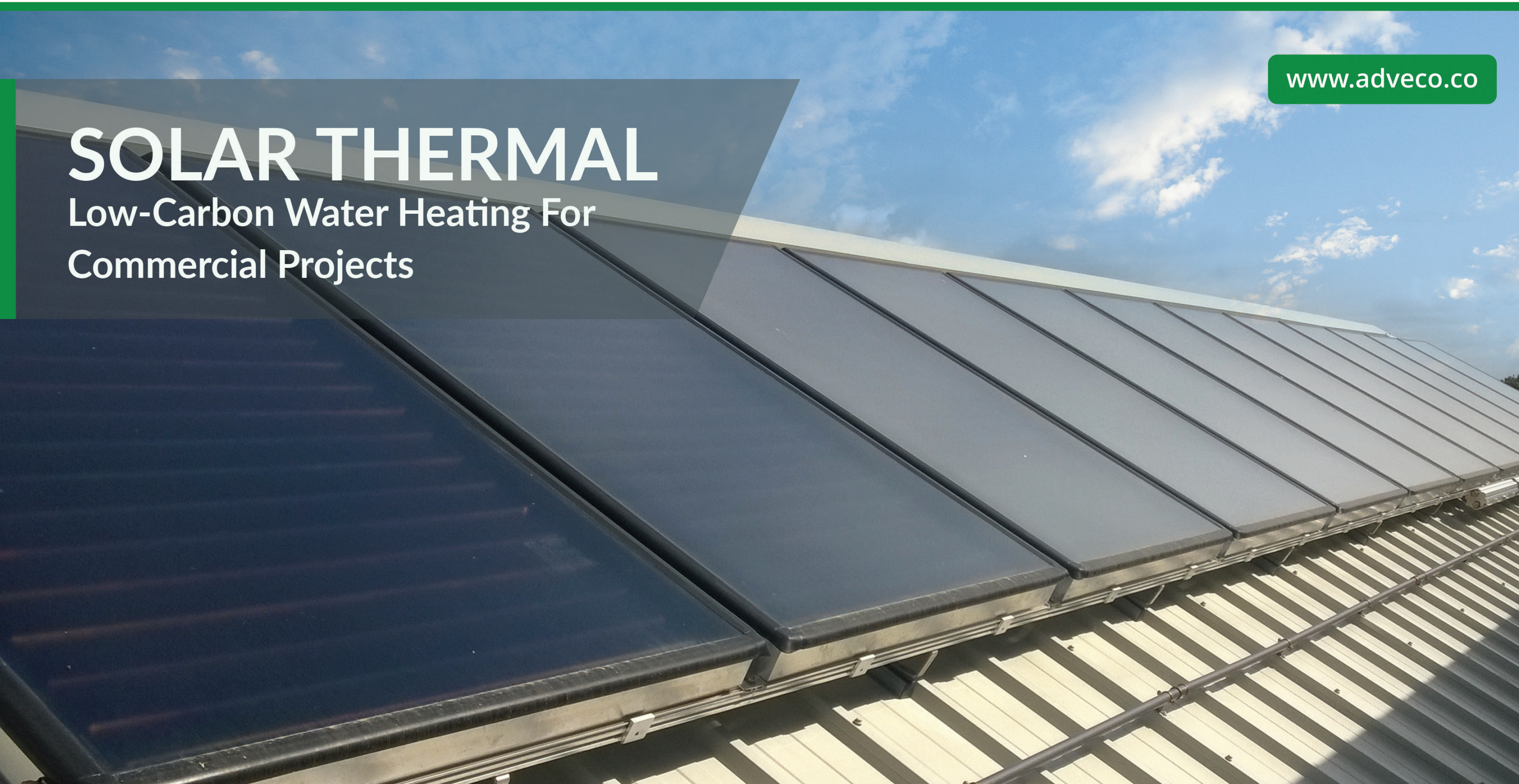
ADVECO

HOT WATER SPECIALISTS



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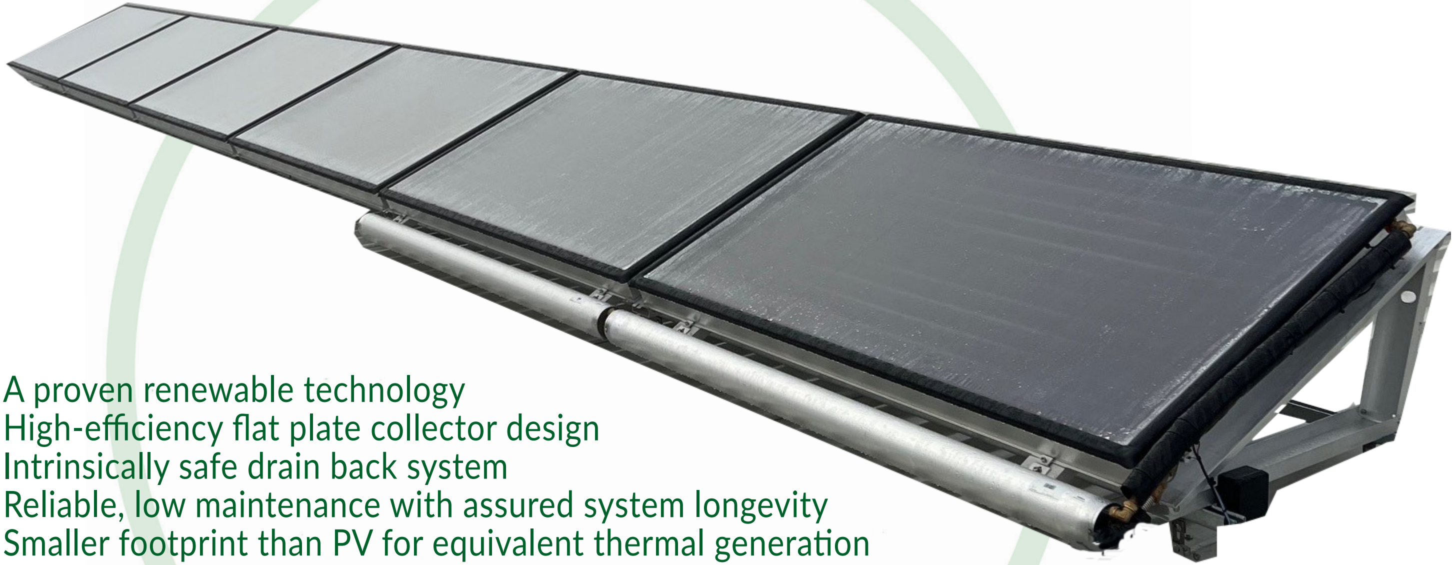
SOLAR THERMAL

Low-Carbon Water Heating For Commercial Projects

ADVECO SOLAR THERMAL

Low-Carbon Water Heating For Commercial Projects



- A proven renewable technology
- High-efficiency flat plate collector design
- Intrinsically safe drain back system
- Reliable, low maintenance with assured system longevity
- Smaller footprint than PV for equivalent thermal generation
- Ideal for renewable applications with large roof area and predictable hot water demands
- Under SAP10 gas hot water systems can be lower carbon with solar therrmal
- Enables heat pump systems to be lower carbon and lower cost if set up in the right way

WORKING TOWARDS A ZERO CARBON FUTURE

50 YEAR HISTORY

CONTINUED GROWTH IN TURNOVER for 10 YEARS

IN HOUSE TRAINING FACILITIES

Designed to support commercial buildings which use large amounts of daily hot water, solar thermal will be a valuable addition to any new build hot water application as well as an ideal technology to address decarbonisation goals for existing properties with gas connections.

It is important to realise that solar thermal systems alone will typically not generate a business's total energy requirements to meet the year-round demands for domestic hot water (DHW). For this reason, the optimal application for solar thermal is to supply pre-heated water into the DHW system. Correctly designed and sized, the solar thermal system can then generate a substantial proportion of the hot water requirements, enough to reduce reliance on the gas or electric boiler, especially during summer months.

Solar thermal also lends itself to working in conjunction not only with other conventional heating technologies but also with the latest generation of renewables, in particular heat pumps. This can be of great advantage to a business, reducing carbon emissions and lowering energy costs to advance sustainability strategies today.

Depending on the building and energy consumption habits, solar thermal will typically provide at least 30% of the annual hot water demand.

With More Than 800 Proven Operational Systems In The UK, Adveco Is The Expert For Commercial Solar Thermal

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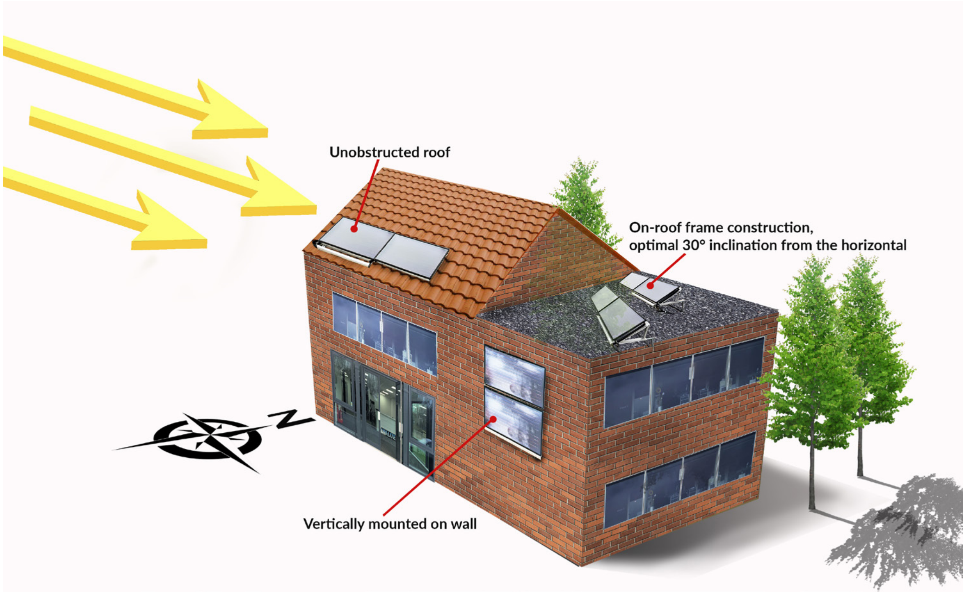
Getting Started With Solar Thermal

Before committing to a solar thermal system, it is vital to consider a wide range of factors. Besides maximising the efficiency of the appliance, it is equally important to have a sustainable and ecologically sound installation. Solar thermal systems are ideal for organisations that use and rely on large amounts of hot water (restaurants, hotels, schools, hospitals and larger offices), but it is important to understand that a solar thermal system will not fully replace your existing water heating system and will not provide space heating.

The actual percentage of your water heating demand covered by solar thermal will depend on your site and energy consumption habits (this figure is typically around 30% for commercial sites).



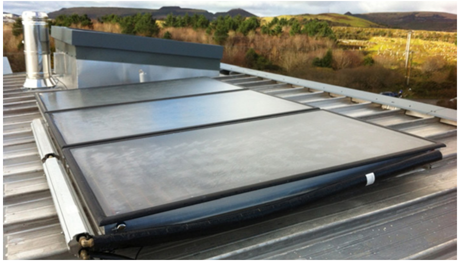
Building Suitability For Solar Thermal

A south-facing and unobstructed roof with an inclination of 30° from the horizontal is optimal, though by no means essential as Adveco solar collectors can be installed in a variety of ways: built on roof; built in roof; mounted on walls or on frame construction to achieve inclination on flat roofs.

All areas of the UK are suitable for solar energy technology; however, even minimal shade can greatly reduce a system's output. If a solar thermal collector suffers significant shade coverage, then the technology will not be applicable and a commercial air source heat pump, such as the Adveco FPi-32 range, may be the preferred option to produce low carbon heat.

Assuming the location exhibits no shade issues, Adveco's application engineers will assess a building's hot water demand and calculate the number of collectors and size of the storage vessel to correctly size an application.

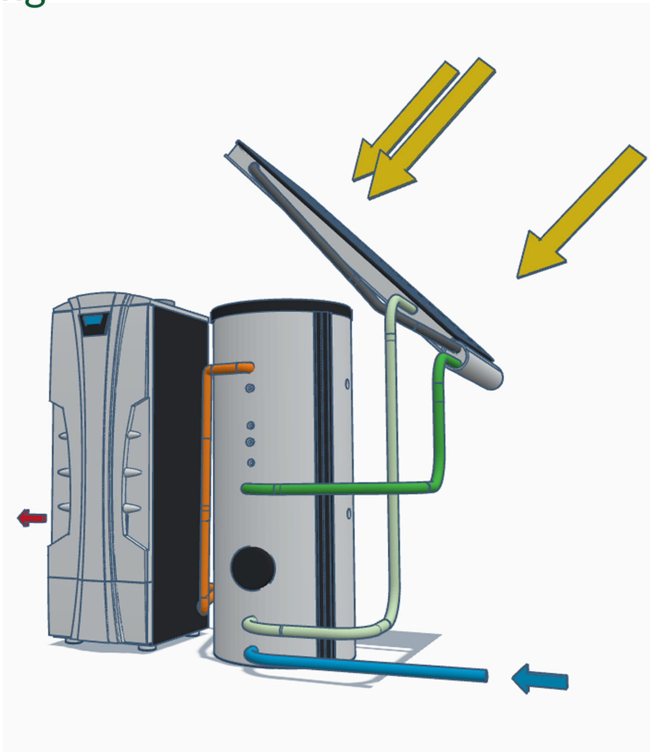
Solar thermal systems are most productive in the summer months, when there is most sunlight, resulting in the additional need for non-renewable energy sources during the winter months. Despite this, sustainability is more than achievable, and Adveco will package the appropriate technology.



Solar Thermal And Gas-Fired Water Heating

Core System Elements:

- Flat plate collector
- Drain back modules
- ATSI stainless steel cylinder
- ADplus water heater



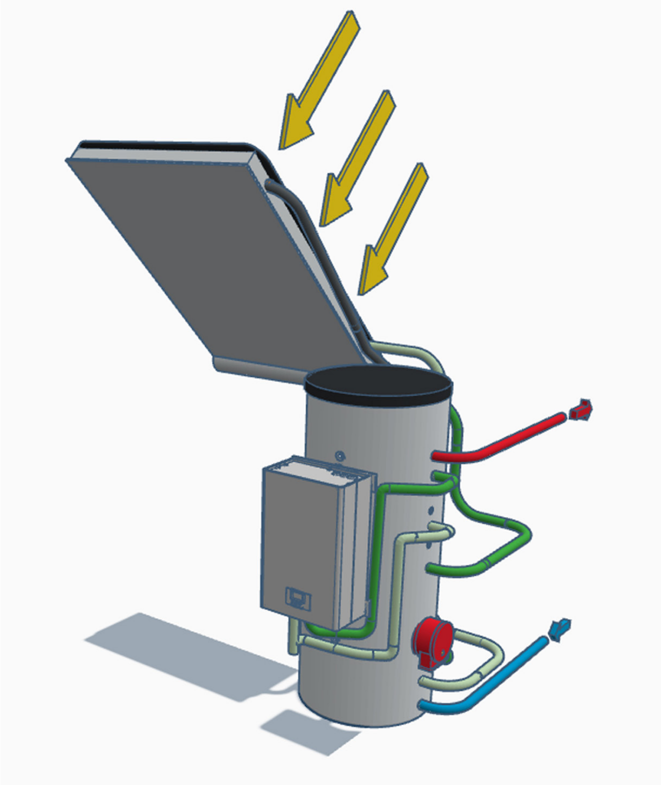
Solar thermal preheat for buildings with an existing gas connection which rely on large amounts of domestic hot water (DHW).

Solar thermal pre-heat is followed by gas water heating to ensure peak demands are met. This reduces demand on gas-fired water heating to conserve energy, reducing emissions and operational costs.

Solar Thermal And Electric Water Heating

Core System Elements:

- Flat plate collector
- Drain back module
- ATST twin coil stainless steel cylinder
- ARDENT electric boiler
- Optional backup electric immersion for added system resiliency



Solar thermal preheat with electrical water heating for new build and gas replacement projects which rely on large amounts of domestic hot water (DHW).

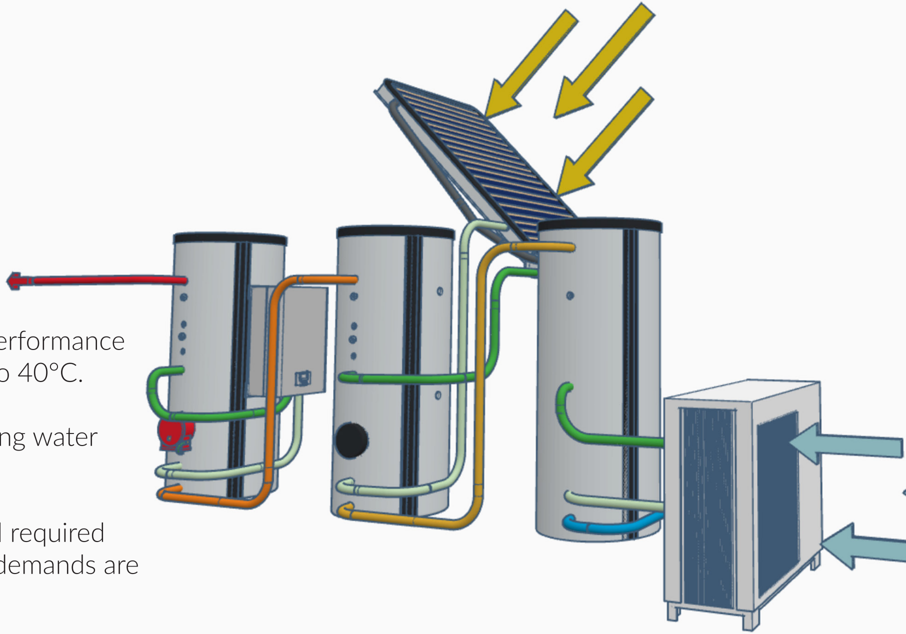
Solar thermal pre-heat with electrical water heating to maximise efficient hot water generation and meet peak demands.

Low carbon (in line with grid electrical supply) system and helps control operational costs associated with electric-only domestic hot water deamnds.

Solar Thermal, Airs Source Heat Pump and Electric Water Heating

Core System Elements:

- Flat Plate collector
- Drain back modules
- FPI-32 air source heat pump
- ATSH stainless steel cylinder
- ATSTI stainless steel sylinders
- ARDENT electric boiler
- Optional backup electric immersion for added system resilienc



The Air source heat pump's (ASHP) coefficient of performance (COP) is maximised by preheating the cold supply to 40°C.

Solar thermal provides a second-stage preheat raising water temperatures to at least 50°C.

The electrical water heater is used to meet the final required operational temperature of 65°C and ensure peak demands are addressed.

For new build and gas replacement projects with large DHW requirements seeking to maximise carbon reduction and lower operational costs.

Solar Thermal And Heat Pumps

Domestic hot water applications without gas can take advantage of low temperature Air Source Heat Pumps (ASHP) to generate preheat, which is then heated to the higher required system temperature by a direct electric immersion heater. This avoids gas connection charges but is more expensive to run with increased carbon emissions. This makes the addition of solar thermal eminently suitable for these systems if used correctly.

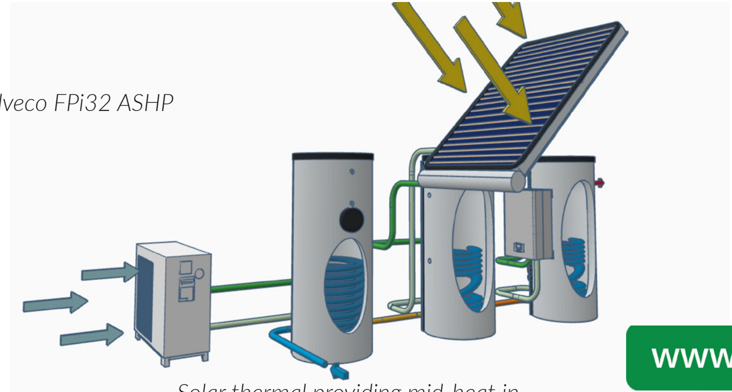
Solar thermal's optimal application is to supply preheat with coldest water possible to maximise the efficiency and output. This should provide maximum free heat with no carbon emissions. However, setting the solar system in front of the ASHP only helps to offset the heat pump, so savings are poor as the direct electric heater continues to consume electricity at a 1:1 rate at greater cost.

Solar thermal therefore needs to be offsetting the direct electric heater. To achieve this we locate solar thermal between the ASHP preheat and direct electric afterheat. By raising the incoming water temperature by 30°C with the ASHP the solar contribution is going to be reduced by 45% due to loss of collector efficiency. Despite this, the additional solar thermal offsetting outweighs the costs of direct electric heating and reduces the system's carbon.

This makes a real case for solar to be used to provide mid-heat for an ASHP and direct electric system.

This approach can also be applied to a mixed low and high temperature heat pump system, where solar thermal is inserted between the low-temperature and high-temperature heat pump stages for similar savings.

Adveco FPi32 ASHP



Solar thermal providing mid-heat in an ASHP/direct electic DHW System

Solar Thermal Flat Plate Collectors

As part of a commercial solar thermal application, Adveco large flat plate collectors are designed to help reduce energy demands, cutting carbon emissions and reducing operational costs associated with the provision of hot water.

The large, modular design supports a variety of roof and wall mounting options to meet the needs of both new build and refurbishment projects.

The collectors house a low-weight, high-performance copper meander absorber manufactured with high-quality ultrasonic welding that assures system longevity and free movement of solar fluid within the collector plate.

Solar thermal collectors are by far the most efficient way to heat water with solar energy. This means flat plate collectors offer a smaller footprint compared to equivalent solar photovoltaics (PV) for domestic hot water (DHW), making them a prime choice when roof or facade space is limited.

A typical 4 kW PV system requires approximately 16 panels covering 25m² of roof to match just three Adveco flat plate collectors covering just 6.6m² roof area.

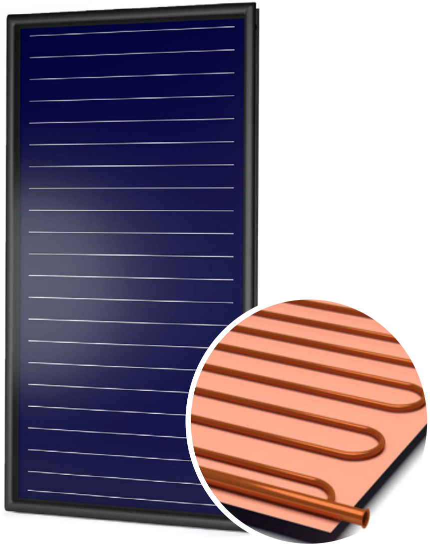
Adveco recommends its solar thermal collectors be supplied with an integrated drain back module to prevent the over-heating of solar fluid (glycol) within the flat plate collector to ensure system longevity.

This approach enables commercial buildings with high demands to deploy a large number of collectors with a small tank and still provide high-temperature water with the knowledge that in times of low use high-temperature build-up in collectors is impossible. This ensures the system remains protected.

This approach is also more cost-effective as there is no requirement for the installation of large solar storage, and more efficient as there is no call to dump unused heat.

For installations in densely urbanised areas, flat plate collectors and drain back operate with no noise for zero sound pollution.

Flat plate collector systems require no specialist registration, such as F-gas, although installers should be solar trained.



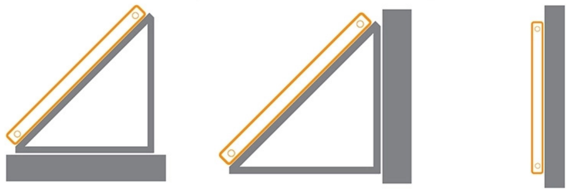
Installing Solar Thermal Collectors

Due to the modular concept of Adveco flat plate solar thermal collectors, applications can be introduced into a wide range of commercial buildings, no matter the form factor of the structure.

Whether roof-mounted, roof integrated or fixed on floor or wall consoles, fixing and connection are carried out with the same components, whatever the installation type. All mounting systems are prefabricated, meaning subsequent adjustments should not be required, accelerating installation timeframes when on site.

All mounting components are manufactured from high-quality materials for assured, long service life. Delivered complete in a single package including assembly materials, installation of single and multiple panel systems is made easy.

Mount on roof hook. Integrated into the roof. Mounted frame on roof hook.



Frame for flat roof. Wall mounted frame. Façade installation.

Drain Back

As with any technology, issues can arise if a commercial system is poorly designed or maintained. In terms of solar thermal systems, the results can vary from frustrating to catastrophic and can prove to be extremely costly.

By far the greater concern is stagnation of the solar fluid as a result of high-temperature build-up within the collectors when a system is not operating. solar thermal collectors or panels utilise the sun's energy to heat a water & glycol mix in the panel. This solar fluid is then pumped to a heat exchanger inside a water cylinder.

If a solar thermal system has no overheat protection the fluid can change to the consistency of tar. The 'tar' can rapidly develop as a film, and within a multiple collector system, it is likely that some of these will become blocked and will not be able to be cleared out causing permanent damage.

This results in very high repair costs. We have seen this issue develop in systems a matter of weeks after initial installation!

Overheat protection is therefore vitally important and will typically require the addition of a large solar storage or buffer vessels to dump unwanted heat to stop the system from stagnating. Together with the heat dump system starting in the middle of the day due to a short period of low demand, the Solar Thermal application could be extremely inefficient.

At Adveco, we are proponents of systems that offer drain back, which as the name implies drains the solar fluid from the collector to a reservoir when not in use, allowing for a system to be safely off.

A drain back vessel located in the plant room is one option, that will also allow for pipework fluid, but will require greater head pumps.

Adveco Drain Back module

Stagnant solar fluid in commissioning station filter

Designed For A Sustainable Future

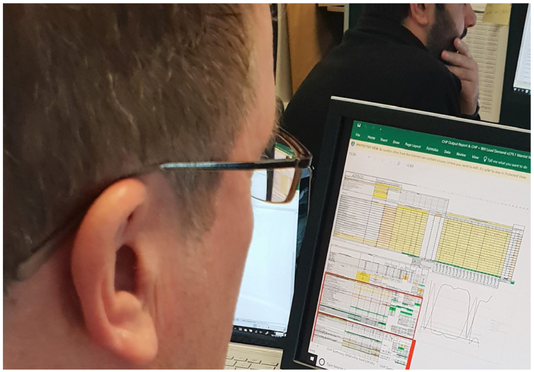
As with any water heating system, every application is unique and this demands a bespoke approach Especially when it comes to correctly sizing the solar thermal system, which will ensure the design is optimised for the application and will therefore operate efficiently.

First, a correctly sized system will consider the daily usage and peak demands. Its aim is to serve all peaks from storage, with the size of the peak determining the size of pre-heat. The recovery time for peaks is what ultimately determines number of collectors a building requires.

Second, the design process needs to size usage with available space. So, sizing considers whether the site is flat, pitched or vertical and the type of construction, its direction and shading. Length of pipe run is also important, if collectors are located a considerable distance from the plant the system's thermal losses could be significantly detrimental to efficient operation.

Together this enables calculation of the Solar Fraction - the total annual heat for hot water compared to total available from solar inputs.

Details of other energy heaters (gas or electric) that are to be used are then added to fully visualise the completed system.



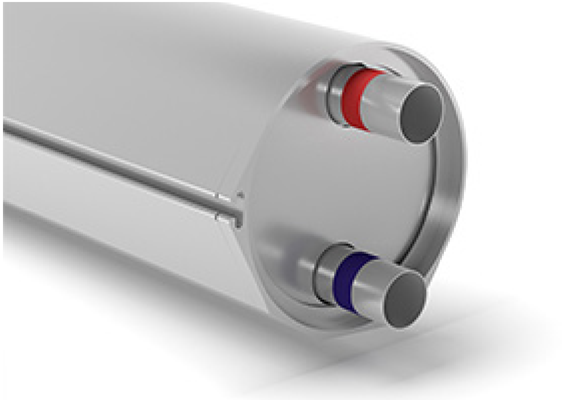
Solar Thermal Systems Element Specifications

Flat Plate Collectors

Technical Specifications	Units	FPC
Net Area	m^2	2.22
Gross Area	m^2	2.52
Temperature resistant (up to)	°C	200
Length	m	2.1
Width	m	1.2
Height	m	0.085
Operational Pressure	bar	6
Weight	kg	37

Drain Back Modules

Technical Specifications	Units	1190	2090
Length	m	1.19	2.09
Collector Field	m^2	5	10
Volume	l	7	13
Empty Weight	kg	6	10



FPi32 Air Source Heat Pump Range

Technical Specifications		Units	FPi32-6	FPi32-9	FPi32-12
Dimensions HxWxD		mm	734x1008x399	882x1165x399	
Power supply		V/Hz/Ph	230 / 50 / 1ph		
Starting current		A	Soft Start		
Run current		A	8	12	15
Refrigerant (R-32)		kg	0.9	1.4	1.8
Heating capacity min./max. (1)		kW	3.50/7.45	4.30/9.21	5.50/11.67
Heating capacity min./max. (2)		kW	3.15/6.80	3.90/8.68	4.90/11.25
Heating Power Input min./max. (1)		kW	7.58/14.10	92.7/20.97	11.07/26.83
Heating Power Input min./max. (2)		kW	9.43/17.32	11.62/25.50	14.01/32.63
COP (1)			4.51	4.48	4.35
COP (2)			3.44	3.46	3.45
Seasonal COP (SCOP)			4.74	4.73	4.71
Circuit maximum pressure		bar	42	42	42
Rated power water pump		W	87		
Noise level (outdoor)		dB(A)	52	53	52
Ambient operational temperature range	Heating	°C	-25 ~ 43	-25 ~ 43	-25 ~ 43
	Cooling	°C	20 ~ 55	20 ~ 55	20 ~ 55

(1) Heating condition: Water in/out temperature 30°C/35°C. Ambient temperature DB/WB 7/6°C.
(2) Heating condition: Water in/out temperature 40°C/45°C. Ambient temperature DB/WB 7/6°C.

ATSI Hot Water Cylinder

ATSI Range Specifications

Description		200	300	400
Volume (l)		212	289	411
Energy efficiency class		B	B	C
Standing losses	W	58	66	85
	kWh/24h	1.39	1.58	2.04
Dry mass (kg)		79	96	128
Lower coil surface area (m^2)		1.8	2.6	3.8
Output capacity (80/60:10/60) (kW)		38.3	55.3	80.8
DHW flow rate (80/60:10/60) (l/h)		657.2	948.9	1386.5
DHW peak half hour flow (l)		443	627	907
DHW peak hour flow (l)		776	1107	1609
DHW peak two hour flow (l)		1429	2050	2986

ATSI Range Dimensions

Description	200	300	400
Height including insulation (mm)	1490	1740	1735
Outer diameter Including insulation (mm)	Ø700	Ø700	Ø800
Inner diameter (mm)	Ø500	Ø500	Ø600
Cold water inlet (mm)	70	70	70
Hot water outlet (mm)	1145	1395	1420
Flow from heat source (mm)	585	775	830
Return to heat source (mm)	195	195	215
Secondary return (mm)	880	1180	1150
Flange centre point (mm)	800	975	1035

ATST Hot Water Cylinder

ATST Range Specifications

Description		300	400	500
Volume (l)		289	411	490
Energy efficiency class		B	C	C
Standing losses	W	66	85	98
	kWh/24h	1.58	2.04	2.35
Dry mass (kg)		96	128	139
Lower coil surface area (m^2)		2.6	3.8	4.0
Output capacity (80/60:10/60) (kW)		55.3	80.8	85.1
DHW flow rate (80/60:10/60) (l/h)		948.9	1386.5	1460.3
DHW peak half hour flow (l)		627	907	1000
DHW peak hour flow (l)		1107	1609	1740
DHW peak two hour flow (l)		2050	2986	3191

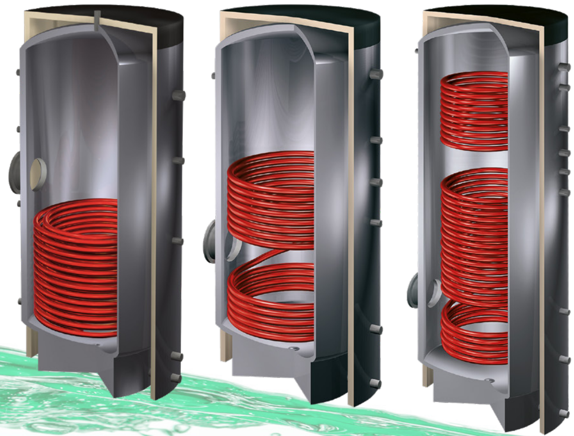
ATST Range Dimensions

Description	300	400	500
Height including insulation (mm)	1740	1735	1985
Outer diameter Including insulation (mm)	Ø700	Ø800	Ø800
Inner diameter (mm)	Ø500	Ø600	Ø600
Cold water inlet (mm)	70	70	70
Hot water outlet (mm)	1395	1420	1670
Flow from heat source (mm)	775	830	885
Return to heat source (mm)	195	215	215
Secondary return (mm)	1180	1150	1400
Flange centre point (mm)	975	1035	1090

ATSH Hot Water Cylinder

Description		300	400	500
Volume (l)		289	411	490
Energy efficiency class		B	C	C
Standing losses	W	66	85	98
	kWh/24h	1.58	2.04	2.35
Dry mass (kg)		96	128	139
Lower coil surface area (m²)		2.6	3.8	4.0
Output capacity (80/60:10/60) (kW)		55.3	80.8	85.1
DHW flow rate (80/60:10/60) (l/h)		948.9	1386.5	1460.3
DHW peak half hour flow (l)		627	907	1000
DHW peak hour flow (l)		1107	1609	1740
DHW peak two hour flow (l)		2050	2986	3191

Description	300	400	500
Height including insulation	1740	1735	1985
Outer diameter Including insualtion	Ø700	Ø800	Ø800
Inner diameter	Ø500	Ø600	Ø600
Cold water inlet	70	70	70
Hot water outlet	1395	1420	1670
Flow from heat source	775	830	885
Return to heat source	195	215	215
Secondary return	1180	1150	1400
Sensor pocket	285	310	310
Sensor pocket	815	895	950
Sensor pocket	1240	1200	1490
Sensor pocket	1415	1440	1690
Flange centre point	975	1035	1090



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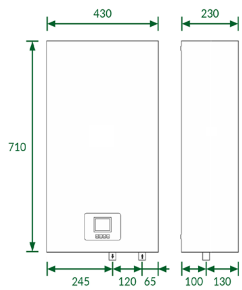
FUSION Electric Water Heaters / ARDENT Electric Boiler

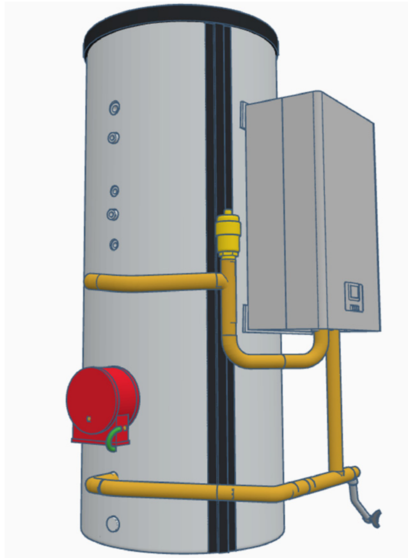
Ardent Premium Technical Specifications	P9	P12	P24
Heat output range (kW)	9.0	12.0	24.3
Element configuration	6 × 1.5	6 × 2.0	9 × 2.7
Power supply (V_{AC} / Phases / Hz)	240 / 1 phase / 50	400 / 3 phase / 50	
Fuse requirement (A)	20	25	40
Inlet and outlet connections (inch)	G 3/4"	G 3/4"	G 3/4"
Boiler water content (l)	12.5	12.5	12.5
Expansion vessel water content (l)	7.0	7.0	7.0
Maximum operating temperature	80	80	80
Operating pressure range (bar)	0.8 – 2.2	0.8 – 2.2	0.8 – 2.2
Energy efficiency class	D	D	D
Housing protection	IP40	IP40	IP40
Dimensions H × W × D (mm)	700 × 430 × 230	700 × 430 × 230	700 × 430 × 230
Dry mass (kg)	25	25	25



Ardent Plus: P9–P24

FUSION-E / FUSION-Eplus Specifications

FUSION Variant	Cylinder Model	Electric Boiler Model	Backup Immersion	Controls
FE 200-9	ATSI 200 (200L)	Ardent P9 (9 kW)	N/A	Thermostat/ Overheat
FE 200-12	ATSI 200 (200L)	Ardent P12 (12 kW)	N/A	Thermostat/ Overheat
FE 200-24	ATSI 200 (200L)	Ardent P24 (24 kW)	N/A	Thermostat/ Overheat
FE 300-9	ATSI 300 (300L)	Ardent P9 (9 kW)	N/A	Thermostat/ Overheat
FE 300-12	ATSI 300 (300L)	Ardent P12 (12 kW)	N/A	Thermostat/ Overheat
FE 300-24	ATSI 300 (300L)	Ardent P24 (24 kW)	N/A	Thermostat/ Overheat
FE 400-9	ATSI 400 (400L)	Ardent P9 (9 kW)	N/A	Thermostat/ Overheat
FE 400-12	ATSI 400 (400L)	Ardent P12 (12 kW)	N/A	Thermostat/ Overheat
FE 400-24	ATSI 400 (400L)	Ardent P24 (24 kW)	N/A	Thermostat/ Overheat
FEplus 200-9	ATSI 200 (200L)	Ardent P9 (9 kW)	6 kW	FUSION Control Box /GSM
FEplus 200-12	ATSI 200 (200L)	Ardent P12 (12 kW)	6 kW	FUSION Control Box /GSM
FEplus 200-24	ATSI 200 (200L)	Ardent P24 (24 kW)	12 kW	FUSION Control Box /GSM
FEplus 300-9	ATSI 300 (300L)	Ardent P9 (9 kW)	6 kW	FUSION Control Box /GSM
FEplus 300-12	ATSI 300 (300L)	Ardent P12 (12 kW)	6 kW	FUSION Control Box /GSM
FEplus 300-24	ATSI 300 (300L)	Ardent P24 (24 kW)	12 kW	FUSION Control Box /GSM
FEplus 400-9	ATSI 400 (400L)	Ardent P9 (9 kW)	6 kW	FUSION Control Box /GSM
FEplus 400-12	ATSI 400 (400L)	Ardent P12 (12 kW)	6 kW	FUSION Control Box /GSM
FEplus 400-24	ATSI 400 (400L)	Ardent P24 (24 kW)	12 kW	FUSION Control Box /GSM



FUSION Eplus

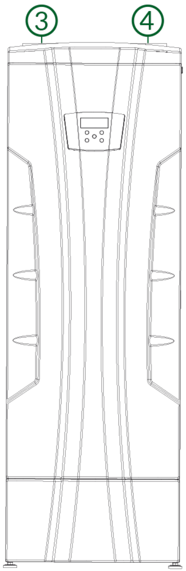
ADplus Condensing Gas Water Heater Specifications

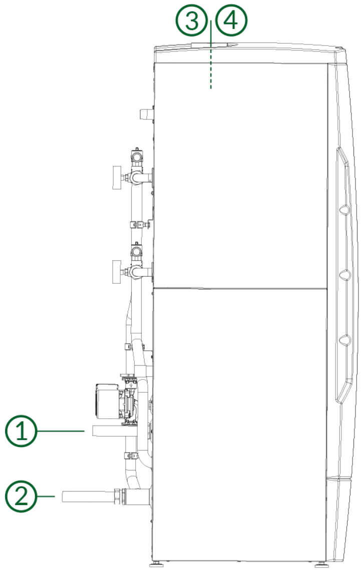
		Units	ADplus70	ADplus115	ADplus140
Gross heat input range	Maximum Minimum	kW	77.6 16.3	128.3 13.3	155.4 16.3
Heat output range	Maximum Minimum	kW	74.0 15.6	121.7 12.8	148.0 15.6
Maximum efficiency (net)	At max. output At min. output	%	105.1 106.3	105.0 106.6	105.1 106.3
DHW Recovery (ΔT 50°C)		l/h	1270	2102	2534
DHW 10-minute peak		l	331	470	543
Gas flow rate	Natural gas LPG	m^3/h kg/h	7.39 5.43	12.22 8.97	14.80 10.87
Heat exchanger water capacity		l	5.7	9.2	11.4
DHW temperature Range		°C	20 - 80	20 - 80	20 - 80
System pressure range		bar	1 - 11	1 - 11	1 - 11
Supply		V / Hz	230 / 50	230 / 50	230 / 50
Electrical consumption	Maximum Minimum	W	472 60	542 60	622 60
CO emissions (0% O_2 with natural gas)		ppm	19	19	19
NO_x emissions (0% O_2 with natural gas)		mg/kWh GCV	27	28	27
Approved flue types			B23	B23	B23
Flue gas mass flow rate	Maximum Minimum	kg/h	115 25	190 20	230 25
Flue gas temperature at outlet	Maximum Minimum	°C	80 30	80 30	80 30
Sound power level (LWA)		dB	66	70	70
Maximum water hardness		ppm	150	150	150
Appliance mass	Empty Full	kg	180 312	218 350	218 350

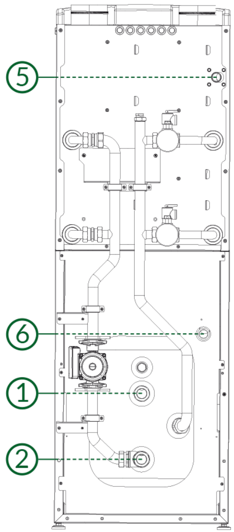
Connections & Dimensions

Connections

Model	DHW Supply (1)	Cold Water Inlet (2)	Air Intake (3)	Flue Gas Outlet Exhaust (4)	Gas Inlet (5)	Condensate Drain (6)
ADplus70	1 ½"	1 ½"	Ø110 mm	Ø110 mm	1"	Ø28 mm
ADplus115	1 ½"	1 ½"	Ø110 mm	Ø110 mm	1"	Ø28 mm
ADplus140	1 ½"	1 ½"	Ø110 mm	Ø110 mm	1 "	Ø28 mm







Dimensions

Model	H x W x D (mm)
ADplus70	1815 x 600 x 706
ADplus115	1815 x 600 x 706
ADplus140	1815 x 600 x 706

Note fittings and flanges are not factory assembled

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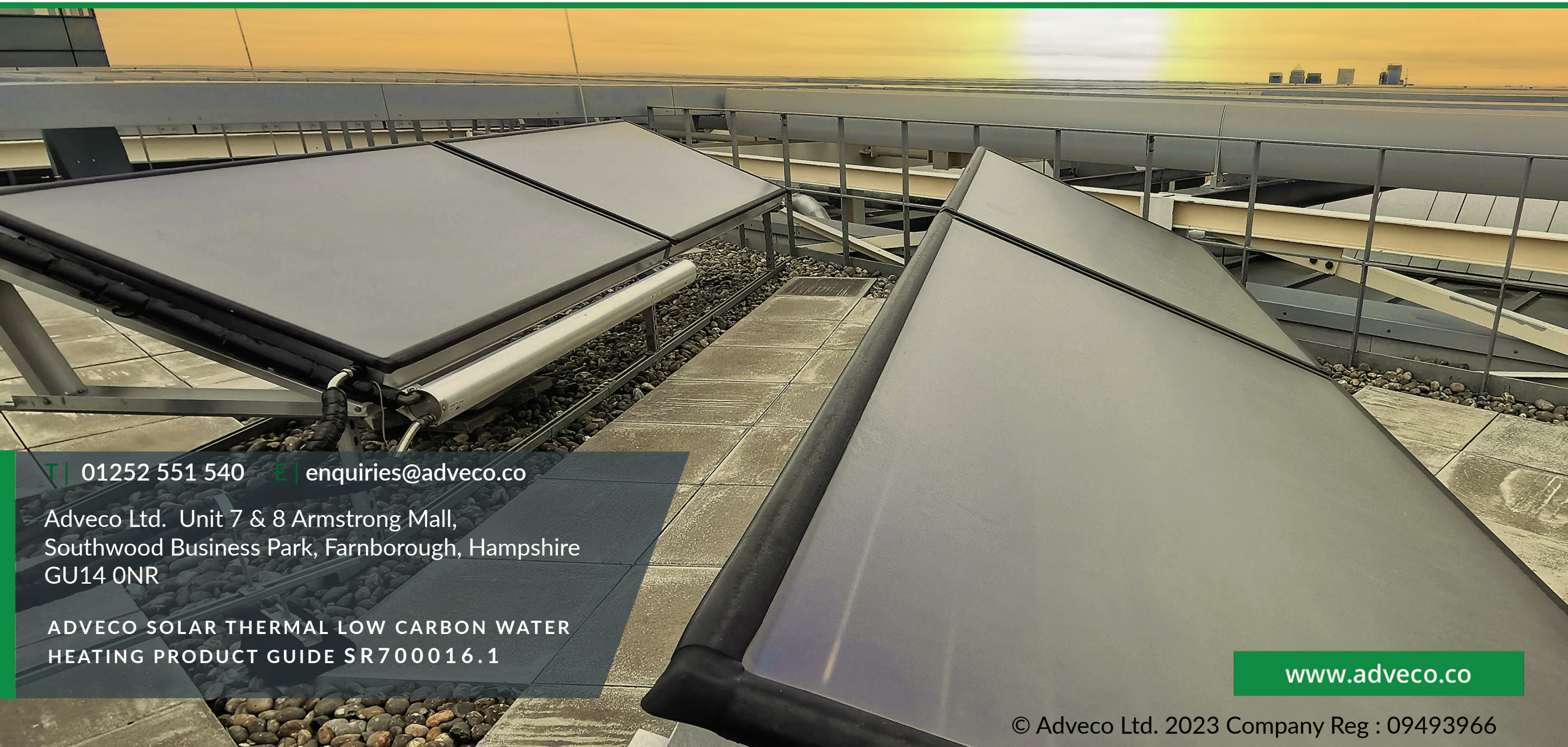

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