HONE
Revolutionary Energy

HONE
Thermal 501
Thermal/Electric 501
Electric 501

Installation
Guide

PHOTONOMI
GLOBAL GROUP

PLEASE READ THIS FIRST

this manual covers different aspects of different HONE installation types, many parts of this manual may NOT be relevant to your installation.

The first part of the manual contains parts which are mandatory from a certification perspective.

Always ask if you are unsure.

HONE THERMAL SYSTEMS OPERATE AT HIGH TEMPERATURE SO DON'T USE ANY EQUIPMENT OR PARTS WE HAVEN'T SUPPLIED FOR SAFETY REASONS

HONE Revolutionary Energy

Contents

1. Introduction

The following information is a step-by-step guide to the installation and operation of the HONE 501 Thermal Collector.

Prior to installation, units that require the Electric module configuration for HONE TE panels should note that you need to insert into the Thermal panel, bolts are provided, if Thermal only installation, ignore this message.

Units are supplied with installation kits per engineering design.

1.1 Storage and Handling

The collectors are supplied fully assembled in export cartons. Please note:

- Open the collectors at the installation site.
- If transported, store vertically.
- Do not stack the collectors flat.
- Two people are required to lift the package.

The product contains glass tubes which are very strong and should be handled with care. Use gloves, eye protection and appropriate clothing when removing from the sealed carton.

1.2 Transporting

When transporting this product, extreme caution is advised. If transporting by road, the cartons should be secured upright in the vehicle, preferably with the use of a pallet.

For air, sea or rail transport, it is advisable to store the cartons inside a wooden crate or fixed in containers.

1.3 Safety Instructions

The Hone 501 Thermal/Electrical Collector Installation must be carried out by a competent installer in compliance with all current local planning requirements, Building Regulations, codes of practice, Health and safety legislation, and any relevant local bylaws and regulations in force at the time.

1.3.1 Heat safety

HONE Thermal Electric Collectors can generate temperatures above boiling point. Pipe circuit temperatures at the cylinder can be in excess of 100 °C. Do not touch or try to access pipework in bright light conditions. Scalding can occur.

1.3.2 Safety valves

Do not install any other valves or fittings in the circuit which alter the design of the diagram in this manual. If you are installing a more complex heating system, please confirm modifications with our design team.

Important: All system pipe connections must use compression fittings with brass olives. Soft soldered joints must NOT be used on the thermal primary circuit. Plastic pipe must NOT be used for any part of the thermal primary circuit. All internal thermal primary system pipework should be insulated using suitable high temperature resistant pipe insulation.

1.3.3 Heating controls

All systems that are not connected with swimming pools must have holiday controls fitted to all Hone Systems as standard.

1.3.4 Protective gloves and goggles

Use protective gloves and goggles when handling glycol or operating dangerous tools or equipment.

1.3.5 Frost protection

While all the systems are filled with HONE supplied fluid to prevent freezing, HONE thermal collectors have been certified with a two-month winter freeze test without antifreeze. The minimum temperatures achieved were minus 16 °C and a full working system was subjected to 60 frost days. While the system froze solid and some days failed to unfreeze at all, the system resumed full service after the heavy frost period without any intervention or reduction in pressure. (please note, do not operate your system without Hone supplied fluid).

1.4 Technical Data

All our system designs should follow our design recommendations for maximum performance, always ask if in doubt.

As a guide:

- 6.5 sqm of standard Flat plate is equivalent to 2.64 sqm of 501.
- 4 sqm of standard Vacuum is equivalent to 1.76 sqm of 501.

1.5 Specifications

Model 501	
Technology	**Thermal** HONE Nanotechnology
No of insulation tubes	14
Gross Area	1.68 m2
Aperture	0.88 m2
Dimensions	1608 mm x 1045 mm x 135 mm
Connections	15 mm
Weight	34.5 KG
Volume	1.92 L
Mountings	Any type: wall, ground, pitch, flat etc.
Nominal flow rate	240 L/H
Max Op pressure	1 MPa
Max temperature	120° C
Stagnation	254.4° C.
Tilt angle	15° to 90 ° from horizontal
Pressure Drop	At flow rate 3.0 L/min ≤ 26.6 mBar
Angle of Tilt	0° to 90° from horizontal
Max continuous wind load	80 mph (36 m/s)
Permissible snow load	500 mm (see page 23)
NOa	0.75
A1	2.368
A2	0.0.
IAM	1.13

1.6 System Description

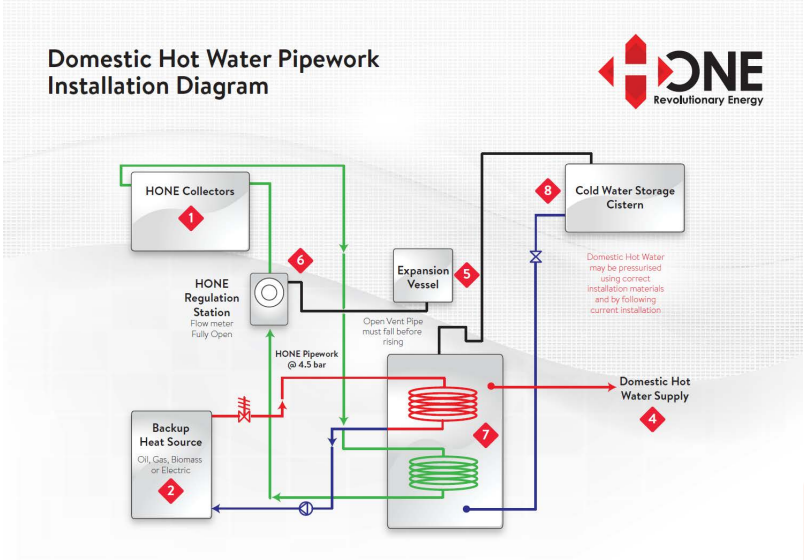
HONE collectors are installed and operated as detailed in Figure 1 in a standard installation. Any variation to this design will need to be approved by our design team. Large commercial and industrial systems need individual designs.

Figure 1. A typical installation of the HONE System.

The collector heats up to a specific set-point temperature which switches on the pump. Once the pump is on, hot water will flow to the storage tank. The HONE system is fully automatic and has both electronic and mechanical safety features.

Only approved HONE cylinders and control/pump stations can be used with the HONE 501 due to its high performance. These will be supplied as part on the Installed system.

The optimum storage tank size is 300 L for all new domestic buildings.



The HONE system operates with a microcomputer which monitor so you just sit back and let it look after your HONE system 24 hours a day.

1.7 Sizing Information Guide

The HONE system has exceptional performance. It was designed to excel at heat retention for air conditioning applications. This allows the system to build heat levels quickly and it achieves significant improvements over legacy HONE technology. HONE systems are smaller than standard systems as they are more powerful.

The installer must not compromise the structural integrity of the building or the existing heating system operation. Installer should tie in with the existing boiler control via a stat on the cylinder to operate the boiler when the temperature drops in the cylinder

All systems are subject to a design review process

1.8 Typical Component List

Here are some typical components of systems.

Description	Detail
Collector	HONE 501 HONE Collectors
Electric	HONE 501 E layer
Circuit	HONE Pipework ONLY (Supplied)
Pump Station	HONE SC
Control System	HONE Control System
Cylinder	HONE (various)
Expansion Vessel	Depends on HONE fluid volume
Antifreeze	HONE High Temperature
Circuit Fluid	HONE HT
Anti-scald	Tempering/Mixer valve

On anti-scalding measures, a tempering/mixer/anti-scald valve is recommended where possible.

2. Installation Instructions

Important Installer Information

This information affects safety and performance. These rules are mandatory for installers to follow to maintain warranty conditions.

- Do not fit an air vent and all installations must be filled and pressurised with an electric pump station.
- Only use the supplied HONE antifreeze.
- Only use the mounting brackets as supplied.
- Only use the stainless-steel connecting pipe as supplied.
- Only install the pump stations and controllers as supplied.
- The safety valve must be 6 bar. It should be fitted as standard to the supplied pump station.
- The HONE system should be pressurised to between 4 and 5 bar.
- Technology will not work when pressure drops below 2.5 bar.
- Performance will drop with pressure below 3 bar.
- You cannot use solder anywhere on the HONE circuit, even high temperature solder.

Holiday Controls

Holiday controls must be installed on the HONE system. Ask your Installer for details of holiday control as they depend on the HONE system installed.

NOTE: Swimming pools can be used as a holiday control system.

- Do not install the HONE system ‘split’ east/west. If you cannot install the system south-facing as you have an east/west house, then install the system on the west side first, then east.
- (this applies to both the northern & southern hemisphere)
- Frost protection is part of system design; there is no need for action or inter vention to the system in frosty weather.

2.1 Roofing Type Instructions

The HONE thermal collector has no wind resistance and is designed to be installed on all roofs in a similar fashion. The mounting system applies to all roof types: slate, concrete tile, tin roof, shingles, etc.

The HONE 501 thermal electric has wind resistance and must be installed per Engineering installation guidelines.

Always ensure you use a sealant appropriate to the roof type and finish.

2.2 Step-by-Step Procedure

The follow procedure details how to install a HONE Collector HONE 501. It is recommended that at least two trained HONE installers are required to install a HONE Collector.

Bracketing, plumbing fittings and nut & bolt kit are included with each collector.

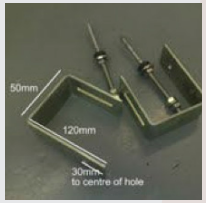
HONE collectors can only be installed by qualified installers.

The installer must not compromise the structural integrity of the building or the existing heating system operation.

Introduction-Step Guide

- HONE collectors are designed for long life installations.
- A HONE collector weighs 34kg and is delivered fully assembled ready to go onto the roof.
- A HONE TE collector weights approx. 45kg and is configured on site fully assembled to go into the roof

- Retrofit Brackets are included with all collectors.
- Plumbing fittings are also provided & must be used.
- Check with Engineering recommendations for nonstandard installs



I. Railing systems are available for new build and commercial/industrial projects (or retrofit if required)

II. Offer the brackets up to the collector to get your measurements and adjust according to roof variance.

III. The room for adjustment and tolerance is +/- 50 mm vertically and +/- 200 mm horizontally.

You can drill into beams by locating them in advance or if you can access the attic, you can insert noggins inside after you drill the holes

RETROFIT MOUNTING ONLY - RAILING SYSTEM AVAILABLE FOR RETROFIT ALSO

STEP 1

Begin by outlining with chalk or a marking pen where the collectors are to be mounted on the roof. Refer to Engineering drawings for Collector and Electric Panel locations

I. Screw the stainless-steel bolt into the timber support and tighten down to the required height.

II. Adjust the water seal and tighten the water seal nut. Use a waterproof bitumen-type product to seal the hole before you tighten.

III. Four mounting bolts should be installed: two for the top of the collector and two for the bottom.

STEP 2

I. Apply the brackets to the stainless-steel bolts and tighten them into position.

II. All four mountings are now installed.

STEP 3

For Thermal Electric assembly. Refer to appendix 1 for instruction in connecting the Electric panel to the collector assembly

I. Drop the collector Thermal or Thermal Electric onto the fittings and loosely fit the locknuts. Do not tighten these until the plumbing is completed.

II. Once plumbed, the final tightening of the panel bolts is all that is required.

III. After installation, each panel should look like.

STEP 4

Heating systems will be more complex in design and need to be specified on a case by case basis. Check out drawing package provided with the install

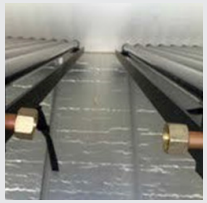
STEP 5

I. Open the plumbing pack which came with the HONE 501. This provides special high-temp pressure fittings.

II. Cut a 100 mm length of 15 mm or ½ inch pipe. Use matching olives for the compression fittings supplied.

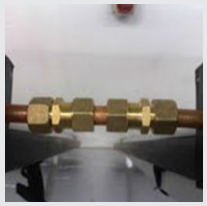
STEP 6

I. An advantage of the special fittings is that you do not need to have your pipes geometrically opposite each other. The fittings operate in a similar way to ball joints to give a long life and a stress-free installation.



II. Attach the taper fittings and insert the copper pipe with olives and caps. Hand tighten until you have all collectors connected together.

III. Once this link is installed between all collectors, tighten all fittings. You will need two plumbing spanners.



STEP 7

I. When insulating the exposed copper piping in the roof, you must use UV resistant and high-temperature resistant insulation and covering.

Silage Tape is fine for this task.

STEP 8

I. Review the installation manual for the chosen pump station and ensure it is installed according to those instructions.

STEP 9

I. If online functionality has been requested from your installer, a router and broadband service is required and a web server .

Once connected, you can access your system online or on your iPhone.

STEP 10

HONE systems are small in size and are high power. The work all year round and provide excellent water temperatures.

Bracketing for wall or roof mounting is available for HONE panels.

HONE 501 collectors are smaller than other collectors but the HONE nanotechnology means they are more powerful per sqm sizing. This makes then ideal for retrofitting onto houses.

Install the E Panels per Appendix 2 attached.

E Panel in combines TE assembly provide 100W per panel. E Panel installed as individual units provide 230W per Panel output (1.3 SQM)

3. Operation

The HONE collectors should always be installed with the manufacturers supplied fixings on to a solid structure.

If in any doubt about the suitability of your roof for the installation of HONE collectors, seek the advice of a qualified structural engineer.

The weight of snow must be factored into any calculation although it typically falls through the collector tubes onto the roof structure.

3.1 Simplified method for PV and thermal panel systems

The simplified methodology presented here can be used to determine the peak wind loads acting on PV and solar thermal systems. This approach is based on the peak velocity pressures derived from BS EN 1991-1-4[42] and its UK National Annex (NA). Example calculations are given in Section A.2.

The following are steps for calculating wind uplift pressure on PV and solar thermal systems:

1. Determine wind speed zone for the site from Figure A1.

2. Read peak velocity pressure qp for the appropriate building height from Table A1.

3. Apply correction factors for orography and site altitude (for sites at altitude ≤100m no correction is required) (see notes to Table A1).

4. Determine the net wind pressure coefficient cp for the particular installation. Note that cp may be given directly for some types of installations (such as above-roof systems), whilst for integrated systems, it may be necessary to determine separately the external pressure coefficient cpe acting on the external surface of the system, and the internal pressure coefficient cpi acting on the underside of the system.

   Where external and internal pressure coefficients are obtained separately, the net pressure coefficient can be obtained from cp = cpe – cpi.

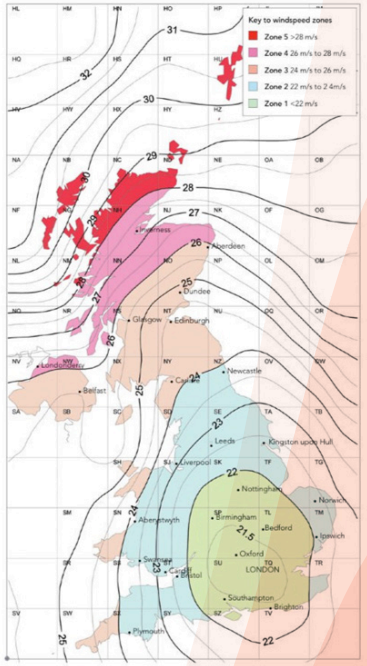


Figure A1 Map of basic mean wind velocity over UK.

5. Calculate the wind pressure, w, in Pascals from equation A1 (see BS EN 1991-1-4 for more details):

w = qp cp SF (Pa) (A1) where SF is the safety factor.

A suggested value is SF = 1.5. Note that the value of the net pressure coefficient cp can depend on a number of factors including roof type, roof pitch and distance from the edge of the roof.

In general, the pressure coefficients will fall into one of four categories depending on the type of PV or solar thermal system:

I. Integrated nominally airtight systems where the PV or solar thermal modules form the weathertight roof covering.

II. Air permeable arrays of PV or solar thermal tiles or slates integrated into pitched roofs.

III. Systems mounted above the roof where there is a clear gap beneath the roof and the modules.

IV. Systems mounted on flat roofs.

• Pressure coefficients for Type (i) systems can be obtained directly from EN 1991-1-4 and the UK National Annex (NA) to EN 1991-1-4, for the appropriate roof type and roof pitch (provided that the modules do not protrude above the surface of the roof by more than 100 mm).

• Pressure coefficients for Type (ii) systems can be obtained from BS 5534[5] by treating the system as roof tiles.

• Pressure coefficients for Type (iii) and Type (iv) systems can be obtained from BRE DG 489[43] or from test data. Ballasted Type (iv) systems will also need to be assessed for sliding and overturning.

Table A1

Peak velocity pressures (q_p) in Pascals (Pa)

Zone	Height	Distance from sea in country terrain			Distance from sea in town terrain		
	(m)	2 km	20 km	>20 km	2 km	20 km	>20 km
1	5	869	783	718	688	620	569
1	10	1009	955	872	883	836	763
1	15	1094	1062	977	1012	982	904
1	20	1122	1108	1017	1066	1052	966
1	25	1166	1166	1072	1137	1137	1045
2	5	1034	931	854	819	738	677
2	10	1201	1136	1038	1050	994	908
2	15	1302	1264	1163	1204	1169	1075
2	20	1335	1318	1210	1268	1253	1149
2	25	1388	1388	1276	1353	1353	1244
3	5	1213	1093	1003	961	866	794
3	10	1409	1334	1218	1233	1167	1066
3	15	1527	1483	1364	1413	1372	1262
3	20	1567	1547	1420	1489	1470	1349
3	25	1629	1629	1498	1588	1588	1460
4	5	1407	1268	1163	1115	1004	921
4	10	1634	1547	1413	1430	1353	1236
4	15	1772	1720	1582	1639	1591	1464
4	20	1817	1795	1647	1726	1705	1565
4	25	1889	1889	1737	1842	1842	1694
5	5	1703	1534	1407	1349	1215	1115
5	10	1977	1872	1710	1730	1638	1496
5	15	2144	2081	1915	1983	1925	1771
5	20	2199	2171	1993	2089	2063	1893
5	25	2286	2286	2102	2229	2229	2049

Notes

1 The altitude correction factor increases by 20% for every 100 m increase in site altitude above 100 m. For example, for a site altitude of 180 m the altitude correction factor is (180-100)/100 * 0.2 = 0.16, therefore multiply the value in Table A1 by 1.16.

2 Site altitude is measured relative to mean sea level.

3 For building heights greater than 25 m, use EN 1991-1-4 and UK National Annex.

4 The values given in Table A1 do not include any safety factors.

5 Sites in town less than 300 m from the edge of the town should be assumed to be in country terrain.

6 Where a site is closer than 1 km to an inland area of water which extends more than 1 km in the wind direction, the distance to sea should be taken as <2 km.

7 For sites more than halfway up a hill where orography is significant, the following corrections should be made:
For hill slopes = 0.1, multiply the pressures in Table A1 by 1.2.
For hill slopes = 0.2, multiply the pressures in Table A by 1.45.
For hill slopes = 0.3, multiply the pressures in Table A by 1.7.

8 Interpolation may be used in Table A1.

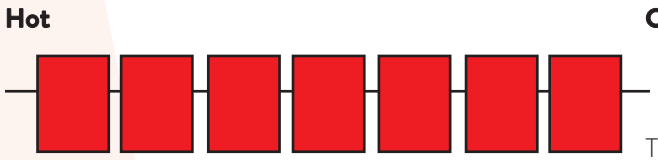
9 A more accurate (less onerous) assessment of peak velocity pressure can be obtained using EN1991-1-4 and the UK National Annex.

3.2 Lightning protection and bonding

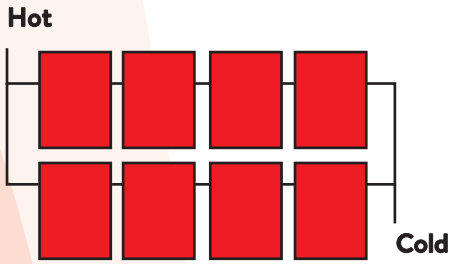
If there is an existing lightning protection system, then you can tie the pipe work to the HONE system. If a lightning system is required, it should be installed by competent lightning-protection systems installers.

3.3 Interconnection

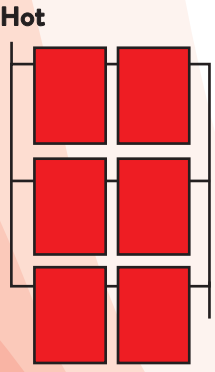
The maximum amount of panels you can connect is 7 (seven) in one series linkup. If you need to install more panels, you need to create parallel groupings. There is no maximum amount of panels you can install.



This is an example



This is an example



This is an example

A 20 sqm array (21 HONE collectors) would consist of three rows of seven installed using model 3 above.

3.4 Controllers & Pump Stations

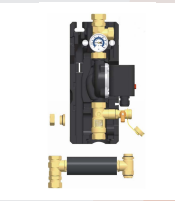
The supplied control system must be used to ensure you get maximum performance form your HONE system. The quality of each component of the entire system is paramount. This ensure that the system will have a long life.

We currently specify a HONE pump station hardware and HONE differential temperature controllers.

There is only one model and it comes with the install kit.

The advantage of a fully integrated pump station is that you have a fully optimized high-quality system which includes:

- non return, fill valves
- pump
- gauges
- pressure release
- expansion vessel attachment, etc.



The differential controller manages sensor settings, temperature limits, safety settings and other functions which optimize the system. Controls pump automatically on 24/7 basis

You must leave enough room around the pump station and container for maintenance, replacement of anodes, relief valves, etc.

3.5 Pump and Controller Instructions

The supplied pump station and controller come with full instructions for their operation and maintenance.

Please note these additional requirements:

1. The pump station must be installed so the circulating pump is drawing colder fluid from the lower section of the cylinder and will circulate the fluid through the collector before returning it to the cylinder at a higher point than draw off, using connection points in the container or in fittings or components, as recommended by the manufacturer.
2. The pump controller must be fitted in an accessible position.
3. The temperature probe pockets must be free of water before the probe is inserted and the pocket must be protected against moisture entry after the probes are inserted.
4. The power supply to the pump station and controller must not be circuits subject to switching by the electricity supplier for the purposes of load management.
5. Where an electrical supply is essential for effective operation of the system or any device used for protection against freezing, notice to this effect must be prominently displayed, advising that the electricity supply should not be turned off.
6. Holiday stat should be fed from a separate non-switched fused spur to ensure it cannot be switched off.

3.6 Antifreeze Instructions

HONE Antifreeze is supplied with the system and should not be mixed.

3.7 Frost Protection/Stagnation

Front Protection

HONE systems are automatically protected against frost if they are installed according manufacturer's instructions.

Stagnation

Stagnation occurs when the cylinder reaches its maximum temperature or if there was a power cut. The HONE collectors will reach high temperatures in excess of 200° C in very hot days.
There will be an increase in pressure in the system and this will be absorbed by the expansion vessel. If the expansion vessel is not able to deal with all the expansion, then the system may vent some pressure through the pressure-release valve.
It will do this into a glycol collection container installed as part of the HONE system. This container should be installed so it cannot be removed.

The pressure release valve should never be vented to a drain. It should be captured into the container supplied with the antifreeze (or other suitable permanent container).

3.8 Filling the loop

Filling the HONE loop correctly comes with experience. HONE systems are the latest Nanotech technology and run at high pressure and high temperatures.

Please note the following:

- Fill the loop with HONE supplied circuit fluids only.
  You pressurize the loop to between 4 and 5 bar.
- Do not fill the loop while the collectors are under sunlight as you could shock the collectors.
  Preferred fill time is Dawn or Dusk
- You need permanent power: Do not fill water or finish insulation covering until electricity supply is permanently connected.

- Ensure HONE controller is configured to the pump station before filling, it does not just work on power up. Code needs to be entered and date/ time need to be set. Language set to English

Use one of these for filling the HONE loop. You cannot pump high-pressure high-performance thermal systems without them.

The pre-insulated HONE stainless pipe work system (supplied) must be used. The pipe work also comes with a sensor wire hidden inside the insulation which you can connect to the collector sensor.

The pump station fill points can be clearly seen once the cover is removed. Follow the instructions as you must close the central circuit valve before filling.

4. Start-up

Starting your HONE system is easy. Confirm that you have pressure between 4 and 5 Bar on the controller, then power on the controller.

Settings in the controller need to be set as follows:

- Pump changed from ON/OFF (HONE) to A (HONE)
- Pump on = +6° C and Pump off = +3° C
- Max tank temp = 95° C (depends on system design)

Check for leaks, noise and ensure all sensors are reporting the expected temperatures.

5. Maintenance

The HONE system is designed to operate for long life times with little intervention. The following service should be requested by the owner:

- A total change of the circuit fluid every five years.
- A refilling of the circuit if the pressure drops below 3 Bar.
- There is no requirement for cleaning of the tube glass (see Page 32).

When changing tubes on the collector, please ensure you wear appropriate safety attire such as safety glasses, safety gloves, correct footwear and security of attachment.

Leakage Indication
Please note that the circuit fluid contains a colour pigment. If you see the circuit pressure dropping from its normal marker AND/OR you detect a leak, you should contact the authorised service agent approved by the manufacturer.

Never dispose of any fluid down the drain.

General Checks

- Please ensure that your installer has completed the checklist page.
- This is a fully automated system. It is designed to deal with frost, high temperatures, holidays, etc., without any intervention.
- The only thing you need to check is that the pressure is maintained. You should check your pressure at night as it is normal to vary slightly during the day.
- If you have supplementary heating installed, please ensure you have the manual and instructions. It is a completely separate system from the HONE system.
- Ensure you also have the pump station and controller manuals, most are available to download from our website.
- If you notice the pressure dropping or that the system not doing what it is supposed to do, please call your installer.
- Circuit fluid will need to be changed every four years.

Glass Cleaning

Once the collectors are at an angle, the tubes should be self-cleaning. If you have issues from birds or other debris or you mount your collectors flat, you may need to consider a cleaning regime. Please use warm soapy water.

In the UK and Ireland, it is not usually required to clean the collectors as rainfall is adequate.

Troubleshooting

Fault	Reason	Solution
Error message displayed on controller	System fault, faulty sensor	Replace faulty part
Pressure fluctuations	Immediately after commissioning there may be air pockets in the system	Empty and refill the system
Pump does not run (and the settings indicate that it should)	Max tank temp reached; Pump faulty; Sensor faulty or installed incorrectly	Controller has shut down correctly and will restart when the temperture falls below set point; Replace Pump; Check Sensor.
The pump is running but no flow rate is detectable (flow meter or by holding pipe work)	Pressure is too low (below 2.5 Bar); There is air in the system; After commissioning; circuit valve is still closed; System is clogged	Refill system; Empty and refill the system; Open the balancing valve and adjust the flow rate; Flush system
The pressure gauge indicates a fall or rise in pressure	The pressure should stay constant but may increase when temps are high and fall back to normal at evening	Check that the expansion vessel is working correctly and is the correct size
The pump makes noise	There is debris or air in the system	Empty and refill using electric pump system
The tank cools down overnight	The non- return valve is faulty; The pump stays running; Heat is convecting around the water system	replace Check settings Check plumbing arrangements

Checklist

Please ensure that all works are completed to meet local regulations and best practice. These may or may not include the mandatory use of approved or certified installers.

No.	Checklist	Yes	No
1	Have all the mounting bolts been tightened and checked?	☐	☐
2	Is there complete insulation covering all pipe work?	☐	☐
3	Is there a safety valve on the cylinder?	☐	☐
4	Is the required expansion vessel installed on the HONE circuit?	☐	☐
5	Have the correct settings been applied to the controller?	☐	☐
6	Has a pressure test been performed?	☐	☐
7	Has the balancing valve been opened fully (100%)?	☐	☐
8	Has the circuit been filled with HONE fluid ?		
9	Has a manual test of the pump been performed to ensure flow rate and that no air exists in the circuit (noise)?	☐	☐
10	Has the collector sensor been firmly secured, sealed and insulated from external wind, rain and other weather factors?	☐	☐
	Are all sensor wires secured permanently in place?	☐	☐
11	Check all electrical connections are tight & secure	☐	☐
12	Ensure all control/spurs/isolators are all correctly	☐	☐
13	labeled	☐	☐

Installer:		Supplier:	
Name:		Name:	
Address:		Address:	
Place:		Inspected By:	
Date:		Signed Off By:	

QUESTIONS:
PLEASE ASK !!

What's Included

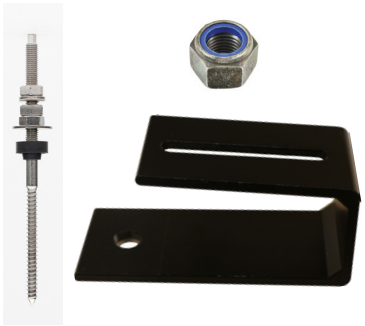
HONE 501 T Thermal Panel

WEIGHT	34.5kg
SIZE	1608 x 1045 x 135 mm (L x W x D)
VOLUME	1.92 L

STOCK SCREW MOUNTING COMPONENTS (INCLUDED AS STANDARD) -

Alternative Roof Mounting systems also available

Standard Thermal Fixings



Additional TE Components

Thank You For Purchasing HONE 501 T Thermal / 501 TE Thermal Electric / 501 E Panels.

Hone Is The Revolutionary New Renewable Energy

IT WILL CHANGE YOUR HOME

LET'S TALK SAFETY

The installation must be performed in accordance with all local Health & Safety Regulations and legislation, local building regulations and planning regulations.

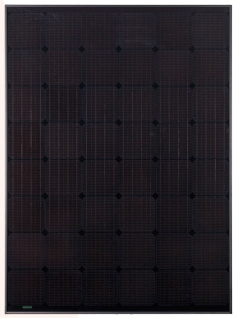
All electrical work necessary to complete the installation of the system and controls should be carried out by a qualified electrical contractor. If availing of government grants or tariff payments, installations typically must be carried out by an installer registered on the government register of approved installers. Please refer to your local rules and regulations.

FIRE SAFETY

Ensure that there is no obvious risk to fire prevention when installing the HONE Electric System. The installer must ensure that all wires are secured correctly to prevent the risk of fire. Note that all equipment must be earth bonded to your countries regulations.

- Before installation consider the condition of the roof structure and the total load that the roof can support in relation to the weight of the collector array. If unsure, consult with structural engineer.
- Only the items supplied by HONE as listed in the BOM (Bill of Materials) should be used in the system generation circuit.
- HONE collectors/panels are supplied fully assembled in export cartons except for the electric component of a TE, which is inserted during installation.
- Follow manual handling procedures when lifting the package.
- The product is fragile and should be handled with care. Use appropriate PPE clothing during handling and installation.
- Only open the panels at the installation site.

What's Included



HONE 501 E Electric Module

WEIGHT	12kg
SIZE	1340 x 977 x 40 (L x W x D)
POWER	200 - 230W

Sunny Boy Inverter
1.5 | 2.0 | 2.5

WEIGHT	9.2kg (20.3lbs)
SIZE W x H x D	460 x 357 x 122mm (18.1 x 14.1 x 4.8 inches)
RATED POWER @230V, 50 Hz	1.5 - 1500 W
	2.0 - 2000 W
	2.5 - 2500 W

Sunny Boy Inverter
3.0 | 3.6 | 4.0 | 5.0 | 6.0

WEIGHT	17.5kg (38.5lbs)
SIZE W x H x D	435 x 470 x 176mm (17.1 x 18.5 x 6.9 inches)
RATED POWER @230V, 50Hz	3.0 - 3000 W
	3.6 - 3680 W
	4.0 - 4000 W
	5.0 - 5000 W
	6.0 - 6000 W

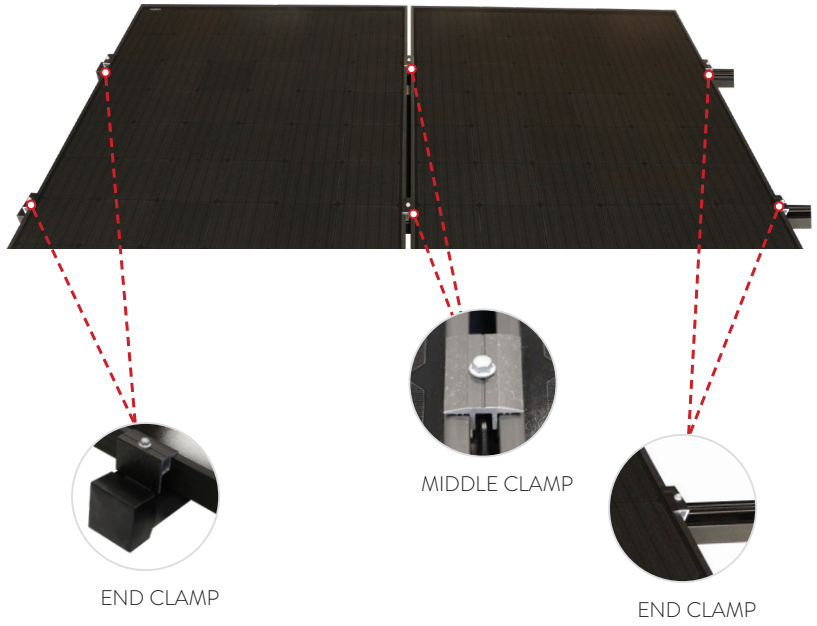
* Inverters shown for domestic installations only. Commercial and industrial inverters available. Inverter type depends on system size.

Pump / Expansion Vessel Connection

Cylinder Options

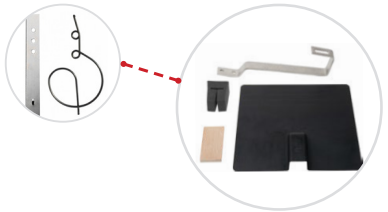
UNVENTED OR VENTED

End Cap And Clamps Detail



Ground Mounting Kit

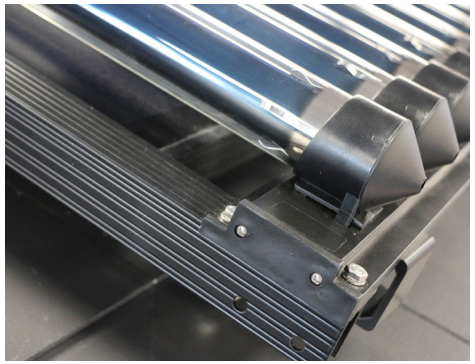
GROUND MOUNTING SYSTEM



SLATE ROOF SYSTEM

ROOF TILE SYSTEM

Mounting Types



ROOF MOUNTED

GROUND MOUNTED / FLAT ROOF

* Applies to Thermal & Thermal Electric installs only.

This set up is for illustrative purposes. A-Frame can be mounted at various angles including 55 °/35 ° etc.

THERMAL SPECIFICATIONS

MODEL	HONE 501 T THERMAL PANELS
Technology	Hone 501T (thermal)
No. of tubes	14
Gross area	1.69 m2
Aperture	0.88 m2
Dimensions	1608 mm x 1045 mm x 135 mm
Connections	15 mm
Weight	34.5 KG
Volume	1.92 L
Mountings	Any types: wall, ground, pitch, flat
Nominal flow rate	240 L/H
Tilt angle	15 to 90° from horizontal
Pressure Drop	At flow rate 3.0 L/min <26.6 mBar
Max Temp	150°C
Permissible snow load	500 mm
NOa	0.75
A1	2.368
A2	0.0000
IAM	1.13

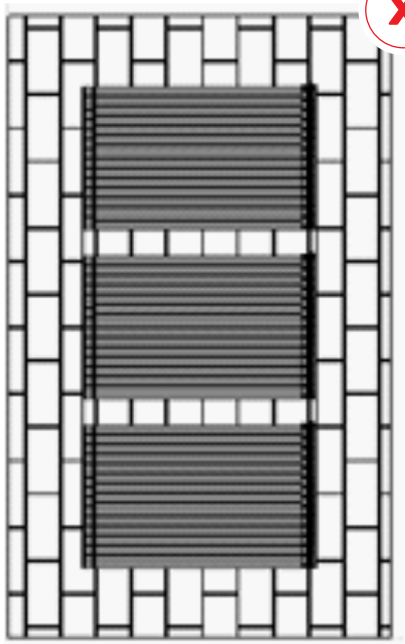
ELECTRIC SPECIFICATIONS

MODEL	HONE 501 ELECTRIC G5	HONE 501 ELECTRIC G6
Maximum Power (Pmax)	200Wp (0/+3%)	230Wp (0/+3%)
Maximum Power Voltage (VMP)	24.4V	26.02V
Maximum Power Current (Imp)	8.20A	8.84A
Open Circuit Voltage (Voc)	30.4	32.41
Short Circuit Current (Isc)	8.77A	9.47A
Nominal Operating Cell Temperature (NOCT)	45+/-2C	45+/-2C
Maximum System Voltage	1000VDC	1000VDC
Maximum Series Fuse	15A	15A
Fire Safety Class	Class C	Class C
Weight	12KG	12KG
Dimensions	1342 x 992 x 35mm	1342 x 992 x 35mm
Module Application	Class A	Class A
Maximum Series Fuse	15A	15A

- **Quality Guaranteed**
- 12 Year Workmanship Warranty
- 25 Year Output Performance Warranty
- > 90% Output for 12 Years
- > 80% Output for 25 Years
- Extremely reliable screwless, interconnected frame for long-term flexibility and strength.
- 8 mounting holes for direct mounting option.
- 20 in-built drainage watersprouts.
- 2 earth (ground) points.
- Tempered ARC (anti reflective) front glass.

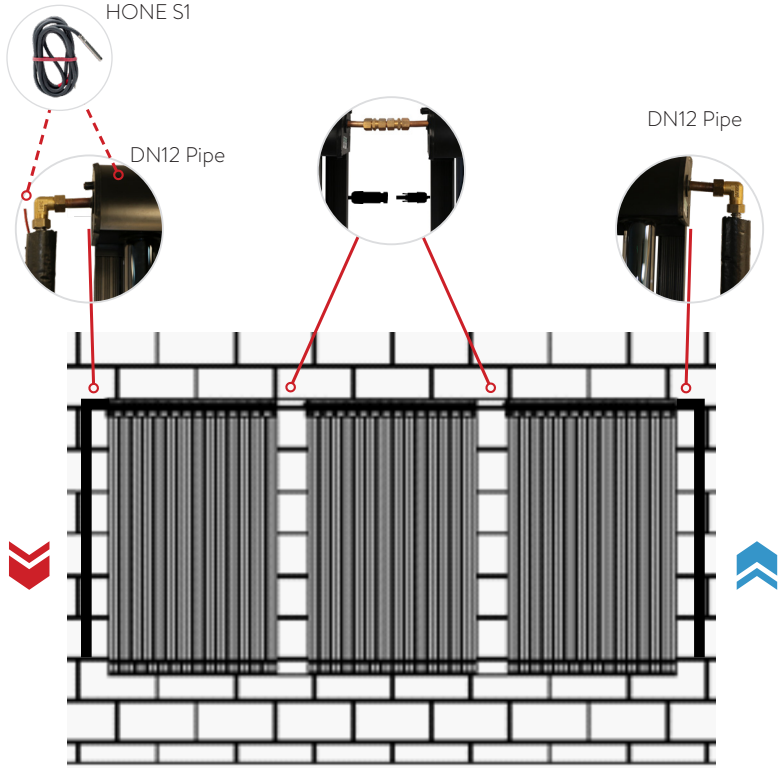
Power Tolerance	-0/+3%
Working Temperature	-40 ° to 85 °C
Max. System Voltage	1000VDC
Wind Rating	54000Pa
Hail Resistance	400mm @ 80km/h
Max. Fuse Rating	15 Amp
Frame Thickness	40mm
	Clamp on long or short sides

Typical Roof Layouts



HORIZONTAL CONNECTION

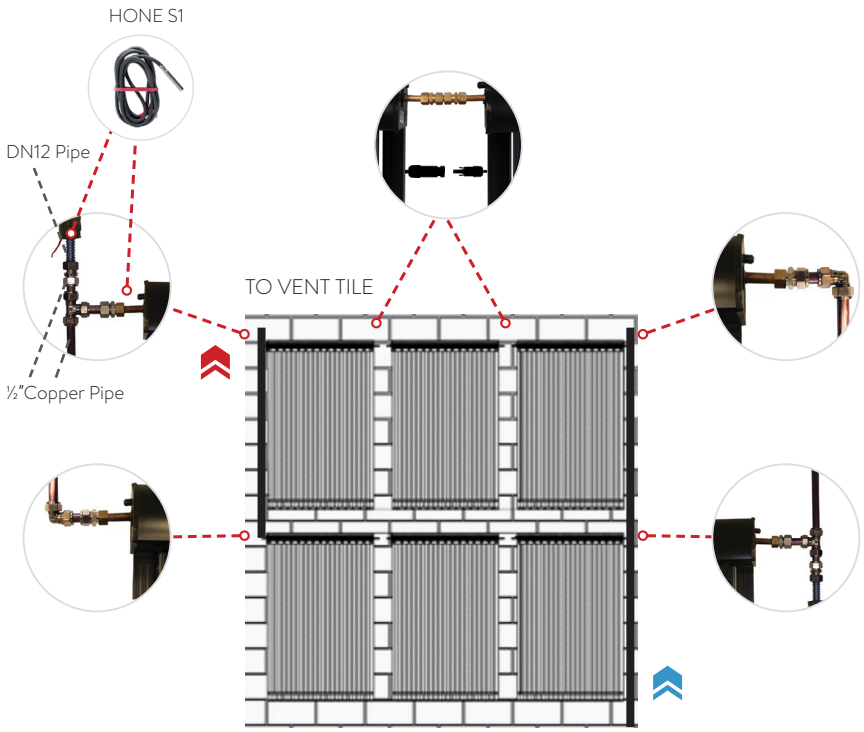
N.B: Panels cannot be mounted in a horizontal configuration



All pipework to be insulated fully.
Pipework in image exposed for illustrative purposes.

SERIES CONNECTION

Typical Roof Layouts

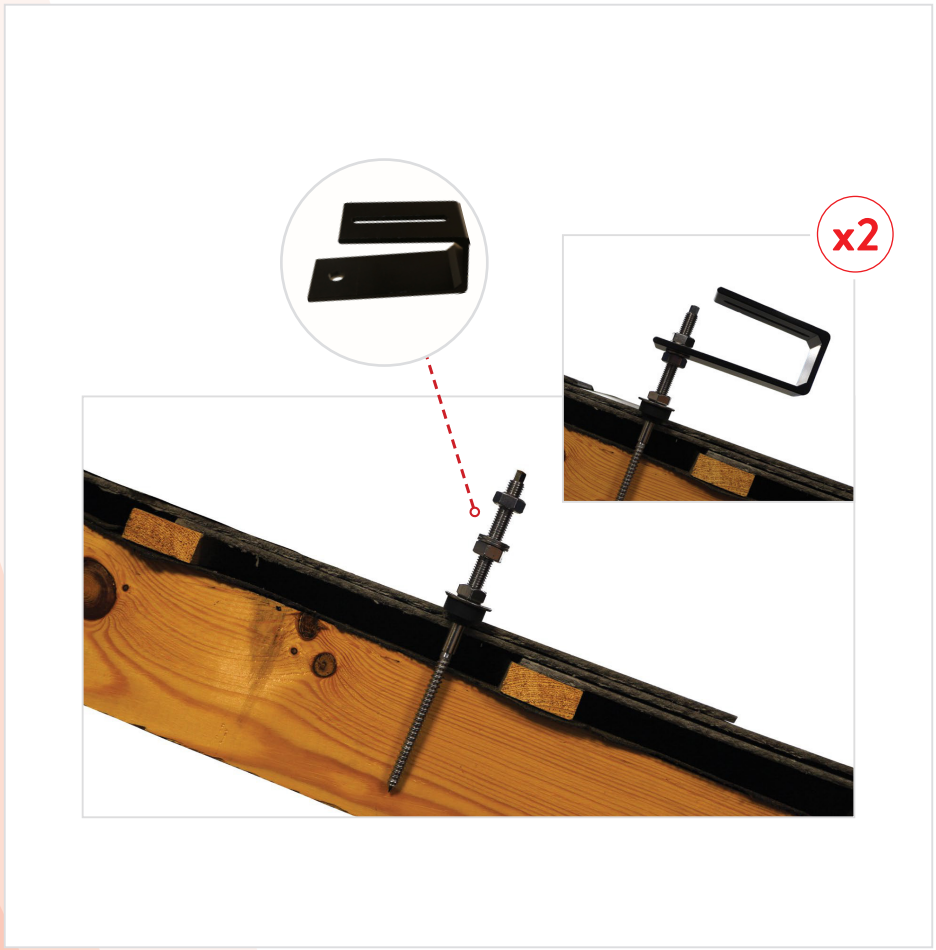


* All exposed pipe work should be insulated with high temperature UV insulation

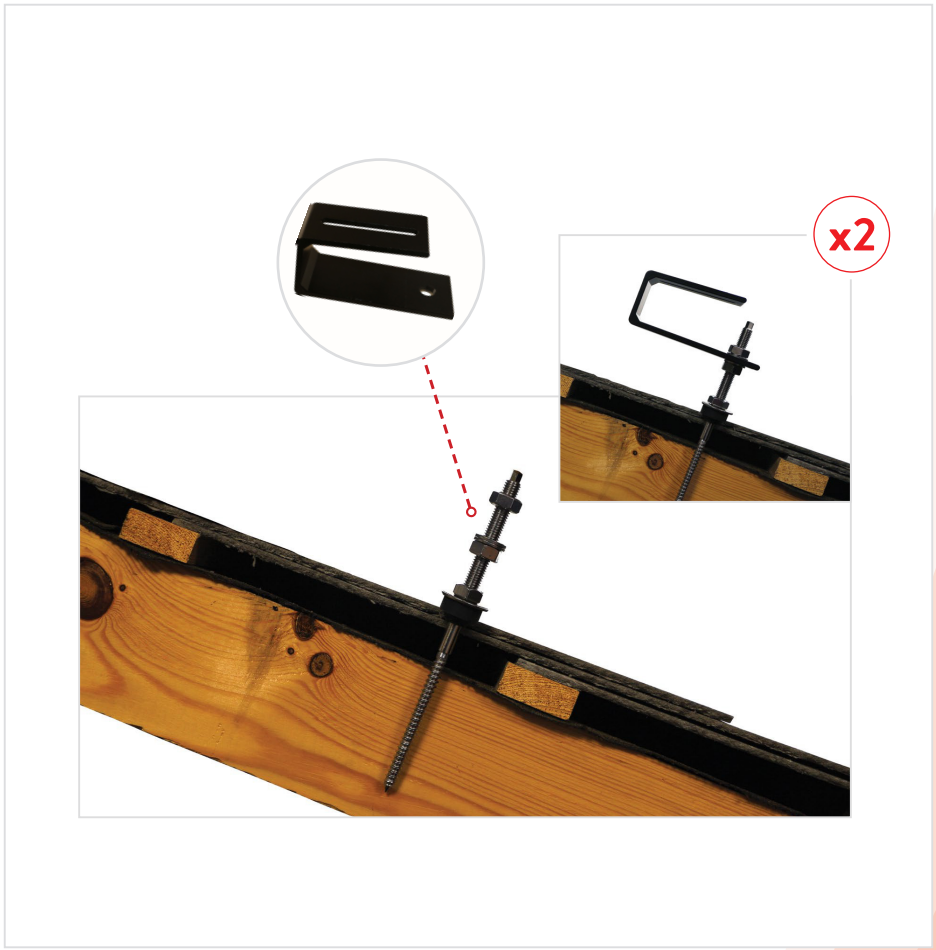
PARALLEL CONNECTION

Stock Screw Fixings

Bottom ‘L’ Bracket Connections



Top ‘L’ Bracket Connections



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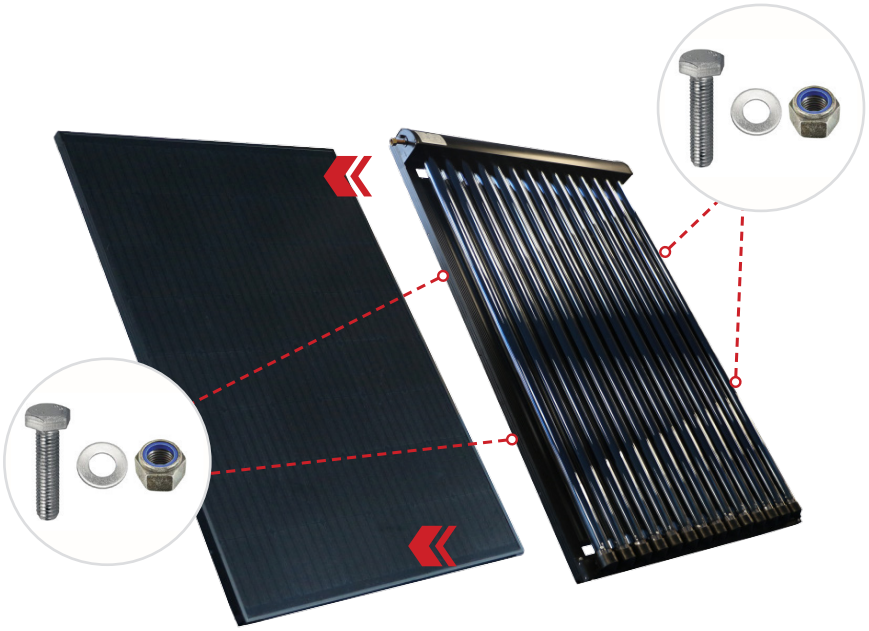
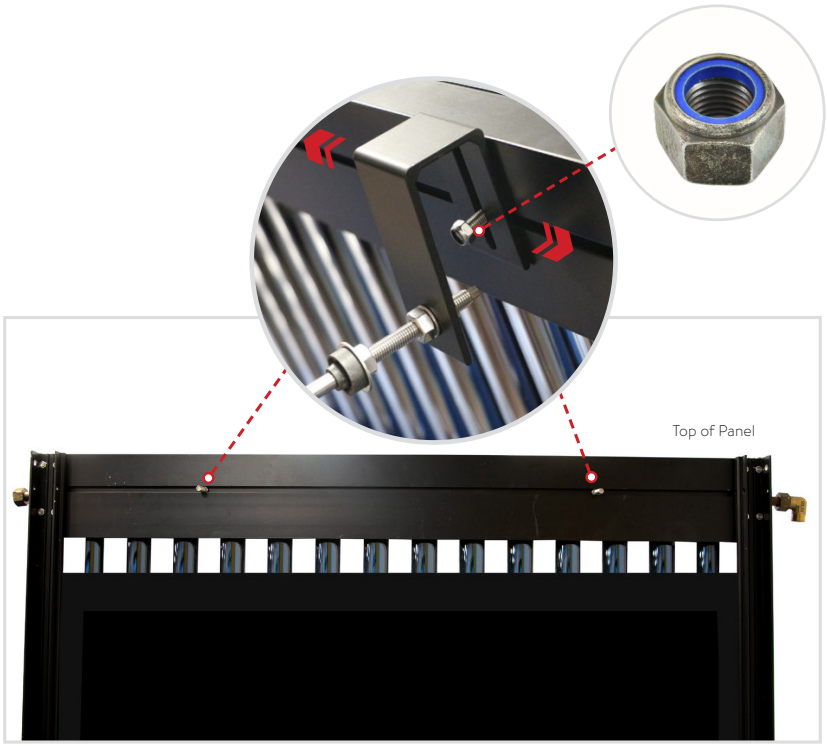
Panel Assembley For Thermal Electric (Only)

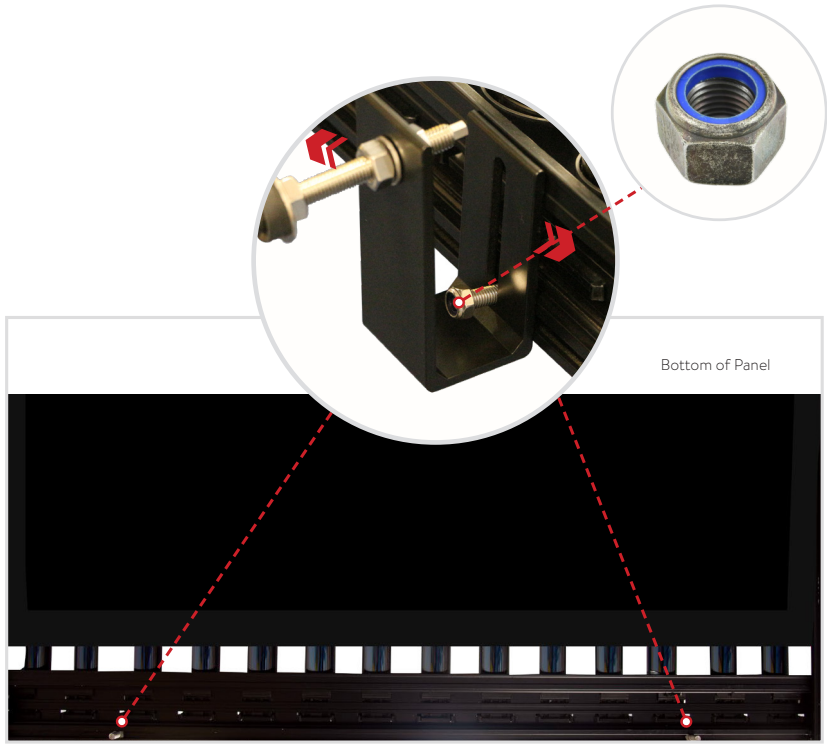
1410mm*

* Bracket to Bracket



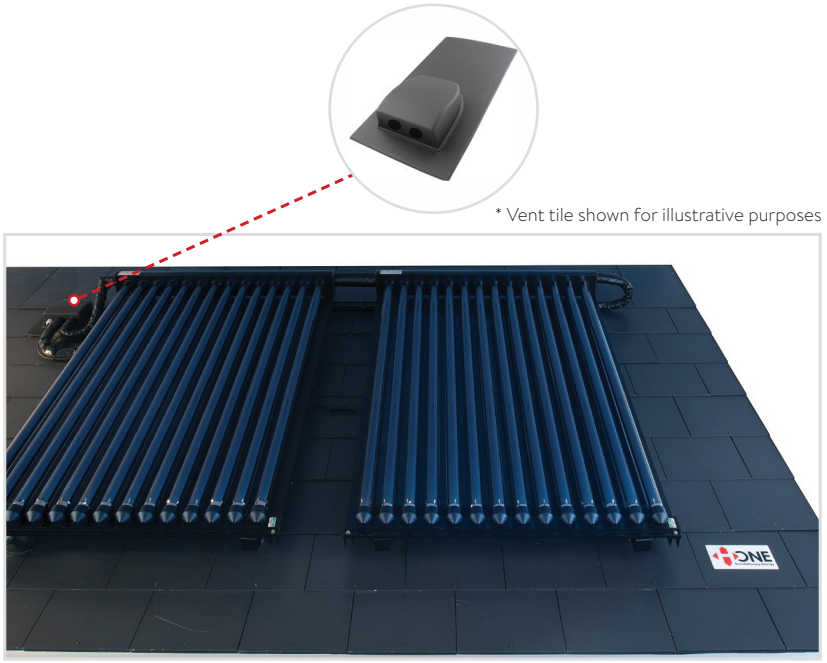
Attach Panel To Brackets





THERMAL / TE » **ROOF MOUNTING**

Finished Layout



* Vent tile shown for illustrative purposes

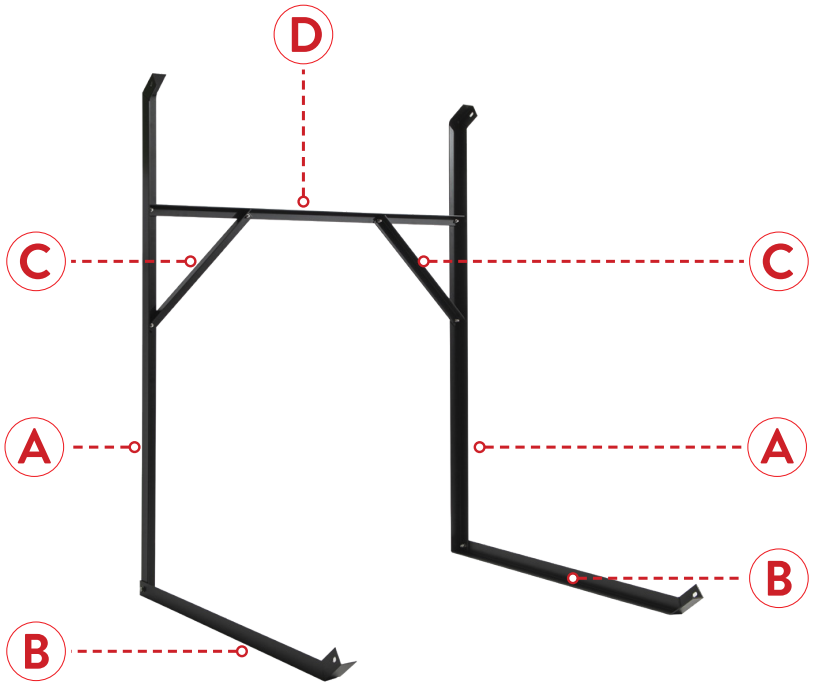
'A' Frame Assembly

M8 Hex Head A2-70 SS Washer & Bolts

M6 Hex Head A2-70 SS Washer & Bolts

M10 Concrete Anchors, Head A2-70 SS Bolts

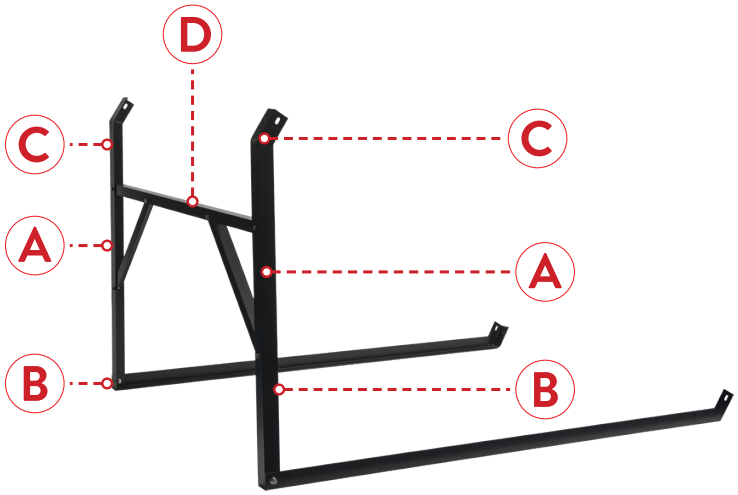
55° ‘A’ Frame Assembly



1310 H mm x 918 L mm (overall frame dimensions).

Distance between ground fixings - 580mm.

35° ‘A’ Frame Assembly



880 H mm x 1440 L mm (overall frame dimensions).

Distance between ground fixings - 1065mm.

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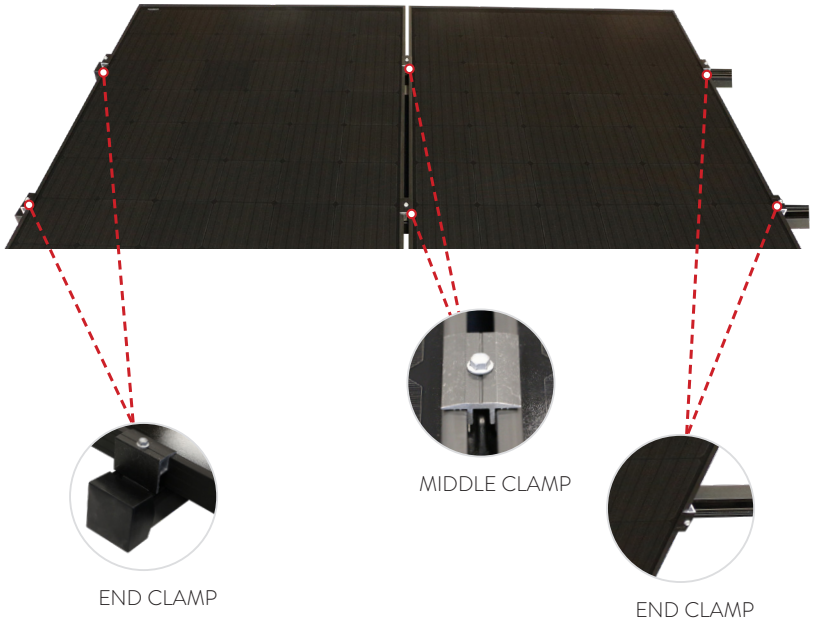
Drilling (If Required)

THERMAL SYSTEMS » **GROUND MOUNTING**

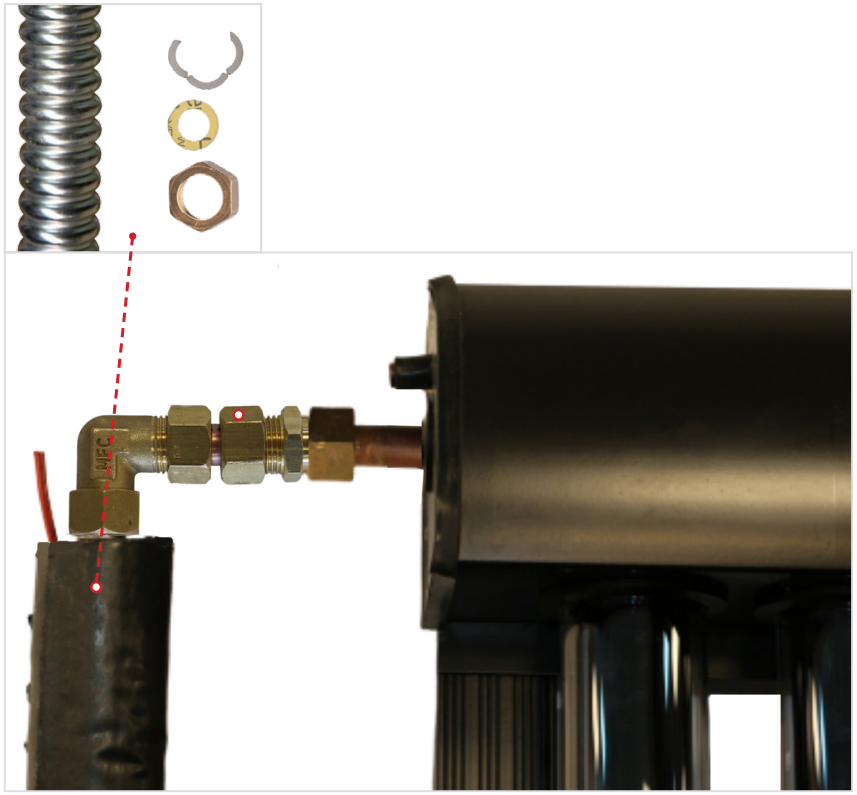
THERMAL SYSTEMS » **GROUND MOUNTING**

End Cap And Clamps Detail



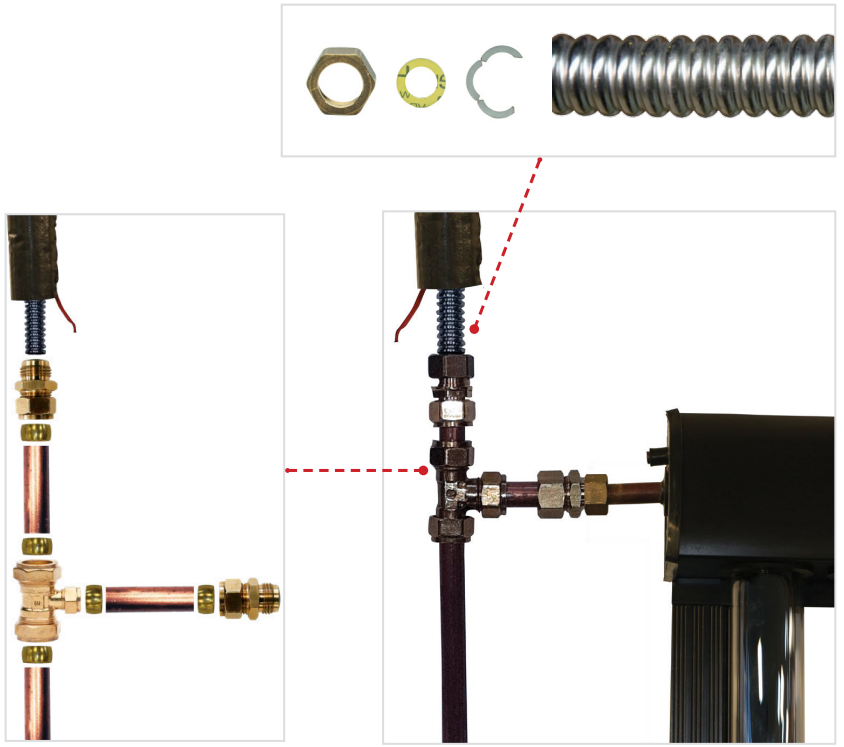
Roof Mounting (Tile/Slate)

Series Connection - Elbow Fitting



All pipework to be insulated fully.
Pipework in image exposed for illustrative purposes.

Parallel Connection - 'T' Fitting

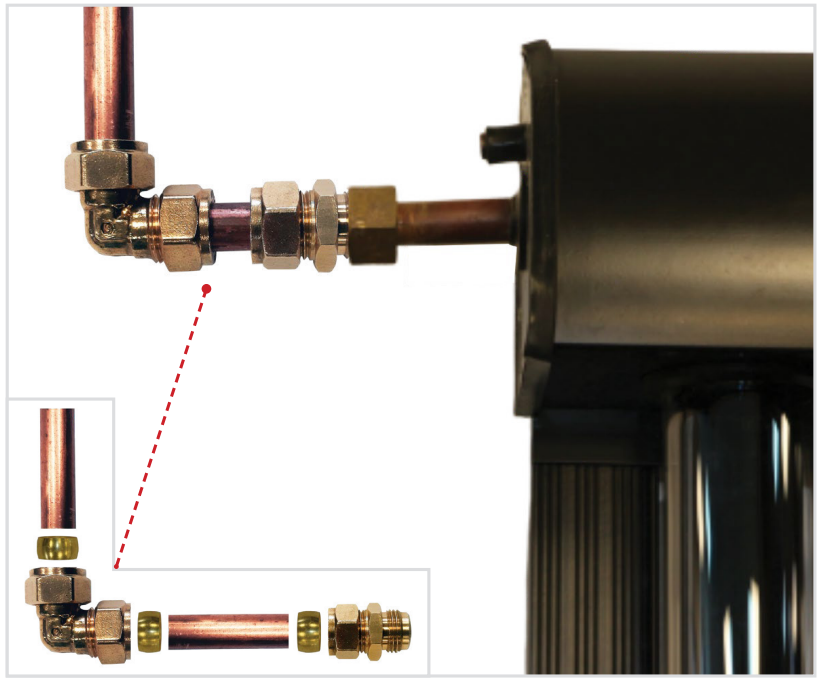


All pipework to be insulated fully.

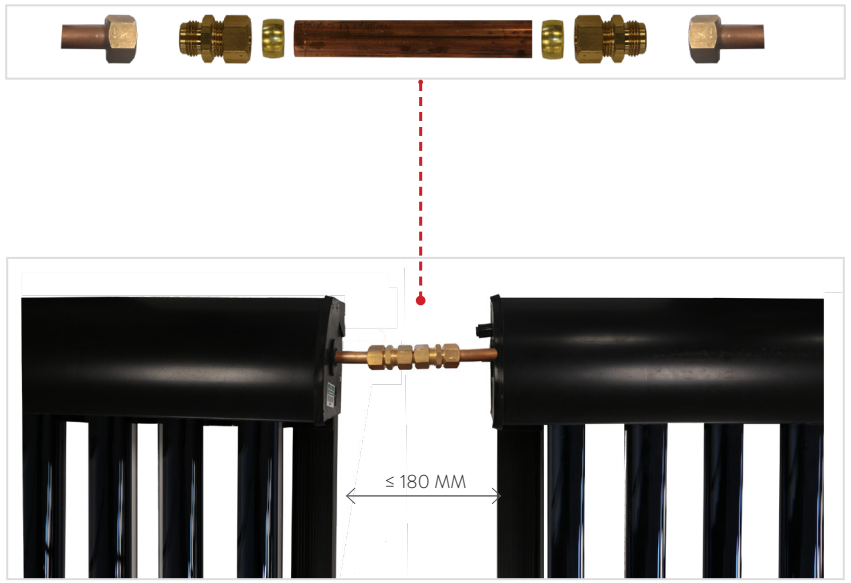
Pipework in image exposed for illustrative purposes.

THERMAL SYSTEMS » **PANEL CONNECTION**

Parallel Connection - Elbow Fitting

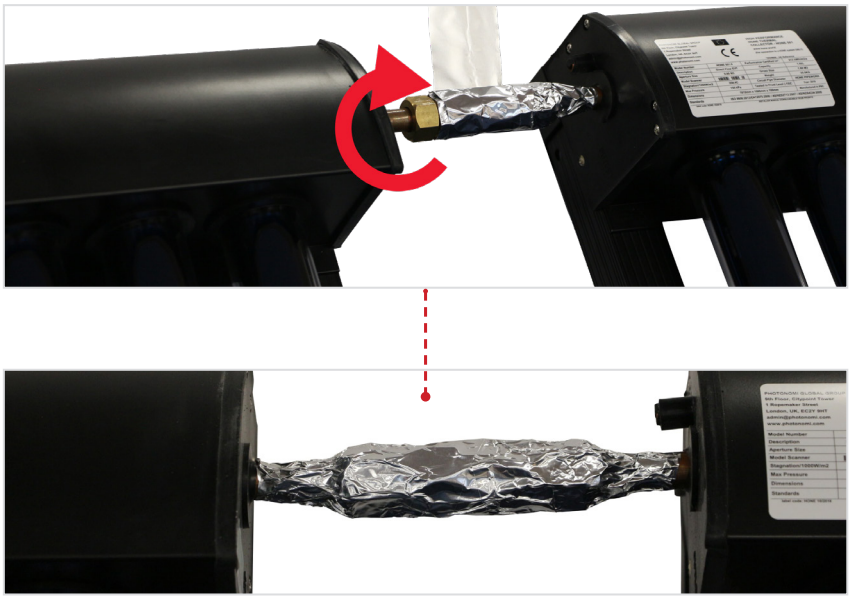


Series Connection - Straight Fitting



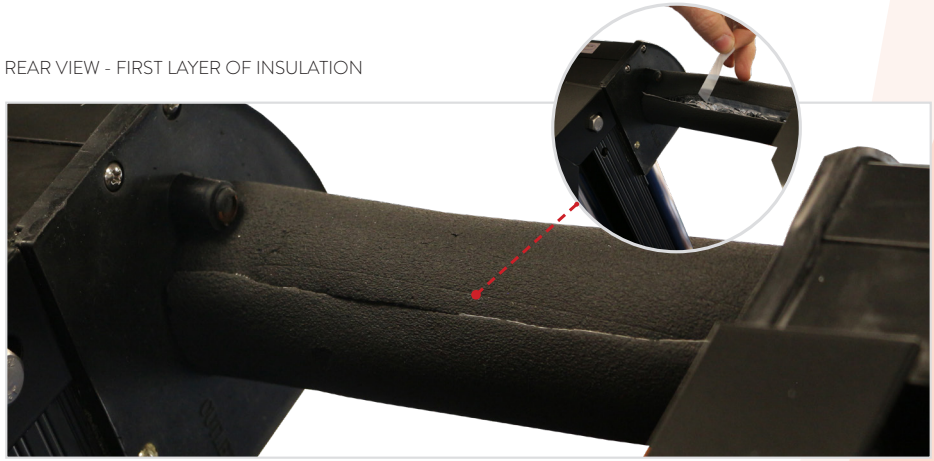
THERMAL SYSTEMS » **PANEL CONNECTION**

2 Layer Insulation Process - All Exposed Piping



FRONT VIEW - FIRST LAYER OF INSULATION

REAR VIEW - FIRST LAYER OF INSULATION



THERMAL SYSTEMS » **PANEL CONNECTION**

FRONT VIEW -SECOND LAYER OF INSULATION

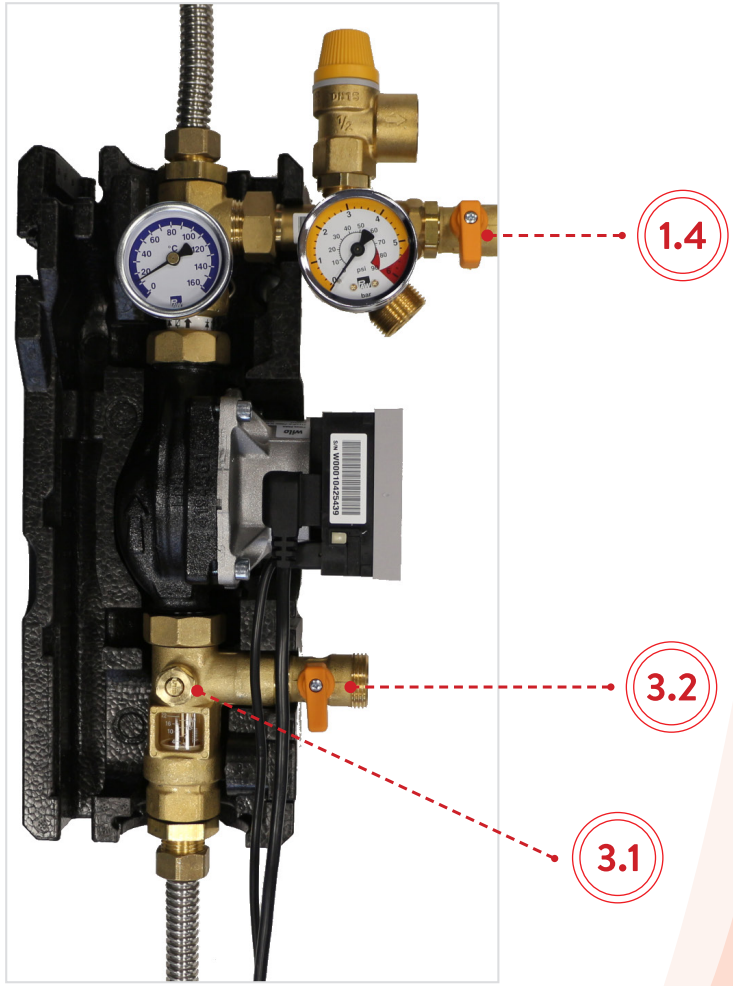
USEFUL TIPS!

Ensure the system has been pressure tested, is full and there are no leaks before insulating pipework.

When insulating the exposed copper piping on the roof, you must use UV resistant and high temperature resistant insulation and covering.

When applying tape, please do not apply excessive pressure and ensure that the tape correctly overlaps. Do not squeeze the insulation in any way as it is the trapped air which insulates the connections.

Filling Instructions For Servicing



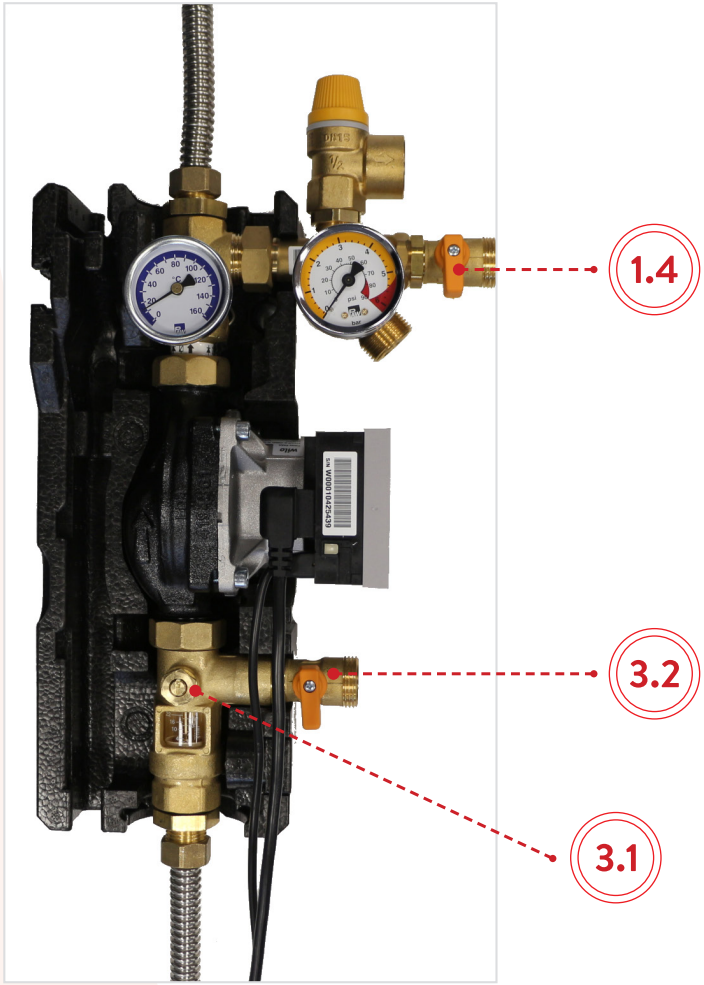
SEQUENCE	ACTION	REF POINT
1	Turn off Pump	
2	Connect inlet from filling station (pressure hose) to top fill valve	1.4
3	Connect outlet from filling station (flush hose) to the bottom drain valve	3.2
4	Close ball valve ONLY	3.1
5	Open valves on fill points	(1.4 & 3.2)
6	Add new fluid to filling station	
7	Turn on filling station and run for 10 minutes ensuring on all air is released from the system. If pressure is high during this process it means there is a restriction which will need to be located	
8	Once completed, close the return valve on the pump station and allow the pressure to build to 4.5 bar. If 4.5 bar cannot be achieved, then maximum achievable pressure however no less than 4 bar	3.2
9	At 4.5 bar, close fill valve on pump station and shut down filling station	
10	**Open the check valve (ball valve) VERY IMPORTANT**	3.1
11	Turn power back on and close and secure all caps	
12	Re-check valve is open	3.1
13	Wait 10 minutes then check and ensure there has been no pressure drop	

N.B: Fill the loop with **HONE** heating fluid provided only. Do not fill the loop while the collectors are under sunlight or when collector temperature exceeds 65°C as you could shock the collectors. Dawn or dusk are the preferred times.

Technical Data

DIMENSIONS	OPERATING DATA	EQUIPMENT	MATERIALS
Height (with pressure relief valve) Width (with fill and drain valve) Depth (with insulation) Pipe connections Connections for expansion tank Outlet pressure relief valve	Max. admissible pressure Maximum operating temperature Max. short-time temperature Max. propylene glycol content	Pressure relief valve Pressure gauge Check valve Flow meter	Valves and fittings Gadgets Check valves Insulation
383 mm 256 mm 150 mm ¾″ internal thread ¾″ internal thread, flat sealing ¾″ internal thread	6 bars 120 ° C 160 ° C, < 15 minutes 50%	6 bars 0 - 6 bars 200 mm wc, can be opened 3-22 l/min	Brass EPDM Brass EPP, λ= 0.041W/ (m K)

Filling Instructions For New Installations



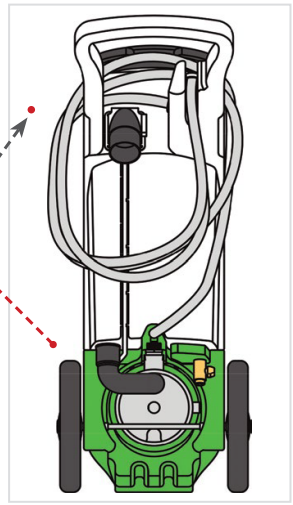
Filling Instructions For New Installations

SEQUENCE	ACTION	REF POINT
1	Turn off Pump	
2	Ensure the filling system is full of water	
3	Connect inlet from pump station to top fill port	1.4
4	Connect outlet to the bottom fill port	3.2
5	Close bottom check valve ONLY	3.1
6	Open valves on fill points	
7	Start fill pump and flush system of debris with fresh water	
8	Switch off filling pump and allow water to drain back into filling station	
9	Empty filling station and ensure it's clean of debris	
10	Add new HONE fluid to filling station	
11	Turn on filling station and run for 10 minutes ensuring all air is released from the system. If pressure is high during this process it means, there is a restriction in the circuit which will need to be located	
12	Once completed, close the return valve on the pump station and allow the pressure to build to 4.5 bar. If 4.5 bar cannot be achieved, then maximum achievable pressure however no less than 4 bar	3.2
13	At 4.5 bar, close fill valve on pump station and shut down filling station	
14	Open the check valve (VERY IMPORTANT)	
15	Turn power back on and close and secure all caps	

N.B: Fill the loop with **HONE** heating fluid provided only. Do not fill the loop while the collectors are under sunlight as you could shock the collectors. Dawn or dusk are the preferred times (recommended filling temperature is <65°C). You need permanent power: Do not fill water or finish insulation covering until electricity supply is permanently connected. Ensure HONE controller is configured to the pump station before filling, it does not just work on power up. Code needs to be entered and date/time need to be set. Language set to English.

THERMAL SYSTEMS » **PUMP CONNECTION**

Pump To Filling Station

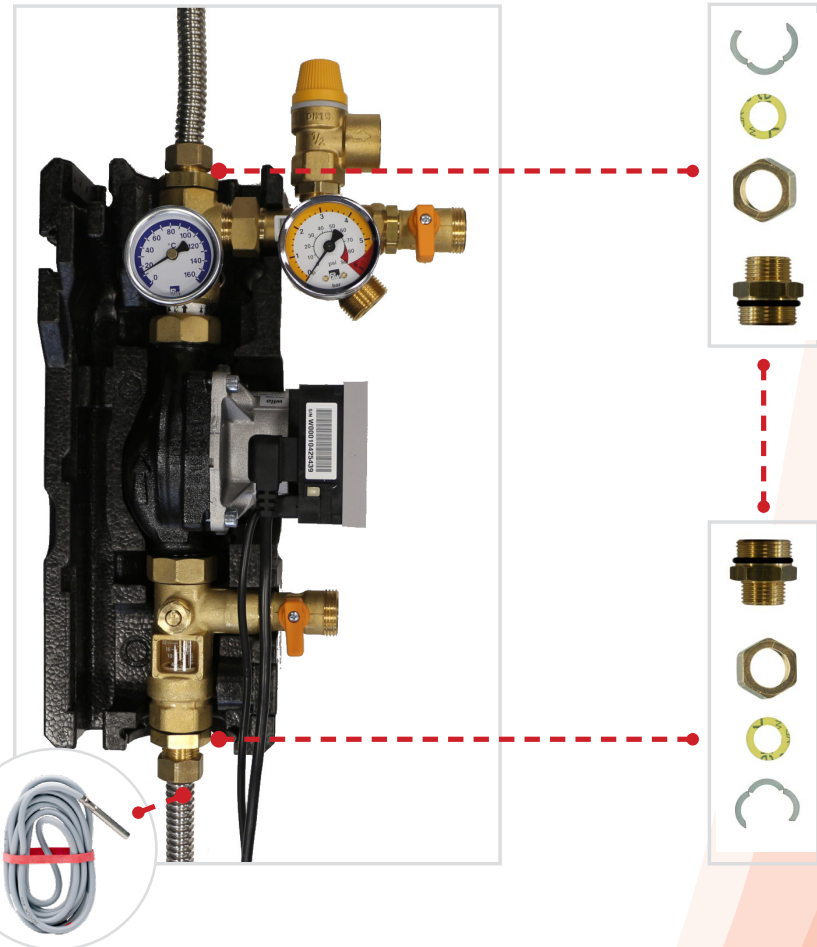


1.4

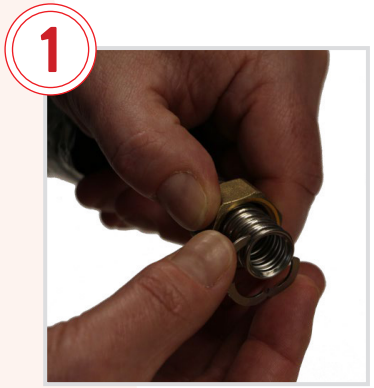
3.2

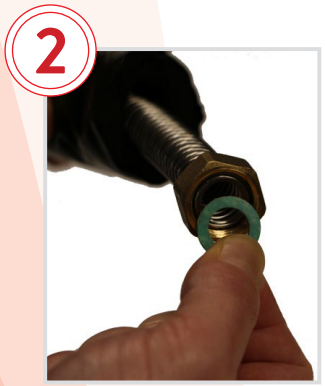
N.B: Please ensure the bottom port of the filling station is connected to the Top Fill Port of the Pump **(Location 1.4).** The top port of the filling station should also be connected to the Return Valve on the Pump Station **(Location 3.2).**

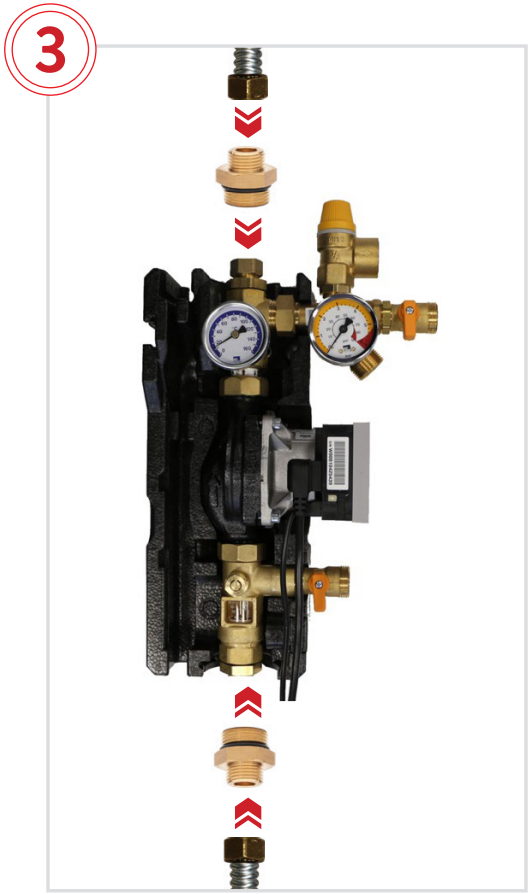
Filling Instructions For New Installations



HONE S4







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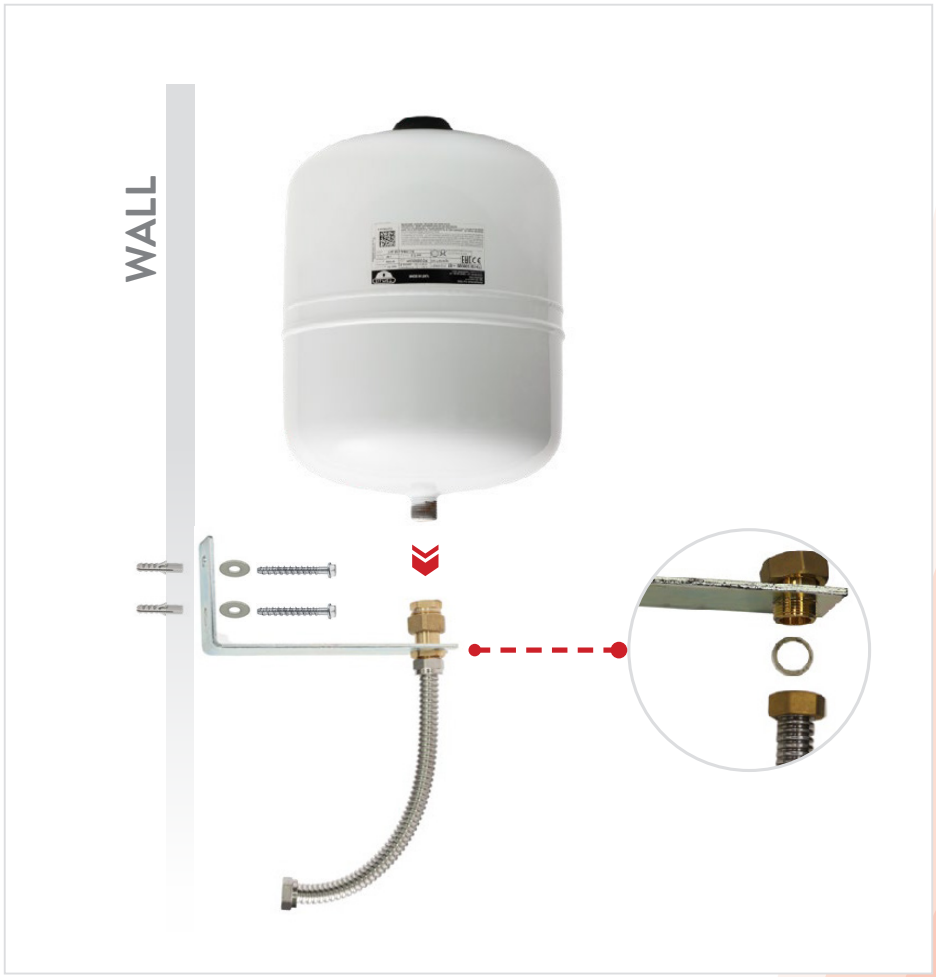
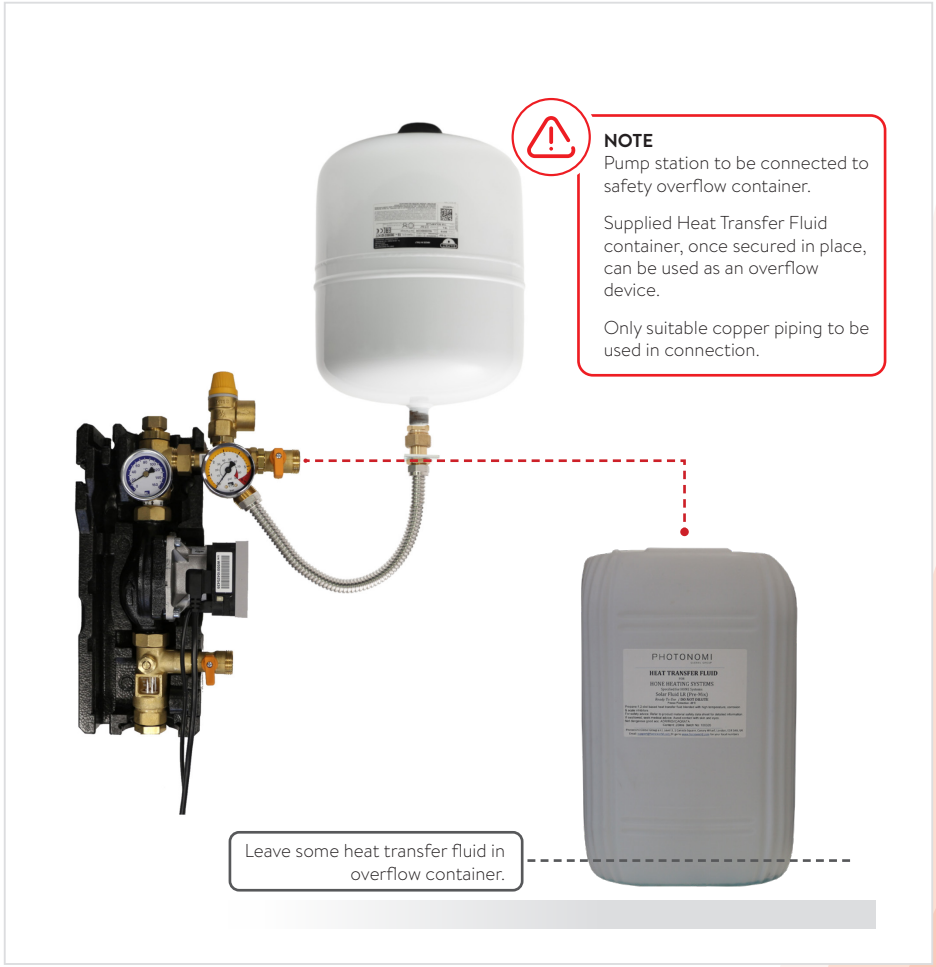
Wall Fixing

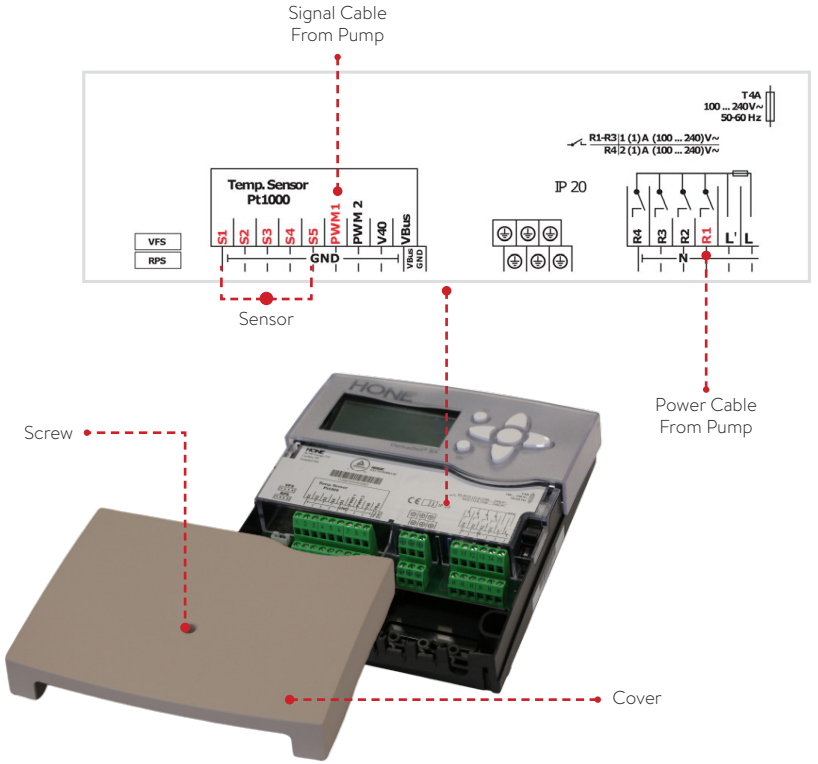


Expansion Vessel To Pump

Safety Overflow Connection



Hone Controller



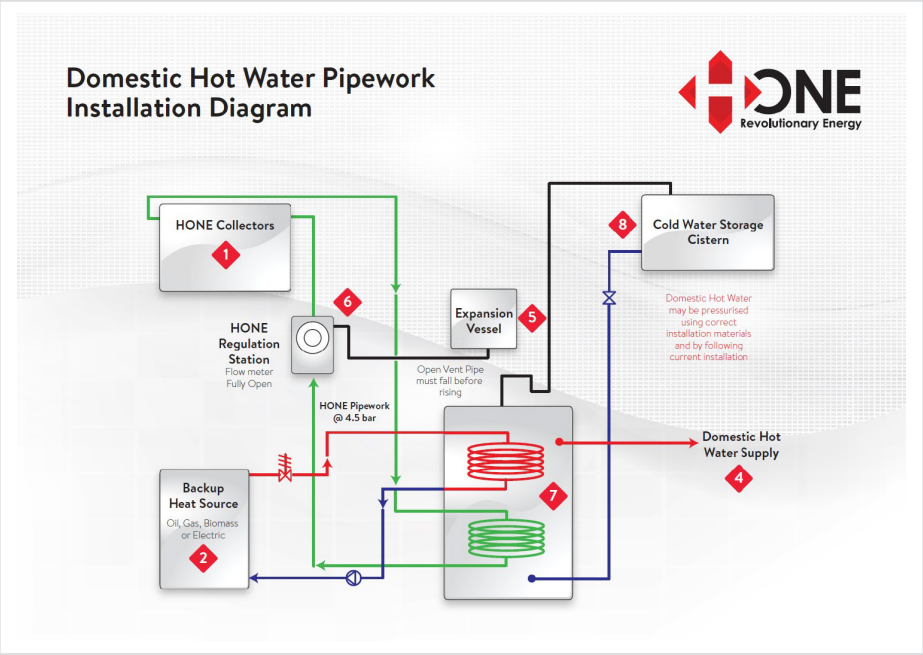
HONE CONTROLLER SETTINGS

The following settings are always inside the cover of the HONE controller:

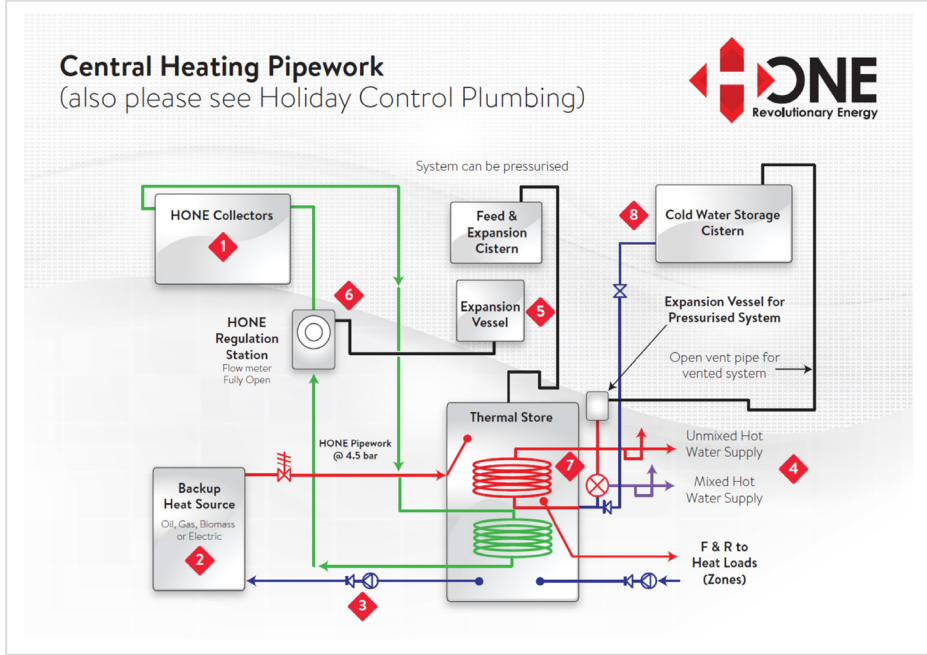
- Ensure 'Arr' is set to 1
- DT 0 is set to 6.0K
- DT F is set to 3.0K
- DT S is set to 10.0K
- S Max is set to 95°C
- Pump 1 is set to 'A'
- N1LO is set to 30
- n1HI is set to 100
- OHQM is set to 'ON'
- Ensure all sensors are correctly positioned and secured tightly in the correct places

OPTIONAL: Communication & Control (data logger, Climate)

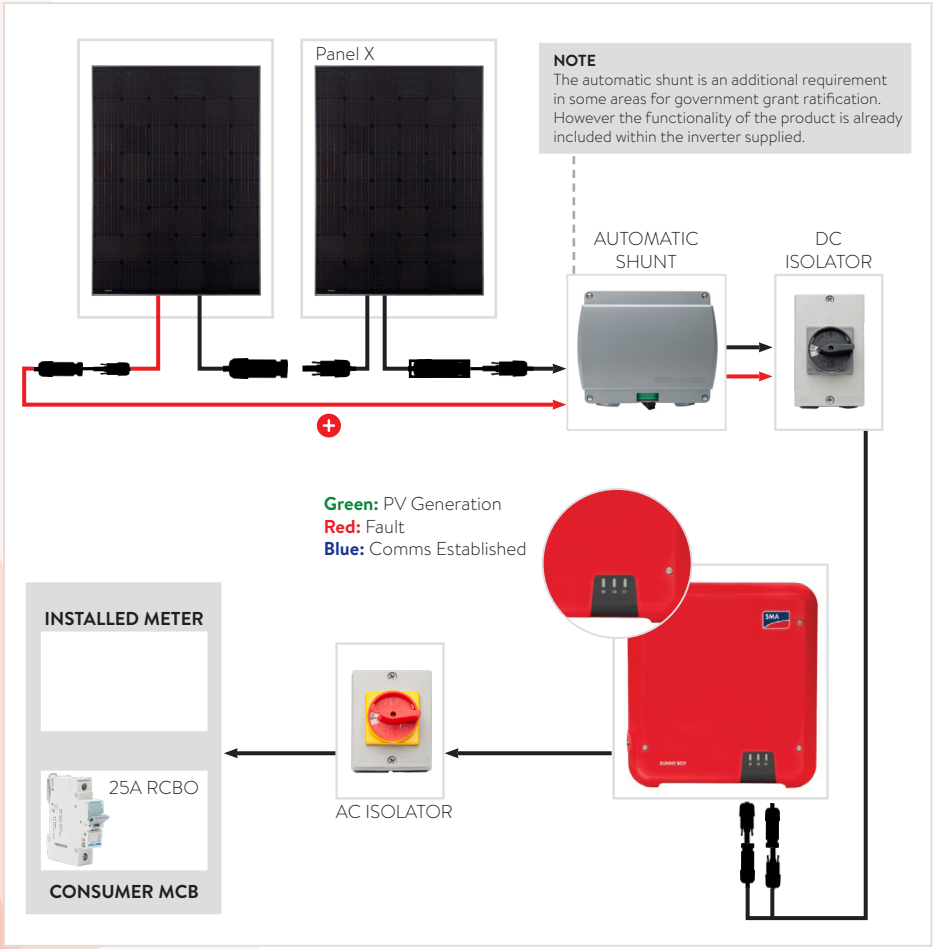
Hot Water Pipework Installation



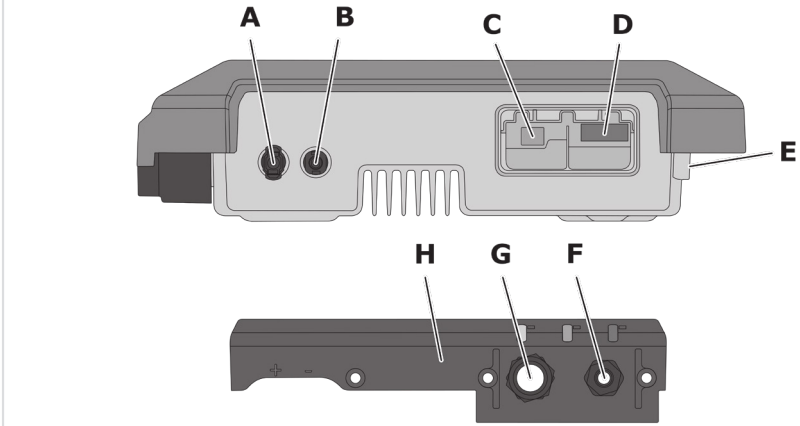
Central Heating Pipework



Installation Example

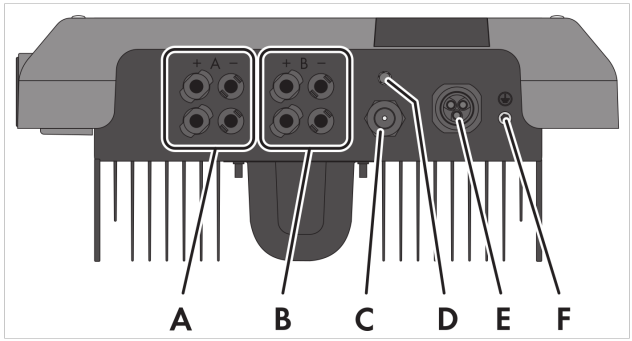


Invertor Connection Overview



SUNNY BOY 1.5 / 2.0 / 2.5

POSITION	DESIGNATION
A	Position DC Connector
B	Negative DC Connector
C	RJ45 Pin Connector for the network cable
D	Pin Connector for the AC Connector
E	Connection of the grounding terminal for additional grounding
F	Cable gland for the AC cable
G	Cable gland for the filler plug for the network cable
H	Connection Cap



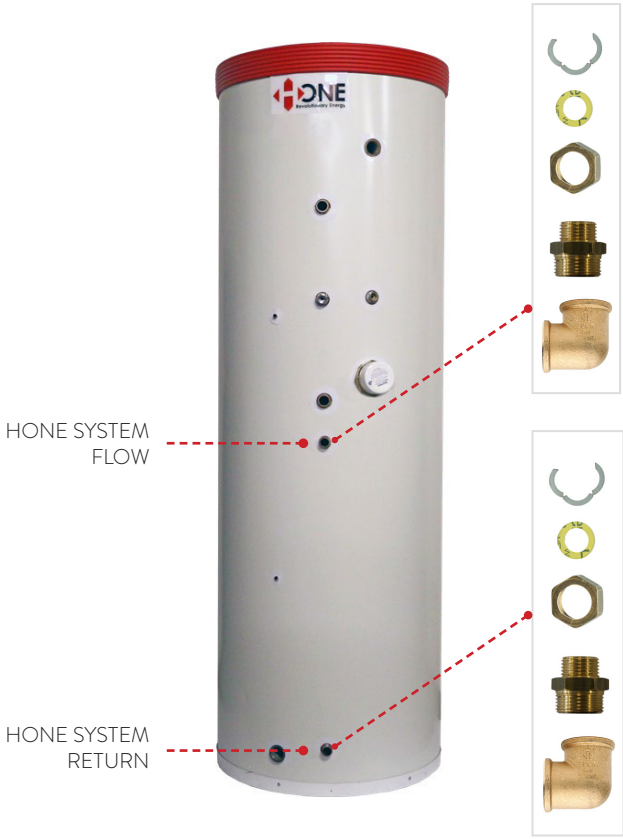
SUNNY BOY 3.0 / 3.6 / 4.0 / 5.0

POSITION	DESIGNATION
A	2 Positives & 2 Negatives DC Connectors, Input A
B	2 Positives & 2 Negatives DC Connectors, Input B
C	RJ45 Pin Connector for the network cable
D	Network part with protective cap
E	Jack with protective cap for WLAN antenna
F	Jack with the AC Connection
G	Connection point for an additional grounding

PLEASE NOTE :

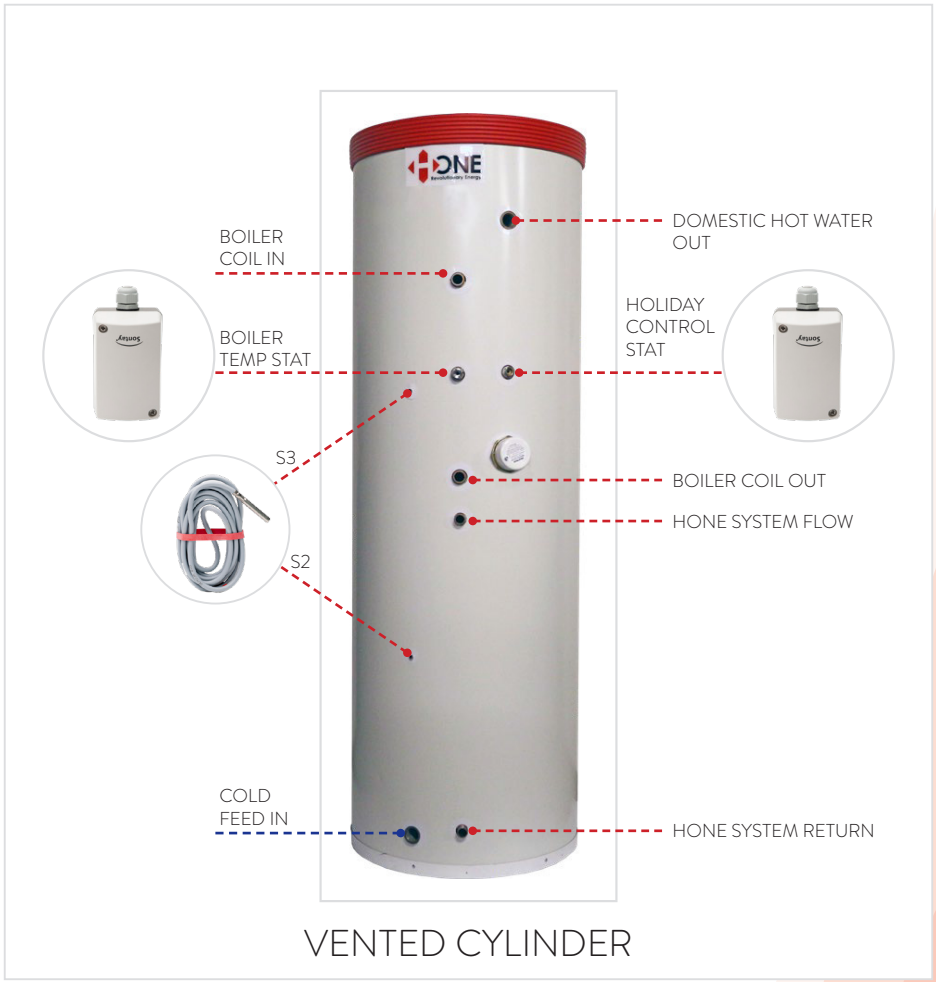
Must be installed by a qualified electrician, refer to technical details and operating manuals on website: **www.honeworld.com**

Cylinder To Panel Connection



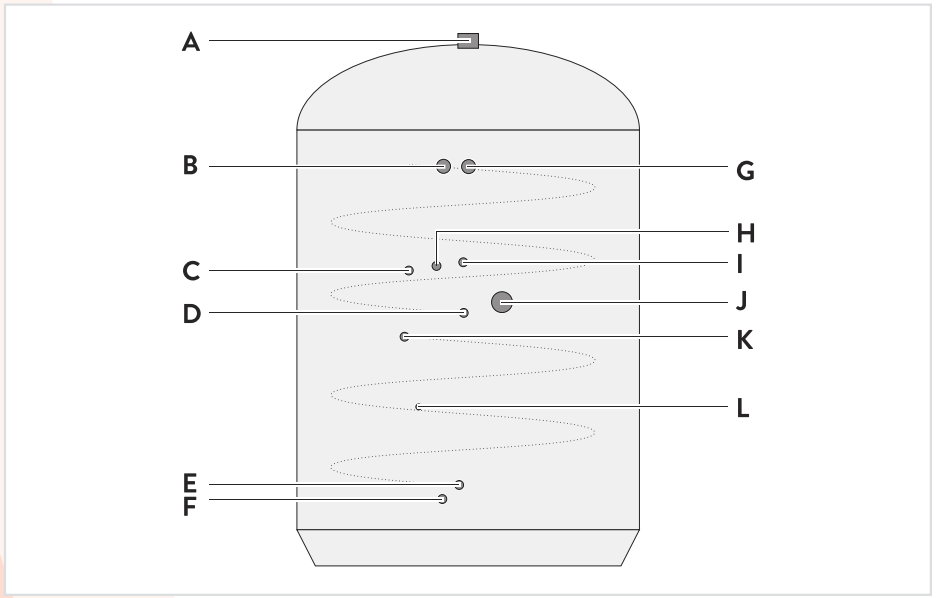
HONE Revolutionary Energy

Cylinder (Vented)



NOTE: All Cylinders come with Holiday Control and DHW Control Stats

Technical Data



VOL	KIT NO	SHELL DIMENSIONS	WEIGHT EMPTY (KG)	WEIGHT FULL (KG)	SOLAR COIL
180 Ltr	H1016HW180	1350 x 450mm	50kg	230kg	1.5m sq
250 Ltr	H1016HW250	1800 x 450mm	68kg	318kg	2.4m sq
300 Ltr	H1016HW300	1800 x 500mm	82kg	382kg	3.0m sq
400 Ltr	H1016HW400	1670 x 740mm	108kg	508kg	6.0m sq
500 Ltr	H1016HW500	2000 x 600mm	132kg	632kg	9.0m sq

POSITION	DESIGNATION
A	1" Female
B	1" for Boiler Coil
C	10mm Pocket ⅓rd down. For sensor 3 (S3) input
D	1" for Boiler Coil
E	¾" Male Solar Coil
F	1" cold Feed c/w Baffle just below lower Solar Coil Connections
G	1" Female Draw Off c/w Internal Pipe
H	2no. 1/2" c/w Boiler Stat (0-90 ° C and 1no. 95 ° C)
I	2no. 1/2" c/w Boiler Stat (0-90 ° C and 1no. 95 ° C)
J	Immersion WIHLWD 3kW @ 240V
K	¾" Male Solar Coil
L	10mm Pocket - 60% of the distance between the 2 coil connections. For sensor 2 (S2) input

INSULATION THICKNESS: 50MM

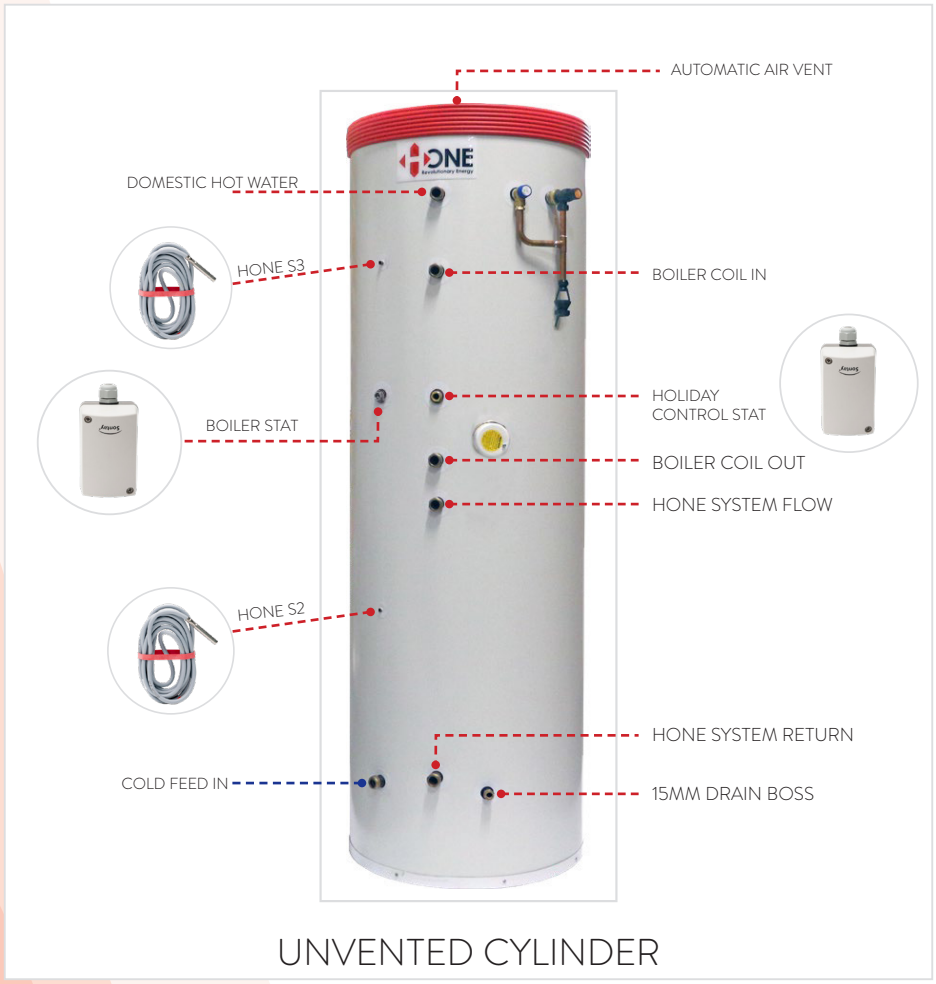
STANDING LOSS/24H:

120L - 1.63 kWh/24h
210L - 2.04 kWh/24h
300L - 1.82 kWh/24h

PLEASE NOTE: White Cased Finish 50mm Foam Lagged Option Available. Bespoke designs avaliable if required

THERMAL SYSTEMS » **CYLINDERS**

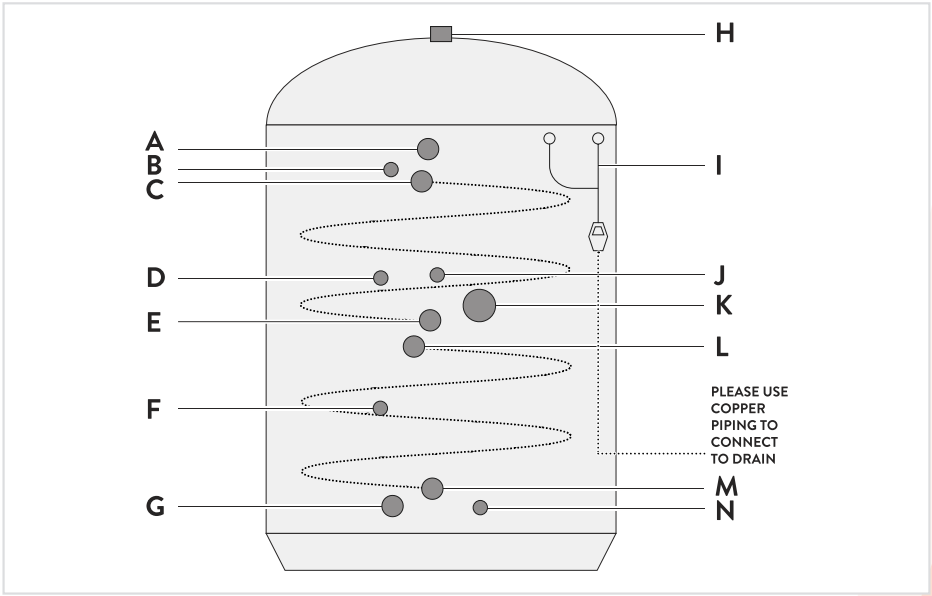
Cylinder (Unvented / Pressurised)



UNVENTED CYLINDER

NOTE: All Cylinders come with Holiday Control and DHW Control Stats

Technical Data



VOL	KIT NO	SHELL DIMENSIONS	WEIGHT EMPTY (KG)	WEIGHT FULL (KG)	SOLAR COIL
180 Ltr	H1016HW180UV	1350 x 450mm	50kg	230kg	1.5m sq
250 Ltr	H1016HW250UV	1800 x 450mm	68kg	318kg	2.4m sq
300 Ltr	H1016HW300UV	1800 x 500mm	82kg	382kg	3.0m sq
400 Ltr	H1016HW400UV	1670 x 740mm	108kg	508kg	6.0m sq
500 Ltr	H1016HW500UV	2000 x 600mm	132kg	632kg	9.0m sq

POSITION	DESIGNATION
A	22mm Female Draw Off c/w Internal Pipe
B	10mm Pocket ⅓ down
C	22mm for Boiler Coil
D	½" Dual Stat
E	22mm for Boiler Coil
F	10mm Pocket - 60% of the distance between the 2 coil connections
G	⅓ " Cold Feed c/w Spreader Pipe & Check Valve Fitted Just below Solar Coil
H	1" Female
I	Relief Valves
J	½" c/w 95 ° C Stat
K	Immersion Fitted
L	22mm HONE Coil
M	22mm HONE Coil
N	15mm Drain Boss

INSULATION THICKNESS: 50MM

STANDING LOSS/24H:

180L - 1.92 kWh/24h
210L - 2.04 kWh/24h
300L - 1.82 kWh/24h

PLEASE NOTE: **White Cased Finish 50mm** Foam Lagged Option Available. Bespoke designs available if required as all cylinder are custom built.

Commissioning Guidelines

The following table outline the steps that are needed to commission a **HONE** heating System and Electric System. It is up to installer to make sure that all the following parameters are met for correct operation of the system:

PLEASE NOTE
Always ask questions if you are unsure/

THE FOLLOWING MUST BE CHECKED	POST INSTALL
Pressure in the system must be at 4.5 bar after final bleeding, make sure that pressure remains steady – monitor for 1 hour after system start.	
Make sure no gases are left in a fully filled system	
Sensors are correctly placed and wired correctly	
All electrical work meets ECTI Rules and BS 7671 safety standards	
Earth Bonding in accordance with ECTI Rules for Thermal Systems	
Temperature readings and controller settings correct: • Controller settings are inside the cover of the Controller • These settings must be as indicated, deviation can cause malfunction	
Pressure relief valves (unvented systems) operating correctly	
Overflow from safety valve sent to drainage	
All Pipe work properly insulated	
Hot Water: **Stat3** set to **60°C**	

Commissioning Guidelines

ACTION	POST INSTALL
Holiday Control: Stat1 set to 90°C – very important • Note the temperature reading on HONE controller **S3** • To test holiday control match stat temperature to cylinder temperature, in doing so the Holiday Pump should activate • Let the pump run for a few minutes, this will draw cooler water from the heating zone to top of tank • Check HONE controller **S3** again, Temperature should have dropped by **3°C** • If successful return holiday stat setting to **90°C**	
Temperature Interlock present between Thermal Cylinder and heating zones. • Heat Interlock: **Stat4** set to **40°C**	
ONLINE MONITORING	
It is essential that the client has good internet access via broadband. This is a requirement of the HONE installation. If not, performance cannot be optimised For access to system data the following ports needs to be opened on the router • **7054, 7053, 80** • This must be requested by the homeowner due to GDPR issues	

HOLIDAY CONTROL (if installed)

- The holiday control is a safety mechanism that forms part of our system. This is there to cool the cylinder temperature when the temperature in the cylinder goes above 90°C. Also, this prevents stagnation occurring in the system
- Cooler water is drawn from a heating zone (preferably the larger) via a separate pump to the top of the cylinder. Ask us for assistance if you are unsure.

Part 1: Declaration Of Works

PART 1: DECLARATION OF WORKS
INSTALLATION DETAILS

Applicant Name*	
Installation Address	
Installation Eircode	
Installation MPRN/DNO Number	

SYSTEM DETAILS

Solar PV System Size	kWp*	Battery Storage (if applicable)	kW kWh
Solar PV System Annual Estimated Yield	kWh**	Method of Yield Calculation (e.g. PVSyst)	
Hot Water Diverter Installed?	Y/N?		

** Total DC Installed Capacity at STC (Nameplate Capacity, NOT Flash Test)*
*** AC kWh based on estimated calculation*

Renewable Installer Details (MUST BE ON THE SEAI SOLAR PV INSTALLER REGISTER)	
Renewable Installer Name	
Renewable Installer Identification Number	

Part 1: Declaration Of Works

Registered Electrical Contractor Details (WHOM COMPLETED THEREGULATORY PAPERWORK FORM)

Identification Number	
Certificate Serial Number	
Certificate Date	
Networks/DNO Form Submission Date	
Property year of Construction	
Total cost of installation (including VAT)	€

SYSTEM COMPONENTS

COMPONENT	MAKE	MODEL	RATING	QUALITY
Solar PV Modules			Wp at STC	
Mounting System			N/A	
Inverter			kW	
Energy Meter			N/A	
Battery Energy Storage System			kW kWh	

Date Of Works Completion

By signing this Declaration of Works, the undersigned declares that;

- The Solar PV system (and, if applicable, battery system) has been installed and commissioning at the above Installation Address on the Date of Works Completion
- All works indicated are fully compliant AND CERTIFIED

- The electrical installation has been installed in accordance with all applicable local laws AND has been issued by a Registered Electrical Contractor for the electrical installation
  I have been paid in full or an agreed payment schedule contract is in place by the homeowner for the works described.

- I have completed an Inspection, Test and Commissioning Report for this solar installation and have given it to the homeowner
- I have provided the homeowner with the required documentation to complete their grant application

Signed Date

THERMAL SYSTEMS » **COMMISSIONING**

Part 2: Inspection, Test And Commissioning Report

CUSTOMER NAME:	
CUSTOMER ADDRESS:	
CUSTOMER EIRCODE	
INSTALLATION CONTRACTOR	
COMPANY NAME	
COMPANY REPRESENTATIVE	
CUSTOMER ADDRESS:	

PB SYSTEM DESCRIPTION:
PV MODULE:

Manufacture	_____	Module Type:	_____
PV Module Performan	_____	No of Modules:	_____
Short Circuit Current Isc (A)	_____	Current (A):	_____
Open Circuit Voltage Voc (V)	_____	Voltage (V):	_____

PB SYSTEM DESCRIPTION:
PV MODULE:

Manufacture:	_____	Inverter Type:	_____
AC Nominal Power (W):	_____	AC Nominal Power (W):	_____
AC Maximum Power (W):	_____	DC Maximum Power (W):	_____
Test Date:	_____	Test Reason:	☐ Initial inspection
Next Test Date:	_____		☐ Retesting

ELECTRICAL CERTS

Cert Number: _____ Test Record Sheet Cert Number: _____

DC TEST RESULTS:

RE: _____ Loop: _____ RCDx1: _____ RCDx5 _____

DESIGN, CONSTRUCTION, INSPECTION AND TESTING

I/we, the responsible person(s) for the design, construction, inspection and testing of the electrical system (asspecified by the signature(s), details of which are described above, have inspected and tested the design and structure with suitable skill and care and confirm that the said words, for which I/we am/are responsible, were carried out to the best of our knowledge and expertise.

TEST RESULTS:

☐ No defects were found ☐ Defects were found

☐ The Photovoltaic system complies with the standards of electrical engineering

Signature / Tester: _____ Date: _____

Remarks: _____

_____

_____

TESTING:

Test Date: _____ Signature / Tester: _____

Inspected circuits (fill out one sheet for large systems and for separate inspections per inspection):

Design and installation of the PV generator

- [ ] The DC system was generally designed, selected and set up in accordance with the requirements in DIN VDE 0100 (IEC 60364) and in particular in accordance with DIN VDE 0100-712 (IEC 60364-7-712)
- [ ] The DC components were measured for DC operation
- [ ] The DC components are rated for the maximum current and maximum voltage
- [ ] Protection is provided by application of class II or equivalent insulation on the DC side
- [ ] PV strand cables, PV generator cables and PV DC main cables have been selected and constructed so that the risk of earth faults and short circuits is reduced to a minimum (DIN VDE 0100-712 para. 522.8.1)
- [ ] The wiring system has been selected and constructed so that it can withstand expected external influences such as wind, ice temperature and solar radiation (DIN VDE 0100-712. 522.8.3)
- [ ] AC and DC cables are physically separated
- [ ] Systems without strand overcurrent protective device: Strand cables are designed so that they can take up the highest combined leakage current of parallel lines (DIN VDE 0100-712 para.433)
- [ ] Systems with strand overcurrent protective device: Overcurrent protective devices are set correctly according to local rules or according to the PV module manufacturer's instruction (DIN VDE 0100-712 para.433.2)
- [ ] There are DC load break switches installed on the DC side of the inverter (DIN VDE 0100-712 para.536.2.2)

PV System/overvoltage protection/electric shock

- [ ] The inverter has a simple separation between the AC side and the DC side
- [ ] Alternatively: A residual device is installed in the circuit and corresponds to a type B RCD (DIN VDE 0100- 712 para. 413.1.1.1.2)
- [ ] The area of wiring loops was kept as small as possible (DIN VDE 0100-712, para. 54)
- [ ] If equipotential bonding conductors are installed, they run in parallel and in as close contact as possible to the PV DC cables

Special factors of PV system – AC circuit

- [ ] Devices for disconnecting the inverter are provided on the AC side
- [ ] Separating and switching devices are connected so that the PV installation in connected on the "load"side and the public supply on the "sources" side (DIN VDE 0100-712 par,. 536.2.2.1)
- [ ] Protection settings of the inverter are programmed according to local regulations

Marking and labelling of the PV system

- [ ] All circuits, protection devices, switches and terminals have appropriate markings
- [ ] All DC connection boxes (PV sub-generator connection box and PV generator connection box) bear a warning that the active parts present in the connection box are supplied by a PV generator and may still be live after the shutdown of PV inverters and public supply
- [ ] The AC main switch has a clear inscription
- [ ] Warnings are present for the double supply at the point of interconnection
- [ ] The protection settings of the inverter and details of the installation are provided on site
- [ ] The procedures for emergency shutdown are provided on site
- [ ] All signs and markings are suitable and permanently attached.

General (mechanical) installation of the PV system

- [ ] Ventilation is provided behind the PV generator to prevent overheating/reduce the fire risk
- [ ] The frame and materials are properly attached and stable; the roof fasteners are weather-resistant
- [ ] The cable routing is weather-resistant

Notes

Test Report for grid-connected photovoltaic systems
according to EN 62446, Annex C

STRING		1	2	3
PV generator	Module			
	Quantity			
PV generator parameters	Voc (STC)			
	Isc (STC)			
Protection device (branch fuse)	Type			
	Rated Value (A)			
	DC rating (A)			
	Capacity (kA)			
Wiring	Type			
	Phase conductor (mm2)			
	Earth conductor (mm2)			
Testing and Measurement of the strand	Voc (V)			
	Isc (A)			
	Irradiance			

Test Report for grid-connected photovoltaic systems
according to EN 62446, Annex C

STRING		1	2	3
Polarity monitoring				
Array Insulation Resistance	Test Voltage (V)			
	Pos – Earth (MΩ)			
	Neg – Earth (M Ω)			
Earth continuity (where fitted)				
Switchgear functioning correctly				
Inverter Make/ Model				
Inverter Serial Number				
Inverter functioning correctly				
Loss of mains test				

Notes

Part 3: Completion Checklist

The Installer must confirm that all the below documentation is complete, and has been provided to the homeowner

REQUIRED DOCUMENT	TICK IF PROVIDED
Declaration of Works – Completed and signed by the Installer	
Inspection, Test and Commissioning Report (EN 62446)	
Certificate – Completed and signed by a Registered Electrical Contractor	
Submitted Networks/DNO Form	
Building Energy Rating Certificate for the Property (if needed for grant/fit)	
Invoice describing the works	
Photographs of the installation	
A: Mounting system as installed	
B: PV Module Array as installed	
C: PV Module Nameplate	
D: Inverter as installed – showing isolators	
E: Consumer Unit with Solar PV MCB/RCD and Solar PV Meter	
F: Battery Energy Storage System as installed (IF APPLICABLE)	
Datasheets for Solar PV Modules, Inverters, and Battery Energy Storage System	
Warranties for Solar PV Modules, Inverters, Mounting System	
O&M Manual for Homeowner	
Basic start up, shut down, safety, operation and maintenance instructions	
Estimation of system performance calculated using common estimator tools and databases such as PVSyst, PVSol, PVGIS or other equivalent, considering the actual location, orientation, pitch, location and over shading conditions of the PV modules.	