GRANT SOLAR SOLUTIONS

Solar thermal water heating and Solar PV power systems

GRANT UK

EFFICIENT HEATING SOLUTIONS

FEATURES:

Grant Solar Thermal Systems

Grant Solar PV Systems

Grant CombiSOL

Grant WinterSOL

Grant Solar Design Service

Grant **Profile**

The Company

With an established history of over 30 years designing, manufacturing and supplying a wide range of highly efficient and reliable heating products, Grant has become a firm favourite for many householders and engineers, when choosing a new or replacement heating system. From the award winning Vortex range of oil-fired condensing boilers to the latest Solar products, Grant has focused on providing cost effective solutions to the problem of rising energy costs.

Quality design

Despite the sophisticated technology employed in the development of new products, Grant's design engineers have kept true to the original concept of simplicity in installation and maintenance, which are essential ingredients of today's heating systems.

Grant products are manufactured from the highest quality materials and designed not just to meet, but to exceed all relevant performance and environmental standards. Backed by highly efficient administration and Grant's comprehensive warranty schemes, the Company is also focused on providing an exceptional after-sales service for all of its customers.

Technology for the future

The Company has achieved an enviable reputation within the heating industry for its high-efficiency approach to new concepts.

Grant is aware that although most domestic houses will continue to be heated by gas, oil or electricity well into the future, there is a growing awareness that we all need to do more to reduce our dependency on fossil fuels. With this in mind the Company has, over recent years, been involved in the development of a range of renewable heating products.

Rest assured

When you order from any of Grant's stockists you can feel secure in the knowledge that you are purchasing the best quality and most reliable product from a long established independent heating specialist. Our policy has always been, and always will be, total commitment to the environment we live in and the customers we serve.

Grant **Solar** Technology

Making a difference

Renewable energy has a key role to play in reducing CO_2 emissions and, in particular, the installation of solar technology is an effective way of reducing a building's carbon footprint. Solar technology is great for the environment, as it has no emissions and is assured for the next 4 billion years! It might also be worth noting that incorporating solar into a property is likely to increase its value. If you look at it in another way, houses with solar are only marginally affected by increasing fuel prices, therefore making them an extremely attractive option to potential buyers. Grant have two unique solar heating solutions.

Solar Thermal

Solar Thermal is a clean and highly efficient means of using renewable energy from the sun to provide the hot water used in the home. The basic principle is easy to understand. If you unroll a garden hose on the ground and leave it exposed to the radiant heat of the sun, in a short time the water in the hose will become warm.

Solar thermal collectors work in very much the same way, only more efficiently. Usually, but not exclusively, roof-mounted solar collectors will be connected to one of the coils of a twin-coil cylinder using a sealed circuit containing a special glycol/water solution. This fluid not only withstands the high temperatures in excess of 200°C on a summer day, but also will not freeze in temperatures down to –25°C. The pump in the system circulates the heated fluid from the panel to the cylinder where the heat is transferred to the stored water through the lower coil.

Solar Photovoltaic

Solar Photovoltaic collectors (or Solar PV as it is commonly known) utilise free energy from the sun to generate electricity. The installation of Solar PV will not only supplement a dwelling's electricity supply but will also satisfy current Building Regulations by providing at least 10% renewable energy. Solar PV collectors rely on daylight (rather than radiation) to generate power through the use of photovoltaic cells within the collectors.

Solar PV collectors are simple to install as they are fixed to a roof in the same way as solar thermal collectors but instead of pipework, cables are used. The cables are connected to an inverter which converts the DC electricity produced to AC electricity (AC electricity comes from The National Grid) which is either consumed by the household or sold back to the national grid. By combining Solar PV and Solar Thermal up to 25% of an average dwellings energy requirements can be met.

The benefits of Grant Solar

Installing a Grant Solar System has many advantages. Apart from reducing the amount of fossil fuels used, and the resultant savings in annual fuel bills, the reduction in harmful emissions will help minimise the long-term effects on the Earth's climate.

All components within the Grant Solar Range are regularly tested under simulated real conditions to ensure customers receive a product of the highest quality and reliability. Grant Solar collectors incorporate self-cleaning glass and can be installed on sloping roofs using either an on-roof or in-roof mounting system and also on flat roofs if required.

Contents

Grant **Solar Thermal** Overview

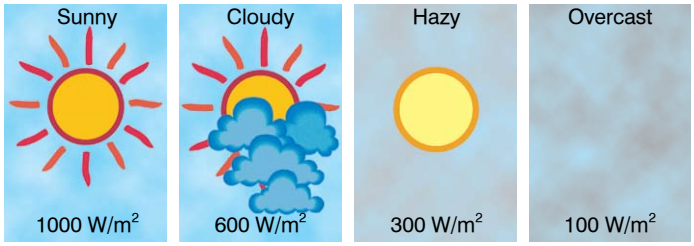
Introduction

The Grant Solar Thermal Range encompasses many unique components, including: two alternative styles of flat plate collector, 'Sahara' and 'Aurora', multifunctional controllers with LCD displays, various mounting arrangements, including In-Roof, On-Roof and Flat-Roof options, and the unique Grant CombiSOL, which integrates Solar Thermal with combination boilers.

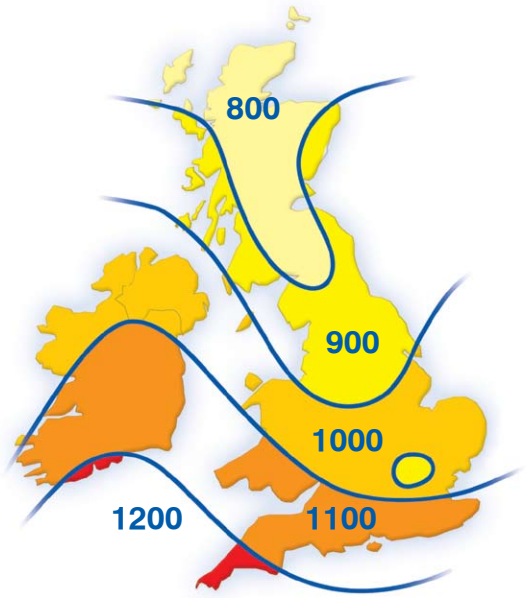
Free energy!

Many people believe that solar panels only work in the summer, however this type of free energy is available throughout the year. From May to September Grant Solar can produce 100% of the energy required for heating your domestic water (see right). Both the Grant Aurora and Sahara collectors operate not just with direct sunlight, but also diffused sunlight, so they even work on cloudy days.

On average Grant Solar can provide up to 70% of your hot water needs per year, for free!



Solar radiation in the UK and Ireland



The diagram above shows the total average solar radiation falling on 1m² surface, inclined at 30° to the horizontal, measured in kilowatt-hours. The average property requires approximately 3,000 kWh per year for domestic water heating.

Technical specifications

Collector

Dimensions (L x W x D)	2039 x 1139 x 80	mm
Collector gross area	2.32	m²
Weight	44.4	kg
Degree of efficiency no	76.1	%
Heat loss U-coefficiency K1/K2	3.94/0/0112	W/m²K
Heat Capacity	1.7	kW
Stagnation Temperature	209	°C
Maximum Operating pressure	6	bar
Fluid Content	1.2	litre

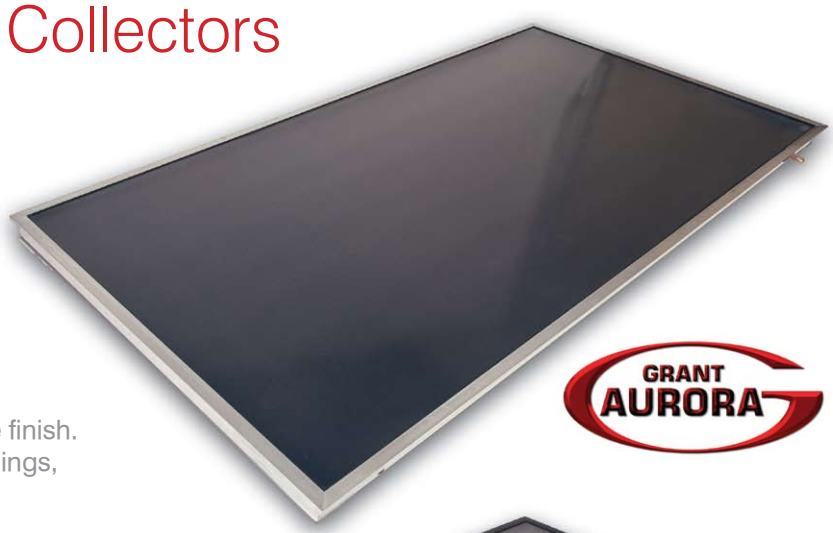
Absorber

Absorption	95	%
Emission	5.0	%
Absorber net area	2.14	m²
Material/coating	Copper/Sunselect	-
Minimum Efficiency	525	kWh/m²a

Grant **Solar Thermal** Collectors

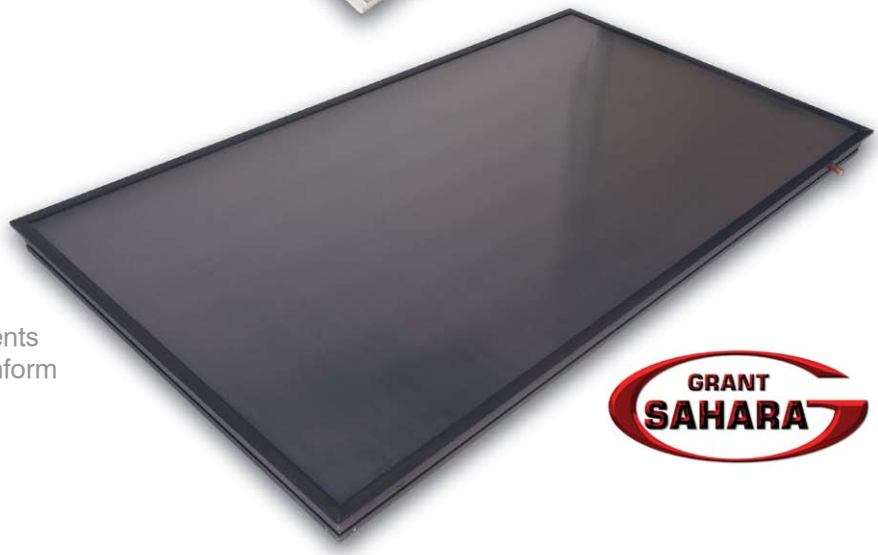
AURORA Overview

The Aurora Collector has a slender, extremely durable aluminium frame with a high quality silver anodised finish. This contemporary look is a stylish feature to accentuate your property and looks great when used on dark roofs like slate.



SAHARA Overview

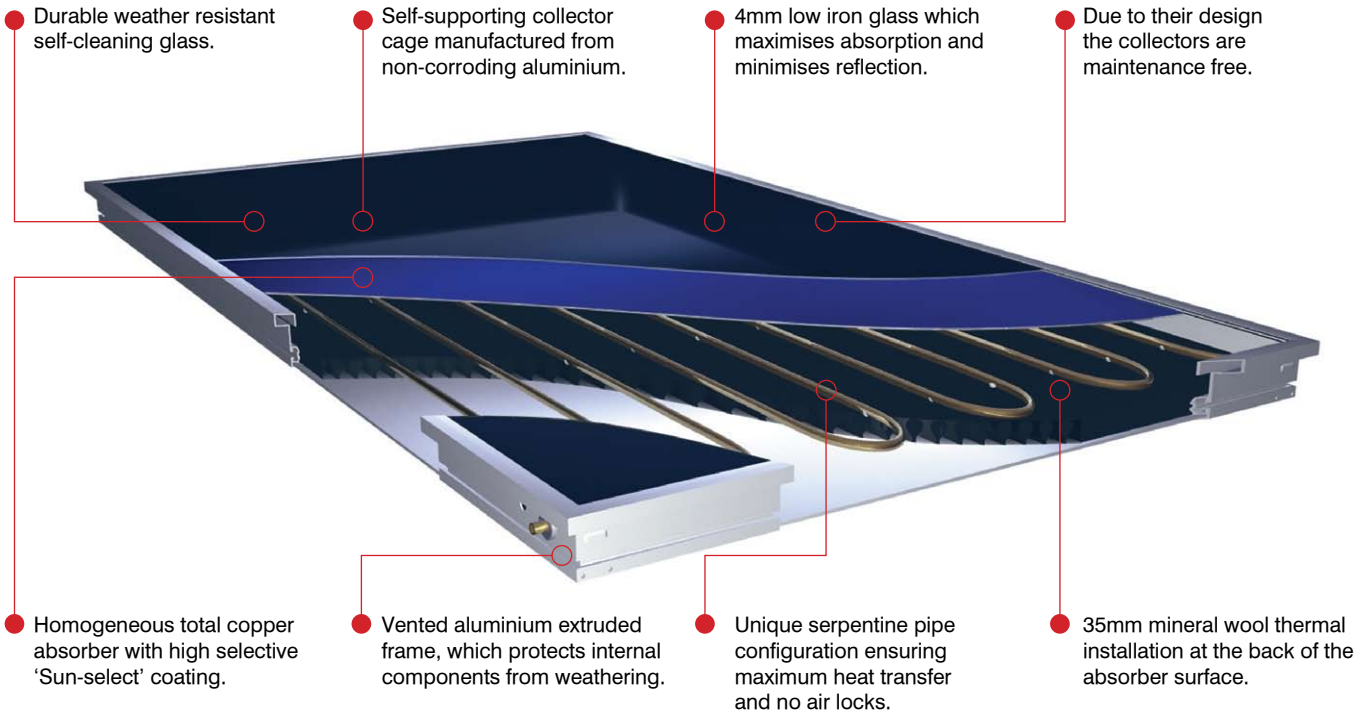
The Sahara Collector also has a slender, extremely durable aluminium frame, but with a tasteful bronze finish. This blends with most roof types on domestic dwellings, thus making for an aesthetically pleasing solution.



Proven Reliability

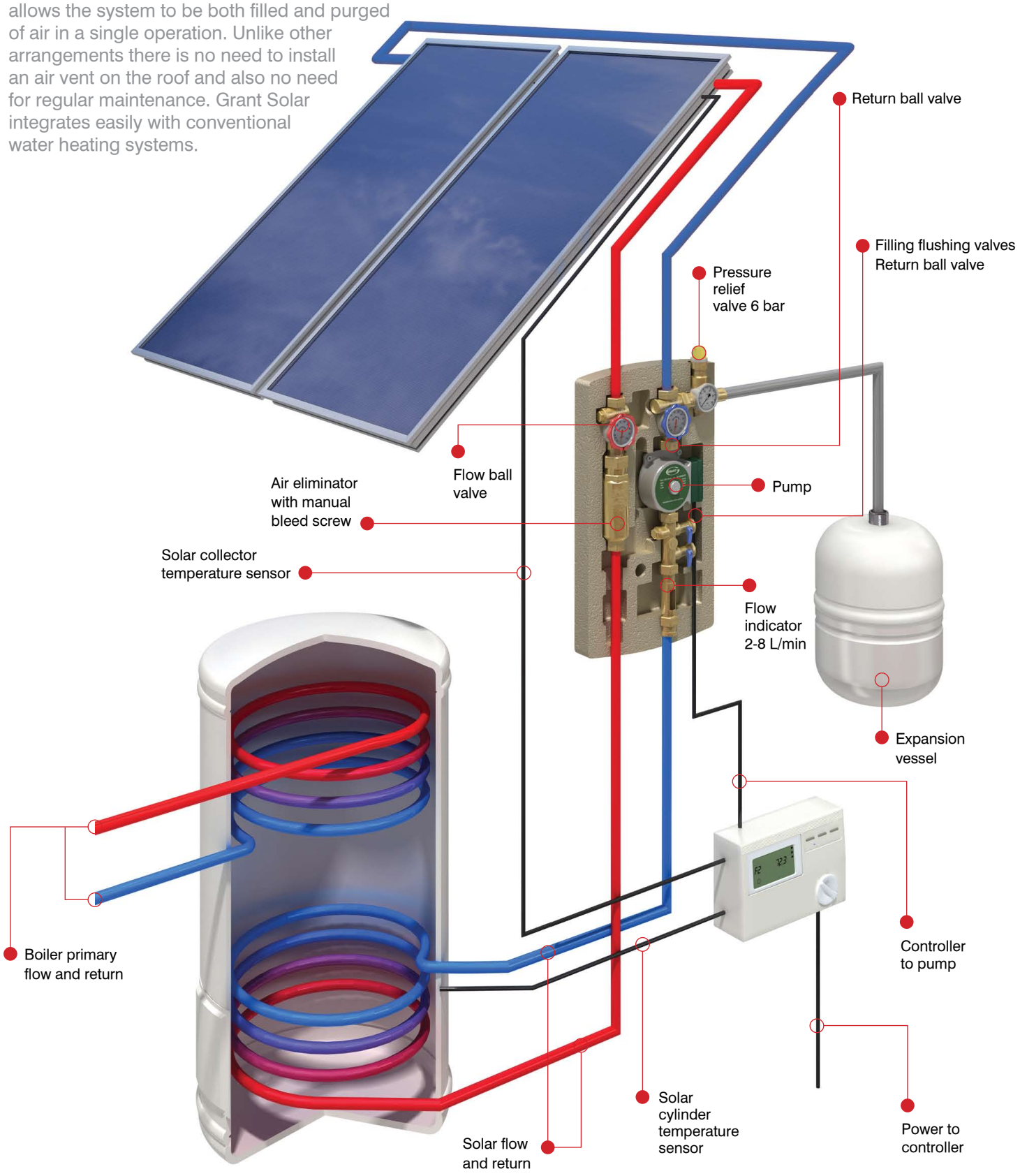
During the manufacturing process, the use of premium materials guarantees the collectors' reliability and durability. Independent assessments verify that the panels and their components conform to the most stern European quality standards.

Design



Grant **Solar Thermal** System

Grant Solar Thermal has unique installation features. The Solar Pump Station incorporates an air eliminator that allows the system to be both filled and purged of air in a single operation. Unlike other arrangements there is no need to install an air vent on the roof and also no need for regular maintenance. Grant Solar integrates easily with conventional water heating systems.



Grant **Solar Thermal** Design

Ease of ordering

To make life as straight forward as possible, Grant have introduced a series of individually numbered kits that meet most installation requirements. These simply consist of either Aurora or Sahara collectors, a roof mounting system, expansion vessel, pump station, control panel, pipe connections and solar fluid - all of which can be installed in approximately two or three days.

Designing your system

Grant Solar Collectors have a total area of 2.32m². As a rule of thumb, when sizing a system, you should allow 1.0-1.3m² of collector area, per person.

Cylinder requirements are 50-60 litres capacity per m² of collector area. To simplify this, for a 2-Collector system of 4.64m², you would require a cylinder of approximately 200 litres. This would be sufficient for 4 people and satisfy up to 70% of your hot water demand per annum.

Things to consider:

- Location of building
- Orientation of building
- Angle of Inclination (roof)
- % of Solar Contribution
- Hot water requirements
- Volume of system
- Shade
- Collector array in m²
- Size of cylinder
- Pipework requirements

How to calculate the number of collectors required

Direction of roof	Solar Radiation (see map on page 4) kWh/Year	Number of people per household <3	4	5	6
South	900 - 1000	2	2	2	3
	1000 - 1100	2	2	2	2
	1100 - 1200	2	2	2	2
South West / South East	900 - 1000	2	2	3	3
	1000 - 1100	2	2	2	3
	1100 - 1200	2	2	2	2
West	900 - 1000	2	3	3	4
	1000 - 1100	2	2	3	3
	1100 - 1200	2	2	2	3
East	900 - 1000	2	3	3	4
	1000 - 1100	2	3	3	3
	1100 - 1200	2	2	2	3

Grant **Solar Thermal** Components

Solar Controllers

The Grant GSD1 and SDC306 Differential Solar Controllers automatically manage the operation of the Solar Thermal System. Monitoring the temperature in both collector and cylinder, they operate the circulating pump only when the difference in temperature will provide efficient heating of the hot water. They will also stop the circulating pump if the temperature in the collector exceeds the maximum set or, if the cylinder has reached the required temperature.

The Grant GSD1 controller is used where the collectors are located on the same side of a roof - such as with a South facing installation, whereas the Grant SDC306 is used where the collectors are located on either side of a roof - such as with an East/ West facing installation.

Both solar controllers monitor and display the amount of solar power produced by the system on a daily and cumulative basis. Amongst other features the SDC306 controller can display the collector and cylinder temperatures and also incorporates a pump kick facility which activates the pump for a short period each day to prevent the possibility of seizure if not operated for more than 24 hours.

Solar Pump Station

The Grant Solar Pump Station houses the 3-speed circulating pump, along with all other control components, in an insulated expanded polypropylene foam enclosure designed for vertical wall mounting.

The flow and return ball valves incorporate temperature gauges to monitor return and flow temperatures and have integral anti-gravity brakes to prevent gravity circulation around the circuit when the pump is stopped.

The air eliminator with manual bleed screw allows for rapid air removal from the sealed system. The 6 bar pressure relief valve is mounted on a manifold with the system pressure gauge and expansion vessel connection.

Filling and flushing of the system is made easy by the combined fill and flush valve assembly and the adjustment of fluid flow rate is simple using the integral flow indicator.

Expansion vessel

The 18 litre expansion vessel, connected to the Solar Pump Station by a flexible hose, incorporates a special membrane selected to withstand the higher temperatures found in solar thermal systems.

Solar Fluid

The Grant Solar Fluid is an odour-free, non-toxic 40/60 glycol/water solution, developed specifically for Solar Thermal applications to protect systems from freezing. The nitrate, phosphate and ammonia free fluid has been formulated to remain stable over long periods of time and is also a good corrosion inhibitor. It is available ready mixed in 10 or 20 litre packs.

Grant **CombiSOL**

Integrating Renewable Technology with combi boilers

With solar thermal systems increasing in popularity in the UK and many new and existing heating installations involving mains pressure combination boilers, a simple, cost effective solution to integrate these two technologies is a must. The Grant CombiSOL is designed to do just that, and is uniquely compatible with most combi boilers and fuel types.

It works by accurately controling the outlet temperature of stored secondary hot water produced by a solar thermal system, directing the flow either straight to the hot water outlet, or via the combi boiler to the same outlet with a seamless changeover. There are additionally minimal temperature fluctuations at the taps.

Compatibility

The Grant CombiSOL also accurately regulates the inlet water temperature to the combination boiler, therefore installing this unit with any combi boiler should not pose a problem, as the mixed water into the appliance is limited to a maximum of 24°C.

Technical Information

The unique thermostatic change-over valves provide a safe and simple solution for adding renewable energies to the home without having the added expense of changing your central heating appliance.

It is important to ensure that the combination boiler can accept an incoming cold mains water temperature of up to 24°C. If in doubt, contact the boiler manufacturer. Grant's extensive research and development programme has refined the use of each valve (marked clearly on the white cap) to give optimum control of hot water delivery to your taps.

Grant **WinterSOL**

Providing a fully heated cylinder in times of low solar gain

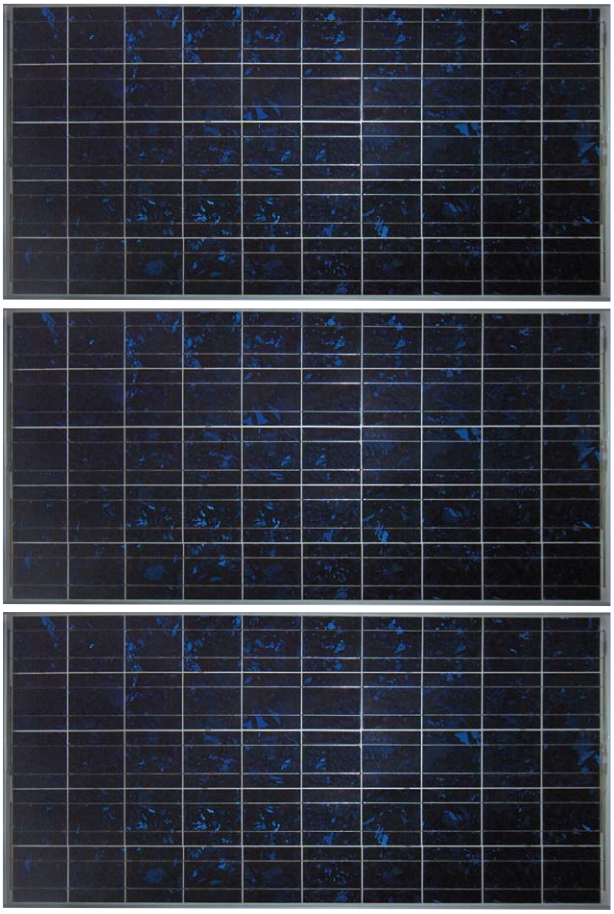
The Grant WinterSOL has been designed to provide homeowners with a fully heated cylinder of hot water during times when there may not be sufficient solar (or heat pump) gain, therefore ensuring hot water demand is satisfied.

How it works

During the winter months, for example, 150 litres of hot water from a 300 litre cylinder may be insufficient. By fitting the Grant WinterSOL, a simple summer/winter switch can be operated by the customer, allowing the central heating boiler to heat the full contents of the cylinder. When solar gain is restored, the switch is set back to summer mode for maximum efficiency. This unit does not directly prevent solar thermal or heat pump systems from operating as it only energised during the customers normal programmed hot water period.

Note: Like all components fitted to potable water, there is a risk of limescale contamination in hard water areas. Precautions should be taken to prevent limescale build up in this valve set. Failure as a result of limescale is not covered by the guarantee.

Grant **Solar PV** Overview



Introduction

Grant Solar PV utilises free energy from the sun to generate electricity. It relies on daylight (rather than radiation) to generate power through the use of photovoltaic cells within roof-mounted collectors (modules). The collectors are simple to install, as they fix to a roof in the same way as Grant Solar Thermal panels in an on-roof, in-roof and flat roof arrangement, both landscape and portrait.

The electricity produced by Grant Solar PV can be used to drive any appliance that is powered by electricity. An inverter (usually situated in the loft) converts the DC current into usable AC current that can be used as power.

A 2.88kW Grant Solar PV System (approximately 16 panels) should produce around 3,285kWh of electricity per annum. To put this into perspective, the average household usage is 6kWh per day, and 2.88kWh should run the lighting in the household using low energy light bulbs for approximately one week.

Typical energy usage

Everyone consumes energy, but sometimes it is hard to know just how much power is really being used. A good way to understand is to look at kilowatts in a different way, like everyday human activities.

A kWh of electricity means:

- 1200 electric shaves
- Drying your hair 15 times
- Listening to 15 CD's
- Using a small refrigerator for 24 hours
- Microwaving 20 meals
- 4 evenings of light with 60W incandescent lamps

Also, keep in mind that for each kWh produced with fossil fuel, about 1.5lb (0.68kg) of CO_2 is released into the atmosphere and that the average person uses around 600-800 kWh of energy every month.

How 'green' is Grant Solar PV?

Grant Solar power is a renewable energy source that does not require the burning of fossil fuels and does not leave a carbon footprint as it generates no carbon dioxide.

It makes no noise, emits no pollutants, creates no waste and uses no fuel, thus meaning it is a VERY green energy supply.

Location of collectors

The location of PV collectors is vitally important. They must receive the maximum amount of daylight possible, so it is not advisable to install them in situations where surrounding buildings or trees may cast shadows.

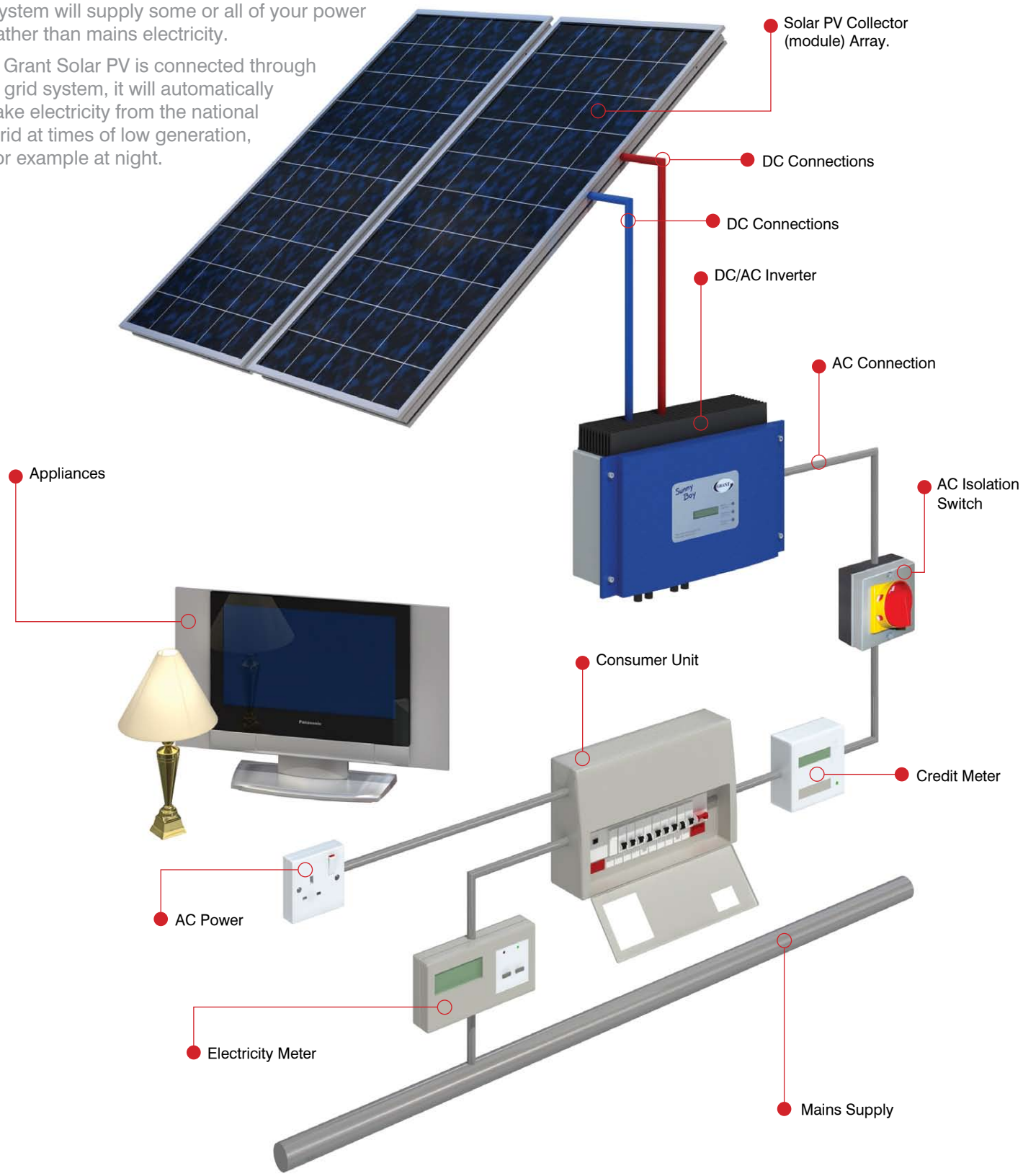
The best location for a PV solar collector is on a south-facing roof or side of a building.

Grant **Solar PV** System

Electricity requirements vary depending on the size of your house and how energy-efficient the building and appliances are. With a Grant Solar PV system you will be able to reduce electricity bills because the system will supply some or all of your power rather than mains electricity.

If Grant Solar PV is connected through a grid system, it will automatically take electricity from the national grid at times of low generation, for example at night.

There is no need to manually switch the system, this will be done instantly.



Grant **Solar PV** Design

To the highest standard

The Grant Solar PV collectors are distinguished by polycrystalline solar cells with a cell efficiency of up to 15% for high yields per square metre of module area. The output tolerance of the collector is +5/-0 %, only modules of the highest quality provide this level of reliability. The rated output is always achieved or exceeded.

The collectors have two connection boxes on the back of each module. A bypass diode bridge for each connection box prevents the individual solar cells from overheating (hot spot effect). This ensures the reliable operation of the collectors and inverter.

The collector frame is made from torsion-proof, anodised aluminium and meets the highest requirements in terms of stability and corrosion resistance.

Technical specifications

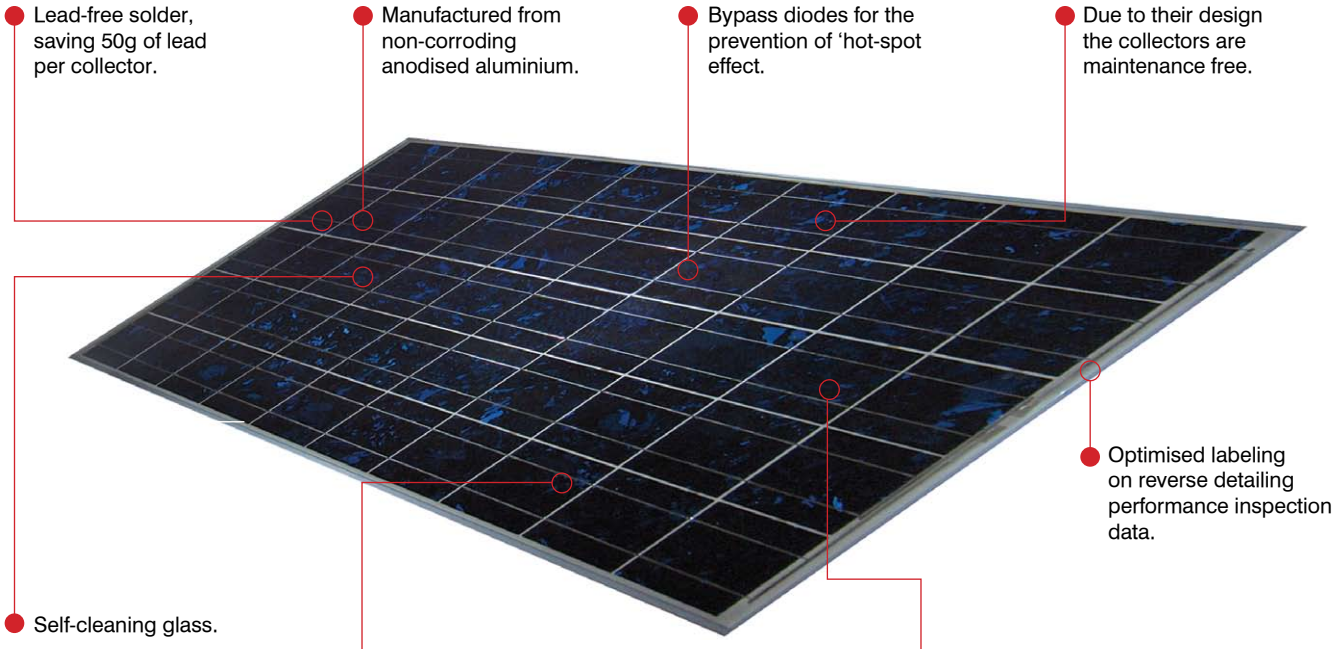
Mechanical Key Data

Outer dimensions (L x W x H)	1658mm x 834mm x 45mm
Design of aluminum frame	Anodised, silver
Front glass (TSG)	Toughened safety glass
Weight	18.5 kg
Height of connection box	11.5 mm
Connection system / cross section of solar cable	Multi contact type 4 / 4 mm^2
Lengths: positive cable / negative cable	125 cm ± 5 cm / 80 cm ± 5 cm
Packing unit	2 modules

Qualifications, Guarantees and Certificates

Suitability to type / type approval	IEC 61215 / EN 61215
Electrical classification	Protection Class II (Part P)
Product guarantee	5 years
Performance guarantee to 90% $P_{mpp\ min}$	12 years
Performance guarantee to 80% $P_{mpp\ min}$	25 years

Design



Grant **Solar PV** Components

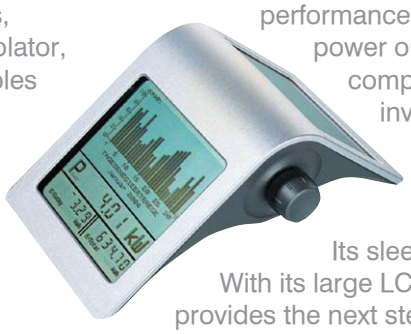
Grant Solar PV Kits

Grant Solar PV is available as standard On-Roof kits comprising: Collectors, mounting brackets, inverter, 32A isolator, single phase in-line kWh metre, cables and adaptors to suit. The following outputs are available in a pack:

- 1.44kWp = 8 collectors
- 1.80kWp = 10 collectors
- 2.10kWp = 12 collectors
- 2.52kWp = 14 collectors
- 2.88kWp = 16 collectors

Bespoke kits of any size including In-Roof and Flat-Roof mounting can be designed to suit almost any application, by special order.

Sunny Beam Wireless Data Monitor



The Sunny Beam is an 'optional' wireless device that monitors the performance of the Grant Solar PV system. It displays real-time power output numerically and graphically, either for the complete system or up to four individual Sunny Boy inverters, and because it is wireless it can be located anywhere in the house.

The unit stores production data for up to a month which can be reviewed at any time, day or night. Its sleek design incorporates a solar cell for more power. With its large LCD screen, easy setup and use, the Sunny Beam provides the next step in monitoring convenience.

Soladin 600 Inverter

The Soladin 600 Inverter is currently the world's smallest mini-string inverter, designed for mounting inside the home. The unit is compact and includes 230V and DC connections. The inverter is fitted with two Multi-Contact DC terminals for easy plug-and-play installation, and also has a communication port for remote monitoring with an advanced yield indicator at the front.

Sunny Boy Inverter

The Sunny Boy is available in two sizes for the standard kits and is an ideal inverter for new or existing power systems with outstanding quality and performance. The unit utilises unsurpassed reliability and efficiency coupled with simplistic design for ease of installation both internally or externally. The unit even features an enhanced temperature range of -25 °C to +60 °C ambient temperature. Furthermore, no additional DC isolator is needed (subject to G83/G59 requirements).

Grant **Solar Thermal** and **PV** Mounting Options

One size fits all

When it comes to collector installations, both Grant Solar Thermal and Solar PV utilise the same mounting arrangements for convenience.

Roof inclination and direction

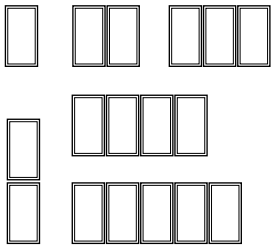
When choosing a system there are a number of factors to consider. Almost any roof type is suitable, however a south facing arrangement could gain 100% of the light available during the day. If the roof was to face South-East or South-West there will be a reduction in yield by 5-10%.

Positioning

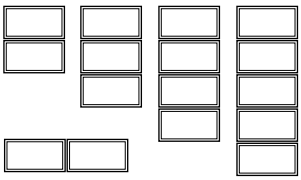
Collectors can be positioned on the roof either in a portrait or landscape arrangement, as shown below.

Solar Thermal

Portrait



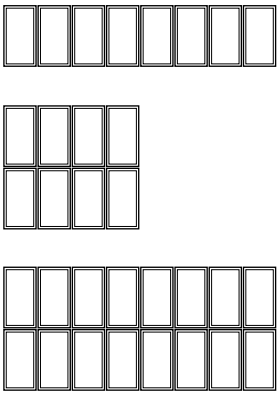
Landscape



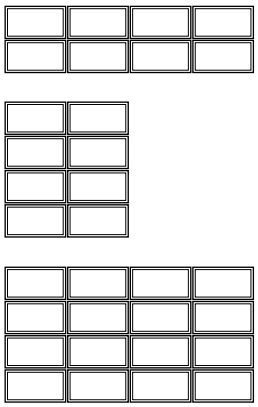
Up to 5 collectors can be used in series*

Solar PV

Portrait



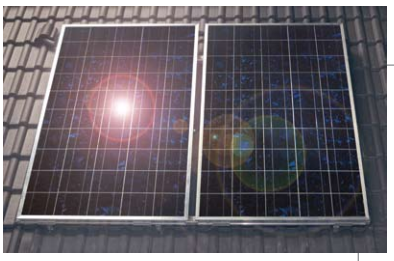
Landscape

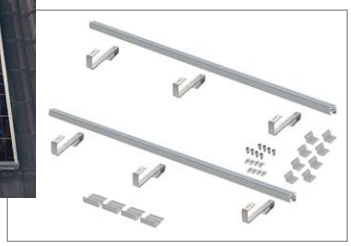


Up to 16 collectors can be used in series*

On-Roof

Grant Solar Collectors can be quickly and easily located above the roof tiles or slates using brackets and a mounting rail attached directly to the roof trusses. This system is available with fixing brackets suitable for all roof tile types including slates, on roof pitches ranging from 20° to 60°. The on-roof mounting system is supplied as standard with any Grant Solar Kit.



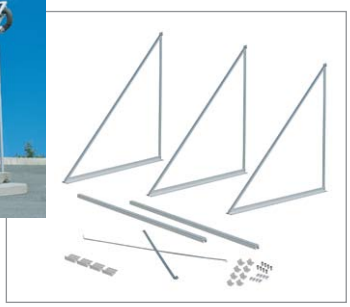


In-Roof*

Installation of Grant Solar Collectors set into the roof tiles or slates ensures a low-profile appearance. The roof surface beneath the collectors is closed within an aluminium weathering cassette incorporating flashings, drainage channels, etc. In new build applications this mounting option reduces roofing costs, as tiles are not required beneath the collectors.

Flat-Roof*

The flat-roof system is based upon the on-roof design. The mounting rails are fitted to a rigid inclined frame structure. This method allows the collectors to be positioned quickly and easily on a flat roof.



*In-Roof and Flat Roof PV kits are available by special order.

Bespoke kits for larger Solar Thermal and PV systems can be designed. Please enquire for details.

Grant **Solar** Design Service

Free Solar Thermal and PV Design

Grant Solar Systems can easily be 'retro-fitted' to existing properties, or you can take the opportunity to install a built-in solution if you are re-roofing, or building a new home.

Grant are now able to offer a unique custom design service for all Grant Solar Thermal and PV systems, completely free of charge, for any household, or business in the UK. With the use of the latest dynamic simulation software for the design and calculation of solar systems, Grant can not only size a system, but give very accurate measurements of the achievable solar gain, CO_2 reduction and fuel savings.

Why not let us design a system for your specific requirements and we can even recommend an installer to carry out the job!

For further information contact the Grant Renewables Team on: **01380 736920**

Technical **Data**

Installation

The installation of the Grant Solar System must be carried out by a competent 'trained' person in accordance with the relevant requirements for safety, current Wiring Regulations, local Building Regulations, Building Standards in Scotland, regulations and bylaws of the local Water Company and Health and Safety document No. 63S (Electricity at Work Regulations 1989). Comprehensive technical information can be found in the installation manual, which is supplied with every solar product. Recent changes to legislation mean that planning permission is not required on most domestic houses, unless the property is listed, or in an area of outstanding natural beauty (Regulations subject to change).

Training Academy

Grant's purpose-built Training Academy incorporates two air-conditioned lecture rooms, product training workshop, external tuition area, solar thermal installation area and refreshment facilities.

Grant Solar Product Courses are available at the Academy in Devizes. The training covers all aspects of the Grant Solar Range including designing and planning a system, installation, operation and key features and benefits of the product range.

In addition, Grant has now increased its offering to include the Logic Solar Hot Water Certificate and Unvented Domestic Hot Water courses. The Logic Unvented Certificate is intended for plumbers and heating installers who wish to obtain the essential qualification to allow them to install domestic unvented hot water systems, in compliance with the Buildings regulations G3 in England and Wales.

After sales service

For peace of mind, all Grant Solar products are backed by a national network of service engineers. In the unlikely event of a problem occurring, your installer should telephone our customer service department on:
01380 736920

Guarantees

All Grant Solar components are covered by a unique 5 year manufacturer's guarantee, with Grant Solar PV collectors having up to a 25 year performance guarantee, from the date of purchase.

All guarantees are subject to being installed in accordance with the manufacturer's instructions. On completion of the installation, the system should be commissioned and the guarantee registration form returned to Grant UK.

Aid and subsidies

There are Government-funded grants and TAX relief available for both Solar Thermal and Solar PV installations in the UK and Ireland. For the latest information, please contact a member of our sales team on the number below.

Website downloads

For further information about the Grant product range or to download our brochures please visit our website at:
www.grantuk.com
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