



In the north of Italy, as here in Borgomanero, forced systems are the usual choice.

Photo: CMG Solari

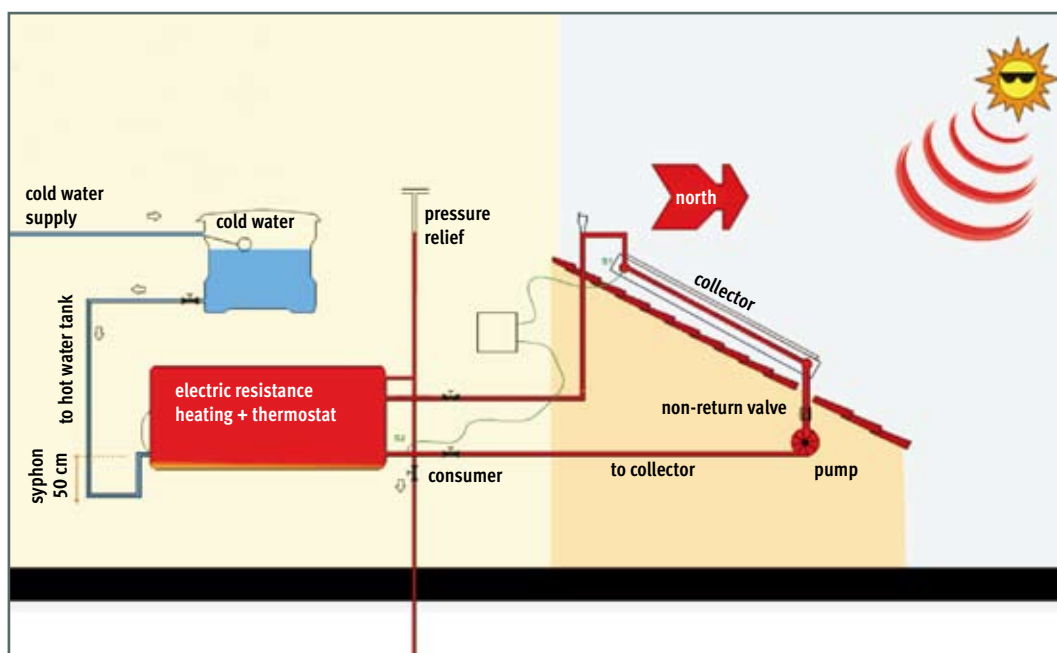
Are sales of packages increasing? "We mainly sell packages, so we cannot comment on the sales of components," answers Florin Plavosin, director of applications engineering for Canadian manufacturer EnerWorks Inc. Other suppliers, however, have identified an increase in the USA and Canada. And the branch is reacting accordingly: Israeli manufacturer Chromagen signed a cooperation agreement with heating specialists A.O. Smith Corporation last year and is now designing special packages for the US market. Wagner & Co. is another company which has recently started to offer system versions specifically for the USA. Most countries in Western and Central Europe are also seen as growth markets for package solutions by many solar thermal manufacturers.

Packages for Central Europe, Canada and the USA

A typical water heating package for the Central European market comprises two collectors (4 to 5 m² collector area) and a 300 litre domestic water tank. A coil heat exchanger is fitted in the bottom of this solar storage tank to transfer the heat from the solar circuit to the water in the tank. A mixture of polypropylene glycol and water flows through the solar circuit as antifreeze protection. Under the climatic conditions of Central Europe, such systems are able to supply 60 % of the typical energy demand for domestic water heating for a family of four. For larger households or greater hot water demand, alternative packages with

Typical open forced circulation system in Brazil, with an electric heating element as a backup. As Brazil is on the southern hemisphere, the sun shines from the north.

Graphic: A Atual, edited by S&WE





Forced systems have a hard time in mediterranean and african countries, because the market is dominated by thermosiphon systems (photo). Those who can afford it, however, are turning increasingly to the more aesthetically pleasing alternative of forced systems.

Photo: Ezinç

three collectors and a solar storage tank capacity of 400 or 500 litres are available.

A solar system in Canada is very similar to those in Central Europe: EnerWorks combines 5.7 m² collector area with a 270 litre tank. One distinction of the Canadian system, however, is that an external plate-type heat exchanger is used to transfer the heat from the solar circuit to the tank. The company headquarters of AET (Alternate Energy Technologies) is located further south, in Florida. There, AET deploys 6 m² collector area to charge a 300 litre tank. At Integrated Solar from Arizona, a typical package provides for 3.7 m² collector area and a tank volume of 300 litres. Both companies rely on an unpressurised drain-back system. In the Integrated Solar system, the coil heat exchanger is in the drain-back vessel which collects the thermal liquid from the solar circuit at standstill. Both Integrated Solar and AET use water as their medium. Frost protection is not necessary, because the solar circuit remains empty when there is no solar energy to harvest due to low outside temperatures and cloudy skies. Since 2010, AET has been including a 60 gallon (225 litre) tank in its drain-back kits. Integrated Solar offers a stainless steel tank as an option. Suppliers of drain-back systems are not restricted to the USA. European manufacturers are the Dutch company ZEN Production Ltd., Soltop Schuppisser AG from Switzerland, Rotex Heating Systems GmbH from Germany and the Belgian manufacturer ESE (European Solar Engineering S.A.). "Ecodrainback" systems with tank capacities of 200 or 300 litres are new to the product range from ESE.

Less is more in the South

In Southern Europe, the typical package contents are somewhat different. AristonThermo Spa from Italy, for example, uses a collector with an area of 2 m² to supply the heat energy for a 150 litre tank. At fellow Italian manufacturer Costruzioni Solari s.r.l, too, the

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Manufacturer, country	Name of the system	Launch of the system	Collector type	Collector surface [m ²] ¹	Absorber coating	Collector warranty [years]	Mounting system	Pre-insulated tubes included [m]	Tank size [L] ²
Siko Solar, Austria	Siko Integral DHW set	1990/ 91	flat	6.4	blue	10	on, in, free, fa	no	500
Solarbayer, Germany	PremiumPlus	2009	flat	8.6	blue	n/a	on, free	no	500
Solarbooster, Turkey	Seasontrack	2009	flat	2.2	blue	5	mobile	not required	120
Solarfocus, Austria	Solarset S0822	2006	flat	8.4	blue	10	on, in, free, fa	no	400
Sole, Greece	FCK 300-2-T270	2009	flat	5.4	blue	5	on, free	no	300
Solimpeks, Turkey	SKT300	2007	flat	4.2	blue	10	on, in, free, fa	no	300
Soltop, Switzerland	Quicksol 500	2008	flat or tubes	5.6	black chrome	5	on, in, free, fa	yes	500
Solver, Poland	Solver Trio GAK 6,06m ²	2010	flat	4.0	blue	10	on, free, fa ⁶	no	300
Sonnenkraft, Germany ²¹	S400R3-DBP	2010/11	flat	7.7	blue	n/a	on, free	no	400
Sunerg, Italy	KFP 300/2/T	2004	flat	4.0	blue	10	on	no	300
Sunex, Poland	Paket 300/4	2010	flat	4	blue	n/a	on, free, fa	no	300
Termicol, Spain	TIA2/300SV	2009	flat	3.8	blue	8	on, in, free, fa	no	300
Tesy, Bulgaria	SS 300 CS	2010	flat	6.0	blue	5	on	no	300
Thermosolar, Germany	TS300/6	1999	flat	6.0	Alox	10	on, in, free, fa	yes	300
Tisun, Austria	SWS 5/ BE 300 SSR	2006	flat	5.1	blue	10	on, in, free, fa ⁶	no	300
Transsen, Brazil	Acoplado ASME 200 ltr – Ultra-flex version	2010	flat	2.0	paint	5	on	yes	200 ²
Unasol, Brazil	Diamante 500 litros	2007	tubes	4.4	n/a	10	on, free	no	500 ²
Vaillant, Germany	SWW 9.203	2010	flat	5.02	blue	n/a	on, in free ⁶	no	300
Viessmann, Germany	SK 02233	2009	flat	5.05	blue	n/a	on, in, free, fa ⁶	no	300
Wagner & Co., Germany	BWB 410 AD	2010	flat	4.5	blue	10	on, in, free, fa	no	300 or 400
Wolf, Germany	CFK-1 Paket	2008	flat	4.6	blue	5	on	no	300
ZEN Production, Netherlands	ZEN SDB 200 single	2004	flat	4.2 up to 5.6	black chrome	10	in, free	yes	200 ²

Large collector areas which provide for high solar coverage of the heating demand are a speciality of Chiryu Heater from Japan.

Photo: Chiryu Heater

smallest package starts with this configuration. In the south of Italy, this scope of system is sufficient to satisfy between 50 and 70% of the hot water demand of a family of four. Other manufacturers are likewise directing their current attention to small sets. Sigma A&G Samouil Co. from Greece has taken a 2.5 m² collector into its portfolio, in combination with a

storage tank between 150 and 200 litres. Portuguese manufacturer Openplus Lda. has also added a new 200 litre tank to its pre-packaged systems, while Bulgarian specialist Tesy Ltd. recently unveiled a new series ranging from 2 m² collector area and a 120 litre storage tank to 6 m² area and a 300 litre tank. Greek manufacturer Sole S.A., by contrast, has launched a new package bundling a 300 litre tank with 7.5 m² collector area.

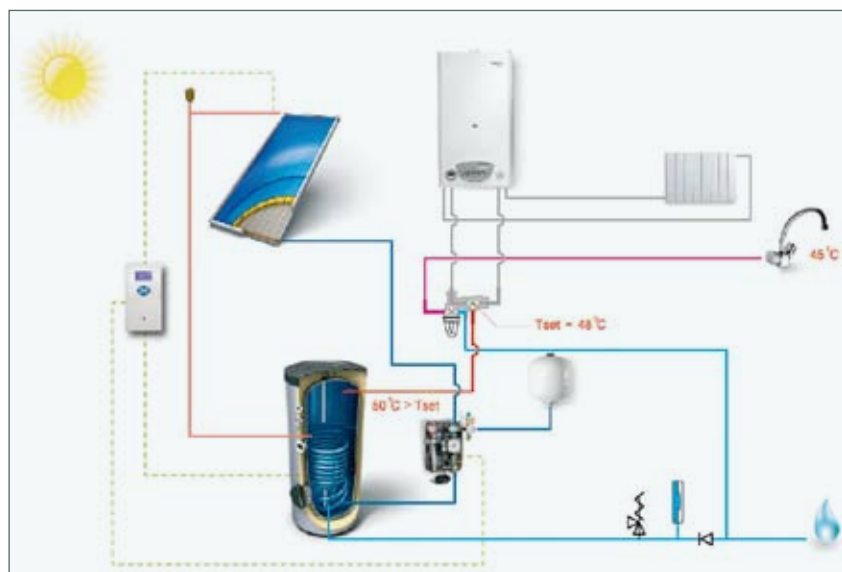
One special form of system is manufactured by the Turkish supplier Sunstrip Turkey. For the so-called Solarbooster, the 120 litre tank and a collector are combined in a single unit



	Tank insulation [mm]	Tank warranty [years]	Solar circulation unit	Controller	Expansion vessel [L]	Frost protection fluid [L]	Water mixer	Noncommittal gross final customer price [€]	Available in
	PU, 50	2	single ⁸	integrated	25	30	yes	4,319	Europe
	n/a	n/a	dual	separate	40	20 ¹⁴	optional	4,100	n/a
	PU, 50	5	dual ¹¹	integrated	8	10 ¹⁴	yes	1,800	n/a
	PU, 55	5	dual ⁸	integrated	33	20 ¹⁴	yes	5,483	Europe
	PU	5	dual	integrated	25	n/a	no	3,581	Europe
	PU, 50	5	dual	integrated	8	n/a ⁶	no	n/a	worldwide
	n/a, 100	5	dual ⁸	integrated	not required	20	yes	7,700	Switzerland
	PU, 50	5	dual	separate	18	10 ¹⁴	no	2,740	Europe
	PU, 50	5	single ^{8, 23}	integrated ²⁴	25	15 ¹⁴	yes	4,690 ²²	n/a
	PU, 100	5	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	n/a	n/a	dual ⁸	integrated	18	29	no	n/a	n/a
	PU, 50	5	single ⁸	integrated	25	10 ¹⁴	no	3,560	worldwide
	PU	2	single	separate	12	20 ¹⁴	n/a	n/a	n/a
	PU, 50	3	dual	separate	25	20	no	3,400	worldwide
	PU, 50	5	dual	integrated	25	11 ¹⁴	yes	3,645	worldwide
	PU, 60	3	single ⁹	integrated	not required	not required	no	n/a	South and Central America
	PU, 50	5	single	integrated ⁶	25 ⁶	not required	no	2,000	Brazil
	n/a	n/a	dual	separate	18	30	no	3,760 ²²	n/a
	HDP, 50	n/a	single ⁸	integrated	25	25	no	3,319 ²²	n/a
	PU, 100	5	dual ⁹	integrated	12 or 18	10 ¹⁴	no	n/a	worldwide
	PU, 50	5	dual ⁸	integrated	25	20	no	n/a	Europe
	EPS, 75	n/a	single or dual ¹²	integrated	not required	not required	no	3,500	Belgium, Netherlands, Italy, UK

as with a solar water heater. This is nevertheless a forced system with a solar pump drawing its power from the integrated PV modules. The mobile system is especially suitable for holiday homes, as it only needs to be set up when the house is actually occupied.

It is logical that a system can be configured with fewer collectors in locations where the sun supplies much more energy over the course of the year. But why are the storage tanks smaller? It seems that the average end consumer here uses less hot water than in Central Europe or North America. On the other hand, as comfort demands are increasing globally, we can expect to see rather larger tanks in the future.



New packages from Tesy: The automatic thermostatic mixer with a pre-set temperature of 48 °C ensures a constant 45 °C at the point of use. If the available sunshine is not sufficient, a gas boiler provides additional heating via the mixing valve. Graphic: Tesy

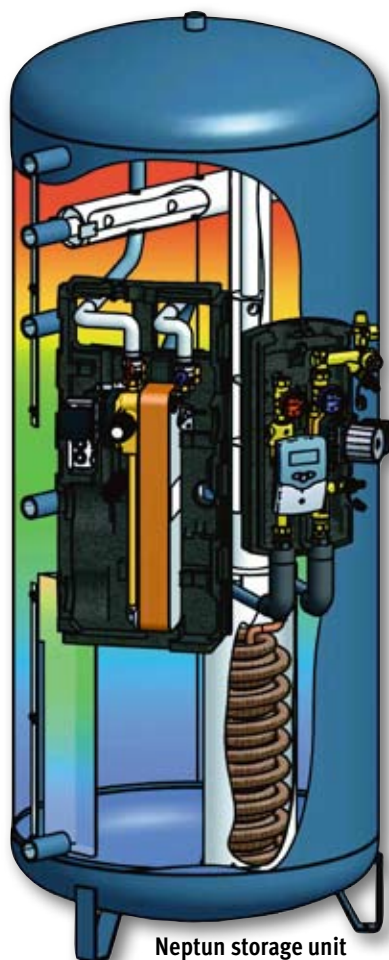
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Neptun storage unit

Photo: Citrin

Open systems in Central and South America

In terms of storage tank capacity and collector area, systems in Central and South America are comparable. A collector with a 240 litre tank, for example, is sold by Módulo Solar S.A. de C.V. from Mexico. At Transsen from Brazil, the corresponding capacity is 200 litres.

In contrast to European and North American systems, however, the typical solar installation in Central and South America is an unpressurised open system. The domestic water flows directly through the collectors, usually from a cold water tank at the top of the building. The lower solar storage tank is fed solely by way of the hydrostatic pressure.

The solar station as heart of the system

All forced systems require a circulation pump and a solar controller which activates the pump when the temperature difference between collectors and storage tank reaches a set value. Pressurised systems must also incorporate a safety valve and an expansion vessel. The safety valve serves to blow off thermal liquid if the permissible pressure is exceeded. In normal operation, of course, this should not happen, as the expansion vessel should take up the greater volume when the liquid begins to evaporate at standstill.

Pool absorber and flat-panel collectors in perfect harmony.

Photo: Transsen

All these components are usually combined into a pump unit, or solar station as it is sometimes called. The solar station also accommodates temperature and pressure gauges, filling and flushing cocks, and gravity brakes to prevent heat losses due to hot water rising into the collectors when the system is at standstill during the night. Solar pump stations are available as single- and dual-line versions. Single-line stations are installed in the return, whereas a dual-line system integrates both feed and return. An air-bleed valve is also included in the feed line in many cases.

The German manufacturer Paradigma Deutschland GmbH, a member of the Ritter Group, always used single-line stations in the past. In April, however, a dual-line station is to be launched. The new station foregoes gravity brakes and instead counters gravity circulation with valves.

Sunerg Solar s.r.l. from Italy recently introduced two types of solar station: The SRD for small systems and the SRD-XL for systems with more than 10 collectors. The XL unit includes a metered flow regulator for flow rates from 20 to 70 L/min.

A dual-line pump station with a new solar controller has just been unveiled by yet another Italian manufacturer, Cordivari Srl Z.I. New differential temperature controllers have also been brought to the market by CMG Solari from Italy, ZEN Production from the Netherlands and the Indian manufacturer Maharishi Solar Technology (P) Ltd. At the same time, Baymak has started offering packages with a variable-speed pump which forms a single unit with the controller. Speed control is similarly a new feature of the AET drain-back system. At Soltop, in future the solar station will be fitted with a solar pump compliant with energy efficiency class A.

There is a noticeable trend towards compact units in which the solar station, controller and buffer tank are united under a single cover. Such systems have been added to the product range by Chromagen from





Nothing missing in the package from Kingspan Solar.

Photo: Kingspan

Israel and by Sole from Greece. A particularly attractive appearance is achieved if the components are concealed beneath a stylish designer cover – as in the case of the Solar Box Tank from Ezinç. Such systems “also reduce installation time and increase the accessibility to controls,” as Kutay Ülke points out.

The drain-back manufacturers also offer compact modules. At AET, the drain-back vessel is mounted above the storage tank, whereas Integrated

Solar accommodates it in a single unit together with other components such as heat exchanger and pump. As unpressurised systems, however, these drain-back variants are able to do away with the otherwise necessary expansion tank and safety fittings.

What is included in a package?

The contents of a solar thermal package vary from one supplier to another. The Chinese manufacturer Apricus Solar Co. Ltd., for example, does not automatically supply the solar storage tank, while others leave out the mounting accessories for the collectors. In most cases, however, a roof-mounting kit or free-standing system is included. Provisions for in-roof installation usually cost extra. For this variant, the collectors are integrated into the tiling like roof windows with metal covers. A few companies even offer the possibility of facade or canopy-style mounting.

The piping for the connection from collector to tank is only supplied by a few manufacturers, for example by Baymak, where flexible stainless steel pipes are new in the pre-packaged sets. Other manufacturers choose copper pipes.



A typical system of the German manufacturer Reinhard Solar.

Photo: Reinhard Solar

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