Storcube
A Part of CEEPOWER

Integrated PVT Solutions

Power, Heat & Water from the Sun

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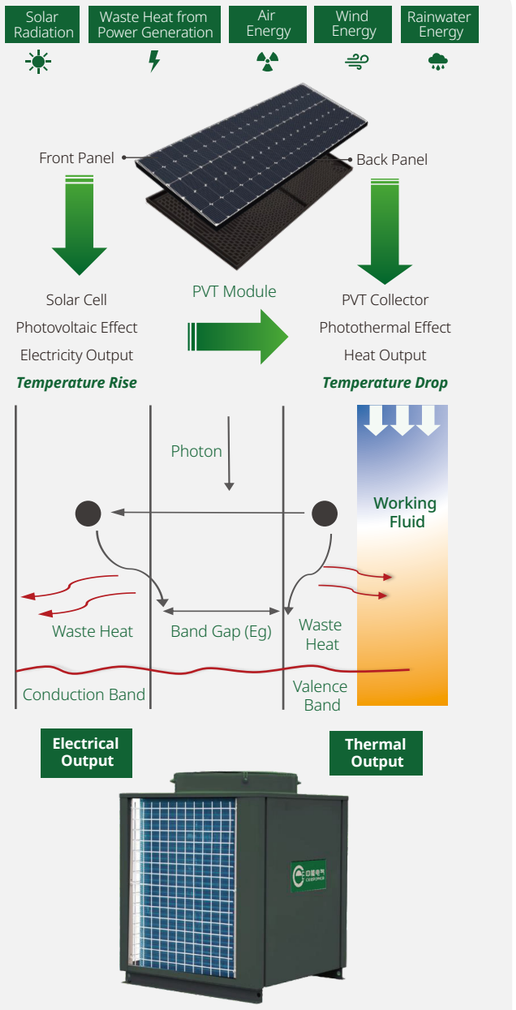
PVT (Photovoltaic-Thermal) Technology

Working Principle

- Temperature effect is a key factor limiting photovoltaic system efficiency. For monocrystalline silicon cells, every 1°C rise in temperature reduces power output by approximately 0.30%.
- PVT(Photovoltaic-Thermal) modules integrate photovoltaic and thermal functions. Shortwave solar radiation is converted into electricity by PV cells, while longwave radiation serves as a low-temperature heat source for heat pumps — enabling dual utilization of solar energy: electrical and thermal.

Workflow Diagram



Direct Expansion / Air Source Heat Pump (DX / ASHP)

Technical Features

Space-Saving

Generates both electricity and heat in limited roof space, avoiding the need for separate PV and solar thermal systems and reducing rooftop resource waste.

Improved PV Efficiency

Under good sunlight conditions, PV panels tend to overheat. A heat pump circulation system helps lower panel temperature, increasing power generation efficiency by over 10%.

Multifunctional Integration

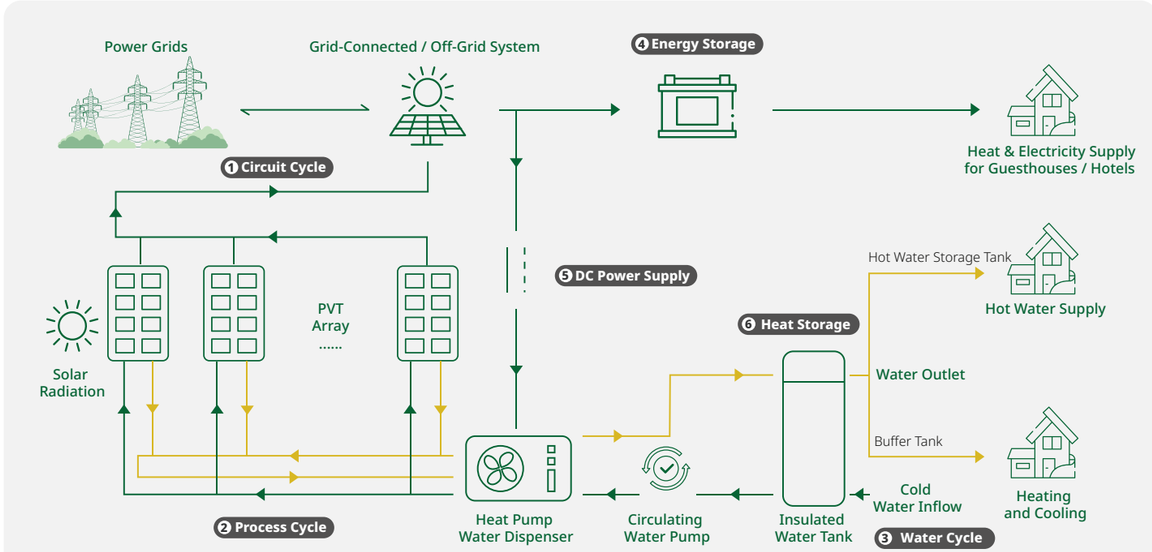
Integrates photovoltaic, solar thermal, and other renewable technologies to simultaneously meet electricity, hot water, and heating demands.

High Energy Efficiency

Based on air-source heat pump technology, using PVT modules as external evaporators can increase the system's COP (Coefficient of Performance) by 20–50% compared to standard air-source heat pumps.

Application of PVT Solar Heat Pump Systems

- The ultimate goal of renewable energy development is to continuously improve the level of electrification.
- Future buildings (including households) will adopt energy microgrid systems, integrating technologies such as photovoltaics, solar thermal, heat pumps, and energy storage (both electricity and heat), along with direct current applications — to achieve source-grid-load-storage integration.



Full-Range PVT Modules

Solar Utilization Exceeds 80%

Heat Pump Efficiency Improves by 20%-50%.

Annual PV Generation Up by 10% on Average

Passive PVT (Photovoltaic-Thermal) Integrated Module

Uses working fluid (antifreeze or water) circulation for natural heat exchange, collecting and transferring solar thermal energy.

Active PVT (Photovoltaic-Thermal) Integrated Module

Utilizes refrigerant circulation in a heat pump system to extract solar and ambient energy, functioning as an external evaporator for the heat pump.

Active PVT Integrated Module Specifications

Module Model	Total Power	Electrical Power	Thermal Power
SPVT-N10/50	1600W	400W	1200W

Excellent Heat Dissipation
Operates 10–20°C lower than conventional PV modules.

High Reliability
Outstanding UV resistance and insulation performance.

24/7 Thermal Supply
Provides domestic hot water or heating in all weather conditions.

Flexible Configuration
Scalable module quantity based on heating demand.

Multidimensional Utilization
Full-spectrum use: front-side power generation, rear-side heat collection.

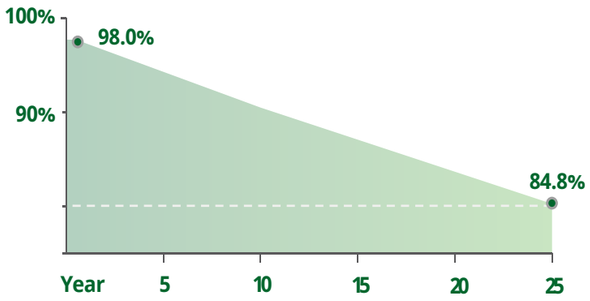
Compact & Powerful
Small footprint, lightweight design, high energy output.

Power Output Warranty:

12-Year Material & Workmanship Warranty
25-Year Linear Power Output Warranty

IEC 61215 & IEC 61730
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO 14064: Greenhouse Gas Emissions
ISO 45001: Occupational Health and Safety Management System

Note: Certification requirements may vary by country or region.
For specific certificates applicable to local markets, please contact us.

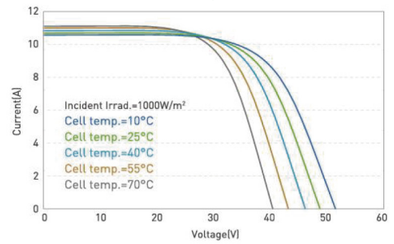


Application Feature

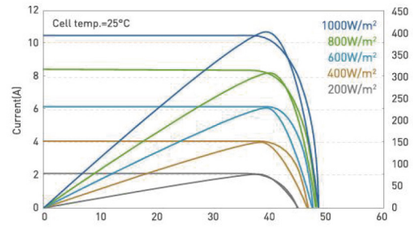
While generating electricity, the system simultaneously circulates heat pump working fluid (refrigerant) to transfer solar thermal energy to the heat pump, functioning as an external evaporator.

■ Curve Characteristics Diagram

I-V Curves at Different Temperatures (395W)



I-V / P-V Curves at Different Irradiance Levels (395W)



■ Performance Parameters (STC*)

Parameter	390W Module	395W Module	400W Module
PAMX (W) - Max Power	390	395	400
VMP (V) - Voltage at Max Power Point	30.1	30.3	30.55
IMP (A) - Current at Max Power Point	13	13.04	13.1
VOC (V) - Open-Circuit Voltage	34.95	35.05	35.2
ISC (A) - Short-Circuit Current	13.61	13.65	13.71
Photovoltaic Conversion Efficiency	0.2104	0.2131	0.2158
Photothermal Conversion Efficiency	0.6312	0.6393	0.6474

STC: Irradiance = 1000 W/m², Cell Temperature = 25°C, AM = 1.5*

■ Temperature Coefficients

Parameter	Value
Open-Circuit Voltage (Voc)	−0.24% / °C
Short-Circuit Current (Isc)	+0.04% / °C
Maximum Power (Pmax)	−0.29% / °C
Nominal Operating Temperature (NOCT)	43 ± 2°C

■ Application Specifications

Parameter	Value
Maximum System Voltage	DC1500V
Operating Temperature	-40~+85°C
Maximum Fuse Current	25A
Safety Class	Class II
Static Load	Wind/Snow Load 2400/5400Pa
Heat Exchange Area	3.7m²
Heat Transfer Medium	R410A or R290
Operating Pressure	< 6.0MPa
Heat Exchange Port	3/8 Inch External Thread

■ Mechanical Specifications

Parameter	Value
Cell Type	N-type Topcon 182mm
Module Dimensions	1937 × 957 × 35 mm
Weight	33 kg
Front Panel	Glass
Back Panel	Aluminum Alloy
Frame	PPO Composite Material
Junction Box	IP68, 3 Diode Tubes
Output Cable	4 mm², 300 mm Cable
Connector	MC4 Compatible

Disclaimer: This product's single page is as comprehensive and detailed as possible based on the existing materials. The company reserves the right to modify data, parameters, and other information. The final interpretation right belongs to Ceepower and its subsidiaries.

Integrated PVT Heat Pump Water Heater

Product Composition

On-Grid

Grid-Tied Micro Inverter

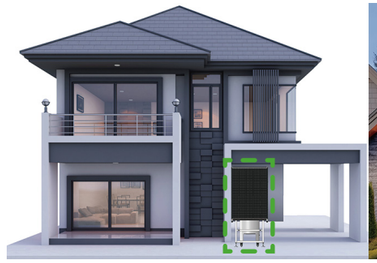
Off-Grid

Battery Storage + Off-Grid Micro Inverter

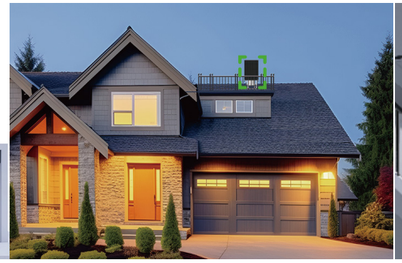
PVT Solar Thermal Component | Compressor | Enamel Water Tank | Energy Storage Battery (Optional) | Micro Inverter (Off-grid/On-grid) | Integrated Bracket | Pipeline Connection

Application Scenarios

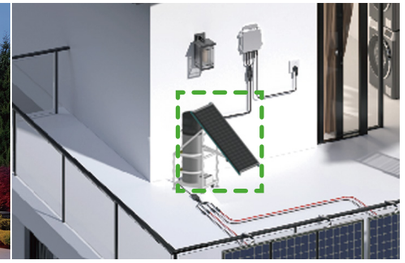
Suitable for residential houses and villas — installation in courtyards, rooftops, or open balconies. Meets daily domestic hot water needs for an entire household.



Courtyard Installation



Rooftop Installation



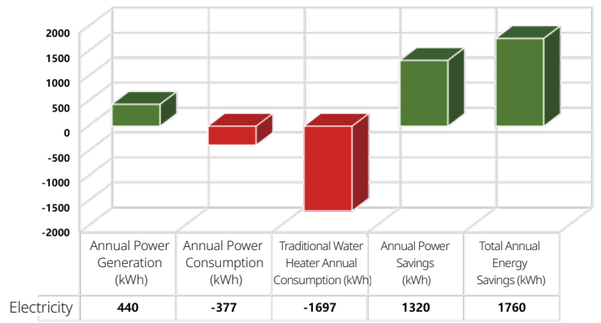
Open Balcony Installation

Competitive Analysis

By using solar energy as the heat source for the heat pump water heater, combined with energy storage and battery storage functions, the system can achieve over 440 kWh of annual power generation (depending on local solar irradiation). Based on a daily hot water usage of 100L, the annual energy savings can reach 377 kWh.

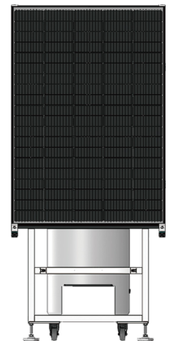
In comparison with traditional electric heating systems (which consume approximately 1697 kWh/year), this solution delivers a net electricity gain of 1320 kWh, resulting in a total annual energy benefit of 1760 kWh.

One-Time Investment, Free Hot Water for Life!



	Annual Power Generation (kWh)	Annual Power Consumption (kWh)	Traditional Water Heater Annual Consumption (kWh)	Annual Power Savings (kWh)	Total Annual Energy Savings (kWh)
Electricity	**440**	**-377**	**-1697**	**1320**	**1760**

Specifications



Parameter	Unit	SPKRS002/01-150 I
PVT Power Rating	W	400-1200
Number of PVT Units	pcs	45293
Power Supply Specification	V/Hz	220/50
Rated Heating Capacity	W	960-3500
Rated Input Power	W	350-500
COP (Coefficient of Performance)	W/W	7
Max Water Output	L/h	70
Max Input Power	W	2500
Max Input Current	A	11.4
Max Water Outlet Temperature	A	60°C
Ingress Protection Rating	--	IPX4
Electric Shock Protection Class	--	Class I
Max Working Pressure (Heat Exchanger)	MPa	2.8
Max Pressure (Discharge/Suction)	MPa	2.8 / 0.7
Max Allowable Pressure (High/Low)	MPa	2.8 / 0.7
Inlet/Outlet Pipe Size	DN	15
Pipe Connection Spec	mm	9.52 × 6.35
Dimensions	mm	φ510 × 1820
Net/Gross Weight	kg	70 / 84
Noise Level	dB(A)	< 38
Operating Temperature Range	°C	-15°C ~ 40°C

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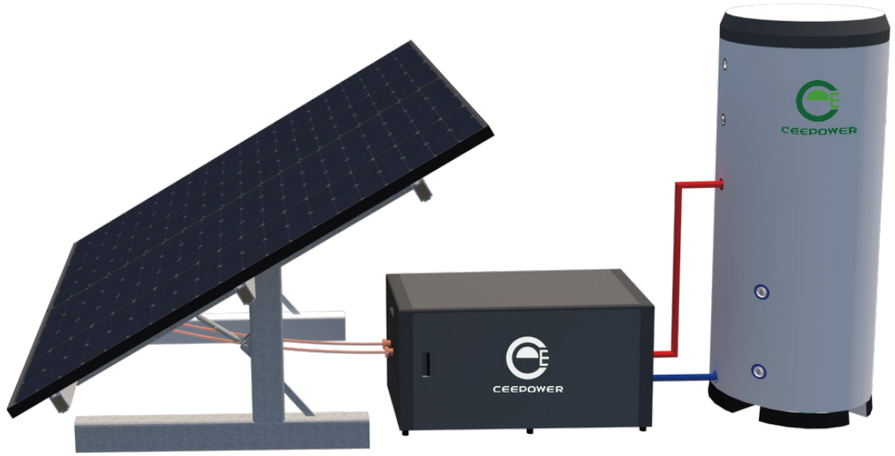
Split-Type PVT Heat Pump Water Heater

Product Composition



PVT Solar Thermal Component | Compressor | Enamel Water Tank | Energy Storage Battery (Optional) | Micro Inverter (Off-grid/On-grid) | Integrated Bracket | Pipeline Connection

Application Scenarios

- For residential and villa rooftops, the system can be flexibly configured and installed based on household size and daily water usage.
- In limited rooftop space, it enables both power generation and domestic hot water supply, avoiding the need for separate PV and solar water heater installations — thus preventing rooftop resource waste.

Specifications

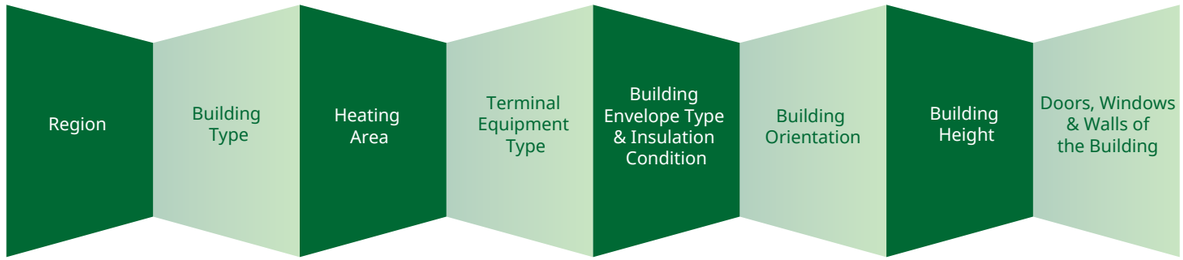
Model	PVTFXRS-1.45IABP
Heating Capacity (W)	1450
Average Input Power (W)	200
Hot Water Production (L/h)	31.2
COP (W/W) (W/W)	7.25
Auxiliary Heating Power (W)	2000
Max Input Power (W)	2300
Max Input Current (A)	11
Max Water Outlet Temperaturé (C)	70
Noise Level (dB(A))	40
Power Supply	220V/1N~50Hz
Refrigerant Type	R290
Expansion Valve Type	Electronic Expansion Valve
Circulating Water Flow (L/h)	249
Allowable Pressure Loss (Outside Unit) (kPa)	40
Water Pipe Size (Inlet/Outlet) (mm)	2 x DN20
Water Pipe Connection Type	Internal Thread
Water Side Pressure Test (MPa)	≤2.0
Liquid Pipe Size (mm)	6.35
Liquid Pipe Connection Type	Flared Connection
Gas Pipe Size (mm)	9.52
Gas Pipe Connection Type	Flared Connection
Length (mm)	585
Width (mm)	428
Height (mm)	389
Net Weight (kg)	33

Test conditions: Steam temperature 20°C, initial water temperature 15°C, final water temperature 55°C.

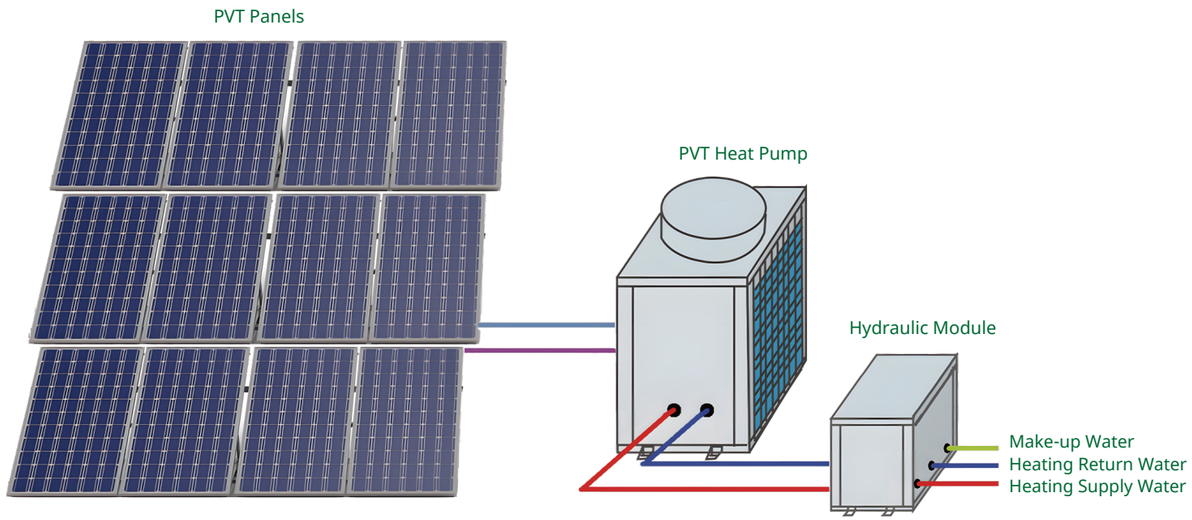
PVT Modular Heat Pump Heating System

Annual Power Generation > Heat Pump Power Consumption

Key Factors in Designing a Building Heating Plan



Application Scenarios



The diagram is for reference only. Actual projects should be based on specific design requirements.

Reference Configuration

No.	Area	System Configuration
1	≤100 m^2	6 PVT panels + 1 set of 3P unit 290 + hydraulic module (1 circulation pump, 1 constant pressure tank, valve group, pipes, fittings)
2	100–150 m^2	12 PVT panels + 1 set of 5P unit 290 + hydraulic module (1 circulation pump, 1 constant pressure tank, valve group, pipes, fittings)
3	150–200 m^2	12 PVT panels + 2 sets of 3P unit 290 + hydraulic module (2 circulation pumps, 1 constant pressure tank, valve group, pipes, fittings)
4	200–300 m^2	24 PVT panels + 2 sets of 5P unit 290 + hydraulic module (2 circulation pumps, 1 constant pressure tank, valve group, pipes, fittings)
5	300–400 m^2	36 PVT panels + 3 sets of 5P unit 290 + hydraulic module (2 circulation pumps, 1 constant pressure tank, valve group, pipes, fittings)

1. *This table is based on the climate and solar radiation conditions of Munich, Germany.*
2. *Our company is capable of providing customized heating system designs for different regional climates and building types.*