

Smart pumps

A solar station without a high-efficiency pump is a non-starter these days. The capability of new bidirectional pumps to send information about their operating status creates new opportunities.



Resol's FlowSol B HE is now available with a bidirectional pump and a controller developed especially for it. Photo: Resol



Orkli's drainback station with HE pump Photo: Orkli



Oventrop has revised the design of its solar stations and equipped them with the latest HE pumps. Photo: Jens-Peter Meyer



Concept study by Watts for a very compact solar station with a bidirectional pump Photo: Jens-Peter Meyer



Single-line solar station with a bidirectional pump by Tuxhorn

Photo: Jens-Peter Meyer



With Solarhot's SV-3000 transfer station, solar-thermal systems with up to 300 m² collector area are possible.

Photo: SolarHot

The solar industry has been concerned with high-efficiency pumps for several years. Should pumps be driven by a PWM or 0-10 volt signal, or is an on/off switch sufficient? Solar installation controller experts have wrestled with these and other questions. But solar station manufacturers also faced challenges. They had to integrate all of the space the new pumps required into the compact design of the stations. A particular challenge was finding a way to place the heat-sensitive electronics of the pumps outside of the insulation. Until now, pump electronics have usually jutted out from the side of the hot water tank, and sometimes – as is the case with the big SolarBloC mega pump from PAW GmbH – to the front.

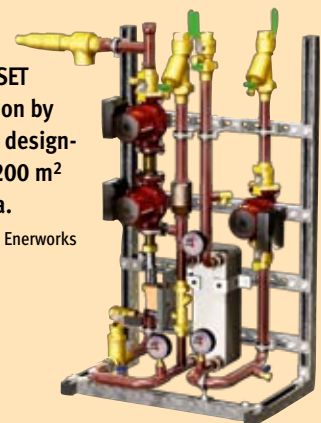
Watts Industries Deutschland GmbH always puts the pump electronics on the front but hides them behind a three-part insulation housing. The first part insulates the rear wall, the second – the intermediate insulation – insulates the pipes, and the third part covers the station as a housing and at the same time allows for the ventilation of the pump electronics. In Germany, the German Energy Conservation Ordinance (EnEV) specifies the level of insulation required for solar lines within the fittings subassembly. With its insulation concept, Watts fulfils the requirement of the regulation. "This was confirmed by the Fraunhofer Institute for Building Physics last February," says Product Manager Udo Link.

Ecodesign pump directive: high-efficiency (HE) pumps to be mandatory

The EU's Ecodesign pump directive states that starting this August, all solar stations must be equipped

The 140 kW SET transfer station by Enerworks is designed for up to 200 m² collector area.

Photo: Enerworks



with HE pumps. Last March, a number of manufacturers took advantage of the ISH international heating and plumbing exhibition to present their new solar stations using HE pumps. Oventrop GmbH & Co. KG of Germany uses Grundfos UPM3 25-75 or Wilo Yonos Para 25/7 pumps in its new Regusol SH-130, LH-130, PH-130 and ELH-130-RC models. Both pumps have a flow-rate range of 2 to 15 l/min. If a greater flow rate of 7 to 30 l/min is needed, customers can select the of the Wilo Yonos Para 25/7.5, which can be used in the LH-130 or LH-180 models. The DN32 version of the Regusol SH-180 can deliver flow rates of 10 to 40 l/min. In addition to switching to HE pumps and its new insulation concept, Oventrop has also revamped the design of its thermometer and manometer and added new solar controllers to stations with integrated controllers.

The Wilo Yonos Para is new in the GPSN 40, GPSN 60 and GPSN 70 stations made by the Polish company Sunex S.A. The Italian company BRV Bonetti Rubinetterie Valduggia Srl offers a choice of the Grundfos UPM3 Solar 7.5, Wilo Yonos Para 25/7, or the Wilo Yonos Para 25/7.5 in its S2 solar 30L. Orkli S. Coop of Spain now offers all of its products with HE pumps. Its products range from the single-line 73020 HE station to the two-line 73000SOHE subassembly and the drain unit for drain-back solar systems.

By last year, PAW had already made the switch to high-efficiency pumps in its solar stations. This year saw some changes to the Solex product family of solar transfer stations with plate heat exchangers. PAW used to have different products for drinking water and heating system buffer water. The new Solex can now be used both in domestic hot water systems with drinking water in a storage tank as well as systems for backup heating with buffer water. The insulation used in the Solex product family is also compliant with the requirements of the EnEV. PAW also redesigned its website for ISH. In its web shop registered users can now order all of the products in its catalogue online. Furthermore, PAW offers installers a special service. For any older products for which current assembly instructions do not help, the company provides the old assembly instructions. All installers have to do is enter the serial number of the product. The same method can also be used as an easy way to order spare parts for older products.

Bidirectional pumps: no balancing valve needed

The latest generation of high-efficiency pumps can do more than just keep the solar circuit in motion with low power consumption. These pumps are bidirectional. That means that they not only receive signals from the controller but also send information about the operating status to the controller. They use these signals to determine the current flow rate. Until now, all pump stations have contained a balancing valve that indicates the flow rate. The valve was needed in on/off controllers to adjust the flow rate. But with propagation of match-flow systems, with their variable flow rates, this is no longer necessary. The flow

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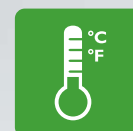
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Solar heat transfer stations with heat exchanger

Manufacturer	Name of the pumping station model	Nominal size DN	Max. flow rate [litre/min]	Max. collector area [m ²]	Max. collector area low-flow [m ²]	Max. heat transfer [kW]	Max. pressure [bar] ¹	Safety valve [bar]	Max. temperature [°C] ²	Sensors
<i>heat transfer stations for small and medium solar systems</i>										
BRV	Modvsol Solo	20	40	n/a	70	35	10/3	6	120 (160) / 110	Vortex
KaMo	Solar X Perfekt 45	25	13	45	n/a	22.5	6/6	6	95 (110) / 95	conventional
Meibes	Solar XL	25	30	40	60	40	6/3	6	110 (120) / 110	conventional
Oventrop	Regusol X-Duo 25-B	25	40	25	55	25	6/10	6	120 (160) / 120	Vortex
PAW	SolexMini HZ	25	20	25	30	15	10/10	3	120 (160) / 95	FlowRotor
Pewo	pewoLoad S25	25	33	67	70		10/6	3	110 (110)/110	conventional
Taconova	TacoSol Load Mega ⁵	20	20	20	25	12.5	6/3	6	110 (160) / 110	Vortex
Tuxhorn	tubra-ÜSTA-mat 20	20	16	18	30	15	10/3	6	120 (140) / 110	conventional
Watts	SU8040	20	20	30	50	25	10/3	6	120 (160) / 110	Vortex
<i>heat transfer stations for large solar systems</i>										
Enerworks	140 kW SET	32	98	201	89	177	6.9/10	6.2	110 / 93	Vortex, pressure
KaMo	Solar X Maxi 2-250	40	52	250	400	125	6/6	6	95 (110) / 95	conventional
LME	LME-500M2	50	200	400	750	300	6/3	10	95 (170) / 95	conventional
Meibes	Solar XXL	32	50	75	150	110	6/3	6	95 (110) / 110	conventional
PAW	SolexMega-Kaskade HZ ⁸	50	160	320	400	200	10/3	6	120 (160) / 95	FlowRotor
Solarhot	SV-1000	40	100	100	100	315	6/11	6	110 (125) / 100	PT-1000
Taconova	TacoSol Load EXA L ⁵	50	120	240	160	120	8/3	8	110 (140) / 110	Vortex
Tuxhorn	tubra-ÜSTA-mat XL 100 K2 ⁸	25	70	138	230	116	10/3	6	120 (140) / 110	conventional ⁷

HE pump = high-efficiency pump; conventional = thermometer, manometer, mechanical flow meter; Vortex= thermometer, manometer, Vortex flow meter; FlowRotor = thermometer, manometer, FlowRotor

rate meter in those systems is needed only to check that they are working properly. The observer can see immediately whether the pump is circulating. With the signal of the bidirectional pump, the controller can now perform this function check. The balancing

valve can be dispensed with, which makes the solar station cheaper.

Resol GmbH from Germany has already launched a bidirectional solar station. It trades under the name FlowSol B HE and is equipped with the Resol DeltaSol CS bidirectional controller and the Wilo Yonos Para ST 15/7.0 iPWM2 bidirectional pump. "The pump reports any malfunctions directly to the controller," says Resol Sales Manager Gerald Neuse. The error message appears on the controller. Customers with the optional internet connectivity device can display the error message on the Resol VBus.net web portal.

A further advantage of bidirectional solar stations is that they can be much smaller due to the elimination of the balancing valve. This was apparent in a concept study for a bidirectional solar station presented by Watts at ISH. In the Watts station, one of the two filling and flushing valves was connected to the balancing valve. In the concept study, the balancing valve was shifted to the station's supply line.

While Watts is still discussing with potential customers whether the bidirectional solar station makes sense, Tuxhorn Bros. GmbH & Co KG of Germany

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n/a	n/a	none	102	Wilco Stratos Para 25/1-8	Wilco Stratos Para 25/1-7	yes	Sorel	n/a
optional	brass	brass	n/a	Wilco Stratos Para 15/1-11	Wilco Stratos Para 15/1-11	optional	Novatec Solar MD	2,167
yes	none	brass	200	Wilco Stratos 15/1-11,5	Wilco Yonos Para 15/6	optional	Energy pro optional	1,928 ³
no	plastic	none	n/a	Wilco Yonos ST PWM 15/7	Wilco Yonos RS PWM 15/7	yes	Regtronix RX-B	n/a
yes	brass	brass	200	Grundfos UPM3 Solar 15-145	Grundfos UPM3 Solar 15-75	optional	SC5.14 ⁴	1,688
no	brass	brass	300	Wilco Stratos Para	Wilco Stratos Para	optional	optional	n/a
yes	brass and stainless steel	brass	n/a	Wilco-Pumpe Star 15/6-3	Wilco-Pumpe RS 15/4-3	n/a	TSL Mega	1,538
no	metal	none	200	Wilco Yonos Para 15/7.0	Wilco Yonos Para 15/7.0	yes ⁶	Deltasol BXplus	2,100
optional	metal	plastic	200	customers request	customers request	optional	Watts LCD Plus	n/a
yes	brass	plastic	n/a	Grundfos UPS	Grundfos UPS	optional	Resol MX	17,250
optional	brass	brass	n/a	Wilco Stratos 1-12	Wilco Stratos 1-12	optional	Novatec Solar MD	11,200
optional	stainless steel	stainless steel	200	Stratos 40/1-12	Stratos Para 30/1-12	yes	UVR1611	15,780
yes	plastic	plastic	230	Wilco Stratos Para 30/1-12	Wilco Stratos Para 30/1-12	optional	none	6,253
yes	brass	brass	200	Grundfos UPM XL 25-125	Grundfos UPML 25-105	optional	SC5.14	14,489
yes	acetal	acetal	700	Grundfos, HE	Grundfos, HE	no	Deltasol BX	6,900
yes	brass and stainless steel	brass and stainless steel	n/a	Wilco Stratos Para 30/1-12	WILCO Stratos Para 30/1-12	yes	TSL Exa Solar-regler	10,083 up to 10,817
yes	metal	metal	200	Wilco Yonos Para 15/7.5	Wilco Yonos Para 15/7.0	optional	DeltaSol BXplus	8,940

¹ primary circuit / secondary circuit; ² primary circuit / secondary circuit (short time load in brackets); ³ price with controller: 2,150 €; ⁴ functions freely programmable; ⁵ expansion vessel before pump; ⁶ two switching valves; ⁷ Vortex flow meter or pressure sensor optional; ⁸ cascade of two stations

presented the single-line Tubra PGS-01 with a bidirectional pump at ISH. Tuxhorn offers a supply line connection fitting that contains the second fill valve.

It is still in question whether the data of the bi-directional pump are accurate enough to generate a solar yield measurement from the detected flow rate.

However, it is possible that in future a separate flow rate measurement will no longer be necessary. In its solar stations market overview, SUN & WIND ENERGY not only presents the products of fittings specialists but also of controller manufacturers offering stand-alone products with controllers. Technische



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Solar stations without heat exchanger

Manufacturer	Model	Type	Nominal size DN	Max. flow rate [litre/min]	Max. collector area [m ²] ¹	Max. admissible pressure [bar]	Safety valve [bar]	Max. temperature [°C]	Max. temperature short term [°C]
Afriso	PrimoSol 130-2	dual line	n/a	38	50	6	6	120	160
Barberi	Trollino	single line	20	15	n/a	10	6	110	n/a
BRV	S2SOLAR30L	dual line	20/25	38	40	10	n/a	100	120
Hummel	Serie 7000	dual line	20	12	18	6	6	110	130
ICMA	S003	dual line	n/a	12	50	10	n/a	140	n/a
IVAR	GP 8000E	dual line	32	70	60	6	6	95	110
Meibes	SolaVentec II	dual line	18	30	20	6	6	95 (110) ²	110 (130) ²
Orkli	73000SOHE	dual line	15	12	20	10	6	110	130
Oventrop	Regusol ELH-130-RC-P	dual line	25	15	25	6	6	120	160
PAW	SolarBloC midi Basic	dual line	20	30	30	10	6	120	160
Resol	Flowsol B HE bidirectional	dual line	15	13	24	6	6	95	120
Solarhot	SV-HX ⁹	n/a	20	23	20	11	6	110	125
Sunex	GPSN 40	dual line	20	15	15	6	6	120	120
Taconova	TacoSol CIRC ZR HE ⁸	dual line	25	28	25	6	6	110	160
Tiemme	4700382	single line	25	10	10	10	6	160 ³	n/a
Tuxhorn	Tubra-PGS-C 01	single line	20	13	26	10	6	120	140
Watts	FBS8180-HE	dual line	20	16	25	10	6	120	160

HE pump = high-efficiency pump; conventional = thermometer, manometer, mechanical flow meter; Vortex = thermometer, manometer, Vortex flow meter; FlowRotor = thermometer, manometer, FlowRotor; bidirectional = thermometer, manometer, bidirectional pump

Data on additional products are available online at www.sunwindenergy.com/solar-thermal/market-overview-solar-stations

Alternative GmbH of Austria was absent from ISH this year. After all, the company pulled its solar station with an integrated heat meter from its product range after some of its customers saw Technische Alternative's device as competing with their own products.

Drainback transfer station for large systems

There is also news in solar stations for large commercial projects. The American company Solarhot

has developed a new transfer station for drainback systems. The SV-1000 DB version can be connected to as much as 100 m² of collector area, and the SV-2000 DB can handle up to 150 m². Solarhot has also improved its transfer stations for conventional solar systems. Added sensors enable the monitoring of the dynamic status of the unit. The new controller can now regulate even larger pumps. Solarhot manufactures these transfer stations in two variants: One is for solar systems with non-pressurised tanks and the other is for pressurised vessels.

Enerworks Inc. of Canada also uses transfer stations for large-scale solar-thermal systems. The 140 kW SET is a new version with a more powerful pump. It is suitable for connection to up to 70 collectors. Until now, the company's most powerful unit was the 80 kW version for a maximum of 40 collectors. The new station includes a heat exchanger bypass for use during cold start-ups. The bypass improves the reliability of the plate heat exchanger. Moreover, Enerworks now uses a controller that enables access to system data via the web. This facilitates troubleshooting and maintenance and prevents failures. It also gives plant operators the capability to monitor the performance of their plants around the clock.

Jens-Peter Meyer

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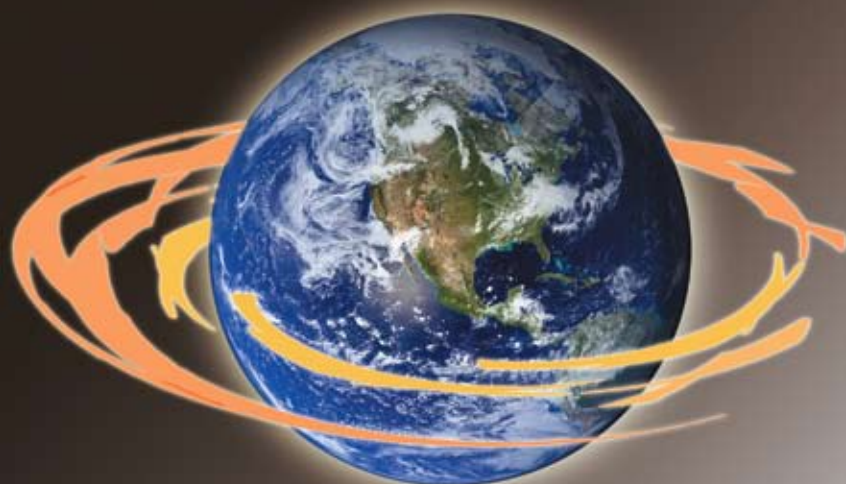
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	Sensors	Air stop	Check valve	Closing pressure check valve [mmWS]	Pump type	Solar controller	List price [€]
	conventional	optional	brass	n/a	Grundfos Solar	optional Afriso SR1	n/a
	conventional	no	brass	200	Grundfos solar	none	n/a
	Vortex	yes	n/a	102	Wilo Yonos Para ST25/7.0	Modvsol L (L3S)	641
	conventional	no	brass	n/a	UPS 25-65/180	Resol	n/a
	n/a	yes	brass	n/a	Grundfos 15/65, Wilo 15/60	S301, S302, S304	n/a
	conventional	yes	yes	n/a	Grundfos UPS Solar 25-120	none	1,642
	conventional	yes	none ⁴	n/a	HE Pumpe ⁵	none	534 ⁶
	conventional	yes	brass	200	Yonos Para ST 15/7 PWM	yes	892.74
	Vortex	yes	plastic	n/a	Wilo Yonos Para 25/7 PWM	Regtronic RC-P	n/a
	conventional	yes	brass	200	Grundfos UPM3 Solar 15-145	SC3.6	681.50
	bidirectional	yes	brass	200	Wilo Yonos Para ST 15/7.0 iPWM2	Deltasol CS Plus bidirectional	n/a
	PT-1000	yes	Noryl	770	Grundfos	Steca/301	650
	conventional	yes	brass	n/a	Wilo-Yonos Para	optional	n/a
	conventional	yes	brass and stainless steel	n/a	Grundfos PM2 15-105/130	Sorel TDC4 or Deltasol BS Pro optional	378
	conventional	no	brass	n/a	Wilo Yonos Para ST 15/7	none	n/a
	conventional ⁷	no	metal	400	Wilo Yonos Para 15/7.0	Deltasol CSplus	640
	conventional	yes	metal	200	HE-Pumpe	diverse manufacturers optional	n/a

¹ specification for high-flow systems; ² specification for HE pump, temperature for conventional pump in brackets; ³ maximum temperature not applicable for the pump; ⁴ siphon in flow delivery and electric stop valve in return flow; ⁵ 3-stage optional; ⁶ price for Grundfos Solar 25-105 PWM; ⁷ Vortex flow meter optional; ⁸ expansion vessel before pump; ⁹ pumping station for drain-back systems



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