> ) (%)		81.4	89.6	93.8	93.3	<b>9</b>
Annual electricity consumption (AEC) (kWh/annum)		542	1,398	2,690	2701	
Tapping cycle		S	M	L	L	

Table 8b: Detailed specifications for Thermino ePV Heat Battery models



### Notes to Table 8a & 8b:

1. Water content of the Heat Battery for sizing expansion vessels.
2. Calculated from the storage capacity of the Heat Battery and assuming that the equivalent hot water cylinder thermostat is set at 60°C, mains cold water inlet temperature is at 10°C and the stored energy utilisation factor of the cylinder is 0.85.
3. The hot water volume available from the Heat Battery normalised to an average outlet temperature of 40°C when it is fully charged.
4. Recommended setting range for hot water tempering valve.
5. When heated by an external heat source.
6. Minimum constant heat source flow temperature from an external heat source for charging the Heat Battery.
7. Heat source flow temperature should not exceed this value when the Heat Battery is being charged.
8. When installed as an electric water heater.
9. Based on standard: BS EN 50440:2015



For more detailed specifications, also see the **Thermino Heat Batteries General Product Application and Design Manual**, available from the [downloads section](#) of our website ([www.sunamp.com](http://www.sunamp.com)).

## 2.6 Pressure Loss Characteristics

For the **Thermino ePV (sizes 70, 150 & 210)**, the pressure loss values can be read in (Figure 6.1), the water circuit must be connected as shown schematically in (Figure 6.4).

For the **Thermino 300 ePV**, the pressure loss values for this model can be read in (Figure 6.1). Please note that this model has combined ports both for the inlet cold mains water (C&D) and hot water outlet (A&B) as shown schematically in (Figure 6.5).

For the **Thermino iPV** models, the pressure loss values for the primary circuit. can be read in (Figure 6.2). The primary circuit of the Heat Battery is connected to the External heating source flow and return as shown schematically in (Figure 6.6), meanwhile the

For the secondary circuit of the Heat Battery, the pressure loss values can be read in (Figure 6.3). Meanwhile the dwelling hot water circuit must be connected as shown schematically in (Figure 6.6).

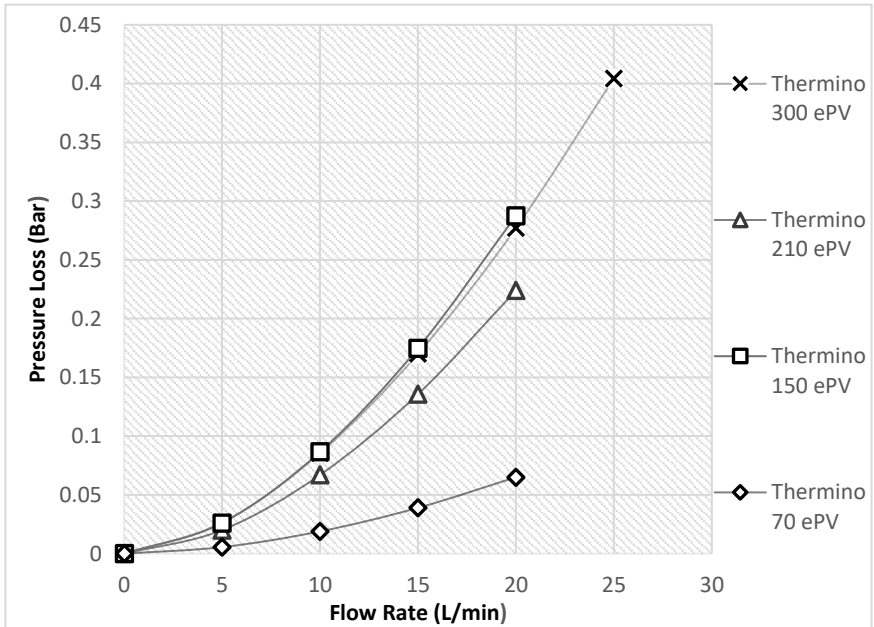


Figure 6.1: Thermino ePV Heat Batteries pressure loss characteristics graph

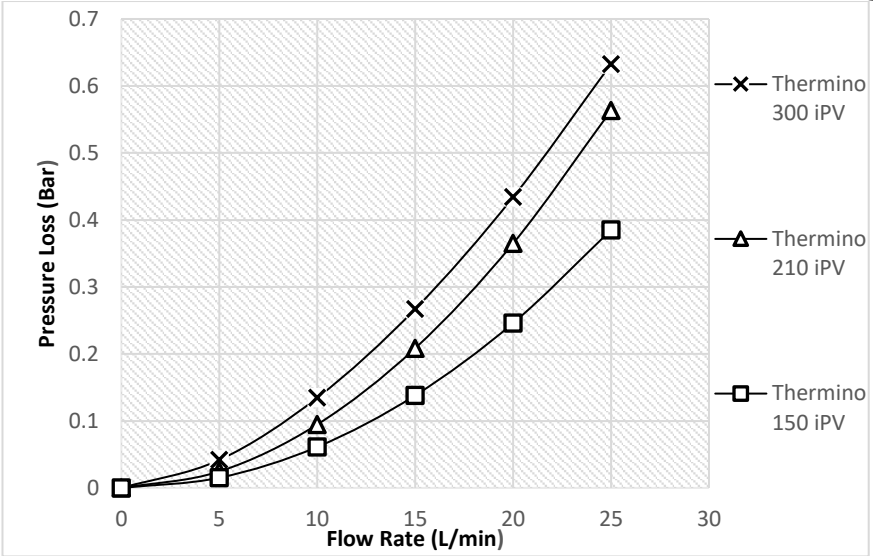


Figure 6.2: Thermino iPV Heat Batteries Primary circuit pressure loss characteristics graph

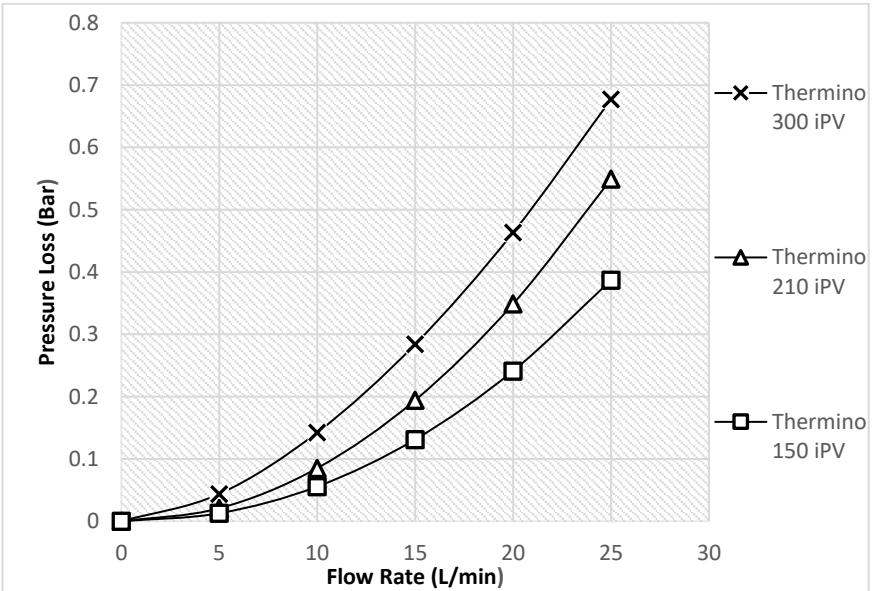


Figure 6.3: Thermino iPV Heat Batteries Secondary circuit pressure loss characteristics graph

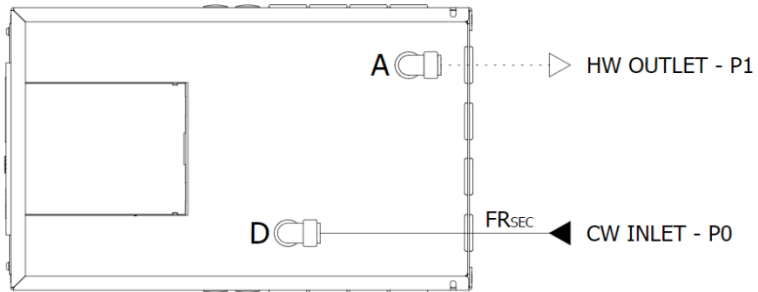


Figure 6.4: Pressure loss at inlet & outlet of the Thermino ePV, sizes 70, 150 & 210.

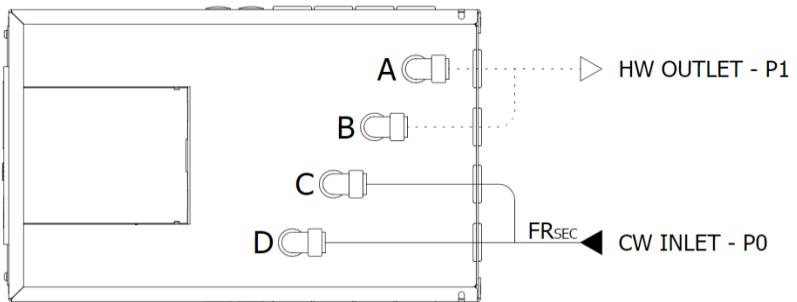


Figure 6.5: Pressure loss at inlet & outlet of the Thermino 300 ePV

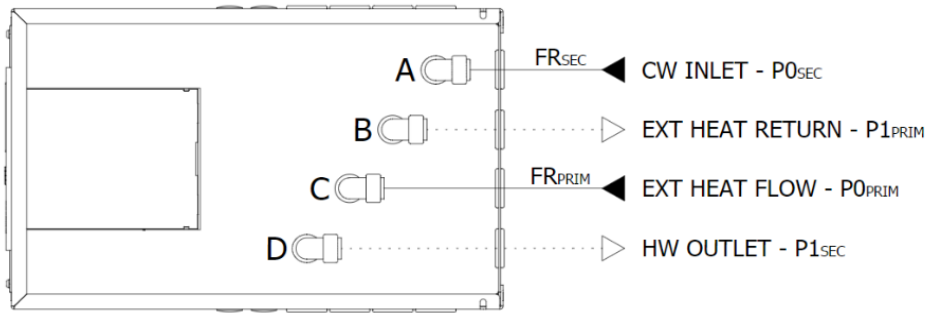


Figure 6.6: Pressure loss at inlet & outlet of the Thermino iPV, sizes 70, 150, 210 & 300.

## 3 Installation



Always read the safety instructions in Section 1 of the manual before installing **Thermino ePV & Thermino iPV** Heat Batteries.

### 3.1 Installation Process

#### Preparation:

- Assess the location of installation considering spatial requirements, clearances, cable runs and tube runs.
- Unpack and discard or recycle packaging according to local disposal or recycling rules.
- Identify which side you wish to make hydraulic and electrical cable entries (see Figure 3a & b in Section 2.3).
- Prepare the system hydraulics and electrics.
- Lift unit into position using appropriate lifting methods.

#### Hydraulic Connection:



**Note:** Please identify the correct hydraulic setup for the product as this manual contains 3 different hydraulic combinations.

**Thermino iPV:** The mains cold water inlet connects to port A; Hot water outlet connects to port D. The external heat source flow pipe connects to Port C and the external heat source return pipe connects to Port B. (Fig. 14.1)

**Thermino ePV:** The mains cold water connects into port D; Hot water outlet connects to port A. (Fig. 13.2)

**Thermino 300 ePV:** The mains cold water inlet is branched to feed into ports C&D and the hot water outlet is branched together and connected into ports A&B. (Fig. 13.1)

- Remove lid. The lid is secured by 2 x M5 button head capscrews at the front and two locating pins at the back (Figure 7):
  - Remove 2 x M5 button head capscrews using 3mm hex head and set aside.
  - Slide the lid forward, then lift the lid up and set aside.
- Remove the top two layers of insulation (layer 1 is 10mm and layer 2 is 32mm thick) and set aside.





- Rotate the elbows to the side you wish to connect the hydraulics (left, right or back).
- Remove the respective rubber grommets in the outer housing and cut the centres (with a cross) with a knife. Re-insert the cut grommets.
- Cut and prepare the two off lengths of Ø22mm copper tube to suit the rest of the installation / system:
  - Always cut the tube square, using a rotary tube cutter whenever possible. Ensure the cutter wheel is appropriate for the copper tube.
  - Deburr the tube end, both internally and externally to create a 1mm chamfer on the outside of the tube.
  - Check the tube ends are free from damage and clean, wiping away any swarf to avoid damaging the 'O' ring on tube insertion.
  - Tube end must also be free from stickers, tape and adhesive residues.
  - Mark the socket depth (27mm) on the tube with a marker.
  - Insert the tube firmly with a slight twisting action until it reaches the tube stop with a positive "click".
  - Ensure the depth insertion mark corresponds with the mouth of the fitting, then pull firmly on the tube to ensure the fitting is secure.
- Fit the earth clamp to the Ø22mm copper tube (See Figure 3a & 3b in Section 2.3).
- Connect to the rest of the fixed system hydraulics.
- Fill the system with water, purging any air out of the system. This may take several minutes and can be aided by repeatedly opening and closing the outlet.
- Once finished purging and with the system pressurised, inspect the piping/tubing and joints for any leaks. Take remedial action if necessary.



### **Electrical Connections:**

- Move the cable strain relief fittings to the side you wish to make the entries / exits. Cover all other holes in the enclosure with the supplied blanking grommets. (Figure 8).
- Feed the mains cable through the strain relief bushing in the Heat Battery housing.

- If applicable, feed the signal cable through the additional strain relief fittings.
- Line up the cable strain relief fitting ratchet feature and compress firmly so that the fitting grips the cable.
- Open the internal controller enclosure using a flat head screwdriver to remove the snap in' lid.
- Connect the wires according to the wiring options if not already fitted.
- Remove or make links according to the wiring options.
- Close up the internal controller enclosure replacing the 'snap fit' lid and check the earth clamp on the copper tube is secure.

### Final Fit After Commissioning:



Commissioning instructions are provided in Section 4 of this manual. Follow the instructions below after commissioning.

- Cut the 32mm thick insulation layer to suit the tube and cable entries. This layer has several perforations for guidance. This can be done with a sharp knife or scissors. Please DO NOT cut inside the Heat Battery.
- Replace the newly cut 32mm thick insulation layer nesting the insulation around the tube work and cables. Makes sure the main and signal cables sit above this layer.
- Replace the top layer 10mm layer of insulation.
- Replace the lid, aligning the rear pins with the slots in the rear of the unit, slide back, fit the 2 x M5 button head capscrews using 3mm hex head.

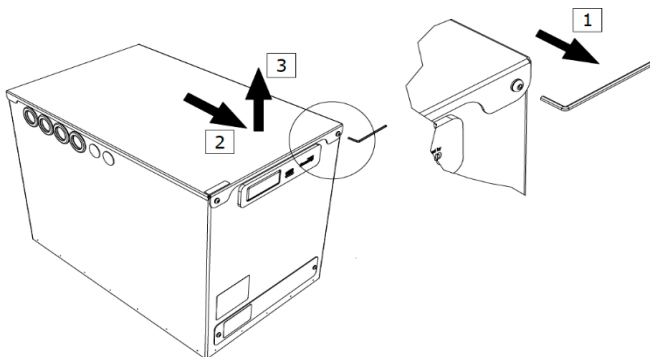


Figure 7: Access to Heat Battery connections

Item	Description
1	Remove fasteners x2 using 3mm Allen Key
2	Slide lid forward
3	Lift lid

Table 9: Access to Heat Battery connections

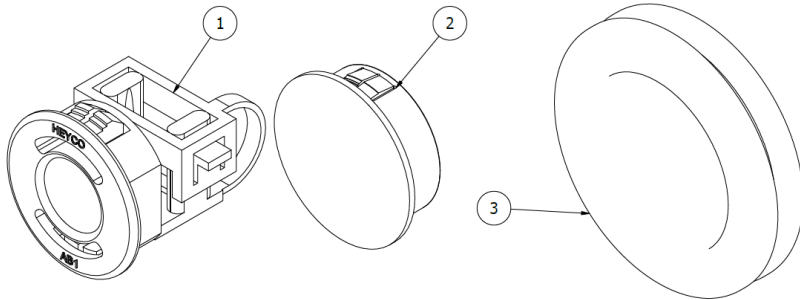


Figure 8: Cable and tube interfaces

Item	Description
1	Cable entry strain relief gland
2	Cable entry blanking bush
3	Tube entry grommet

Table 10: Cable and tube interfaces

## 3.2 Water Supply Requirements



**Important:** All components fitted in the water system should be *Water Regulations Advisory Scheme (WRAS)* approved.

### 3.2.1 General



For information regarding expansion vessel sizing and pressure relief valves, refer to the information provided on the product data label regarding water content and industry guidance.



**Important:** Although the Heat Batteries are designed for **1.0MPa (10 bar)** maximum working pressure, it is recommended that if the incoming mains pressure is greater than **0.5MPa (5 bar)**, a WRAS approved pressure regulator set at 0.5MPa (5 bar) should be fitted.

- Connect the Heat Batteries as per the guidance in section 3.1 / diagrams 13.1, 13.2 or 14.2, depending on the type of unit.
- DO NOT use detachable hose-sets to connect the product to the water mains.
- Minimum - Maximum dynamic mains water supply pressure: **0.15MPa (1.5bar) - 1.0MPa (10 bar)**.
- Minimum mains cold and hot water tube sizes: **Ø22mm copper or equivalent**.
- Expansion vessel charge pressure = Incoming mains pressure (MPa).
- A potable water expansion relief valve **MUST** be fitted, unless it has been established that the water is able to expand back into the mains. In case of doubt over the presence of non-return valves in the system, a potable water expansion relief valve should be fitted as a precaution.
  - The valve should be fitted in compliance with Building Regulations Approved Document G.
  - The valve should be chosen based upon the mains water pressure, with a maximum allowable rating of **1MPa (10 bar)**.
- The external heating source circuit (closed circuit) must be fitted with an expansion relief valve.
- A WRAS approved hot water tempering valve should be fitted at the outlet from the Heat Battery. The tempering valve should be set to deliver hot water between 45°C and 55°C.

### 3.2.2 Hard Water and Limescale



Where mains water hardness can exceed **150 ppm Total Hardness**, you must install a scale reducing device in the cold-water supply to the Heat Batteries.

Limescale can be controlled using: chemical limescale inhibitors, polyphosphate dosing, electrolytic scale reducers or water softeners.

### 3.3 Location and Space Requirements

- The Heat Battery is suitable for indoor use only.
- Avoid locations in close proximity to other building services, hot works and other sources of heat. Hot works, such as soldering, welding or brazing must **ONLY** be undertaken a **minimum distance of 1m from the system**, and by using cooling clips or other heat absorbent materials.
- Due to the weight of the Heat Battery, ensure the floor is level, sound and capable of supporting its weight (Table 6).
- Allow for space of 150mm around the Heat Battery (i.e. to view LED lights), and space of 450mm above it (i.e. to remove the lid if necessary):

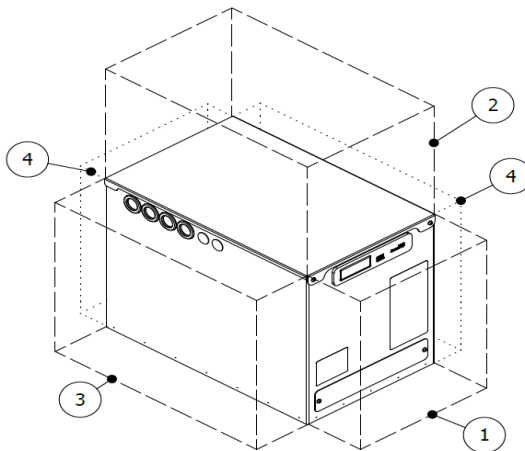


Figure 9: Spacing (in mm) surrounding the Sunamp Ltd. Heat Battery

Item	Space	Reason
1	150mm	To access terminal cover and to ensure visibility of the data badge and LEDs
2	450mm	To remove lid and access internals
3	150mm	To allow for tube and cables entry (side dependent)
4	10mm	If no access required (side dependent)
-	< 3000mm	Recommended length of cable runs

Table 11: Space requirements

### 3.4 Hydraulic Requirements



Sunamp Ltd. Heat Batteries are NOT suitable for tank-fed hot water systems.

- Connect the Heat Batteries as per the guidance in section 3.1 / diagrams 13.1, 13.2 or 14.2, depending on the type of unit.
- All connection tube work inside the Heat Battery casing must be **Ø 22mm copper tube**. This is to allow the earth connection between the case, inlet, and outlet tube fittings.
- Ensure that the unit is **electrically isolated** from mains and that the controller lid is closed whilst performing any hydraulic pipework. This is to avoid water or particles coming into contact with the PCB and other electrical components.
- DO NOT fit isolation valves between the expansion vessel and the Heat Battery.
- The tube grommets used for inlet and outlet into the Heat Battery must be cut to allow the passage of the copper tubes by safely using an appropriate cutting tool.
- Although Ø22mm copper or equivalent plastic tube work should suffice in most installations:



- Plastic tube work must ONLY be used outside the Heat Battery and no plastic tube connections must be made to the Heat Battery inlet or outlet ports.
- It is recommended that sizing of the tube work should consider mains water supply pressure, the design flow rates, size of the Heat Battery and pressure loss.
- As a mandatory requirement it is necessary to install an energy supply cut off valve or equivalent (i.e. 2-way port valve or 3-way port valve) on the external heat source Flow circuit.
- When connecting to a heat pump, a bypass valve must be fitted between the heat pump outlet flow and return, prior to any energy supply cut off valves or equivalents.

### 3.5 Temperature and Insulation Requirements



Applying excessive heat to the system tubes will cause damage to the Heat Battery and its internal components.

- Heat Batteries use the Plentigrade® P58 Phase-Change Material (PCM), which has a **phase transition temperature of 58°C**.
- All connected tubes should be insulated for **at least 1m** from their connection points with the Heat Battery.
- The flow temperature of the external heating source must not exceed 80°C.
- Please ensure that the External Heat Source must have control and overheat safety thermostats.

### 3.6 Electrical and Wiring Requirements

The model within this manual is fitted with an internal controller situated at the top of the Heat Battery. There are 2 wiring options available for this range:

#### 1. **Thermino iPV: connection to External heat source**

For this model, the Heat Battery is charged by the external heat source from bottom to top and discharges hot water draw-off from top to bottom.

When heated by surplus PV, the heating element charges the Heat Battery from bottom to top.

## 2. Thermino ePV: Solar PV surplus energy and grid electricity supply

The Heat Battery is charged by the heating element from bottom to top and discharged during hot water draw-off from bottom to top.

### 3.6.1 General



External wiring to the Heat Batteries must be in accordance with current IET (BS.7671) Wiring Regulations and any other applicable local regulations. **Local Means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.**



Note: The lid cover of the controller can be removed by using a flat head screwdriver.

- The Heat Batteries must be earthed correctly.
- The point of connection to the mains should be readily accessible and adjacent to the Heat Battery installation.
- The product must have its own **dedicated 16A MCB** protected supply.
- Connection must allow isolation of the electrical supply, such as a double pole switch having a 3mm (1/8") contact separation in both poles. The means of isolation must be accessible to the end user after installation.
- All models are designed for heating by integrated electric heaters. Wiring must be installed in accordance with the instructions provided (Sections 3.7).
- All models are fitted with only one 2.8kW heating element at ~230V AC and therefore recharging times increase with size of the Battery.
- The mains power cable to the Sunamp Controller should be a minimum of 2.5mm<sup>2</sup>, 4 core H05 VV-F sheathed cable, to BS 6500. This cable must be prepared according to Figure 10 (below), where the Green/Yellow (Protective Earth) cable is 15 mm longer than the Brown (Permanent Live), Black (Modulating Live) and Blue/ Grey (Neutral). Please note that Figure 10, only relates for the Heat Battery terminal connections for information on the Solar Power Diverter connection, please refer to (Section 3.9).



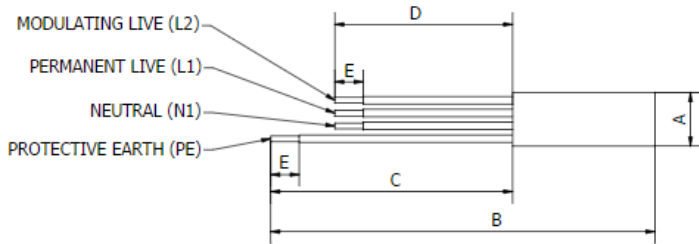


Figure 10: Wire length preparation diagram

Item	Description
<b>L1</b>	Permanent Live
<b>L2</b>	Modulating Live
<b>N1</b>	Neutral
<b>PE</b>	Protective Earth
<b>A</b>	Ø10.5mm MAX
<b>B</b>	< 3000mm from Heat Battery to fixed disconnection
<b>C</b>	75mm
<b>D</b>	60mm
<b>E</b>	8mm

Table 12: Wire lengths

### 3.6.2 Controller Wiring Diagram Thermino ePV

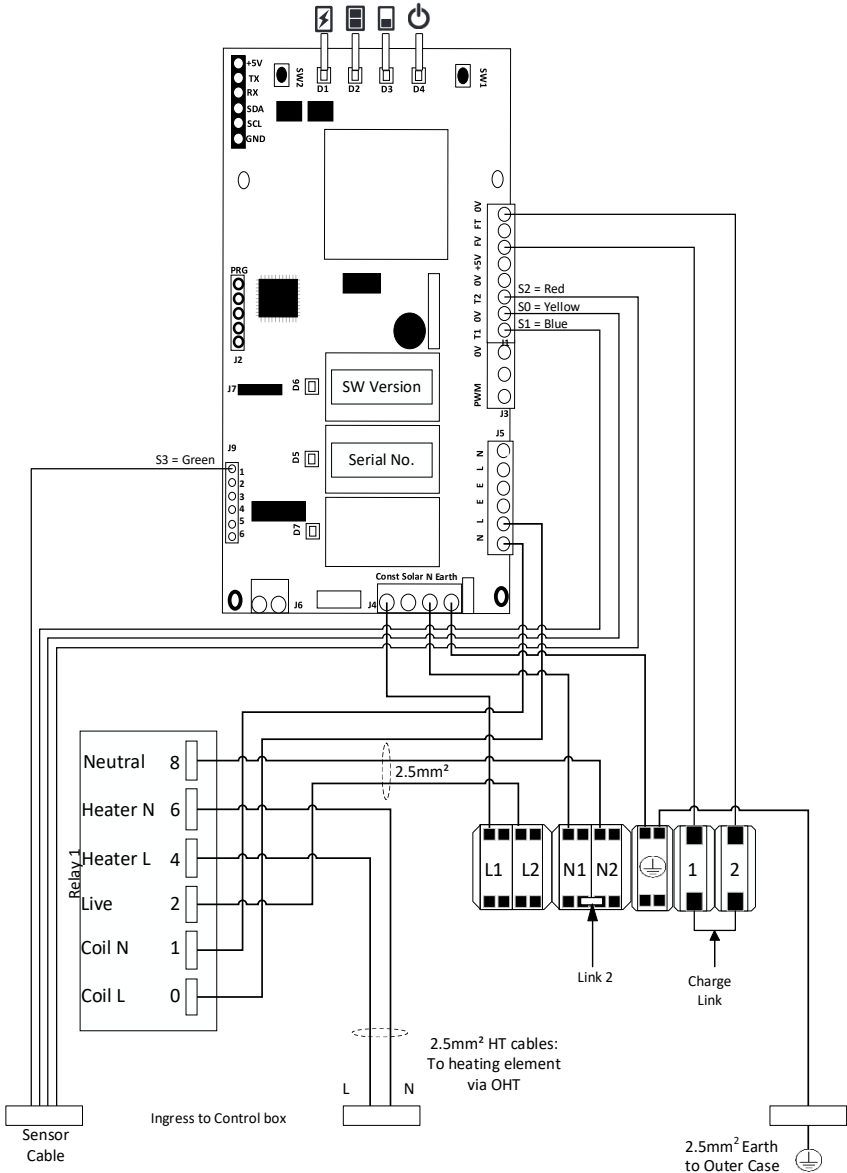


Figure 11: **Thermino ePV** Internal controller wiring diagram (wire sizes=0.75mm<sup>2</sup>, unless stated otherwise)

### 3.6.3 Controller Wiring Diagram Thermino iPV

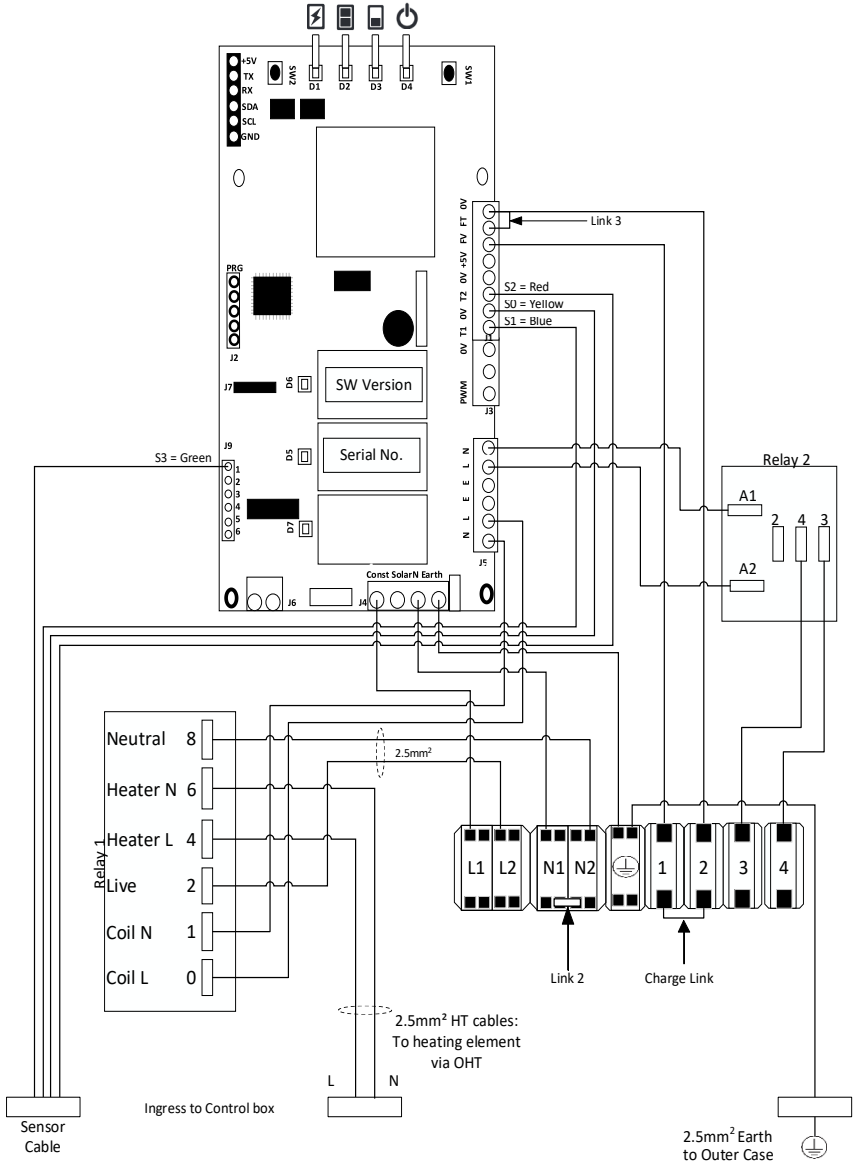


Figure 12: **Thermino iPV** Internal controller wiring diagram (wire sizes=0.75mm<sup>2</sup>, unless stated otherwise)

### 3.7 Wiring – Thermino ePV



**Important:** Please follow (Table 13.1) for information regarding the Links.

Link specification	Removed or Fixed
Link 1	Removed (Factory setting)
Link 2	Fixed (Factory setting)
Charge Link	Fixed (Factory setting)

Table 13.1: Wiring eHW +iPV - Link settings

- Run and connect 4 Core mains power supply cable (16A, minimum 2.5mm<sup>2</sup> CSA) from the Solar Power Diverter to the Heat Battery. (Figures 13.1, 13.2, 13.3 & Section 3.9).
- Wire the cable via the appliance case grommets and into the control box housing (Figures 8, 11 and 13.3).
- Prepare if necessary and wire the mains power cable in the following Heat Battery terminals (Figure 10 & 13.3):
  - **Brown (Live):** Terminal L1 (Permanent Live)
  - **Black (Live):** Terminal L2 (Modulating Live)
  - **Blue/ Grey (Neutral):** Terminal N1 (Neutral)
  - **Green/Yellow (Earth):** Terminal PE (Protective Earth)

### 3.7.1 Controller Wiring Schematic and Diagram

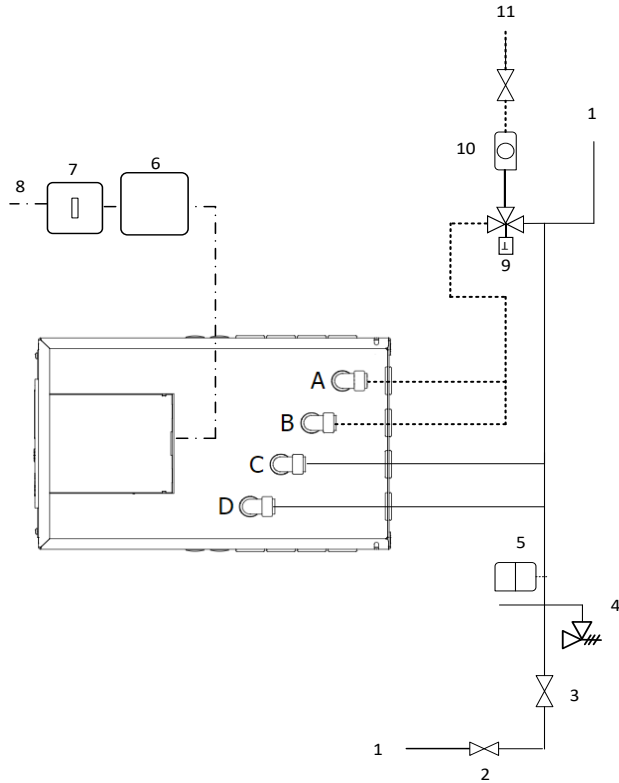


Figure 13.1: **Thermino 300 ePV** schematic (see Figure 3a for piping and electrical options available)

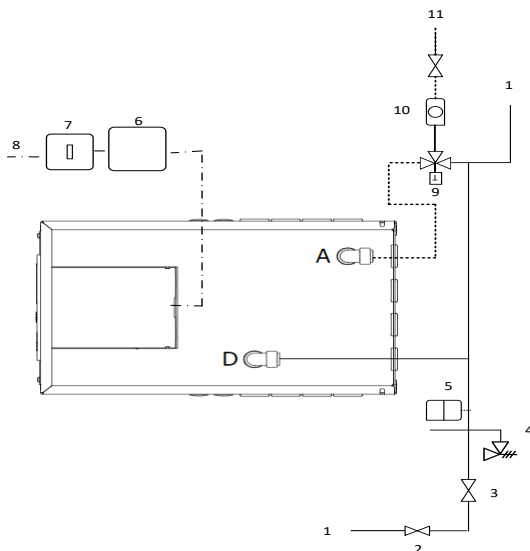


Figure 13.2: **Thermino ePV** schematic (see Figure 3b for piping and electrical options available)

Item	Description	Item	Description	Item	Description
<b>1</b>	Cold water supply to dwelling	<b>4</b>	Mains Expansion Relief Valve (max. of 10 bar)	<b>7</b>	Double-pole isolating switch, (Min. 16A)
<b>2</b>	Check Valve	<b>5</b>	Expansion Vessel	<b>8</b>	Electrical supply ~230V AC, 16A
<b>3</b>	Cold water pressure regulator	<b>6</b>	Solar Power Diverter controller	<b>9</b>	Hot Water Tempering Valve
<b>10</b>	Hot Water flow regulator	<b>11</b>	Hot water supply to dwelling		

Table 13.2: Explanation of components for Figure 13.1 and 13.2.

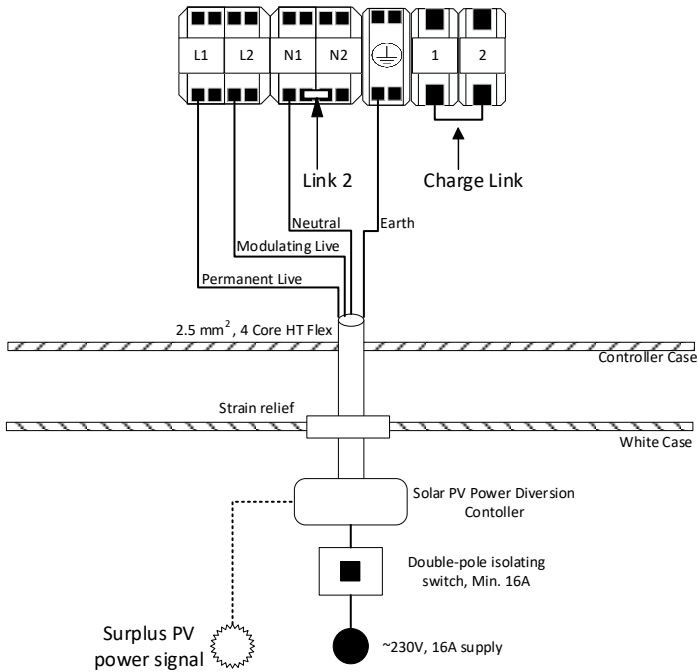


Figure 13.3: Thermino ePV system wiring

### 3.8 Wiring – Thermino iPV



**Important:** Please follow (Table 14.1) for information regarding the Links.

Link specification	Removed or Fixed
Link 1	Removed (Factory setting)
Link 2	Fixed (Factory setting)
Charge Link	Fixed (Factory setting)

Table 14.1: Wiring Thermino iPV – Link 1 & 2 settings



Link 3 will be provided fixed within the product; this can be removed to meet the functionality required in (Table 14.2). Please isolate the electrical power to the unit if the Link requires removal.

Link specification	Removed or Fixed	
Link 3	Fixed (Factory setting)	If connected to a High temperature heat pump - The link ensures that the Heat Battery demand can be satisfied by the heat source delivering a flow temperature greater than 65°C.
	Removed	If connected to a Boiler - Removing the link ensures that the Heat Battery demand can be satisfied by the heat source delivering a flow temperature greater than 75°C.

Table 14.2: Wiring Thermino iPV - Link 3 setting

- Run and connect 4 Core mains power supply cable (16A, minimum 2.5mm<sup>2</sup> CSA) from the Solar Power Diverter to the Heat Battery. (Figures 14.1,14.2 & Section 3.9).
- Wire the cable via the appliance case grommets and into the control box housing (Figures 8,14.2 and 12).
- Prepare if necessary and wire the mains power cable in the following terminals (Figure 10 & 14.2):
  - **Brown (Live):** Terminal L1 (Permanent Live)
  - **Black (Live):** Terminal L2 (Modulating Live)
  - **Blue/ Grey (Neutral):** Terminal N1 (Neutral)
  - **Green/Yellow (Earth):** Terminal PE (Protective Earth)

### 3.8.1 External heat source sensor cable wiring

- Wire a 2 core PVC insulated cable (minimum 0.75mm<sup>2</sup> CSA, 24 x 0.2mm according to BS 6500), the Heat Battery controller in this application acts as hot water thermostat. The cable will act as a hot water heating control signal from the Heat Battery controller terminals T3 & T4 into the appropriate terminals of the heating system wiring centre (please refer to External heat source manual). Please run the wire into the Heat Battery appliance via the appliance case cabling grommets and then into the control box housing through the hole available. Secure the cables in Terminals T3 & T4 independently (Figure 8). The control signal load must be no greater than (~230V AC, 3A or 12 to 24VDC, 0.5A max).



### 3.8.2 Controller Wiring Schematic and Diagram

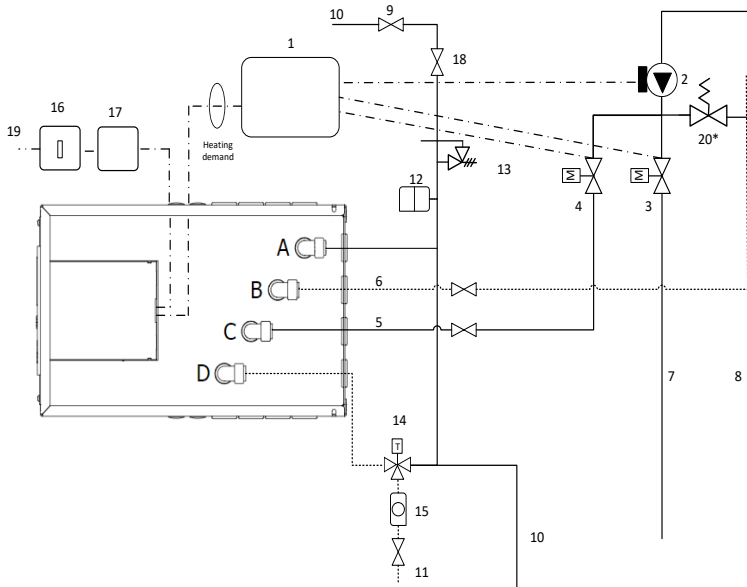


Figure 14.1: Example wiring option 1 schematic (see Figure 3a for piping and electrical options available)

Item	Description	Item	Description	Item	Description
<b>1</b>	External Heat Source Controller	<b>7</b>	Central Heating Flow	<b>13</b>	Mains Expansion Relief Valve (max. of 10 bar)
<b>2</b>	Circulation pump	<b>8</b>	Central Heating Return	<b>14</b>	Hot Water Tempering Valve
<b>3</b>	Central heating Zone Valve	<b>9</b>	Check Valve	<b>15</b>	Hot Water flow regulator
<b>4</b>	Heat Battery Hot Water Zone Valve	<b>10</b>	Cold supply water to dwelling	<b>16</b>	Double-pole isolating switch, (Min. 16A)

<b>5</b>	Flow from External Heat Source	<b>11</b>	Hot water supply to dwelling	<b>17</b>	Solar Power Diverter controller
<b>6</b>	Return to External Heat Source	<b>12</b>	Expansion Vessel	<b>18</b>	Cold Water Pressure regulator
<b>19</b>	Electrical supply from Dwelling consumer board ~230V AC, 16A	<b>20*</b>	Auto-bypass valve		
Note: *Only required for installation with High Temperature Heat Pumps to guarantee enough flow rate required by the heat pump in defrosting.					

Table 14.2: Explanation of components

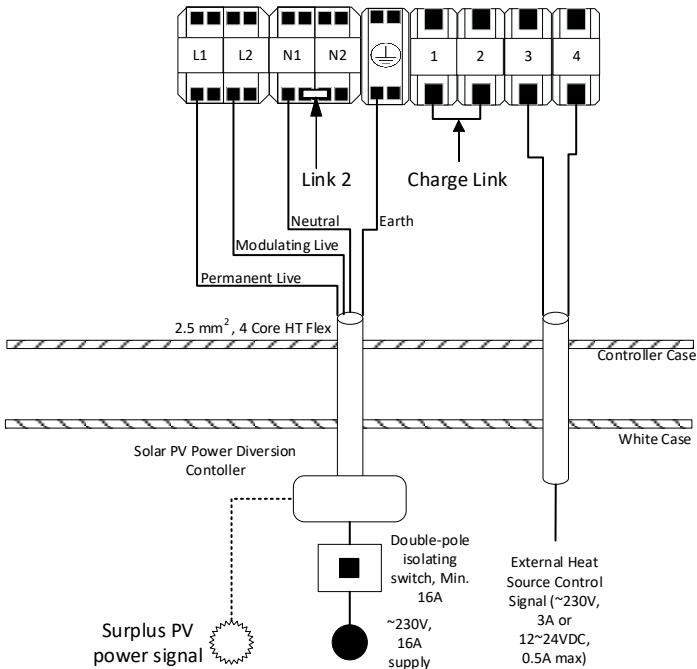


Figure 14.2: Thermino iPV system wiring

### 3.9 Wiring Setup of Solar Power Diversion Controller



Please refer to Solar Power Diverter Instruction Manual for further information.

- The mains power cable from the Sunamp Controller to the Solar Power Diverter should be a minimum of 2.5mm<sup>2</sup>, 4 core H05 VV-F sheathed cable, to BS 6500.
- Prepare if necessary and wire the mains power cable from the Sunamp Controller in the following terminals on the Solar Power Diverter (Figure 15):
  - **Brown (Live):** Terminal L "Supply" (Permanent Live)
  - **Black (Live):** Terminal L1 "Heaters" (Modulating Live)
  - **Blue/ Grey (Neutral):** Terminal N "Heaters" (Neutral)
  - **Green/Yellow (Earth):** Terminal E "Heaters" (Protective Earth)
- The power main cable from the Double-pole isolating switch, Min. 16A to the Solar Power Diverter should be a minimum of 2.5mm<sup>2</sup>, 4 core H05 VV-F sheathed cable, to BS 6500.
- Prepare if necessary and wire the mains power cable Solar Power Diverter (Figure 15):
  - **Brown (Live):** Terminal L "Supply" (Live)
  - **Blue (Neutral):** Terminal N "Supply" (Neutral)
  - **Green/Yellow (Earth):** Terminal E "Supply" (Protective Earth)
- Please note that the Brown (Live) cable from the Double-pole isolating switch, Min. 16A and the Brown (Permanent Live) cable from the Sunamp Controller, will be wired into the same location on the Solar Power Diverter.

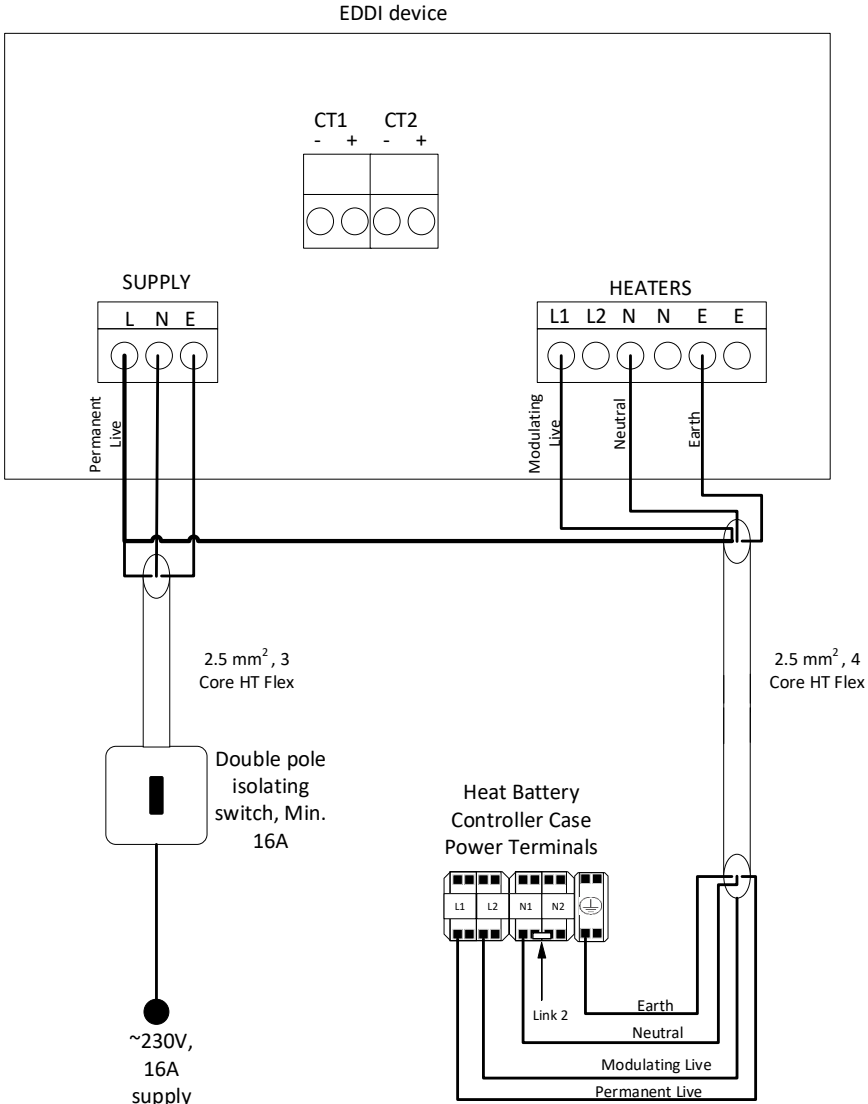


Figure 15: Exemplary Solar Power Diverter wiring – “MYENERGI EDDI”

## 4 Commissioning



Before commissioning the product, first ensure that you have properly reviewed the previous sections, particularly in regard to Heat Battery specifications as well as location, electrical supply and water supply requirements.



The Heat Battery and its associated pipework **MUST** be filled and fully vented before the Heat Battery power supply is switched ON.

### 4.1 Preparation

- Ensure all packaging material has been removed.
- Ensure all components are clean and undamaged.

### 4.2 Process

1. Ensure that the temperature sensor of the Heat Battery is fully inserted into its pocket. The white marker should be sitting on top of the blue cable gland.
2. Turn on the water supply and ensure that there are no leaks.
3. Fully open any hot water taps in the dwelling and allow to run for a **minimum time of 2 minutes**. This is for any air to leave the system. This may vary depending on Sunamp Ltd. Heat Battery model size.




Note: For larger models such as the Thermino 210 ePV & Thermino 210 iPV, the **minimum time is increased to 4 minutes**.

4. Switch ON the power supply to the Heat Battery and Solar diverter controller, via the Double-pole isolating switch, Min. 16A.
5. Switch ON the power supply to the External Heat Source, via its dedicated isolator (if Thermino iPV installed).
6. On the External Heat Source controller setting for hot water heating (if Thermino iPV installed):
  - a. Please set target hot water cylinder temperature: 65 – 70°C



7. The flow rate in the Heat Battery charging circuit should be adjusted so that the temperature difference between flow and return is between 5 – 7°C (if Thermino iPV installed):



8. If available press the BOOST button on the Solar Power Diverter.
9. Continue to run the tap for a further **2 minutes**, then close.
10. Check the front of the Heat Battery to ensure that the “power” and “heating element” LED’s are lit (see Table 15).
11. Allow the Heat Battery to charge for approximately **30 minutes** with the hot water tap closed.
12. Please note that on first charge or when the Heat Battery has been switched off and cooled down the heating element will cycle ON and OFF for up to one hour, depending on the Heat Battery size. This is normal operation. If heating element cycling persists for more than one hour, please refer to (Table 16 & 17).
13. After 30 minutes open the hot water tap and check for hot water.
14. Adjust the Hot Water Tempering Valve, so that the output temperature is **45°C to 55°C**, if applicable.
15. Check hot water temperature at all hot water outlets in the dwelling with the customer and advise on temperature settings.
16. Ensure that the Heat Battery charges to half charge and that there are no lights flashing (which may otherwise indicate an error, see Table 16, below).
-  17. Pre-planned Boost times should be set on the Solar Power Diverter, the information on how these are set can be found in the relevant section of the Solar Power Diverter manual. These depend on the end user usage type of the system.
-  18. If using the MyEnergi EDDI as a Solar Power Diverter, please ensure that the setting “Hot Cancel delay” is programmed, this to a time of 45 minutes. Please refer to the MyEnergi EDDI manual for more information.
19. Leave all product information and literature with the customer / end user.
-  20. Fill in and return the Sunamp Ltd. commissioning certificate, provided with the product. **These documents MUST be compiled and returned to Sunamp after installation.**
21. Fix any Energy labels to product main body.

## 5 Operation



Always read the safety instructions in Section 1 of the manual before operating the **Thermino ePV & Thermino iPV Heat Batteries**.

### 5.1 Switch On/Off

Power is supplied to the Heat Battery via the Double-pole isolating switch, Min. 16A. The Heat Battery will remain in operation whilst it is connected to the mains. The Heat Battery will switch off if you disconnect it from the mains.

### 5.2 LED Indicators and Status

LED Indicators are available to observe the status of the **Thermino ePV & Thermino iPV Heat Battery** installed.





	Status	Meaning
	OFF	Power OFF
	ON	Power ON
	Pulsing	Heat Battery charging from 0 - 50%
	ON	Heat Battery charge level >50%
	Off	Heat Battery charge level 0 - 50%
	Pulsing	Heat Battery charging from 50 - 100%
	Solid	Heat Battery charge level 100%
	Off	Heating element INACTIVE
	Solid	Heating element ACTIVE

Table 15: LED indicators



## 5.3 Troubleshooting

### 5.3.1 During Installation

Fault	Possible Cause(s)	Possible Solution
<b>The appliance does not deliver hot water after installation</b>	Issue with External Heat Source (ONLY for Thermino iPV installs)	Refer to External Heat Source manual, the boost button on the solar power diverter will activate the heating element inside the Heat Battery. Given there are no issues with the power supply to the Heat Battery or Solar Power Diverter. Please note this will result in higher electricity costs if this is activated in a continuous mode.
	Solar Power Diverter not powered or not powered correctly	Check wiring and power supply to Solar Power Diverter and rectify if necessary. Refer to Solar Power Diverter manual.
	Heat Battery not powered or not powered correctly	Check wiring and power supply to Heat Battery and rectify where necessary
	Non-self-resetting thermal cut-out has tripped	Make sure the appliance is full of water and purge if necessary: <ol style="list-style-type: none"> <li>1. Disconnect the power supply</li> <li>2. Open the electrical cover at the base of the unit</li> <li>3. Reset the non-self-resetting thermal cut-out</li> <li>4. Check if the temperature sensor is fully inserted in the Heat Battery (section 4.2, 1)</li> <li>5. Reassemble the unit, and</li> <li>6. Reconnect the supply.</li> </ol> <p><b>If the problem persists, please contact Sunamp Ltd.</b></p>
<b>LED D4 (power symbol) is rapidly flashing</b>	Temperature sensor string is faulty	Check that the sensor cable is properly connected to the PCB and that the connector block is properly pushed in.  <b>If the problem persists, please contact Sunamp Ltd.</b>
	Air might still be trapped in the system	Check that the mains supply valve is fully opened.





The flowrate from the appliance is lower than expected		Make sure the appliance is fully de-aired and purge if necessary.
	Incoming water pressure is too low	Measure the incoming pressure from the mains supply and <b>contact Sunamp Ltd.</b>

Table 16: Installation troubleshooting

### 5.3.2 After Installation or During Use



**Warning:** This product does not contain any user-serviceable or user-settable components. All fault-finding and fault-remediation works therefore need to be carried out by a competent person

Fault	Possible Cause(s)	Possible Solution
<b>No hot water</b>	Issue with External Heat Source	Refer to External Heat Source manual, the boost button on the solar power diverter will activate the heating element inside the Heat Battery. Given there are no issues with the power supply to the Heat Battery or Solar Power Diverter. Please note this will result in higher electricity costs if this is activated in a continuous mode.
	Issue with Solar Power Diverter	Refer to Solar Power Diverter manual.
	Power supply has been temporarily or permanently disconnected.	Check power supply, If power supply is ON call your installer.
	The off-peak switch is not on (if fitted)	If the power supply is OFF, switch on and wait for hot water. If the power supply fails again call installer.
<b>Water leak</b>	Various	Isolate the water and electricity supply to the unit and contact your installer.

Table 17: Post-installation troubleshooting

## 6 Maintenance



Where undertaking maintenance, repairs or removals, and where necessary, ensure that the system is first disconnected from the electrical and/or water supply.

- The product does NOT require any regular maintenance.
- In areas, where the mains water hardness can exceed 150 ppm Total Hardness and a scale-reducing device has been fitted, the service and maintenance requirements of this device (especially re-fill requirements) need to be adhered to.
- The air pressure in the expansion vessel should be checked every 2-3 years and topped up if necessary.
- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard, please refer to the Electrical wiring sections (3.6 - 3.8).

### 6.1 Removal of Lids



Warning: Disconnect power mains before accessing (live components on PCB). **Strictly no live parts.**

- The lid of the Sunamp Ltd. Heat Battery is fixed to the outer case using **2 x M5 Button Head capscrews**. These can be undone by using a **3mm hexagonal Allen key** (Figure 7).
- The terminal cover plate can be removed by unscrewing the **2 x M5 Button Head capscrews**. These can be undone by using a **3mm hexagonal Allen key**.
- The lid of the controller cover is a snap fit lid to be pried with a flat head screwdriver to be removed.

### 6.2 Cleaning

- The product does not require any regular cleaning.
- Should the product exterior have become dirty it can be wiped down with a damp cloth and a mild detergent (such as soap) after having



been isolated from the electricity supply. Let the appliance dry before reconnecting the electricity supply.

### 6.3 Warranty



Information regarding product warranty can be found on the Sunamp Ltd website: [www.sunamp.com/warranty](http://www.sunamp.com/warranty).

## 7 Recycling and Disposal



This symbol on the product and accompanying documents means the product should not be mixed with general household waste at the end of its life.

For proper treatment, recovery and recycling, please take this product to designated collection points where it will be accepted free of charge at the end of its life.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

Please contact your local authority for further details of your nearest designated collection point. Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation.

Manual Part Number: D0043

Version Number: 1

Publication Date: 06/12/2021

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