

Snowland

—Low temperature air source heat pump

The low temperature (EVI:Enhanced Vapor Injection) air source heat pump is specially designed for the cold region in the North part. The snowland series heat pump is equipped with international famous brand Copeland compressor, they can work at minimum -25°C for house heating



EVI Theory of Operation

Copeland EVI Scroll compressors are equipped with a vapour injection connection for Economizer Operation. Economizing can be accomplished by utilising a subcooling circuit similar to the circuit shown in Figure 1. This increases the refrigeration capacity and the system efficiency. The benefits provided will increase as the compression ratio increases.

The schematic shows a system configuration for the economizer cycle. A heat exchanger is used to provide additional subcooling to the refrigerant before it enters the evaporator. This subcooling process provides the increased capacity gain measured in the system. During the subcooling process, a certain amount of refrigerant is evaporated. This evaporated refrigerant is injected into the compressor and provides additional cooling at higher compression ratios.

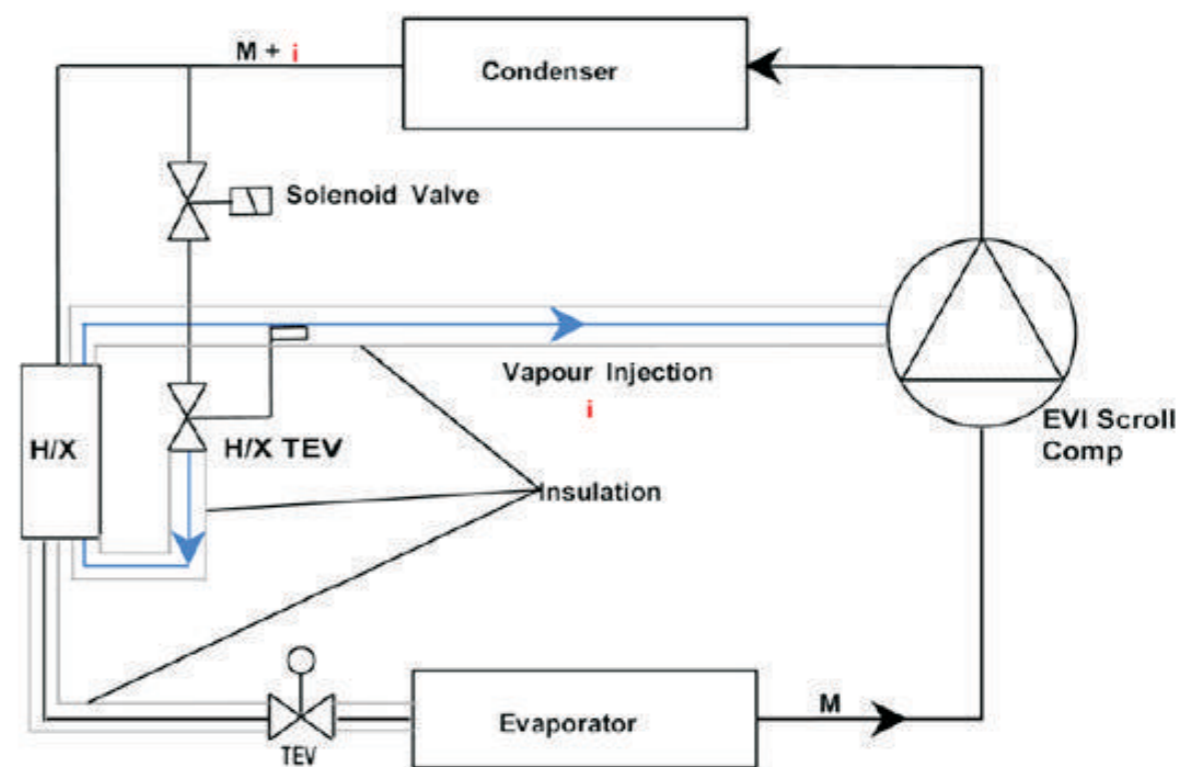


Figure 1. EVI Schematic

How does the conventional air source heat pump work?

The heat from the sun is stored in the air year after year so that we can get a large of free renewable energy constantly from the nature.

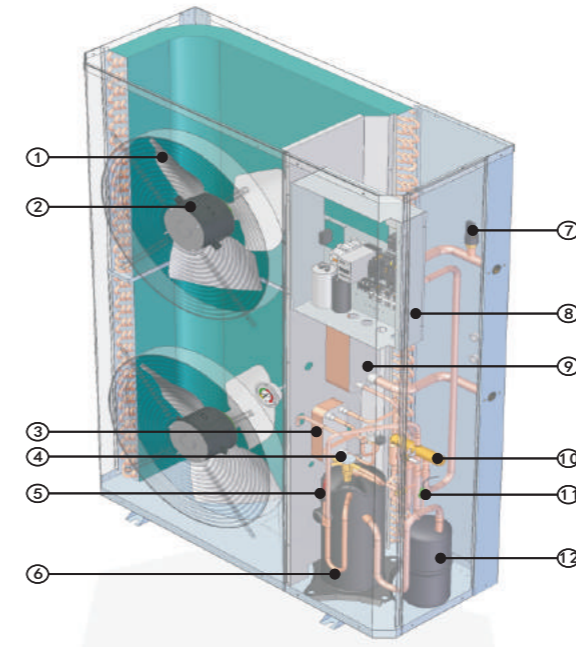
The stored energy is the ideal heat source for your daily heating demand.

The air source heat pump absorbs heat from the solar energy in the air. The heat is collected and transferred to be high grade heat to be released to heat house or domestic hot water by underfloor heating system or radiator.

The solar energy stored in the air is absorbed into the heat pump system by a heat exchanger (evaporator). In the evaporator, the refrigerant absorbs the solar energy and turns into gas at very low temperature.

The gas refrigerant is compressed by compressor and turns into hot and high pressure gas, then transfers heat to the water which will be used for house heating .Then the refrigerant coverts into low pressure liquid and is ready to absorb heat for the next cycle.

Structure



- 1-Axial fan blade
- 2-Axialfan motor
- 3-Economizer
- 4-Expansion valve
- 5-High pressure switch
- 6-Compressor
- 7-Water flow switch
- 8-Electric box
- 9-Heat exchanger
- 10-4 way valve
- 11-Low pressure switch
- 12-Gas-liquid separator

This diagram takes model R PEVI - 1 6 M H as example, this model's actual structure has some difference from other models' structure.

When the ambient temperature is very low, what will happen ?

When the conventional scroll compressor operates at the low evaporating temperature, the suction specific volume will increase, the compression ratio will increase and the discharge temperature will raise quickly. All of those will cause the sharp decrease of the compressor performance, the insufficient heating and the hard operation of the compressor. In this case, the air source heat pump has great increasing power consumption but quick decreasing of the heating capacity, so the heat pump is unable to increase the water temperature effectively .

The effective working temperature of the air source heat pump is only -5°C!

To solve the above problem, the supplier of the scroll compressor developed the Enhanced Vapour Injection(EVI) compressor, which means the medium pressure vapour is injected into the intermediate vapour injection port in order to increase the discharge volume, decrease the discharge temperature and improve the heating capacity, so that the heat pump can provide sufficient heat capacity even at the low ambient temperature. Meanwhile, the open and close of the vapour filling channel is applied as a supplementary means to unload or adjust the capacity.

The low temperature air source heat pump can normally work at -25°C

Specification

Model		RPEVI-10MH	RPEVI-12MH	RPEVI-16MH	RPEVI-25MH	RPEVI-34MH
Heating capacity *	KW	9.2	11.6	15.9	24.6	34
Heating power input *	KW	2.5	3.2	4.4	6.8	7.4
COP*	/	3.68	3.63	3.61	3.62	/
Max. water temperature	°C	60	60	60		60
Rated water temperature	°C	55	55	55		55
Water flow	m3/h	1.58	1.99	2.73	4.23	5.6
Water pressure drop	Kpa	22	24	28	30	40
Water connections	Inch	1	1	1	1	1.5
Noise	dB(A)	52	52	55	58	58
Compressor	Brand	Copeland (EVI)	Copeland (EVI)	Copeland (EVI)	Copeland (EVI)	Copeland (EVI)
	Quantity	1	1	1	1	2
Power supply	/	220V/1PH/50Hz	220V/1PH/50Hz	380V/3PH/50Hz	380V/3PH/50Hz	380V/3PH/50Hz
Refrigerant	/	R407C	R407C	R407C	R407C	R407C
Net weight	kg	100	110	150	240	265
Gross weight	kg	115	125	165	265	280
Net dimensions	mm	1110*460*850	1110*460*850	1110*460*1655	1110*460*1655	1110*460*1655
Packing dimensions	mm	1175*530*1010	1175*530*1010	1180*530*1800	1360*625*1800	1360*625*1800

1. Unit working temperature : -25°C to 43°C

2. *Test condition: ambient temp: 7°C/6°C, water inlet/outlet: 30°C/35°C

** Test condition: ambient temp: -2°C, water inlet/outlet: 30°C/35°C

*** Test condition: ambient temp: -20°C, water inlet/outlet: 30°C/35°C

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