

PAH VS

HIGH EFFICIENCY AIR TO WATER HEAT PUMPS

EQUIPPED WITH INVERTER SCREW COMPRESSORS AND AXIAL FAN

Heating power from 480 kW to 1380 kW

R513A



Packaged air cooled heat pumps of PAH VS Ke series are suitable for outdoor installation and can be used to cool and heat fluid solutions for air conditioning or in industrial applications. The SEMI-HERMETIC SCREW compressor technology with INVERTER motor control, constantly modulating, guarantees a high capacity of partialisation of the cooling and heating power supplied, with a consequent increase in seasonal efficiency, also in applications with highly variable loads. All the units are totally factory assembled and tested, following specific quality procedures. Besides they are totally hydraulic, cooling and electrical connected permitting a quick installation once on site. Before the test the cooling circuits of each unit are subjected to a pressure test and then charged with Refrigerant R513A and non-freezing oil.

VERSIONI

HE High efficiency, EC fans.
U Ultra low noise.

TECHNICAL DATA

PAH VS Ke		402	502	602	702	802	902	1002	1102
Heating capacity (EN14511) ⁽¹⁾	kW	496,5	622,1	706,6	821,9	980,6	1091,8	1266,9	1343,1
Total input power (EN14511) ⁽¹⁾	kW	122,3	154,5	176,8	206,5	237,2	268,9	297,0	330,0
Input current	A	205,9	260,1	297,6	347,6	399,4	452,8	500,1	555,6
COP (EN14511) ⁽¹⁾	W/W	4,06	4,03	4,00	3,98	4,13	4,06	4,27	4,07
SEER	W/W	4,59	4,58	4,60	4,59	4,60	4,63	4,62	4,60
Cooling capacity (EN14511) ⁽²⁾	kW	412,0	521,2	624,2	723,1	808,6	908,5	1050,6	1112,4
Total input power (EN14511) ⁽²⁾	kW	155,1	193,0	217,4	251,6	290,8	334,9	367,1	416,5
Input current	A	261,1	324,9	365,9	423,6	489,5	563,8	618,0	701,2
EER	W/W	2,66	2,70	2,87	2,87	2,78	2,71	2,86	2,67
Sound power ⁽³⁾	dB(A)	97	99	99	100	100	101	102	102
Sound pressure ⁽⁴⁾	dB(A)	64,5	66,0	66,0	67,0	67,0	68,0	69,0	69,0
Power supply	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Circuits	n°	2	2	2	2	2	2	2	2
Compressors	n°	2	2	2	2	2	2	2	2
Fans	n°	8	10	12	14	16	20	20	20
Refrigerant		R513A	R513A	R513A	R513A	R513A	R513A	R513A	R513A
Refrigerant charge	kg	158	177	340	452	478	515	537	551
Global warming potential (GWP)		573	573	573	573	573	573	573	573
Equivalent CO ₂ charge	t	91	101	195	259	274	295	308	316

PAH VS U Ke		402	502	602	702	802	902	1002	1102
Heating capacity (EN14511) ⁽¹⁾	kW	480,0	607,7	708,6	836,4	943,5	1106,2	1163,9	1318,4
Total input power (EN14511) ⁽¹⁾	kW	115,6	145,6	166,2	194,3	223,5	248,6	278,1	312,5
Input current	A	194,6	245,2	279,9	327,0	376,3	418,5	468,2	526,1
COP (EN14511) ⁽¹⁾	W/W	4,15	4,17	4,26	4,31	4,22	4,45	4,19	4,22
SEER	W/W	4,58	4,58	4,60	4,60	4,58	4,61	4,63	4,58
Cooling capacity (EN14511) ⁽²⁾	kW	407,9	517,1	606,7	704,5	811,6	918,8	1040,3	1133,0
Total input power (EN14511) ⁽²⁾	kW	150,4	188,7	212,4	248,4	284,3	311,8	354,3	395,5
Input current	A	253,2	317,7	357,6	418,2	478,6	524,9	596,5	665,9
EER	W/W	2,71	2,74	2,86	2,84	2,86	2,95	2,94	2,86
Sound power ⁽³⁾	dB(A)	92	94	94	95	96	97	98	98
Sound pressure ⁽⁴⁾	dB(A)	60	61	61	62	63	64	65	65
Power supply	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Circuits	n°	2	2	2	2	2	2	2	2
Compressors	n°	2	2	2	2	2	2	2	2
Fans	n°	10	12	14	16	20	20	24	24
Refrigerant		R513A	R513A	R513A	R513A	R513A	R513A	R513A	R513A
Refrigerant charge	kg	177	197	452	478	537	551	621	649
Global warming potential (GWP)		573	573	573	573	573	573	573	573
Equivalent CO ₂ charge	t	101	113	259	274	308	316	356	372

Performances are referred to the following conditions:

(1) Heating: Ambient temperature 7°C DB, 6°C WB, water temperature 30/35°C.

(2) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C

(3) Sound power level in accordance with ISO 3744.

(4) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744.

PAH VS HE Ke		402	502	602	702	802	902	1002	1102
Heating capacity (EN14511) ⁽¹⁾	kW	516,6	645,8	739,2	871,5	995,4	1113,0	1269,5	1375,5
Total input power (EN14511) ⁽¹⁾	kW	121,4	149,4	173,1	196,1	229,8	251,6	314,3	356,9
Input current	A	204,4	251,4	291,4	330,1	386,9	423,6	529,2	600,9
COP (EN14511) ⁽¹⁾	W/W	4,26	4,32	4,27	4,44	4,33	4,42	4,04	3,85
SEER	W/W	5,25	5,57	5,47	5,15	5,35	5,44	5,60	5,68
Cooling capacity (EN14511) ⁽²⁾	kW	462,0	581,7	661,5	783,3	905,1	1000,7	1146,6	1239,0
Total input power (EN14511) ⁽²⁾	kW	150,8	179,4	209,9	243,3	289,6	311,6	363,9	381,9
Input current	A	253,9	302,0	353,4	409,6	487,5	524,6	612,7	643,0
EER	W/W	3,06	3,24	3,15	3,22	3,13	3,21	3,15	3,24
Sound power ⁽³⁾	dB(A)	95	96	101	99	100	101	100	101
Sound pressure ⁽⁴⁾	dB(A)	63	64	69	66	67	68	67	68
Power supply	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Circuits	n°	2	2	2	2	2	2	2	2
Compressors	n°	2	2	2	2	2	2	2	2
Fans	n°	10	12	14	16	20	20	24	24
Refrigerant		R513A	R513A	R513A	R513A	R513A	R513A	R513A	R513A
Refrigerant charge	kg	185	205	478	515	557	580	656	680
Global warming potential (GWP)		573	573	573	573	573	573	573	573
Equivalent CO ₂ charge	t	106	117	274	295	319	332	376	390

PAH VS HE U Ke		402	502	602	702	802	902	1002
Heating capacity (EN14511) ⁽¹⁾	kW	485,1	627,9	716,1	844,2	963,9	1131,9	1281,0
Total input power (EN14511) ⁽¹⁾	kW	106,1	137,4	159,4	185,8	207,0	272,2	293,8
Input current	A	178,6	231,3	268,4	312,8	348,5	458,3	494,5
COP (EN14511) ⁽¹⁾	W/W	4,57	4,57	4,49	4,54	4,66	4,16	4,36
SEER	W/W	5,37	5,47	5,47	5,11	5,27	5,33	5,46
Cooling capacity (EN14511) ⁽²⁾	kW	443,1	562,8	621,6	758,1	875,7	1010,1	1129,8
Total input power (EN14511) ⁽²⁾	kW	140,1	177,2	198,8	243,1	284,3	335,8	359,5
Input current	A	235,8	298,2	334,7	409,2	478,6	565,3	605,2
EER	W/W	3,16	3,18	3,13	3,12	3,08	3,01	3,14
Sound power ⁽³⁾	dB(A)	89	90	97	96	97	95	96
Sound pressure ⁽⁴⁾	dB(A)	57	58	65	63	64	62,	63
Power supply	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Circuits	n°	2	2	2	2	2	2	2
Compressors	n°	2	2	2	2	2	2	2
Fans	n°	12	14	16	20	20	24	24
Refrigerant		R513A	R513A	R513A	R513A	R513A	R513A	R513A
Refrigerant charge	kg	205	248	515	557	580	656	680
Global warming potential (GWP)		573	573	573	573	573	573	573
Equivalent CO ₂ charge	t	117	142	295	319	332	376	390

Performances are referred to the following conditions:

(1) Heating: Ambient temperature 7°C DB, 6°C WB, water temperature 30/35°C.

(2) Cooling: ambient air temperature 35°C, evaporator water temperature in/out 12/7 °C

(3) Sound power level in accordance with ISO 3744.

(4) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744.

COMPONENTS

FRAME

All units are made from hot-galvanised sheet steel, painted with polyurethane powder enamel and stoved at 180°C to provide maximum protection against corrosion. The frame is self-supporting with removable panels. All screws and rivets used are made from stainless steel. The standard colour of the units is RAL9018.

COOLING CIRCUITS

The refrigerant circuit is assembled using internationally recognised brand name components with all brazing and welding being performed in accordance with ISO 97/23. The refrigerant

utilised is R513A. The refrigerant circuit includes: sight glass, filter drier, electronic expansion valves, 4 way reversing valve, check valves, liquid receiver, liquid separator, schrader valves for maintenance and control, pressure safety device (for compliance with PED regulations).

COMPRESSOR

Compressors of semi-hermetic screw type, controlled by integrated frequency inverter, allowing to adapt the power to the load variations ensuring at the same time the maximum efficiency at different operating conditions. The compressors are provided

with motor thermal protection, rotation direction control, crank-case heater, oil filter, oil service valve, POE oil charge and vibration dumpers kit. Compressors lubrication is of forced type without pump, to avoid excessive oil migrations to the cooling circuit, compressors are equipped with an oil separator on discharge side. Both compressors are equipped with an oil flow safety switch, an optoelectronic device operating in case the oil flow inside the compressor falls below the minimum threshold.

SOURCE HEAT EXCHANGER

Finned pack type, Copper/Aluminium, with micro-finned copper tubes, positioned in staggered rows and mechanically expanded into an aluminium finned pack. Fins are designed with such a shape providing the highest heat exchange efficiency. The max operating pressure refrigerant side is 45 relative bar.

USER HEAT EXCHANGERS (SIZE 402-502)

The user heat exchanger is a braze welded, plate type heat exchanger, manufactured from AISI 316 stainless steel. The use of this type of exchanger results in a massive reduction of the refrigerant charge of the unit compared to a traditional shell-in-tube type. A further advantage is a reduction in the overall dimensions of the unit. The exchangers are factory insulated with flexible close cell material and can be fitted with an antifreeze heater (accessory). Each exchanger is fitted with a temperature sensor on the discharge water side for antifreeze protection.

USER HEAT EXCHANGERS (SIZE 602-1102)

Tube bundle type with dry expansion and pure electrolytic copper tubes, shell and tube plate made up of carbon steel. The exchanger is provided with anti-condensation insulation made up of a nitrile rubber and polyethylene foam with a thickness of 8mm externally protected by an embossed scratchproof polyethylene film. The hydraulic connection are of elastic Victaulic type. Inside the shell, some plastic and corrosion-proof baffles, allowing a correct water distribution and making the tube bundle particularly strong and vibration free, even with high water flows. The evaporator is also provided with a safety water flow switch that does not allow the unit to operate in case of water flow rate lack to the evaporator.

FANS

The fans are direct drive axial type with aerofoil blades, are statically and dynamically balanced and are supplied complete with a safety fan guard complying with the requirements of EN 60335. They are fixed to the unit frame via rubber anti-vibration mountings. The electric motors are electronic type, with permanent magnet motors with an integrated driver that modulates the speed of rotation. The motors are fitted with integrated thermal overload protection and have a moisture protection rating of IP 54.

MICROPROCESSORS

All units are supplied as standard with microprocessor controls. The microprocessor controls the following functions: control of the water temperature, antifreeze protection, compressor timing, compressor automatic starting sequence (For multiple compressors), alarm reset. The control panel is supplied with display showing all operational icons. The microprocessor is set for automatic defrost (when operating in severe ambient conditions) and for summer/ winter change over. The control also manages the integration with other heating sources (electric heaters, boilers, solar panels etc) and both the heating circuit pump and the domestic hot water circuit pump. If required (available as an option), the microprocessor can be configured in order for it to connect to a site BMS system thus enabling remote control and management.

ELECTRIC ENCLOSURE

The enclosure is manufactured in order to comply with the requirements of the electromagnetic compatibility standards 2014/35/UE

and 2014/30/UE. Access to the enclosure is achieved by removing the front panel of the unit. The following components are supplied as standard on all units: main switch, a sequence relay that disables the power supply in the event that the phase sequence is incorrect (scroll compressors can be damaged if they rotate in the wrong direction), thermal overloads (protection of pumps and fans), compressor fuses, control circuit automatic breakers, compressor contactors, fan contactors and pump contactors. The terminal board has volt free contacts for remote ON-OFF, Summer/ winter change over (heat pumps only) and general alarm.

CONTROL AND PROTECTION DEVICES

All units are standardly equipped with several control and safety devices: water return temperature sensor, installed on the water return pipe of the system, and anti-freeze probe, installed on the water supply pipe to the system high-pressure switch with automatic reset. There are also included a low-pressure automatic reset, pressure transducer (used to optimize the defrosting cycle and modulate the rotation speed of the fans according to external conditions), Freon side safety device, compressor thermal protection, fan thermal protection, flow switch.

VERSIONS

Ultrasilenced version (U)

The remarkably low sound level is reached on U versions without sacrificing performance or working limits.

This is done by:

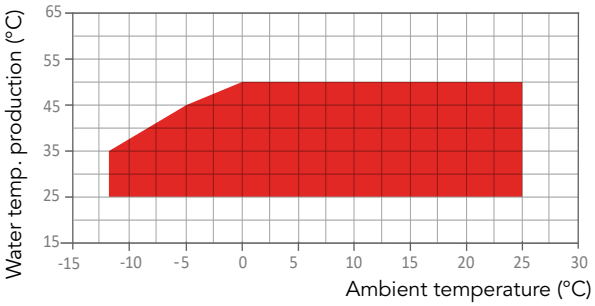
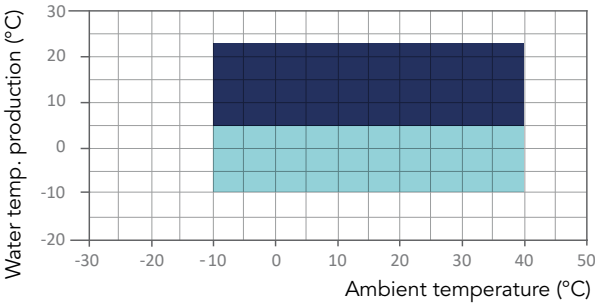
- Adopting refrigerant/air exchangers with wider surfaces than those of the units in standard version.
- Soundproof compressor casing with higher thickness of the soundproof material;
- Fan speed control through variable fixed drive.

Version with partial heat recovery RP

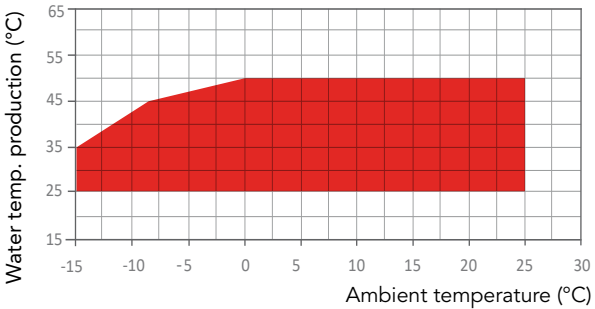
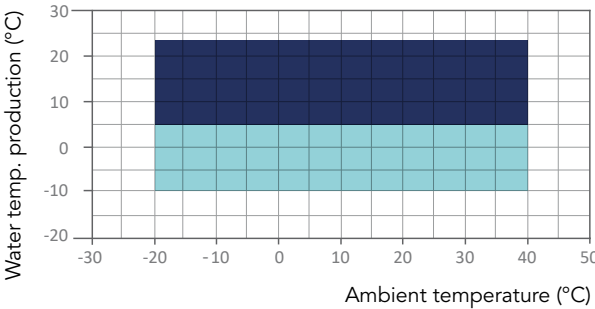
In this configuration, a refrigerant/water heat exchanger is installed on each cooling circuit on gas discharge line. Such exchanger, placed in series and before the air condenser, is sized to recover about 20% of the condensing heat to produce hot sanitary water at medium / high temperatures.

OPERATION LIMITS

Standard version

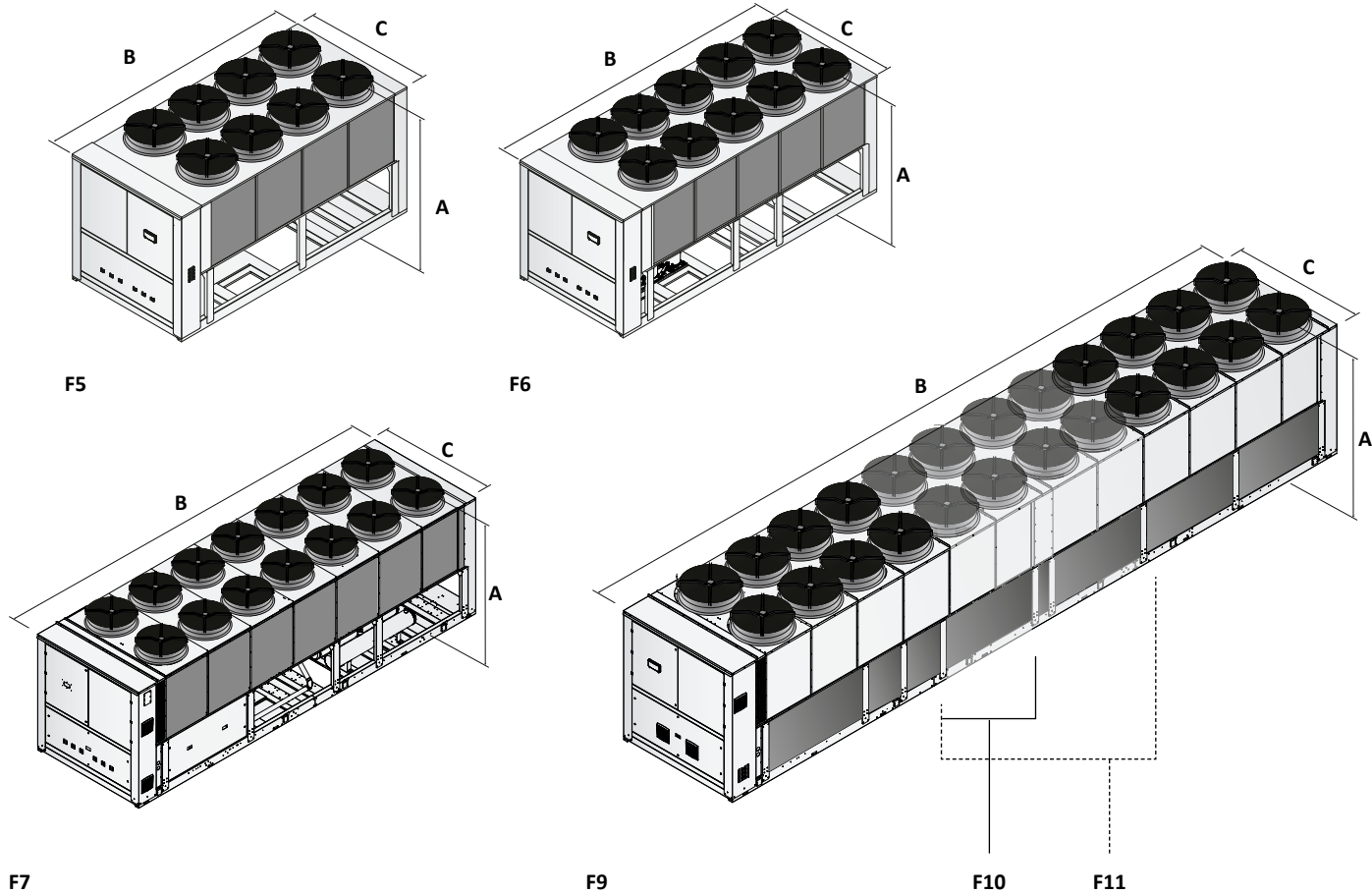


HE version



Cooling mode
 Glycol set-up

Heating mode



FRAME	F5	F6	F7	F8	F9	F10	F11
A (mm)	2560	2560	2560	2560	2560	2560	2560
B (mm)	4750	5725	6700	7250	9800	10680	12780
C (mm)	2300	2300	2300	2300	2300	2300	2300

ACCESSORIES

PAH VS Ke		402	502	602	702	802	902	1002	1102
Amperometer	A	O	O	O	O	O	O	O	O
Electrical power supply different than standard	AE	O	O	O	O	O	O	O	O
Electrofin Coil Treatment	BEF	O	O	O	O	O	O	O	O
Operation in cooling mode down to -20°C	BF	O	O	O	O	O	O	O	O
Soundproofed compressors cabinet with standard material	CF	●	●	●	●	●	●	●	●
Soundproofed compressors cabinet with higher thickness material	CFU ⁽¹⁾	O	O	O	O	O	O	O	O
Soundproofing jacket on compressors	CI	O	O	O	O	O	O	O	O
Compressors inrush counter	CS	O	O	O	O	O	O	O	O
Condensing coil protection grid	GP	O	O	O	O	O	O	O	O
Anti-intrusion grid	GP3	O	O	O	O	O	O	O	O
Victaulic insulation on pump side	I1	O	O	O	O	O	O	O	O
Victaulic insulation buffer tank side	I2	O	O	O	O	O	O	O	O
RS 485 Serial interface	IH	O	O	O	O	O	O	O	O
Seawood packing	IM	O	O	O	O	O	O	O	O
TCP/IP Protocol serial interface	IWG	O	O	O	O	O	O	O	O
Phase monitor	MF	O	O	O	O	O	O	O	O
Buffer tank module	MV	O	O	O	O	O	O	O	O
Pump group	P1	O	O	O	O	O	O	O	O
Pump + tank	P1+MV	O	O	O	O	O	O	O	O
Pump Variable flow 2 Poles high prevalence	P12HVS ⁽²⁾	O	O	O	O	O	O	O	O
Pump Variable flow 2 Poles high prevalence + tank	P12HVS+MV ⁽²⁾	O	O	O	O	O	O	O	O
Pump Variable flow 2 Poles	P12VS ⁽²⁾	O	O	O	O	O	O	O	O
Pump Variable flow 2 Poles + tank	P12VS+MV ⁽²⁾	O	O	O	O	O	O	O	O
Higher available pressure pump group	P1H	O	O	O	O	O	O	O	O
Higher available pressure pump group + tank	P1H+MV	O	O	O	O	O	O	O	O
Double pump group	P2	O	O	O	O	O	O	O	O
Double pump group + tank	P2+MV	O	O	O	O	O	O	O	O
Double pump group Variable flow 2 Poles high prevalence	P22HVS ⁽²⁾	O	O	O	O	O	O	O	O
Double pump group Variable flow 2 Poles high prevalence + tank	P22HVS+MV ⁽²⁾	O	O	O	O	O	O	O	O
Double pump group Variable flow 2 Poles	P22VS ⁽²⁾	O	O	O	O	O	O	O	O
Double pump group Variable flow 2 Poles + tank	P22VS+MV ⁽²⁾	O	O	O	O	O	O	O	O
Higher available pressure double pump group	P2H	O	O	O	O	O	O	O	O
Higher available pressure double pump group + tank	P2H+MV	O	O	O	O	O	O	O	O
Rubber-type vibration dampers	PA	O	O	O	O	O	O	O	O
Spring-type vibration dampers	PM	O	O	O	O	O	O	O	O
Remote display	PQ	O	O	O	O	O	O	O	O
In-line twin pump group (only one working)	PT	O	O	O	O	O	O	O	O
In-line twin pump group (only one working) + tank	PT+MV	O	O	O	O	O	O	O	O
In-line twin pump group Variable flow	PTVS	O	O	O	O	O	O	O	O
In-line twin pump group Variable flow + tank	PTVS+MV	O	O	O	O	O	O	O	O
Anti-freeze heater on evaporator	RA	O	O	O	O	O	O	O	O
Shut-off valve on compressors discharge side	RD	O	O	O	O	O	O	O	O
Shut-off valve on compressors suction side	RH	O	O	O	O	O	O	O	O
Compressor overload relays	RL	O	O	O	O	O	O	O	O
Prepainted fins coil	RM	O	O	O	O	O	O	O	O
Partial heat recovery	RP	O	O	O	O	O	O	O	O
Copper/Copper coil	RR	O	O	O	O	O	O	O	O
Electronic thermostatic valve	TE	●	●	●	●	●	●	●	●
Voltmeter	V	O	O	O	O	O	O	O	O
Brine Version	VB	O	O	O	O	O	O	O	O
Solenoid valve	VS	O	O	O	O	O	O	O	O

(1) Standard for U versions

(2) 4 poles for U versions (P14 / P24)

● Standard ○ Optional – Not available