WAMAK

Heat pump

SCROLL

EEV

HEAT COOL

WEB APP

TWW 120 EVI HD Modul

WAMAK TWW 120 EVI HD Modul

Product description

High-efficiency heat pump consisting of multiple modules of separate heat pumps. A wide range of applications from heating, cooling and domestic hot water heating of office or multifunctional buildings, to industrial applications in cascade connection.

Use for demanding industrial applications. By combining the most suitable performance and application variants of heat pump modules, it is possible to tailor-make the complete system required. Each module is refrigeration, hydraulically and electrically isolated with a separate controller. The connection of the modules is cascaded, whereby each single controller can take over the function of the cascade master.

As a primary source, thermal energy from underground water at a depth of between 12 and 30 metres is used. A submersible pump delivers the groundwater to the heat pump and, depending on the quality and chemical composition, the heat from the groundwater is extracted either directly in the heat pump or through a separating heat exchanger with an intermediate circuit and antifreeze. The heat pump then raises this temperature to a usable temperature for heating or hot water.

The EVI (Enhanced Vapour Injection) technology allows the heat pump to achieve higher header flow temperatures even at lower source temperatures. EVI also has a possitive impact on the compressor lifespan and overall system stability because the discharge gas temperature from the compressor is lower.

The twin compressors give the system robustness and the ability to distribute the heat output according to the actual load.

Product features

- Scroll compressor
- EVI technology
- Asymetric plate heat exchanger
- Multi-stage capacity control
- Phase and rotation control
- High pressure sensor - analogue
- Flow switch consumer - on/off - (with accessory)
- Flow switch source - on/off - (with accessory)
- DHW temperature sensor
- Cascade control
- Solid frame structure
- Sylomer pads under compressor unit
- Electronic expansion valve
- Two-stage capacity control
- Compressor soft starter
- High pressure switch
- Low pressure sensor - analogue
- Flow sensor consumer - analogue - (with accessory)
- Outdoor temperature sensor
- Buffer temperature sensor
- Modbus connection
- Two level frame

Basic performance data - WAMAK TWW 120 EVI HD Modul

Heating - EN 14511		
Heating capacity [kW]	W10 / W35 (max)	**123.9** (62.0 / 123.9)
	W10 / W35 (min)	**62.0** (62.0 / 123.9)
	W10 / W34	**124.0** (62.0 / 124.0)
Electrical power input [kW]	W10 / W35 (max)	**21.7** (10.7 / 21.7)
	W10 / W35 (min)	**10.7** (10.7 / 21.7)
	W10 / W34	**21.3** (15.3 / 31.0)
Heating efficiency faktor [COP]	W10 / W35 (max)	5.71
	W10 / W35 (min)	5.79
	W10 / W34	5.83
Seasonal space heating energy efficiency - SCOP EN 14825		
Average Climate / Low Temperature [35°C]	SCOP	6.46
	η [%]	258.6
	Label	A+++
	Qhe [kWh]	255977.4
	Pdesignh [kW]	123.9
	Tbivalent [°C]	-10
Cooling		
Cooling capacity - [kW]	A35 / W23-18	96.9
	A25 / W23-18	101.8
	A35 / W12-7	72.8
	A25 / W12-7	72.8
Seasonal space cooling energy efficiency - SEER EN 14825		
[W 23 / 18°C]	SEER	5.14
	Qce [kWh]	43680.0
	ηc [%]	205.7
Sound EN 12102		
Acoustic power - Lw	dB(A)	65
Acoustic pressure - Lp	**1 m** dB(A)	57
	5 m dB(A)	43
	10 m dB(A)	37
Mechanical and operational information		
Compressor type (3~ 400/50)	SCROLL / 2 /	On/Off
Refrigerant	R410A (GWP - 2088)	15.8 kg
Operating limit temperatures heating - (min / max) [°C]		25 / **65**
Operating limit temperatures source - (min / max) [°C]		**-10 (7)** / 30
Weight		530 kg

Main technical data - WAMAK TWW 120 EVI HD Modul

Enclosure type		HD2L1
Basic dimensions	Height [mm]	2000
	Width [mm]	820
	Length [mm]	1200
Weight [kg]		530
Colour		Gray
Enclousure IP Class		IP20
Refrigeration cycle		
Compressor	Type	Scroll
	Number of stages	2
	On/Off	
	Power factor Cosϕ	0.64
	Winding resistance	0.76 Ohm
Refrigerant		R410A
	Volme	15.8 kg
	GWP	2088
	Safety class	A1
Refrigeration oil type	POE RL32-3MAF	
	Oil volume	2 x 3.38 L
Maximal pressure - refrigerant [bar]		50
	PED class	2
EVI - vapour injection with economizer		
Electrical connection data		
Line voltage [#~ V/Hz]		3~ 400/50
Current	nominal [A]	46.70
	maximal [A]	74.80
	starting [A]	63.04
Softstart		2 x MCD 201
Main safety		C80

Control System

Main controller	SIEMENS	RVS 21 AVS 55.199	
Extension module	AVS75.3xx	AVS75.3xx	AVS75.3xx
Bus Clip-In		LPB OCI346	Modbus OCI352
Online connection		Web server OZW672	ToSyMo
Superheat controller			Carel EEV Cont

*** with accessory

Heat energy rejection side data		
Operating limit temperatures heating	MAX [°C]	65
	MIN [°C]	25
for more see operating limits diagram		
Condenser	Port size	VIC 2.1/2 "
	Type	BPHE
	Count	1
	Material	AISI 316
Maximal operating pressure - refrigerant [bar]		50
Maximal operating pressure - Water [bar]		3
Testing pressure [bar]		70
Heat transfer medium		Water
Volume flow - Water [m3/h]		10.64 ~ 21.28
Internal pressure drop - Water [kPa]		20
Temperature difference	@ 35°C (nom)	5 K
	@ 55°C	8 K
	@ 65°C	10 K
Renewable energy extraction side data		
Operating limit temperatures source	MIN [°C]	-10 (7)
	MAX [°C]	30
for more see operating limits diagram		
Evaporator	Port size	VIC 2.1/2 "
	Type	BPHE
	Count	1
	Material	AISI 316
Maximal operating pressure - refrigerant [bar]		29
Heat transfer medium		Water
Maximal operating pressure - Water [bar]		3
Volume flow - Water [m3/h]		11.05 ~ 22.10
Internal pressure drop - Water [kPa]		20
Temperature difference - Water		4 K

WAMAK TWW 120 EVI HD Modul

ErP (EU) No 811/2013: Technical parameters for heat pump space heaters

Model	**TWW 120 EVI HD Modul**
Air-to-water heat pump	no
Brine-to-water heat pump	no
Water-to-water heat pump	yes
Low-temperature heat pump	no
Equipped with a supplementary heater	no
Heat pump combination heater	no
Temperature application	low (35°C - 30°C)
Climate conditions	average

Item	Symbol	Value	Unit
Rated heat output at Tdesignh	Prated	123.9	kW
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = -7 °C	Pdh	124.0	kW
Tj = +2 °C	Pdh	124.1	kW
Tj = +7 °C	Pdh	62.1	kW
Tj = +12 °C	Pdh	62.1	kW
Tj = bivalent temperature	Pdh	123.9	kW
Tj = operation limit temperature	Pdh	---	kW
Bivalent temperature	Tbiv	-10	°C
Power consumption in modes other than active mode			
Off mode	Poff	0.010	kW
Thermostat-off mode	Pto	0.010	kW
Standby mode	Psb	0.010	kW
Crankcase heater mode	Pck	0.000	kW
Other items			
Capacity control		multi-stage	
Sound power level			
indoors	Lwa	65	dB
outdoors	Lwa	---	dB
Annual energy consumption	Q_{HE}	255977.4	kWh

Item	Symbol	Value	Unit
Seasonal space heating energy efficiency	ηs	258.6	%
Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = -7 °C	COPd	5.83	-
Tj = +2 °C	COPd	6.4	-
Tj = +7 °C	COPd	6.9	-
Tj = +12 °C	COPd	7.3	-
Tj = bivalent temperature	COPd	5.7	-
Tj = operation limit temperature	COPd	---	-
Tj = operation limit temperature	TOL	---	°C
Heating water operating limit temperature	WTOL	65	°C
Supplementary heater			
Rated heat output	Psup	19.0	kW
Type of energy input		electricity	
For air-to-water heat pumps: Rated air flow rate, outdoors	-	---	m3/h
For water- or brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	-	11.05 ~ 22.10	m3/h

Contact details: WAMAK, s.r.o., Orovnica 252, 96652, Orovnica, Slovensko, info@wamak.sk

WAMAK TWW 120 EVI HD Modul

ErP (EU) No 811/2013: Technical parameters for heat pump space heaters

Model	**TWW 120 EVI HD Modul**
Air-to-water heat pump	no
Brine-to-water heat pump	no
Water-to-water heat pump	yes
Low-temperature heat pump	no
Equipped with a supplementary heater	no
Heat pump combination heater	no
Temperature application	middle (55°C - 47°C)
Climate conditions	average

Item	Symbol	Value	Unit
Rated heat output at Tdesignh	Prated	123.4	kW
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = -7 °C	Pdh	124.6	kW
Tj = +2 °C	Pdh	125.1	kW
Tj = +7 °C	Pdh	62.7	kW
Tj = +12 °C	Pdh	62.8	kW
Tj = bivalent temperature	Pdh	123.4	kW
Tj = operation limit temperature	Pdh	---	kW
Bivalent temperature	Tbiv	-10	°C
Power consumption in modes other than active mode			
Off mode	Poff	0.010	kW
Thermostat-off mode	Pto	0.010	kW
Standby mode	Psb	0.010	kW
Crankcase heater mode	Pck	0.000	kW
Other items			
Capacity control		multi-stage	
Sound power level			
indoors	Lwa	65	dB
outdoors	Lwa	---	dB
Annual energy consumption	Q_{HE}	254944.4	kWh

Item	Symbol	Value	Unit
Seasonal space heating energy efficiency	ηs	200.6	%
Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = -7 °C	COPd	4.03	-
Tj = +2 °C	COPd	5.2	-
Tj = +7 °C	COPd	5.9	-
Tj = +12 °C	COPd	6.5	-
Tj = bivalent temperature	COPd	3.6	-
Tj = operation limit temperature	COPd	---	-
Tj = operation limit temperature	TOL	---	°C
Heating water operating limit temperature	WTOL	65	°C
Supplementary heater			
Rated heat output	Psup	19.0	kW
Type of energy input		electricity	
For air-to-water heat pumps: Rated air flow rate, outdoors	-	---	m3/h
For water- or brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	-	11.05 ~ 22.10	m3/h

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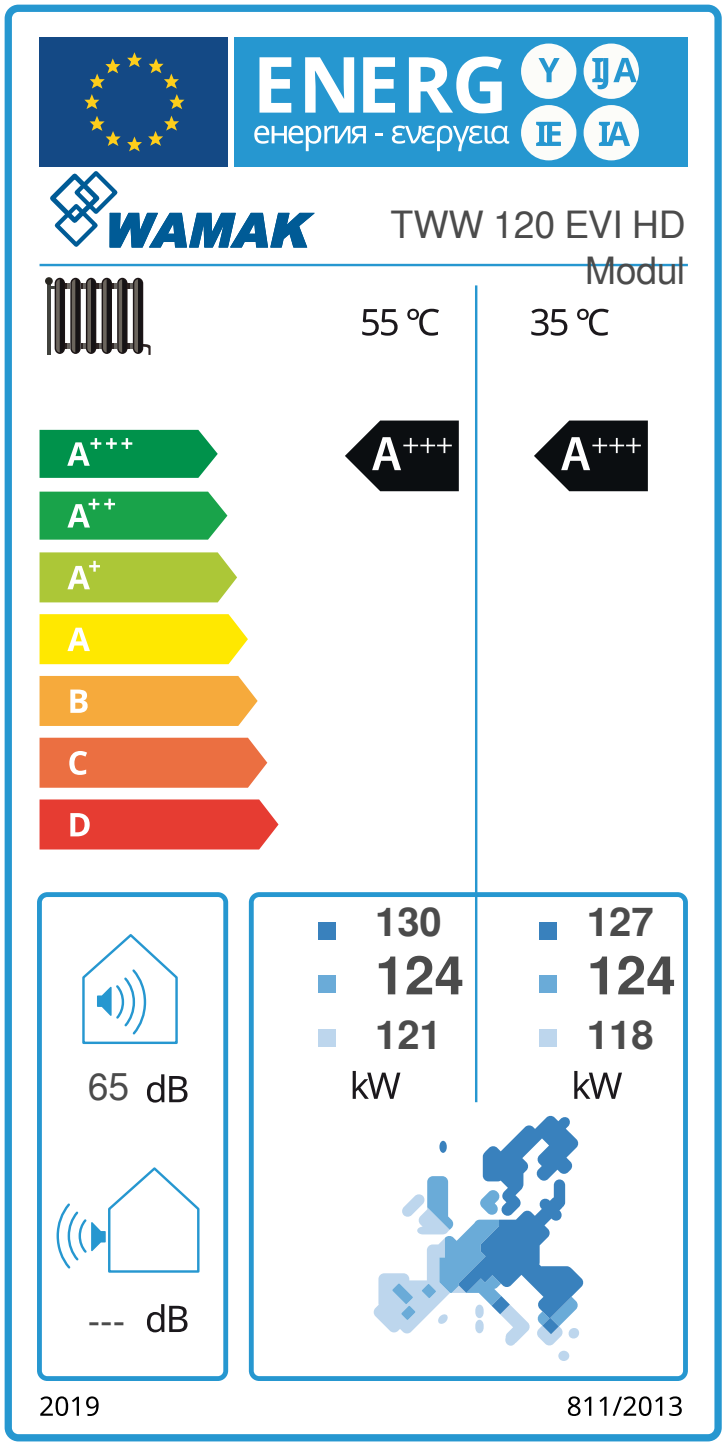


TWW 120 EVI HD **ErP Data**

Modul

		55 °C	35 °C
Energy class		A+++	A+++
η	[%]	200.6	258.6
P_{rated}	[kW]	124	124
Q_{HE}	[kWh/y]	254945	255978
SCOP	[-]	5.02	6.46
$T_{bivalent}$	[°C]	-10	-10

CONTROLER

+ QAA55/75	class **VII**	3.5% ↓
- QAA55/75	class **III**	1.5% ↓

Heating performance data

Version: v202223.006-BW-WW

Source - Brine [0°C] / Low Temperature [35°C]

ZHI46K1P-TWD_R410A_2_BWW

	Operating conditions	Qh	P	COP
1	B0 / W30-35	98.4	21.7	4.53
2	B0 / W30-35 (MIN)	49.2	10.7	4.60
A	B0 / Wxx-34	98.3	21.2	4.63
B	B0 / Wxx-30	97.8	19.4	5.04
C	B0 / Wxx-27	48.7	8.9	5.45
D	B0 / Wxx-24	48.5	8.3	5.82
E	B0 / Wxx-35	98.4	21.7	4.53
F	B0 / Wxx-35	98.4	21.7	4.53

SCOP DATA EN 14825:2018	
Source - Brine [0°C] / Low Temperature [35°C]	
SCOPon	5.13
SCOPnet	5.13
SCOP	5.13
η [%]	205.17
Label	A+++
Qh [kWh]	203294
Pdesignh [kW]	98.4
Tbivalent [°C]	-10

Source - Brine [0°C] / Medium Temperature [55°C]

	Operating conditions	Qh	P	COP
1	B0 / W47-55	100.4	34.0	2.95
2	B0 / W47-55 (MIN)	50.2	16.6	2.99
A	B0 / Wxx-52	101.1	31.1	3.36
B	B0 / Wxx-42	101.2	24.2	4.22
C	B0 / Wxx-36	49.8	10.6	4.70
D	B0 / Wxx-30	49.5	9.6	5.17
E	B0 / Wxx-55	100.4	34.0	2.95
F	B0 / Wxx-54	101.2	31.8	3.18

SCOP DATA EN 14825:2018	
Source - Brine [0°C] / Medium Temperature [55°C]	
SCOPon	4.11
SCOPnet	4.11
SCOP	4.10
η [%]	164.18
Label	A+++
Qh [kWh]	207426
Pdesignh [kW]	100.4
Tbivalent [°C]	-10

Source - Water [10°C] / Low Temperature [35°C]

	Operating conditions	Qh	P	COP
1	W10 / W30-35	123.9	21.7	5.71
2	W10 / W30-35 (MIN)	62.0	10.7	5.79
A	W10 / Wxx-34	124.0	21.3	5.83
B	W10 / Wxx-30	124.1	19.5	6.35
C	W10 / Wxx-27	62.1	9.0	6.86
D	W10 / Wxx-24	62.1	8.5	7.32
E	W10 / Wxx-35	123.9	21.7	5.71
F	W10 / Wxx-35	123.9	21.7	5.71

SCOP DATA EN 14825:2018	
Source - Water [10°C] / Low Temperature [35°C]	
SCOPon	6.47
SCOPnet	6.47
SCOP	6.46
η [%]	258.60
Label	A+++
Qh [kWh]	255977
Pdesignh [kW]	123.9
Tbivalent [°C]	-10.00

Source - Water [10°C] / Medium Temperature [55°C]

	Operating conditions	Qh	P	COP
1	W10 / W47-55	123.4	34.0	3.63
2	W10 / W47-55 (MIN)	61.7	16.8	3.68
A	W10 / Wxx-52	124.6	31.0	4.03
B	W10 / Wxx-42	125.1	24.2	5.17
C	W10 / Wxx-36	62.7	10.6	5.92
D	W10 / Wxx-30	62.8	9.6	6.51
E	W10 / Wxx-55	123.4	34.0	3.63
F	W10 / Wxx-55	123.4	34.0	3.63

SCOP DATA EN 14825:2018	
Source - Water [10°C] / Medium Temperature [55°C]	
SCOPon	5.02
SCOPnet	5.02
SCOP	5.02
η [%]	200.64
Label	A+++
Qh [kWh]	254944
Pdesignh [kW]	123.4
Tbivalent [°C]	-10.00

Low temperature cooling W 12 / 7°C

	Operating conditions	Qc	P	EER
A	W30-35 / W12-7	74.8	23.2	3.22
B	W26-xx / W12-7	76.2	21.2	3.59
C	W22-xx / W12-7	77.3	19.4	3.98
D	W18-xx / W12-7	77.9	18.6	4.20

SEER DATA EN 14825:2018 [W 12 / 7°C]	
SEERon	3.86
SEER	3.86
Qc [kWh]	43680
η [%]	154.44

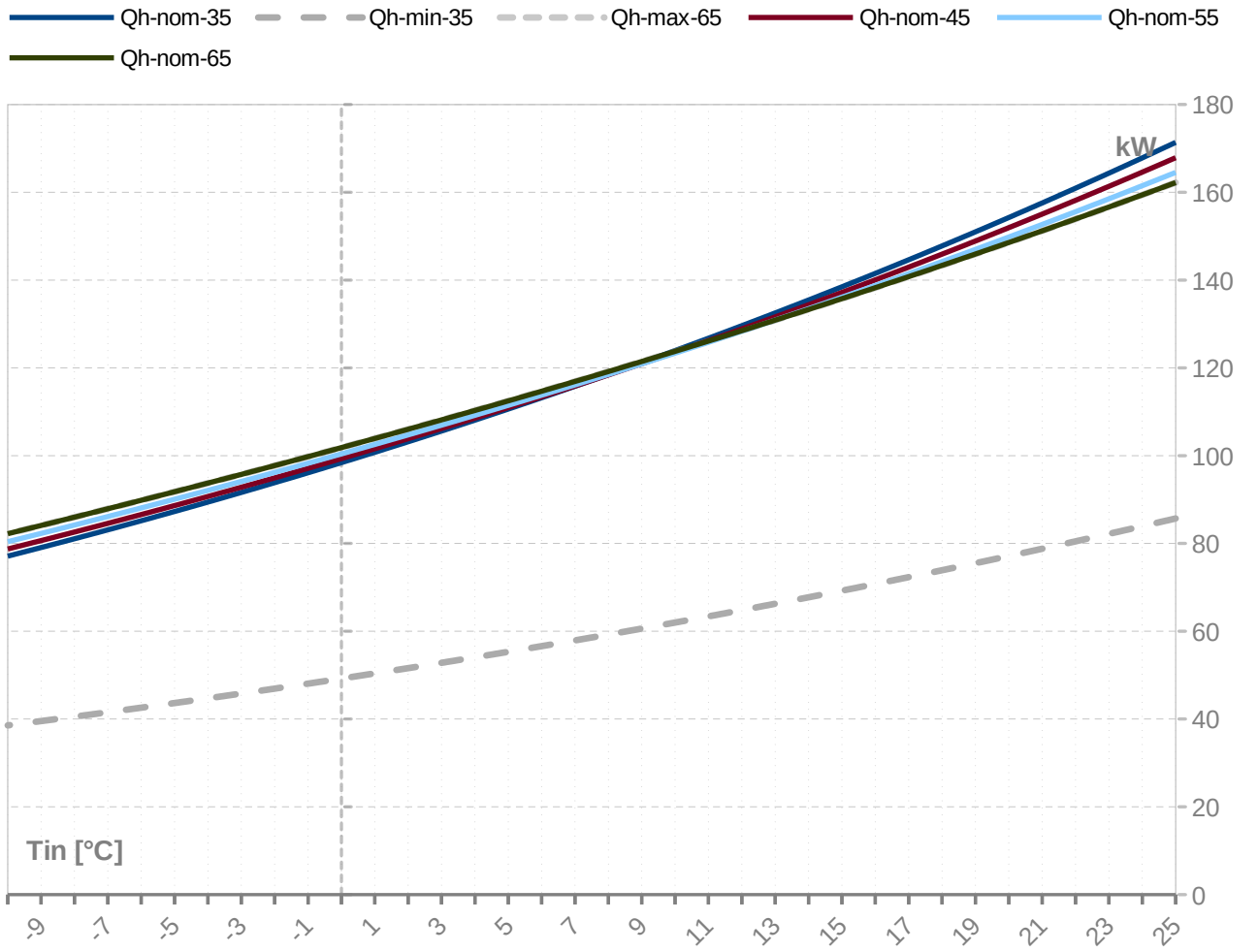
Radiant cooling W 23 / 18°C

	Operating conditions	Qc	P	EER
A	W50-xx / W23-18	86.9	36.5	2.38
B	W40-xx / W23-18	93.9	29.0	3.24
C	W30-35 / W23-18	99.5	23.2	4.29
D	W26-xx / W23-18	101.4	21.2	4.77

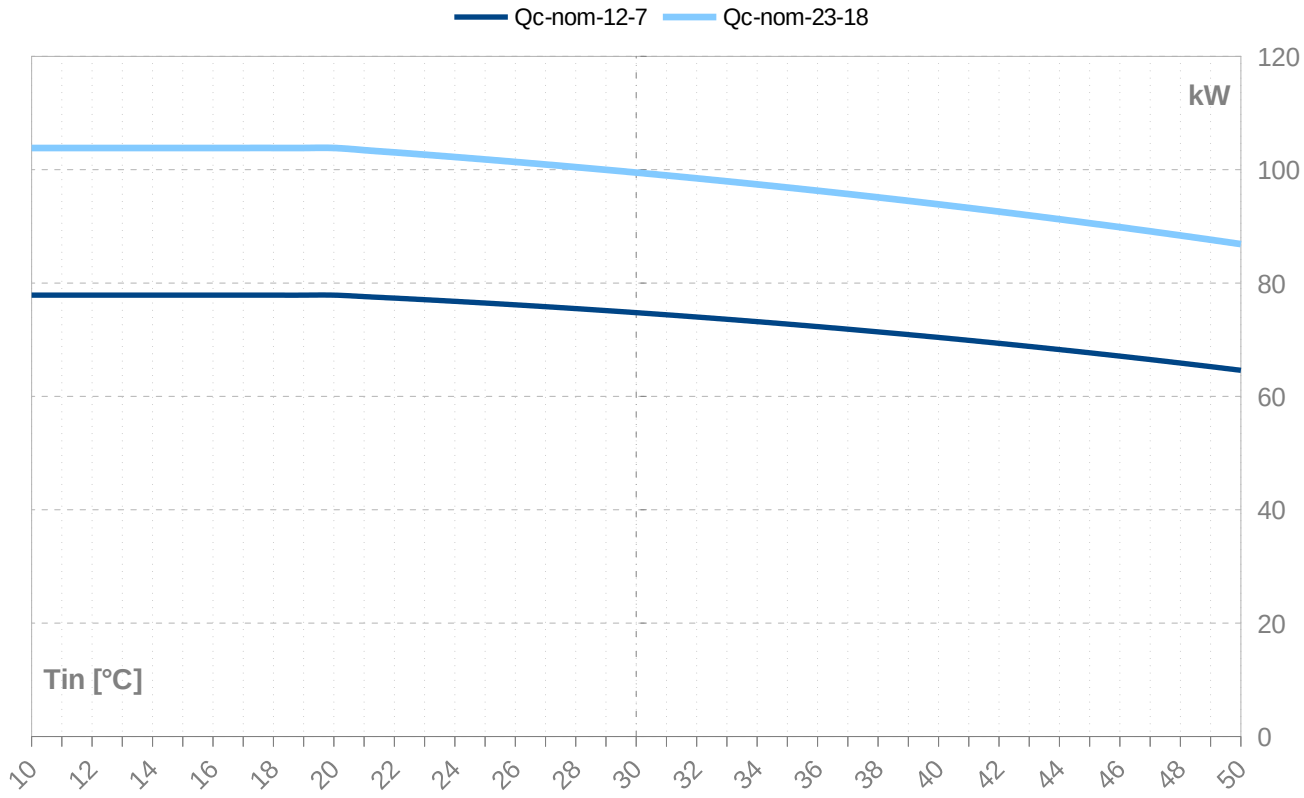
SEER DATA EN 14825:2018 [W 23 / 18°C]	
SEERon	5.15
SEER	5.14
Qc [kWh]	43680
η [%]	205.69

Performance lines - heating

ZHI46K1P-TWD_R410A_2_BWW



Performance lines - cooling



Th -OU	**[°C]**			**35**							
Ts -IN	**Qh nom**	**Qh min**	**Qh max**	**Pin nom**	**Pin min**	**Pin max**	**COP nom**	**Qc nom**	**Qc min**	**Qc max**	**I nom**
[°C]	**[kW]**	[kW]	[kW]	**[kW]**	[kW]	[kW]	**kW / kW**	[kW]	[kW]	[kW]	[A]
25	**171.4**	85.7	171.4	**22.2**	10.9	22.2	**7.73**	150.7	75.3	150.7	46.9
24	**167.8**	83.9	167.8	**22.1**	10.9	22.1	**7.59**	147.2	73.6	147.2	46.8
23	**164.4**	82.2	164.4	**22.1**	10.9	22.1	**7.45**	143.8	71.9	143.8	46.7
22	**160.9**	80.5	160.9	**22.0**	10.9	22.0	**7.31**	140.4	70.2	140.4	46.6
21	**157.6**	78.8	157.6	**22.0**	10.8	22.0	**7.18**	137.1	68.5	137.1	46.6
20	**154.3**	77.1	154.3	**21.9**	10.8	21.9	**7.04**	133.8	66.9	133.8	46.5
19	**151.0**	75.5	151.0	**21.9**	10.8	21.9	**6.90**	130.6	65.3	130.6	46.5
18	**147.8**	73.9	147.8	**21.8**	10.8	21.8	**6.76**	127.4	63.7	127.4	46.5
17	**144.6**	72.3	144.6	**21.8**	10.8	21.8	**6.63**	124.3	62.1	124.3	46.5
16	**141.5**	70.8	141.5	**21.8**	10.7	21.8	**6.49**	121.2	60.6	121.2	46.5
15	**138.5**	69.2	138.5	**21.8**	10.7	21.8	**6.36**	118.1	59.1	118.1	46.5
14	**135.5**	67.7	135.5	**21.8**	10.7	21.8	**6.23**	115.1	57.6	115.1	46.5
13	**132.5**	66.3	132.5	**21.7**	10.7	21.7	**6.10**	112.2	56.1	112.2	46.5
12	**129.6**	64.8	129.6	**21.7**	10.7	21.7	**5.96**	109.3	54.7	109.3	46.5
11	**126.8**	63.4	126.8	**21.7**	10.7	21.7	**5.84**	106.5	53.2	106.5	46.6
10	**123.9**	62.0	123.9	**21.7**	10.7	21.7	**5.71**	103.7	51.8	103.7	46.6
9	**121.2**	60.6	121.2	**21.7**	10.7	21.7	**5.58**	100.9	50.5	100.9	46.6
8	**118.5**	59.2	118.5	**21.7**	10.7	21.7	**5.46**	98.2	49.1	98.2	46.7
7	**115.8**	57.9	115.8	**21.7**	10.7	21.7	**5.34**	95.5	47.8	95.5	46.7
6	**113.2**	56.6	113.2	**21.7**	10.7	21.7	**5.22**	92.9	46.5	92.9	46.8
5	**110.6**	55.3	110.6	**21.7**	10.7	21.7	**5.10**	90.4	45.2	90.4	46.9
4	**108.1**	54.0	108.1	**21.7**	10.7	21.7	**4.98**	87.8	43.9	87.8	46.9
3	**105.6**	52.8	105.6	**21.7**	10.7	21.7	**4.87**	85.3	42.7	85.3	47.0
2	**103.2**	51.6	103.2	**21.7**	10.7	21.7	**4.75**	82.9	41.4	82.9	47.0
1	**100.8**	50.4	100.8	**21.7**	10.7	21.7	**4.64**	80.5	40.3	80.5	47.1
0	**98.4**	49.2	98.4	**21.7**	10.7	21.7	**4.53**	78.1	39.1	78.1	47.1
-1	**96.1**	48.1	96.1	**21.7**	10.7	21.7	**4.43**	75.8	37.9	75.8	47.2
-2	**93.8**	46.9	93.8	**21.7**	10.7	21.7	**4.32**	73.6	36.8	73.6	47.3
-3	**91.6**	45.8	91.6	**21.7**	10.7	21.7	**4.22**	71.3	35.7	71.3	47.3
-4	**89.4**	44.7	89.4	**21.7**	10.7	21.7	**4.12**	69.2	34.6	69.2	47.3
-5	**87.3**	43.6	87.3	**21.7**	10.7	21.7	**4.02**	67.0	33.5	67.0	47.4
-6	**85.2**	42.6	85.2	**21.7**	10.7	21.7	**3.93**	64.9	32.5	64.9	47.4
-7	**83.1**	41.5	83.1	**21.7**	10.7	21.7	**3.83**	62.8	31.4	62.8	47.5
-8	**81.1**	40.5	81.1	**21.7**	10.7	21.7	**3.74**	60.8	30.4	60.8	47.5
-9	**79.1**	39.5	79.1	**21.7**	10.7	21.7	**3.65**	58.8	29.4	58.8	47.5
-10	**77.1**	38.6	77.1	**21.6**	10.7	21.6	**3.56**	56.9	28.4	56.9	47.5
-11	**75.2**	37.6	75.2	**21.6**	10.7	21.6	**3.48**	55.0	27.5	55.0	47.5
-12	**73.3**	36.6	73.3	**21.6**	10.6	21.6	**3.39**	53.1	26.6	53.1	47.5
-13	**71.4**	35.7	71.4	**21.6**	10.6	21.6	**3.31**	51.3	25.7	51.3	47.5
-14	**69.6**	34.8	69.6	**21.5**	10.6	21.5	**3.23**	49.5	24.8	49.5	47.4
-15	**67.8**	33.9	67.8	**21.5**	10.6	21.5	**3.16**	47.8	23.9	47.8	47.4

-- attention: operating limits not reflected in performance table

Th -OU	**[°C]**			**45**							
Ts -IN	**Qh nom**	**Qh min**	**Qh max**	**Pin nom**	**Pin min**	**Pin max**	**COP nom**	**Qc nom**	**Qc min**	**Qc max**	**I nom**
[°C]	**[kW]**	[kW]	[kW]	**[kW]**	[kW]	[kW]	**kW / kW**	[kW]	[kW]	[kW]	[A]
25	**167.9**	83.9	167.9	**26.7**	13.1	26.7	**6.30**	143.0	71.5	143.0	52.9
24	**164.6**	82.3	164.6	**26.6**	13.1	26.6	**6.18**	139.7	69.9	139.7	52.9
23	**161.4**	80.7	161.4	**26.6**	13.1	26.6	**6.06**	136.5	68.2	136.5	52.8
22	**158.2**	79.1	158.2	**26.6**	13.1	26.6	**5.94**	133.3	66.7	133.3	52.8
21	**155.0**	77.5	155.0	**26.6**	13.1	26.6	**5.82**	130.2	65.1	130.2	52.7
20	**151.9**	76.0	151.9	**26.6**	13.1	26.6	**5.71**	127.1	63.5	127.1	52.7
19	**148.9**	74.4	148.9	**26.6**	13.1	26.6	**5.59**	124.0	62.0	124.0	52.7
18	**145.9**	73.0	145.9	**26.6**	13.1	26.6	**5.48**	121.0	60.5	121.0	52.7
17	**143.0**	71.5	143.0	**26.6**	13.1	26.6	**5.37**	118.1	59.0	118.1	52.7
16	**140.0**	70.0	140.0	**26.6**	13.1	26.6	**5.26**	115.2	57.6	115.2	52.7
15	**137.2**	68.6	137.2	**26.6**	13.1	26.6	**5.15**	112.3	56.2	112.3	52.7
14	**134.4**	67.2	134.4	**26.7**	13.1	26.7	**5.04**	109.5	54.7	109.5	52.7
13	**131.6**	65.8	131.6	**26.7**	13.2	26.7	**4.94**	106.7	53.4	106.7	52.7
12	**128.9**	64.4	128.9	**26.7**	13.2	26.7	**4.83**	104.0	52.0	104.0	52.7
11	**126.2**	63.1	126.2	**26.7**	13.2	26.7	**4.73**	101.3	50.6	101.3	52.8
10	**123.6**	61.8	123.6	**26.7**	13.2	26.7	**4.63**	98.6	49.3	98.6	52.8
9	**121.0**	60.5	121.0	**26.7**	13.2	26.7	**4.53**	96.0	48.0	96.0	52.8
8	**118.4**	59.2	118.4	**26.7**	13.2	26.7	**4.43**	93.4	46.7	93.4	52.8
7	**115.9**	57.9	115.9	**26.7**	13.2	26.7	**4.33**	90.9	45.4	90.9	52.8
6	**113.4**	56.7	113.4	**26.8**	13.2	26.8	**4.24**	88.4	44.2	88.4	52.9
5	**111.0**	55.5	111.0	**26.8**	13.2	26.8	**4.14**	86.0	43.0	86.0	52.9
4	**108.6**	54.3	108.6	**26.8**	13.2	26.8	**4.05**	83.5	41.8	83.5	52.9
3	**106.2**	53.1	106.2	**26.8**	13.2	26.8	**3.96**	81.2	40.6	81.2	52.9
2	**103.9**	51.9	103.9	**26.8**	13.2	26.8	**3.88**	78.8	39.4	78.8	52.9
1	**101.6**	50.8	101.6	**26.8**	13.2	26.8	**3.79**	76.6	38.3	76.6	53.0
0	**99.3**	49.7	99.3	**26.8**	13.2	26.8	**3.71**	74.3	37.2	74.3	53.0
-1	**97.1**	48.6	97.1	**26.8**	13.2	26.8	**3.62**	72.1	36.0	72.1	53.0
-2	**94.9**	47.5	94.9	**26.8**	13.2	26.8	**3.54**	69.9	35.0	69.9	53.0
-3	**92.8**	46.4	92.8	**26.8**	13.2	26.8	**3.46**	67.8	33.9	67.8	52.9
-4	**90.7**	45.3	90.7	**26.8**	13.2	26.8	**3.39**	65.7	32.8	65.7	52.9
-5	**88.6**	44.3	88.6	**26.8**	13.2	26.8	**3.31**	63.6	31.8	63.6	52.9
-6	**86.6**	43.3	86.6	**26.8**	13.2	26.8	**3.24**	61.6	30.8	61.6	52.9
-7	**84.6**	42.3	84.6	**26.7**	13.2	26.7	**3.16**	59.6	29.8	59.6	52.8
-8	**82.6**	41.3	82.6	**26.7**	13.2	26.7	**3.09**	57.6	28.8	57.6	52.8
-9	**80.6**	40.3	80.6	**26.7**	13.2	26.7	**3.02**	55.7	27.9	55.7	52.7
-10	**78.7**	39.4	78.7	**26.6**	13.1	26.6	**2.96**	53.8	26.9	53.8	52.6
-11	**76.8**	38.4	76.8	**26.6**	13.1	26.6	**2.89**	52.0	26.0	52.0	52.5
-12	**75.0**	37.5	75.0	**26.5**	13.1	26.5	**2.82**	50.2	25.1	50.2	52.4
-13	**73.2**	36.6	73.2	**26.5**	13.1	26.5	**2.76**	48.4	24.2	48.4	52.3
-14	**71.4**	35.7	71.4	**26.4**	13.0	26.4	**2.70**	46.7	23.3	46.7	52.2
-15	**69.6**	34.8	69.6	**26.4**	13.0	26.4	**2.64**	45.0	22.5	45.0	52.0

-- attention: operating limits not reflected in performance table

Th -OU	**[°C]**			**55**							
Ts -IN	**Qh nom**	**Qh min**	**Qh max**	**Pin nom**	**Pin min**	**Pin max**	**COP nom**	**Qc nom**	**Qc min**	**Qc max**	**I nom**
[°C]	**[kW]**	[kW]	[kW]	**[kW]**	[kW]	[kW]	**kW / kW**	[kW]	[kW]	[kW]	[A]
25	**164.5**	82.3	164.5	**33.7**	16.6	33.7	**4.89**	133.1	66.5	133.1	61.3
24	**161.5**	80.8	161.5	**33.7**	16.6	33.7	**4.79**	130.0	65.0	130.0	61.3
23	**158.5**	79.3	158.5	**33.7**	16.6	33.7	**4.70**	127.0	63.5	127.0	61.3
22	**155.6**	77.8	155.6	**33.7**	16.6	33.7	**4.61**	124.1	62.0	124.1	61.3
21	**152.7**	76.3	152.7	**33.8**	16.6	33.8	**4.52**	121.2	60.6	121.2	61.3
20	**149.8**	74.9	149.8	**33.8**	16.7	33.8	**4.44**	118.3	59.1	118.3	61.3
19	**147.0**	73.5	147.0	**33.8**	16.7	33.8	**4.35**	115.4	57.7	115.4	61.3
18	**144.2**	72.1	144.2	**33.8**	16.7	33.8	**4.26**	112.6	56.3	112.6	61.3
17	**141.5**	70.7	141.5	**33.9**	16.7	33.9	**4.18**	109.9	54.9	109.9	61.3
16	**138.8**	69.4	138.8	**33.9**	16.7	33.9	**4.10**	107.1	53.6	107.1	61.4
15	**136.1**	68.1	136.1	**33.9**	16.7	33.9	**4.01**	104.4	52.2	104.4	61.4
14	**133.5**	66.7	133.5	**33.9**	16.7	33.9	**3.93**	101.8	50.9	101.8	61.4
13	**130.9**	65.4	130.9	**34.0**	16.7	34.0	**3.86**	99.2	49.6	99.2	61.4
12	**128.3**	64.2	128.3	**34.0**	16.8	34.0	**3.78**	96.6	48.3	96.6	61.5
11	**125.8**	62.9	125.8	**34.0**	16.8	34.0	**3.70**	94.1	47.0	94.1	61.5
10	**123.4**	61.7	123.4	**34.0**	16.8	34.0	**3.63**	91.6	45.8	91.6	61.5
9	**120.9**	60.5	120.9	**34.0**	16.8	34.0	**3.55**	89.1	44.6	89.1	61.5
8	**118.5**	59.3	118.5	**34.0**	16.8	34.0	**3.48**	86.7	43.4	86.7	61.5
7	**116.1**	58.1	116.1	**34.1**	16.8	34.1	**3.41**	84.3	42.2	84.3	61.5
6	**113.8**	56.9	113.8	**34.1**	16.8	34.1	**3.34**	82.0	41.0	82.0	61.5
5	**111.5**	55.7	111.5	**34.1**	16.8	34.1	**3.27**	79.7	39.8	79.7	61.5
4	**109.2**	54.6	109.2	**34.1**	16.8	34.1	**3.20**	77.4	38.7	77.4	61.5
3	**107.0**	53.5	107.0	**34.1**	16.8	34.1	**3.14**	75.1	37.6	75.1	61.5
2	**104.7**	52.4	104.7	**34.1**	16.8	34.1	**3.07**	72.9	36.5	72.9	61.5
1	**102.6**	51.3	102.6	**34.1**	16.8	34.1	**3.01**	70.8	35.4	70.8	61.5
0	**100.4**	50.2	100.4	**34.0**	16.8	34.0	**2.95**	68.6	34.3	68.6	61.4
-1	**98.3**	49.1	98.3	**34.0**	16.8	34.0	**2.89**	66.5	33.3	66.5	61.4
-2	**96.2**	48.1	96.2	**34.0**	16.8	34.0	**2.83**	64.4	32.2	64.4	61.3
-3	**94.1**	47.1	94.1	**34.0**	16.8	34.0	**2.77**	62.4	31.2	62.4	61.3
-4	**92.1**	46.0	92.1	**33.9**	16.7	33.9	**2.71**	60.4	30.2	60.4	61.2
-5	**90.1**	45.0	90.1	**33.9**	16.7	33.9	**2.66**	58.4	29.2	58.4	61.1
-6	**88.1**	44.0	88.1	**33.9**	16.7	33.9	**2.60**	56.5	28.2	56.5	61.0
-7	**86.1**	43.1	86.1	**33.8**	16.7	33.8	**2.55**	54.6	27.3	54.6	60.9
-8	**84.2**	42.1	84.2	**33.7**	16.6	33.7	**2.50**	52.7	26.3	52.7	60.8
-9	**82.3**	41.1	82.3	**33.7**	16.6	33.7	**2.44**	50.8	25.4	50.8	60.6
-10	**80.4**	40.2	80.4	**33.6**	16.6	33.6	**2.39**	49.0	24.5	49.0	60.5
-11	**78.5**	39.3	78.5	**33.5**	16.5	33.5	**2.34**	47.2	23.6	47.2	60.3
-12	**76.7**	38.3	76.7	**33.4**	16.5	33.4	**2.29**	45.5	22.7	45.5	60.1
-13	**74.9**	37.4	74.9	**33.3**	16.4	33.3	**2.25**	43.7	21.9	43.7	59.9
-14	**73.1**	36.5	73.1	**33.2**	16.4	33.2	**2.20**	42.1	21.0	42.1	59.7
-15	**71.3**	35.7	71.3	**33.1**	16.3	33.1	**2.15**	40.4	20.2	40.4	59.4

-- attention: operating limits not reflected in performance table

Th -OU	**[°C]**						**65 (T-max)**				
Ts -IN	**Qh nom**	**Qh min**	**Qh max**	**Pin nom**	**Pin min**	**Pin max**	**COP nom**	**Qc nom**	**Qc min**	**Qc max**	**I nom**
[°C]	**[kW]**	[kW]	[kW]	**[kW]**	[kW]	[kW]	**kW / kW**	[kW]	[kW]	[kW]	[A]
25	**162.2**	81.1	162.2	**42.9**	21.2	42.9	**3.78**	122.2	61.1	122.2	71.9
24	**159.4**	79.7	159.4	**42.9**	21.2	42.9	**3.71**	119.3	59.7	119.3	72.0
23	**156.6**	78.3	156.6	**43.0**	21.2	43.0	**3.65**	116.5	58.3	116.5	72.0
22	**153.9**	77.0	153.9	**43.0**	21.2	43.0	**3.58**	113.8	56.9	113.8	72.1
21	**151.2**	75.6	151.2	**43.0**	21.2	43.0	**3.51**	111.0	55.5	111.0	72.2
20	**148.6**	74.3	148.6	**43.1**	21.2	43.1	**3.45**	108.3	54.2	108.3	72.2
19	**145.9**	73.0	145.9	**43.1**	21.3	43.1	**3.39**	105.7	52.8	105.7	72.3
18	**143.3**	71.7	143.3	**43.1**	21.3	43.1	**3.32**	103.1	51.5	103.1	72.3
17	**140.8**	70.4	140.8	**43.2**	21.3	43.2	**3.26**	100.5	50.2	100.5	72.4
16	**138.3**	69.1	138.3	**43.2**	21.3	43.2	**3.20**	97.9	49.0	97.9	72.4
15	**135.8**	67.9	135.8	**43.2**	21.3	43.2	**3.14**	95.4	47.7	95.4	72.5
14	**133.3**	66.7	133.3	**43.2**	21.3	43.2	**3.08**	92.9	46.5	92.9	72.6
13	**130.9**	65.4	130.9	**43.2**	21.3	43.2	**3.03**	90.5	45.3	90.5	72.6
12	**128.5**	64.2	128.5	**43.3**	21.3	43.3	**2.97**	88.1	44.0	88.1	72.6
11	**126.1**	63.1	126.1	**43.3**	21.3	43.3	**2.92**	85.7	42.9	85.7	72.7
10	**123.8**	61.9	123.8	**43.3**	21.3	43.3	**2.86**	83.4	41.7	83.4	72.7
9	**121.5**	60.7	121.5	**43.3**	21.3	43.3	**2.81**	81.0	40.5	81.0	72.7
8	**119.2**	59.6	119.2	**43.3**	21.3	43.3	**2.75**	78.8	39.4	78.8	72.8
7	**116.9**	58.5	116.9	**43.3**	21.3	43.3	**2.70**	76.5	38.3	76.5	72.8
6	**114.7**	57.3	114.7	**43.2**	21.3	43.2	**2.65**	74.3	37.1	74.3	72.8
5	**112.5**	56.2	112.5	**43.2**	21.3	43.2	**2.60**	72.1	36.1	72.1	72.8
4	**110.3**	55.2	110.3	**43.2**	21.3	43.2	**2.55**	70.0	35.0	70.0	72.8
3	**108.1**	54.1	108.1	**43.2**	21.3	43.2	**2.50**	67.8	33.9	67.8	72.7
2	**106.0**	53.0	106.0	**43.1**	21.3	43.1	**2.46**	65.7	32.9	65.7	72.7
1	**103.9**	52.0	103.9	**43.1**	21.3	43.1	**2.41**	63.7	31.8	63.7	72.6
0	**101.8**	50.9	101.8	**43.1**	21.2	43.1	**2.37**	61.6	30.8	61.6	72.6
-1	**99.8**	49.9	99.8	**43.0**	21.2	43.0	**2.32**	59.6	29.8	59.6	72.5
-2	**97.7**	48.9	97.7	**42.9**	21.2	42.9	**2.28**	57.6	28.8	57.6	72.4
-3	**95.7**	47.9	95.7	**42.9**	21.1	42.9	**2.23**	55.7	27.8	55.7	72.3
-4	**93.7**	46.9	93.7	**42.8**	21.1	42.8	**2.19**	53.8	26.9	53.8	72.2
-5	**91.8**	45.9	91.8	**42.7**	21.1	42.7	**2.15**	51.9	25.9	51.9	72.1
-6	**89.8**	44.9	89.8	**42.6**	21.0	42.6	**2.11**	50.0	25.0	50.0	71.9
-7	**87.9**	43.9	87.9	**42.5**	21.0	42.5	**2.07**	48.2	24.1	48.2	71.8
-8	**86.0**	43.0	86.0	**42.4**	20.9	42.4	**2.03**	46.4	23.2	46.4	71.6
-9	**84.1**	42.0	84.1	**42.3**	20.9	42.3	**1.99**	44.6	22.3	44.6	71.4
-10	**82.2**	41.1	82.2	**42.2**	20.8	42.2	**1.95**	42.8	21.4	42.8	71.2
-11	**80.4**	40.2	80.4	**42.0**	20.7	42.0	**1.91**	41.1	20.5	41.1	70.9
-12	**78.5**	39.3	78.5	**41.9**	20.7	41.9	**1.87**	39.4	19.7	39.4	70.6
-13	**76.7**	38.3	76.7	**41.7**	20.6	41.7	**1.84**	37.7	18.9	37.7	70.4
-14	**74.9**	37.4	74.9	**41.6**	20.5	41.6	**1.80**	36.1	18.0	36.1	70.1
-15	**73.1**	36.5	73.1	**41.4**	20.4	41.4	**1.77**	34.4	17.2	34.4	69.7

-- attention: operating limits not reflected in performance table

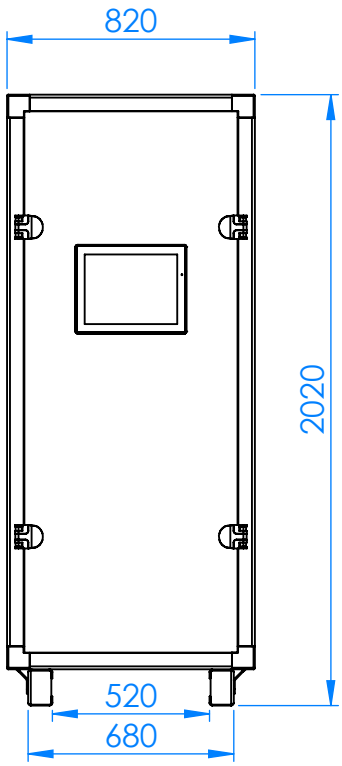
Tc -OU	**[°C]**			**W 12 / 7 °C**							
Ts -IN	**Qc nom**	**Qc min**	**Qc max**	**Pin nom**	**Pin min**	**Pin max**	**EER**	**Qh nom**	**Qh min**	**Qh max**	**I nom**
[°C]	**[kW]**	[kW]	[kW]	**[kW]**	[kW]	[kW]	**kW / kW**	[kW]	[kW]	[kW]	[A]
40	**70.4**	35.2	70.4	**29.0**	14.3	29.0	**2.43**	97.5	48.7	97.5	55.5
39	**70.9**	35.5	70.9	**28.4**	14.0	28.4	**2.50**	97.4	48.7	97.4	54.7
38	**71.4**	35.7	71.4	**27.7**	13.7	27.7	**2.58**	97.3	48.6	97.3	54.0
37	**71.9**	35.9	71.9	**27.1**	13.4	27.1	**2.65**	97.2	48.6	97.2	53.3
36	**72.3**	36.2	72.3	**26.5**	13.1	26.5	**2.73**	97.1	48.5	97.1	52.6
35	**72.8**	36.4	72.8	**25.9**	12.8	25.9	**2.81**	97.0	48.5	97.0	52.0
34	**73.2**	36.6	73.2	**25.4**	12.5	25.4	**2.89**	96.9	48.4	96.9	51.3
33	**73.6**	36.8	73.6	**24.8**	12.2	24.8	**2.97**	96.8	48.4	96.8	50.7
32	**74.0**	37.0	74.0	**24.3**	12.0	24.3	**3.05**	96.7	48.3	96.7	50.1
31	**74.4**	37.2	74.4	**23.7**	11.7	23.7	**3.14**	96.6	48.3	96.6	49.5
30	**74.8**	37.4	74.8	**23.2**	11.4	23.2	**3.22**	96.4	48.2	96.4	48.9
29	**75.1**	37.6	75.1	**22.7**	11.2	22.7	**3.31**	96.3	48.2	96.3	48.3
28	**75.5**	37.7	75.5	**22.2**	10.9	22.2	**3.40**	96.2	48.1	96.2	47.7
27	**75.8**	37.9	75.8	**21.7**	10.7	21.7	**3.49**	96.1	48.1	96.1	47.2
26	**76.2**	38.1	76.2	**21.2**	10.5	21.2	**3.59**	96.0	48.0	96.0	46.7
25	**76.5**	38.2	76.5	**20.8**	10.2	20.8	**3.68**	95.9	47.9	95.9	46.1
24	**76.8**	38.4	76.8	**20.3**	10.0	20.3	**3.78**	95.7	47.9	95.7	45.6
23	**77.1**	38.5	77.1	**19.9**	9.8	19.9	**3.88**	95.6	47.8	95.6	45.1
22	**77.3**	38.7	77.3	**19.4**	9.6	19.4	**3.98**	95.5	47.7	95.5	44.6
21	**77.6**	38.8	77.6	**19.0**	9.4	19.0	**4.09**	95.3	47.7	95.3	44.1
20	**77.9**	38.9	77.9	**18.6**	9.1	18.6	**4.20**	95.2	47.6	95.2	43.6

Tc [°C]				**W 23 / 18 °C**							
0	**Qc nom**	**Qc min**	**Qc max**	**Pin nom**	**Pin min**	**Pin max**	**EER**	**Qh nom**	**Qh min**	**Qh max**	**I nom**
[°C]	**[kW]**	[kW]	[kW]	**[kW]**	[kW]	[kW]	**kW / kW**	[kW]	[kW]	[kW]	[A]
40	**93.9**	46.9	93.9	**29.0**	14.3	29.0	**3.24**	120.9	60.4	121.0	55.4
39	**94.5**	47.3	94.5	**28.4**	14.0	28.4	**3.33**	120.9	60.5	121.0	54.7
38	**95.1**	47.6	95.1	**27.7**	13.7	27.7	**3.43**	120.9	60.5	120.9	53.9
37	**95.7**	47.9	95.7	**27.1**	13.4	27.1	**3.53**	120.9	60.5	120.9	53.2
36	**96.3**	48.1	96.3	**26.5**	13.1	26.5	**3.63**	121.0	60.5	120.9	52.4
35	**96.9**	48.4	96.9	**25.9**	12.8	25.9	**3.74**	121.0	60.5	120.9	51.7
34	**97.4**	48.7	97.4	**25.4**	12.5	25.4	**3.84**	121.0	60.5	120.9	51.1
33	**97.9**	49.0	97.9	**24.8**	12.2	24.8	**3.95**	121.0	60.5	120.9	50.4
32	**98.5**	49.2	98.5	**24.3**	12.0	24.3	**4.06**	121.1	60.5	120.9	49.7
31	**99.0**	49.5	99.0	**23.7**	11.7	23.7	**4.17**	121.1	60.5	120.9	49.1
30	**99.5**	49.7	99.5	**23.2**	11.4	23.2	**4.29**	121.1	60.6	120.9	48.5
29	**100.0**	50.0	100.0	**22.7**	11.2	22.7	**4.41**	121.1	60.6	120.9	47.9
28	**100.5**	50.2	100.5	**22.2**	10.9	22.2	**4.53**	121.2	60.6	120.9	47.2
27	**100.9**	50.5	100.9	**21.7**	10.7	21.7	**4.65**	121.2	60.6	120.9	46.6
26	**101.4**	50.7	101.4	**21.2**	10.5	21.2	**4.77**	121.2	60.6	121.0	46.1
25	**101.8**	50.9	101.8	**20.8**	10.2	20.8	**4.90**	121.2	60.6	121.0	45.5
24	**102.2**	51.1	102.2	**20.3**	10.0	20.3	**5.03**	121.3	60.6	121.0	44.9
23	**102.7**	51.3	102.7	**19.9**	9.8	19.9	**5.17**	121.3	60.6	121.0	44.3
22	**103.1**	51.5	103.1	**19.4**	9.6	19.4	**5.31**	121.3	60.6	121.1	43.8
21	**103.4**	51.7	103.4	**19.0**	9.4	19.0	**5.45**	121.3	60.6	121.1	43.2
20	**103.8**	51.9	103.8	**18.6**	9.1	18.6	**5.60**	121.3	60.6	121.1	42.6

-- attention: operating limits not reflected in performance table

LEGEND:

Ts-IN: Temperature renewable source - inlet [°C]
Th-OU: Temperature heating - outlet (flow) [°C]
Tc-OU: Temperature cooling - outlet (flow) [°C]
Qh nom: Heating capacity nominal
Qh min: Heating capacity minimal
Qh max: Heating capacity maximal
Pin nom: Power input at nominal heating capacity
Pin min: Power input at minimal heating capacity
Pin max: Power input at maximal heating capacity
COP nom: coefficient of performance at nominal heating capacity
Qc nom: cooling / heat extraction capacity at nominal heating capacity
Qc min: cooling / heat extraction at minimal heating capacity
Qc max: cooling / heat extraction at maximal heating capacity
I nom: Current at nominal heating capacity
EER: energy efficiency ratio at nominal cooling capacity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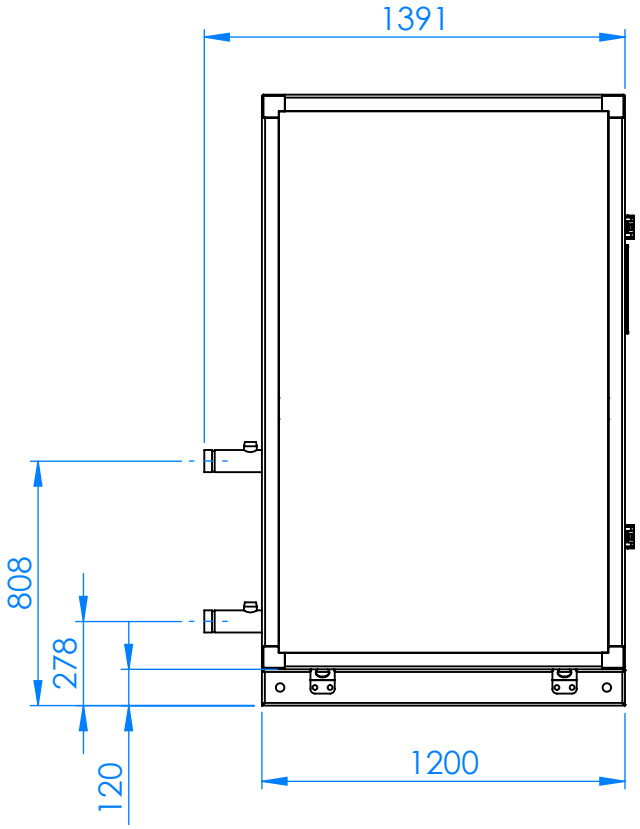
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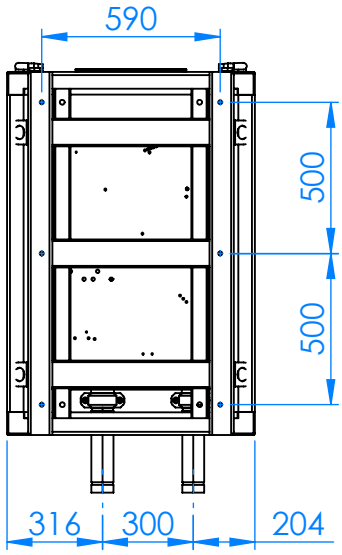
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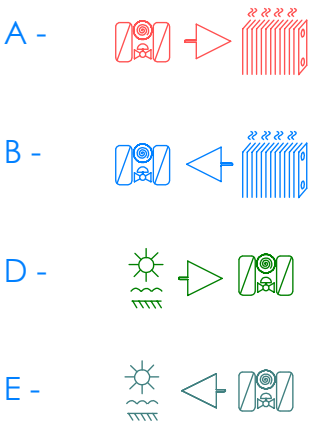
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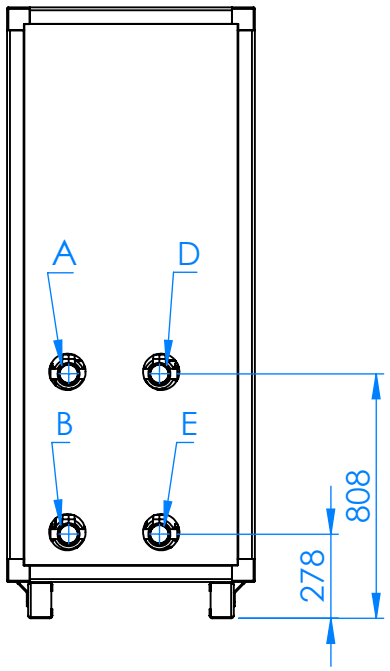
B -
D -
E -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D
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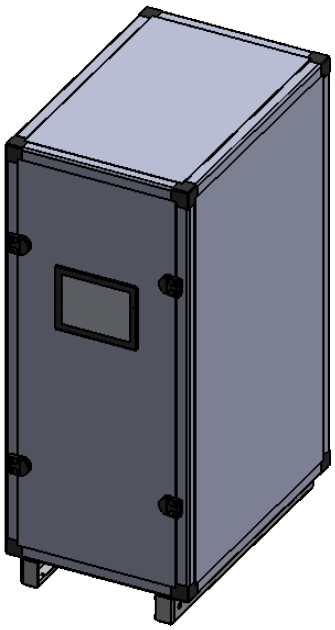
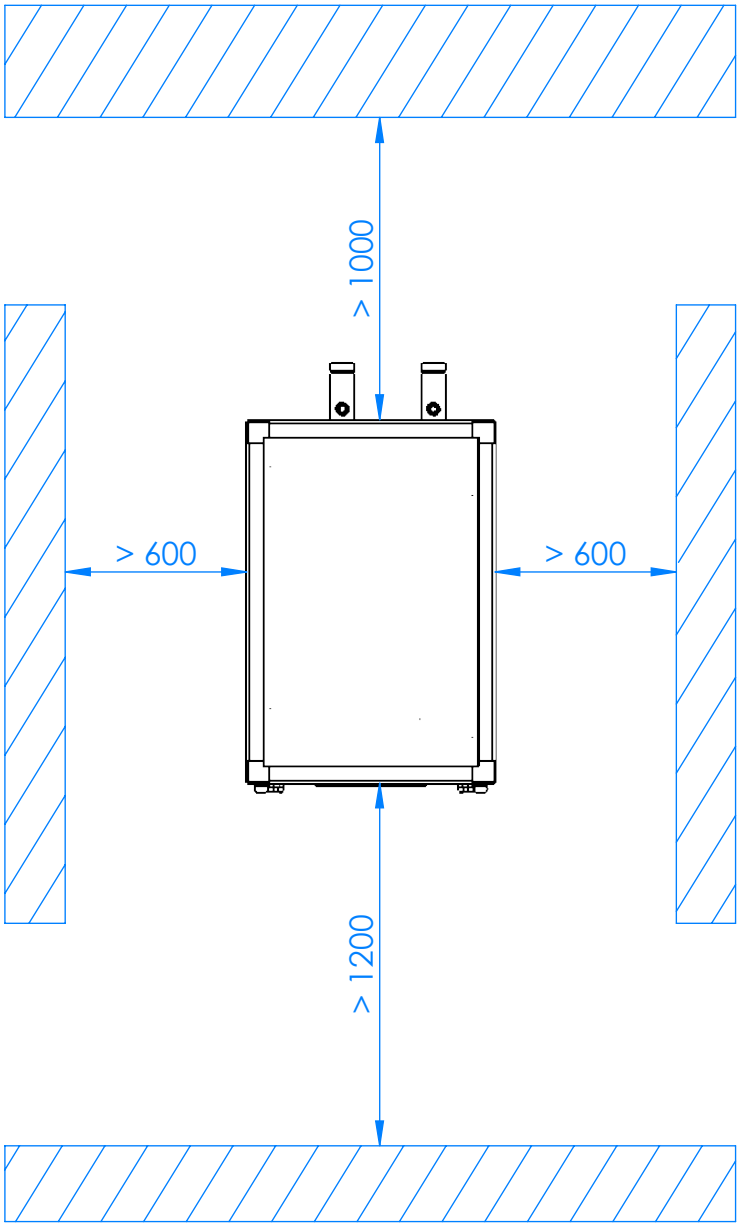
E
808
278

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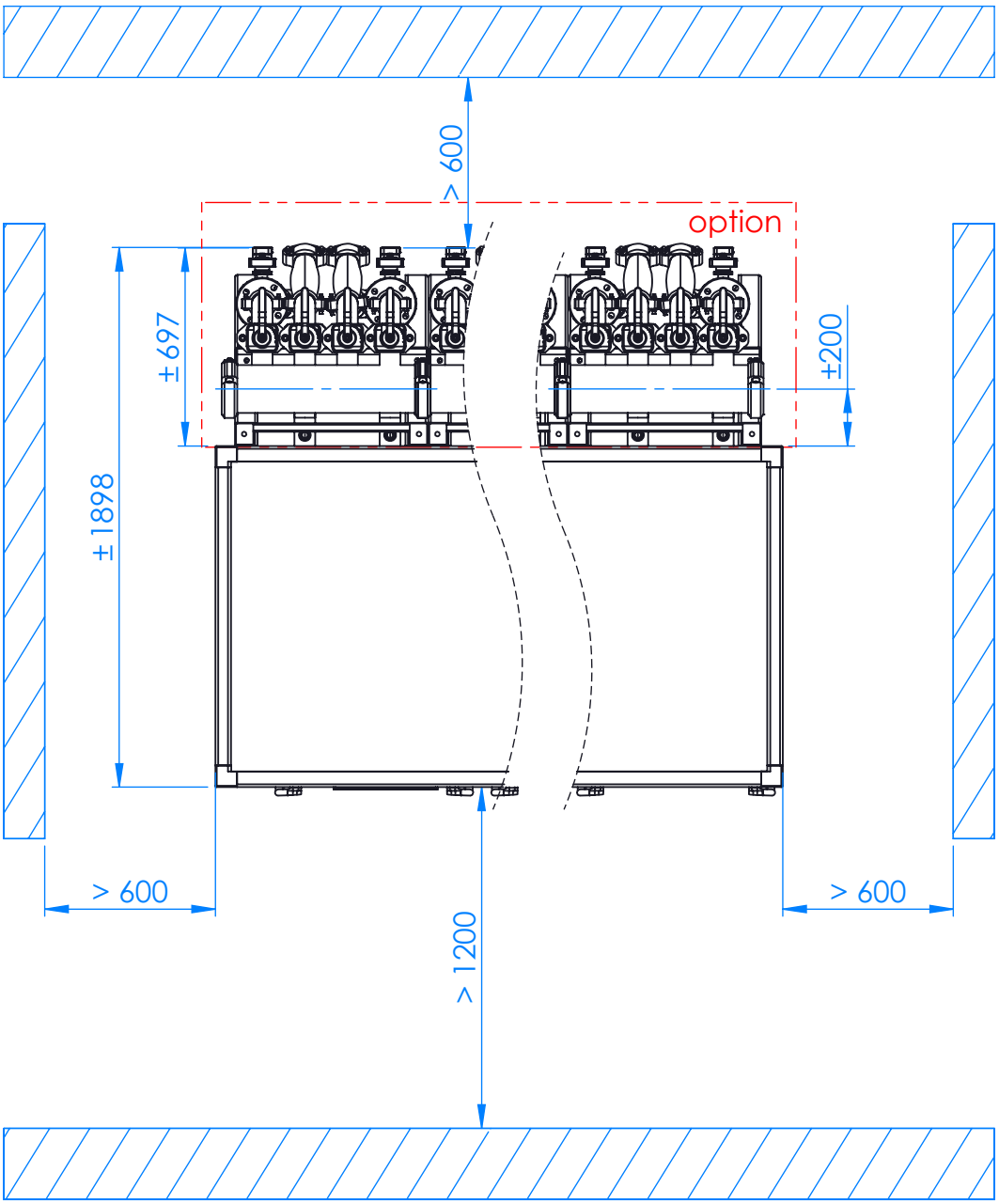
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