

LATENTO®

Enhanced
efficiency



LATENTO all-year solar systems for DHW
and back-up the heating

IVT
WÜRTH  GROUP

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LATENTO solar systems

In a very few years, fossil fuels will either be exhausted or totally uneconomical to use for heat generation purposes. At the same time, every year the sun radiates an amount of energy which corresponds to about 10,000 times the world's primary energy demands, free of charge. Without question, the sun is the "fuel of the future".

The design of modern low-energy and passive houses requiring little heat makes it possible to utilise solar energy for heating living areas as well as for pre-heating swimming pools in addition to heating for the hot water system.

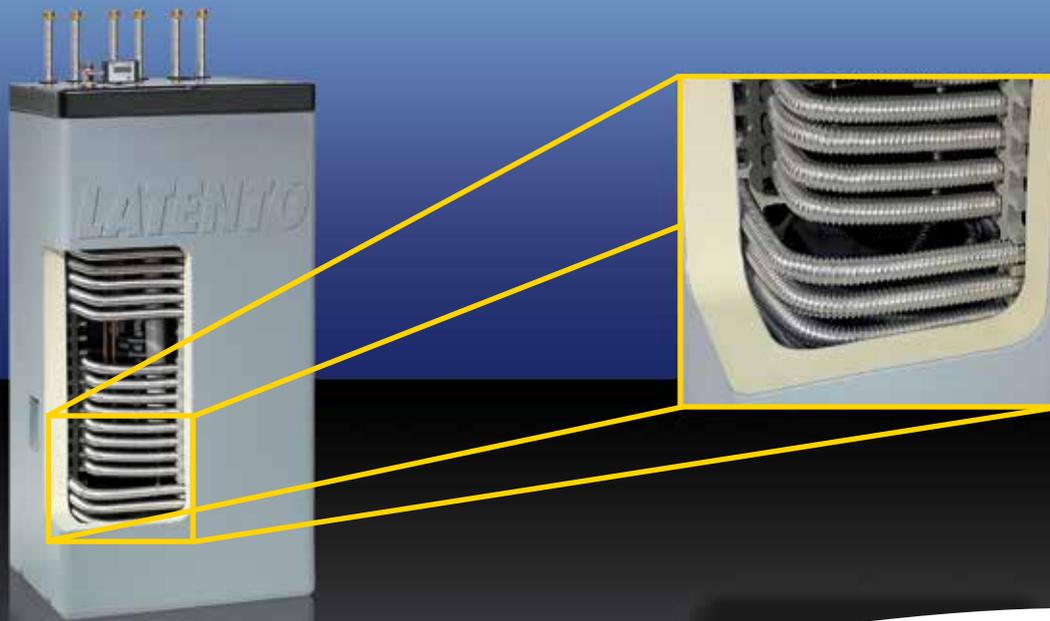
Modern systems have to be compatible with fossil-fuel and regenerative fuel systems (solar, pellets, heat-pumps etc.) and ensure the existing resources are optimally usable for all energy supplies. A decisive factor in the quality of a solar system is how much annual oil or gas usage it can replace by solar energy. A **LATENTO** all-year solar system is the optimum solution.

An efficient solar heating system not only takes care of hot water supplies during the summer, it also converts solar energy in the winter and the transitional months. With many solar systems, however, on cool days the warmth of the sun never even reaches the solar storage because the collector promptly reflects the sun's heat it receives away

again, or it loses the energy in the pipework and storage system. These "apparent" yields then have to be raised to usable temperatures with expensive supplementary energy – which is not the case with a **LATENTO** solar system.

It is not the size of the collector units or the storage volume which is decisive regarding the effectiveness of a solar heating system, but the efficiency of its components and how well they are tuned to the demands of the consumers. With a larger collector surface, the yield would certainly be greater, but the solar utilisation rate would deteriorate. The larger the collectors, the more frequently the system is inactive in summer – the sun delivers far more energy than residents can possibly use. Especially in winter and in the transitional periods, when supplementary heating is most in demand, a **LATENTO** solar system makes its mark with high solar yields and extremely low levels of heat loss.

LATENTO uses solar output large and small for heating water and utilises it even during frosty weather to supplement the heating. That means the highest possible level of efficiency for maximum solar warmth all the year round.



LATENTO^{XXL}

Solar layer stratified storage tank

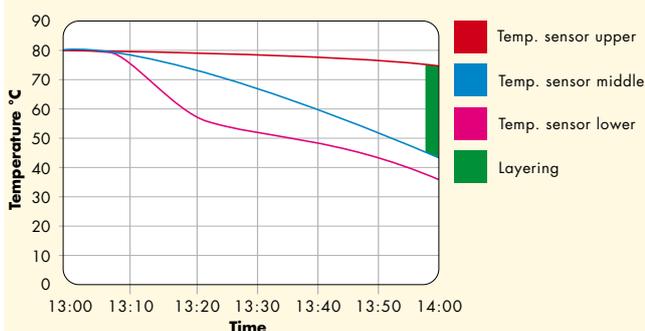
Four characteristics which make all the difference

Efficiency is the decisive factor for the effectiveness of solar thermal systems. The **LATENTO** stratified storage tank – the core of the **LATENTO** solar system – carries complete convection with four essential characteristics which in total assure you of the best possible efficiency and thus maximum effectiveness of your solar heating system.

1. Stratification

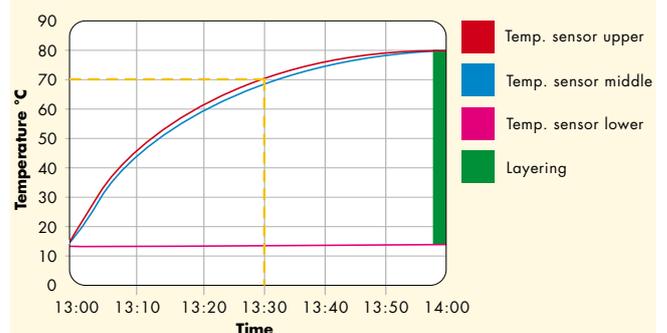
A stable stratification of the temperatures of the stored water ensures with ...

... exclusive utilisation as back-up heating, that the temperature in the domestic hot water region – or the upper storage area – is maintained. The output for domestic hot water heating is additionally available all the time.



When operating as back-up heating (tapping via exchanger in the middle area), the temperature for hot water (DHW) is maintained!

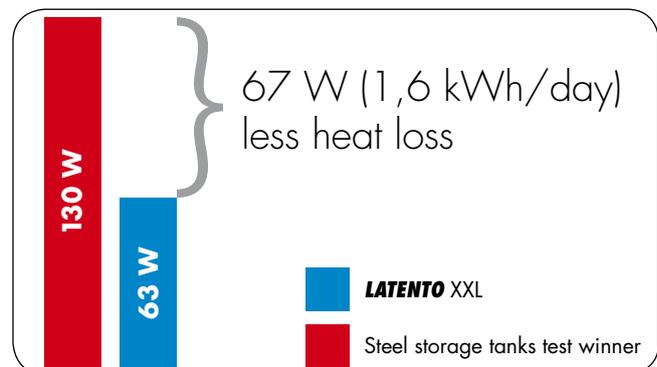
... fast loading that hot water can be tapped after only 30 minutes of solar yield.



The solar area still stays cool even during back-up heating/loading, so that solar yield is still possible!

2. Insulation

The **LATENTO** plastic storage tank is manufactured completely of insulating material (PP/PUR/PP). Conventional steel storage tanks by contrast have to be insulated additionally. Apart from this, the **LATENTO** has no side and bottom connections, which also lead to heat losses (heat bridges in conventional steel storage tanks). The temperature losses of 0.1 K/h are commensurately low, corresponding to a thermal power loss of 63 W. For comparison: the best steel storage tank tested by the consumer magazine Stiftung Warentest 03/2009 demonstrated a heating power loss of 130 W. This difference in heat loss can correspond to a complete day's solar yield in winter (40 l hot water).



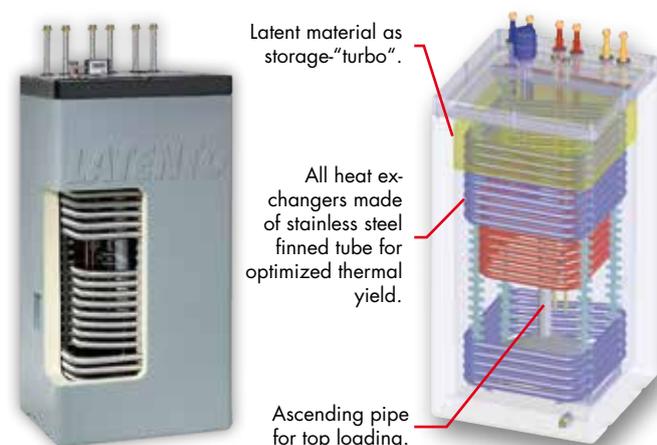
3. Output

With tapping capacity of 247 l (65°C storage temperature, without re-heating), a continuous rating of 1220 l/h, a storage capacity of max. 54 kWh and nominal power rating of NL 7,3, the **LATENTO** XXL guarantees a high level of comfort and is ready to use quickly. On a sunny day, it

can be ready to provide ample water for a shower after only 30 minutes' loading. To warm up the contents of a much larger storage tank to a usable temperature demands substantially more solar energy, and this just isn't always available.

4. Compactness

On account of its dimensions of only 78x78x158 cm (standing area 0.64 m², diagonal measurement 1.76 cm), the **LATENTO** is ideal for refurbishing old buildings and for installation in small spaces. Thanks to this compactness and the integral carrying handles, the **LATENTO** is no problem for transport and negotiates all standard sizes of doors.



Further advantages of the LATENTO stratified storage tank

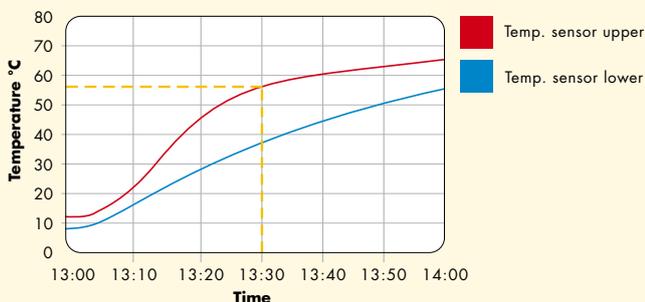
- The design of the DHW heat exchanger caters for pre-heating of the drinking water and cools down the lower storage area. Even when the solar yield is low, the **LATENTO** installation starts to work.
- Storage usable up to 85°C
- Latent material for additionally increased output as “storage turbo”
- Digital temperature and water-gauges



LATENTO_{XW}

Hot water storage tank

LATENTO XW loading



After only 30 minutes' loading* there is already a usable temperature of 50°C available.

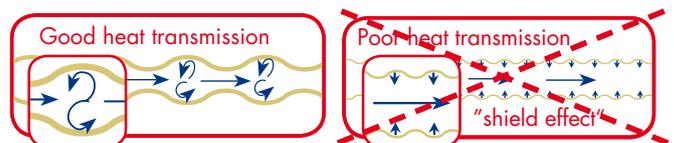
*Loading rate 22 kW



The **LATENTO XW** hot water storage tank works on the continuous-flow heater principle and has heating and discharge heat exchangers of long-wave stainless steel corrugated pipes for a very high continuous rating of 1.350 l/h (at 85°C re-heating), a tapping capacity of 277 l (65°C storage temperature, without re-heating) and a storage capacity of max. 54 kWh*. In addition, the heat loss is absolutely marginal. The **LATENTO XW** is suitable for combination with all heat generators – solar as well. Storage temperature and contents are shown by means of a digital display.



A **LATENTO** installation on the roof of the Playmobil Funpark on Malta



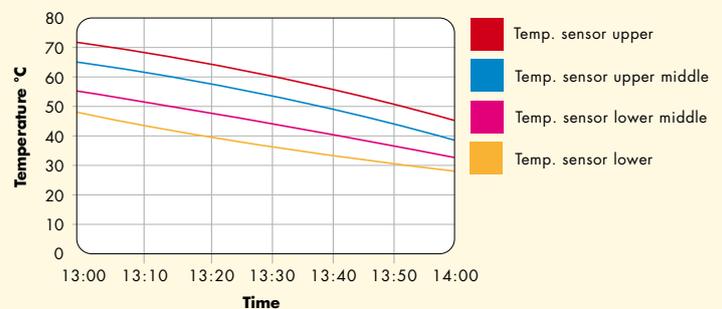
All heat exchangers are manufactured with long-wave stainless steel corrugated pipes for improved heat yield. This discourages the "shield effect" (flow-past) which is experienced with a narrow-waveband pipe.

LATENTO_{XP} Unpressurised buffer storage tank



Our buffer storage for long-term heat storage. The XP has a large heat exchanger of long-wave stainless steel pipe for very good heat transmission. Its insulating plastic tank loses virtually no stored heat (0.1 K/h). Latent material makes sure of an additional output. Storage temperature and contents are shown by means of a digital display.

LATENTO XP tapping with 35°C (VL) with approx. 14 kW tapping power



Output figures LATENTO XP	$\Delta T = 5 \text{ K}$	$\Delta T = 10 \text{ K}$	$\Delta T = 35 \text{ K}$
Exchanger output	15 kW	25 kW	50 kW

These advantages apply to all LATENTO storage tanks:

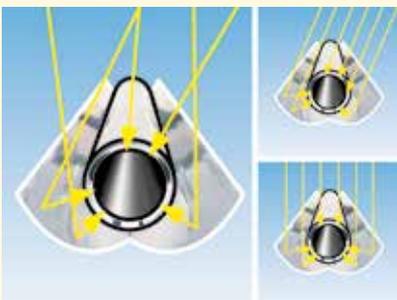
- High-quality tank insulation means the best possible efficiency
- Compact design
- Heat exchanger of long-wave stainless steel corrugated pipe for improved heat yield (no "shield effect" which is experienced with a narrow-waveband pipe)
- Output improved by the addition of latent material ("storage turbo")
- Fresh water principle (no bacterial growth, legionella formation) – hygienically optimal (the continuous-flow water heater principle gives legionella no chance)
- Digital temperature and content display
- Light and easy to handle
- Integrated carrying handles and belt grooves to simplify transport
- Ready to connect
- Easy to install with the connections arranged close to the wall
- Maintenance-free and does not corrode
- Maximum utilisation of volume
- Attractive design
- More than ten years' experience with plastic storage tanks



CPC 12/CPC 18

Solar collectors

Angle of incidence



Even at unfavourable angles of incidence, both direct and diffuse sunlight are optimally directed to the absorber thanks to the mirror geometry.

The **LATENTO** vacuum tube collectors perform convincingly at all times, having a very low heat loss and thus a very high efficiency, resulting in high solar yields even in transitional and winter months.

A highly-reflective, weather-resistant CPC mirror makes sure that the sun's rays from almost every direction and even at unfavourable angles of incidence are directed onto the absorber. Arrangement of the vacuum tubes to face in a particular direction is not necessary.

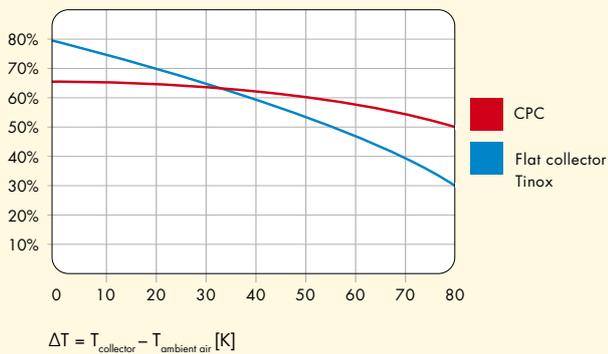
What you can expect from IVT solar collectors:

- very fast reaction times
- almost loss-free (< 6%)
- resistant to weather and ageing
- high performance even on cool days
- easy to install
- fracture-resistant (for example hail)
- "Made in Germany"
- "Solar Keymark" (DIN tested)

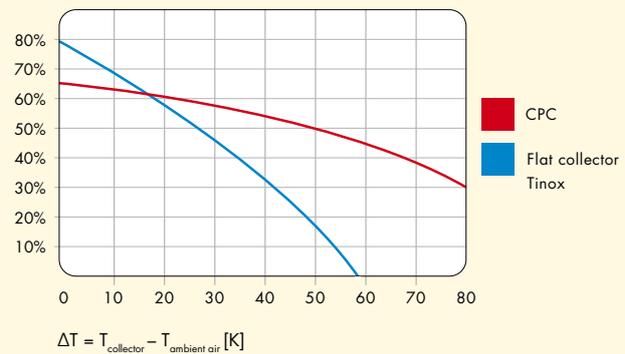


Comparison of the efficiency curves of the CPC collector and a flat collector

800 W/m²
radiation incidence



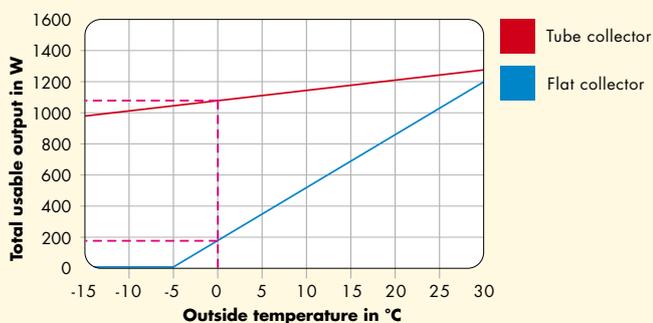
300 W/m²
radiation incidence



The vacuum of the CPC tube collectors (thermos-flask principle) ensures a low rate of heat radiation and thus a high rate of efficiency, above all on days when

ambient temperatures are low or the sun's radiation is diffuse – in other words, at all times when heating support is needed.

Comparison of the output of a CPC vacuum pipe collector with a flat collector



Example: output of a 7 m² collector area on an average January day (300 W solar radiation and 0°C outside temperature)

- The flat collector (efficiency approx. 10%) achieves a usable output of about 0.2 kW
- The tube collector (efficiency approx. 50%) achieves a usable output of about 1 kW

On an average January day, taking Würzburg as our example, with approx. 0°C outside temperature and 300 W/m² radiation intensity, the CPC tube collector with 7 m² collector area achieves over 1,000 W of

usable output, and the flat collector just 200 W. Increasing the collector area does not lead to higher temperatures and thus a better yield.



Connections Speed/Fix

Our fully-insulated connections are designed for maximum solar yield. Please note, however, that for the best possible yields it is necessary to install optimal insulation over the whole of the solar lead from the collector to the storage tank. Take care to avoid those insulation gaps which swallow up solar yield.

The Speed CPC connection set provides for a quick and simple connection from the collector. It consists of flexible

stainless steel corrugated pipe with high temperature- and weather-resistant heat insulation.

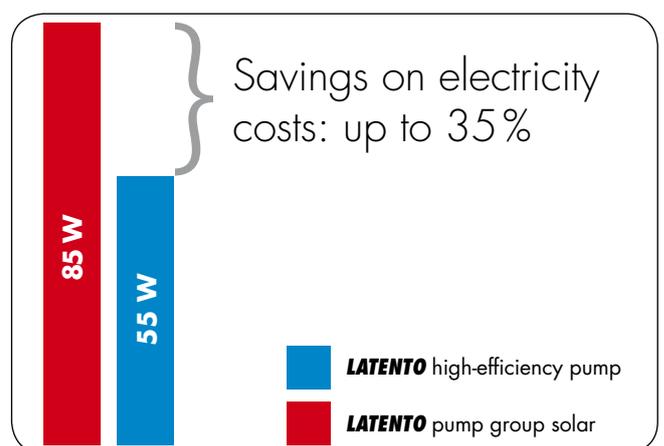
The matching quickly-fitted pipework system for complete insulation of the connection of pump group and vacuum tube collector consists of soft copper pipe (18x0.8 mm or 18x1 mm) or stainless steel corrugated pipe DN 16 or DN 20. A silicone sensor cable is integrated into the system. The insulation is designed using high-temperature resistant EPDM rubber foam.

Pump groups

The **LATENTO** solar heating system works with completely-insulated solar pump groups with integrated permanent vent for continuous removal of micro-bubbles in the solar circulation. This facilitates venting at the pump group.

Speed of the pump is infinitely variable according to output, and this means the pump group lasts longer and it saves electricity.

Using a **LATENTO** high-efficiency pump group, the maximum power drawn is 55 W. Compared with the 85 W **LATENTO** pump group solar, this solution saves up to 35% of electricity costs.



Tip: expansion vessels

We recommend that expansion vessels are included in the design, as per DIN 4757 standards, to guarantee the safety of the solar heating system itself. The expansion vessels in the **LATENTO** system are deliberately generously dimensioned. This is often not the case in traditional systems, and this can lead to system mal-

functions due to overheating or evaporation of the solar fluid in the installation. **LATENTO** expansion vessels prevent damage occurring to the system when it is not working.

Example: for a 7 m² collector area, we recommend a 50-litre expansion vessel.

Regulation

An efficient solar system certainly requires an efficient controller system. The new **LATENTO** solar controllers are easy to handle and providing various functions, for example, to regulate the whole heating system, to control individual temperature-difference or to control pump station with integrated solar regulator. This guarantees the high efficiency, the stability and long-life of a solar thermal system.

Solar controller S:

The **LATENTO** Solar controller S is a small controller which is suitable for simple solar systems. As a temperature difference controller it can be also used for other applications.



Solar controller L:

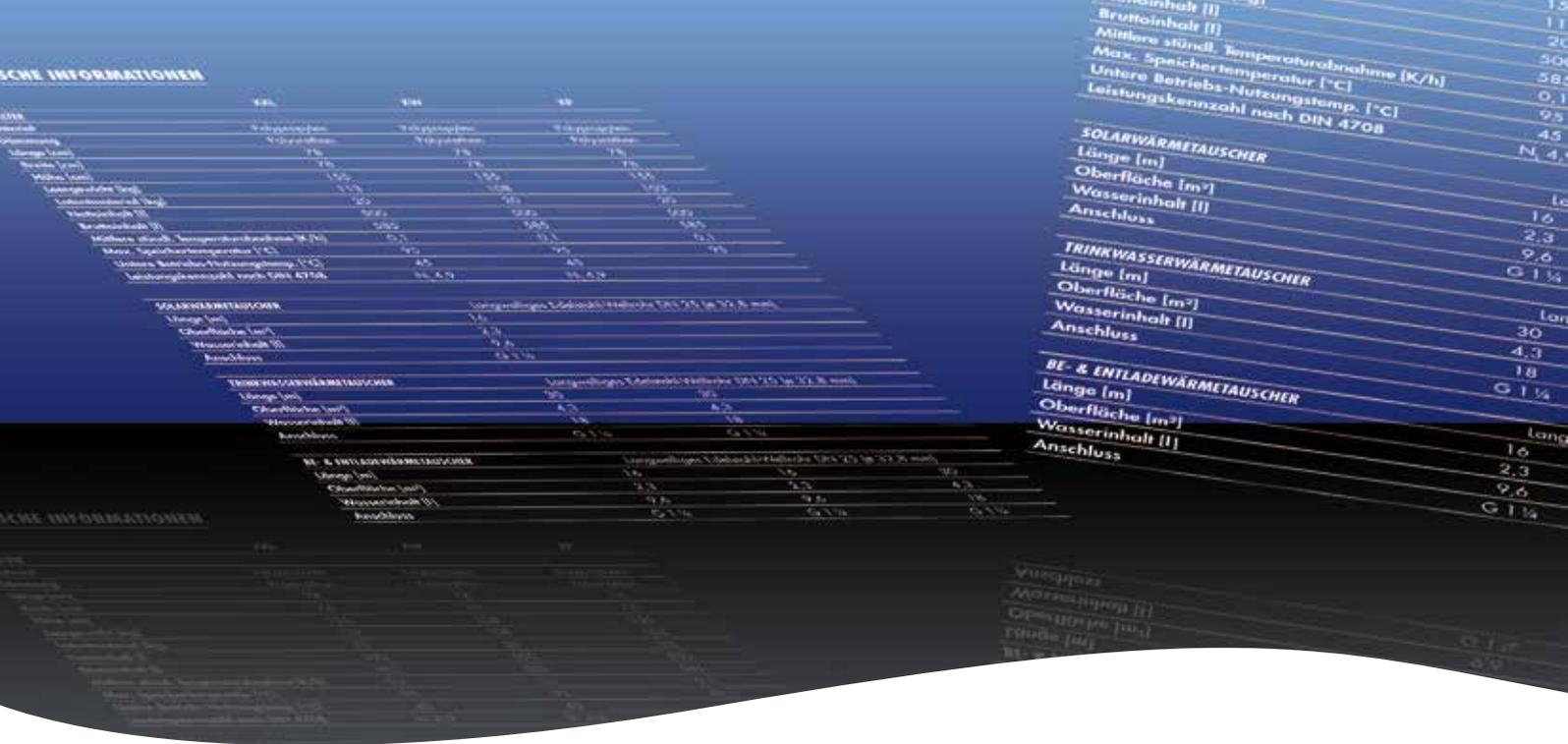
The **LATENTO** Solar controller L is a large difference controller which is suitable for complex solar systems. It provides 36 basic systems with additional functions for unused relays VFS and RPS flow, PWM output for high-efficiency pumps and pressure metering Remote control. Data logging via external data logger is also available.



System controller:

The **LATENTO** system controller is a large heating controller to regulate complex heating system with different heaters and also solar system. It provides totally 24 basic systems (11 hydraulic systems are designed by IVT) and a commissioning assistant which is used for quick and easy operating. Multilingual full-text menu with help texts and graphic mode is very friendly that even normal user can easily handle.





Technical data

Vacuum tube collector	CPC 12	CPC 18
Number of vacuum tubes	12	18
Width x height [m]	1.64x0.105	
Length [m]	1.39	2.08
Gross area [m ²]	2.28	3.41
Aperture area [m ²]	2.0	3.0
Collector capacity [l]	1.5	2.4
Weight approx. [kg]	37	54
Max. perm. operating press. [bar]	10	
Colour	grey, RAL 7015	
Glass material	Borosilicate 3.3	
Glass tube diameter [mm]	47	
Wall thickness [mm]	1.6	
Vacuum	long-term stable 10 ⁻⁶ mbar	
Absorber material	Aluminium	
Coating	Aluminium nitrite	
Optical efficiency	C ₀ : 0.642	
Loss factor C ₁ [W/m ² K]	0.885	
Loss factor C ₂ [W/m ² K ²]	0.001	
Setting angle [°]	15–90	
Connection	Threaded clamping ring	

	XXL	XW	XP
STORAGE TANK	500	500	500
Material tank	Polypropylene		
Material cover	Polypropylene		
Insulation	Polyurethane		
Lenght l [cm]	78	78	78
Width b [cm]	78	78	78
Hight h [cm]	158	158	158
Diagonal measurement (cm)	176	176	176
Weight empty [kg]	98	92	88
With Latent material [kg]	118	112	108
Gross capacity [l]	536	536	536
Average hourly temperature loss [K/h]	0,1	0,1	0,1
Max. storage temperature [°C]	85	85	85
Tapping rating (65 °C storage temperature) without re-heating [l]	247	277	
Continuous rating (85 °C re-heating) [l/h]	1220	1350	
Continuous power Q_D 85/10/45 (kW)	50	55	
Nominal power rating N_L^*	7,3	11,5	

SOLAR HEAT EXCHANGER	Long-wave stainless steel corrugated pipe DN 25 (ø 32,8x0,3 mm)		
Lenght [m]	14		
Surface area [m ²]	2,2		
Water content [l]	9,8		
Anschluss	G 1 ¼		

DRINKING WATER HEAT EXCHANGER	Long-wave stainless steel corrugated pipe DN 25 (ø 32,8x0,3 mm)		
Lenght [m]	29,1	31,2	
Surface area [m ²]	4,2	4,5	
Water content [l]	20,5	21,7	
Connection	G 1 ¼	G 1 ¼	

HEATING & DISCHARGE HEAT EXCHANGER	Long-wave stainless steel corrugated pipe DN 25 (ø 32,8x0,3 mm)		
Lenght [m]	15,8	19,5	33,5
Surface area [m ²]	2,3	2,8	4,8
Water content [l]	11,0	13,6	23,5
Connection	G 1 ¼	G 1 ¼	G 1 ¼

* as per DIN 4708-3 (heating rate 60 kW) ITW ((University of Stuttgart/Germany)



About the company

IVT (Installations- und Verbindungstechnik GmbH & Co. KG) is known internationally for innovative products in the fields of plumbing and heating engineering. Founded in 1994, the company which is a partner of the globally-active Würth Group uses modern extrusion plants to manufacture PE-X pipes for drinking water pipework, radiator connection systems and surface heating systems.

In 2001, the unpressurised Latento solar layered storage tank also came from IVT's research and development department. The plastic storage tank set standards in the field of efficient solar energy storage, and in 2006 as the first solar energy storage had the honour of the "Blue Angel" environmental award bestowed on it.

With its system solutions for drinking water installations and their radiator connection systems and surface heating systems, the **PRINETO** plastic pipe system is the ideal complement to a **LATENTO** all-year-round solar heating installation.

IVT's company philosophy is the realisation of innovations of a high technical standard. Many years of experience in the field of plastics engineering and numerous national and international references bear witness to the high quality of IVT products.

A brief portrait

Since its formation in 1994, IVT has grown continuously. It has 140 employees at home and abroad, annual sales amounting to some 34 million euro, and IVT has modern manufacturing facilities at its headquarters in Rohr, near Nuremberg and realises major national and international projects.

Business activities are concentrated on innovative solutions for sanitary and heating systems, which are well-known under the brand names of **PRINETO**, **NANOTEC** and **LATENTO**.

References

There are already thousands of **LATENTO** solar heating systems installed all over the world in various types of property (single- and multiple-occupancy houses, industrial buildings, hotels etc.), and the numbers are increasing all the time. Well-known developers and building sponsors as well as many installation and industrial concerns who set great store by quality and service are happy to rely on **LATENTO** all-year-round solar systems.



House in Madrid, Spain



Hotel Neubrandenburg, Germany



House in Peking, China



Grand Harbour Hotel, Malta



House in Nagano, Japan



Leisure park in Malta

LATENTO Solar heating systems efficient down to the last detail



A highly-efficient solar heating system is only created by consistently maintaining essential efficiency criteria in all components and by their perfect interaction. As a complete system, the **LATENTO** all-year solar heating system, with all its carefully-thought-out detail solutions, takes care of highly-efficient utilisation of solar energy for heating water and for supporting heating systems – throughout the whole year.

Your **LATENTO** system supplier

E&OE; subject also to technical modifications!

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