



Heat pump



TWW 440
WHR
HeavyDuty 2L4

WAMAK TWW 440 WHR HeavyDuty 2L4

Product description

High-efficiency heat pump consisting of multiple modules of separate heat pumps. Each module contains one short closed refrigerant circuit with a pair of quiet Scroll compressors and robust stainless steel plate heat exchangers. Applications range from heating, cooling and domestic hot water heating of office or multi-functional buildings, to cascading applications in industrial applications.

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.

Thermal energy from various industrial or ancillary processes is used as a primary source. Usually in the temperature range between 20° and 50°C. Depending on the quality and chemical composition of the process medium, the heat is extracted either directly in the heat pump or via a pre-wired heat exchanger with intermediate circuit. The heat pump then raises this temperature with high efficiency to a usable temperature for heating or hot water.

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

Product features

- Scroll compressor
- Electronic expansion valve
- Two-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 - (with accessory)
- Cascade control
- Solid frame structure
- Sylomer pads under compressor unit
- Asymmetric plate heat exchanger
- Multi-stage capacity control
- High pressure switch
- Low pressure sensor - analogue
- Flow sensor consumer - analogue - (with accessory)
- Outdoor temperature sensor - (with accessory)
- Buffer temperature sensor - (with accessory)
- Modbus connection
- Two level frame

Basic performance data - WAMAK TWW 440 WHR HeavyDuty 2L4

Heating - EN 14511		
Heating capacity [kW]	W10 / W35 (max)	242.8 (30.4 / 242.8)
	W10 / W35 (min)	30.4 (30.4 / 242.8)
	W10 / W34	244.3 (30.5 / 244.3)
Electrical power input [kW]	W10 / W35 (max)	41.2 (5.0 / 41.2)
	W10 / W35 (min)	5.0 (5.0 / 41.2)
	W10 / W34	40.5 (4.9 / 40.5)
Heating efficiency faktor [COP]	W10 / W35 (max)	5.89
	W10 / W35 (min)	6.07
	W10 / W34	6.04
Seasonal space heating energy efficiency - SCOP EN 14825		
Average Climate / Low Temperature [35°C]	SCOP	3.97
	η [%]	158.8
	Label	A+++
	Qhe [kWh]	501624.8
	Pdesignh [kW]	242.8
	Tbivalent [°C]	-7
Cooling		
Cooling capacity - [kW]	A35 / W23-18	183.8
	A25 / W23-18	206.8
	A35 / W12-7	119.8
	A25 / W12-7	119.8
Seasonal space cooling energy efficiency - SEER EN 14825		
[W 23 / 18°C]	SEER	5.43
	Qce [kWh]	71880.0
	η_c [%]	217.3
Sound EN 12102		
Acoustic power - Lw	dB(A)	73.9
Acoustic pressure - Lp	1 m dB(A)	65.9
	5 m dB(A)	51.9
	10 m dB(A)	45.9
Mechanical and operational information		
Compressor type (3~ 400/50)	SCROLL / 8 /	On/Off
Refrigerant	R513A (GWP - 631)	4 x 16 kg
Operating limit temperatures heating - (min / max) [°C]		45 / 85
Operating limit temperatures source - (min / max) [°C]		-10 / 50
Weight		2120 kg

Main technical data - WAMAK TWW 440 WHR HeavyDuty 2L4

Enclosure type			HD2L4		
Basic dimensions	Height [mm]		2000		
	Width [mm]		2800		
	Length [mm]		1200		
Weight [kg]			2120		
Colour			Gray		
Enclosure IP Class			IP20		
Refrigeration cycle					
Compressor	Type		Scroll		
	Number of stages		8		
	On/Off				
	Power factor Cosφ		0.63		
	Winding resistance		1.23 Ohm		
Refrigerant			R513A		
	Volme		4 x 16 kg		
	GWP		631		
	Safety class		A1		
Refrigeration oil type	POE RL32-3MAF				
	Oil volume		8 x 3.38 L		
Maximal pressure - refrigerant [bar]			32		
PED class			2		
EVI - vapour injection with economizer					
Electrical connection data					
Line voltage [#~ V/Hz]			3~ 400/50		
Current	nominal [A]		137.76		
	maximal [A]		178.40		
	starting [A]		12.9		
Softstart			-		
Main safety			C180		
Control System					
Main controller	SIEMENS	RVS 61			
Extension module	AVS75.3xx	AVS75.3xx	AVS75.372		
Bus Clip-In			Modbus OCI352		
Online connection		Web server OZW672	ToSyMo		
Superheat controller			SEC61		
*** with accessory					
Heat energy rejection side data					
Operating limit temperatures heating			MAX [°C]		85
			MIN [°C]		45
for more see operating limits diagram					
Condenser	Port size		4 x VIC 2.1/2 "		
	Type		BPHE		
	Count		4		
	Material		AISI 316		
Maximal operating pressure - refrigerant [bar]			32		
Maximal operating pressure - Water [bar]			6		
Testing pressure [bar]			70		
Heat transfer medium			Water		
Volume flow @ dT 5K (nom) - Water [m3/h]			7.27 ~ 58.13		
Internal pressure drop - Water [kPa]			4 x 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
			MAX [°C]		50
for more see operating limits diagram					
Evaporator	Port size		4 x VIC 2.1/2 "		
	Type		BPHE		
	Count		4		
	Material		AISI 316		
Maximal operating pressure - refrigerant [bar]			20		
Heat transfer medium			Water		
Maximal operating pressure - Water [bar]			6		
Volume flow - Water [m3/h]			6.84 ~ 54.73		
Internal pressure drop - Water [kPa]			4 x 20		
Temperature difference - Water			4 K		

WAMAK TWW 440 WHR HeavyDuty 2L4

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

Model	TWW 440 WHR HeavyDuty 2L4
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	Item	Symbol	Value	Unit
Rated heat output at Tdesignh	Prated	242.8	kW	Seasonal space heating energy efficiency	ηs	158.8	%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = -7 °C	Pdh	244.3	kW	Tj = -7 °C	COPd	6.04	-
Tj = +2 °C	Pdh	250.2	kW	Tj = +2 °C	COPd	6.6	-
Tj = +7 °C	Pdh	31.8	kW	Tj = +7 °C	COPd	7.4	-
Tj = +12 °C	Pdh	32.3	kW	Tj = +12 °C	COPd	7.9	-
Tj = bivalent temperature	Pdh	242.8	kW	Tj = bivalent temperature	COPd	5.9	-
Tj = operation limit temperature	Pdh	---	kW	Tj = operation limit temperature	COPd	---	-
Bivalent temperature	Tbiv	-7	°C	Tj = operation limit temperature	TOL	---	°C
Power consumption in modes other than active mode				Heating water operating limit temperature	WTOL	85	°C
Off mode	Poff	0.040	kW	Supplementary heater			
Thermostat-off mode	Pto	0.010	kW	Rated heat output	Psup	46.0	kW
Standby mode	Psb	0.010	kW	Type of energy input		electricity	
Crankcase heater mode	Pck	0.050	kW				
Other items							
Capacity control		multi-stage		For air-to-water heat pumps: Rated air flow rate, outdoors	-	---	m3/h
Sound power level				For water- or brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	-	6.84 ~ 54.73	m3/h
indoors	Lwa	74	dB				
outdoors	Lwa	---	dB				
Annual energy consumption	QHE	501624.8	kWh				

Contact details: WAMAK, s.r.o., Orovnic 252, 96652, Orovnic, Slovakia, info@wamak.sk

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Model	TWW 440 WHR HeavyDuty 2L4
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	Item	Symbol	Value	Unit
Rated heat output at Tdesignh	Prated	211.8	kW	Seasonal space heating energy efficiency	ηs	142.7	%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = -7 °C	Pdh	221.6	kW	Tj = -7 °C	COPd	3.97	-
Tj = +2 °C	Pdh	239.2	kW	Tj = +2 °C	COPd	5.3	-
Tj = +7 °C	Pdh	31.0	kW	Tj = +7 °C	COPd	6.2	-
Tj = +12 °C	Pdh	31.8	kW	Tj = +12 °C	COPd	7.0	-
Tj = bivalent temperature	Pdh	211.8	kW	Tj = bivalent temperature	COPd	3.5	-
Tj = operation limit temperature	Pdh	---	kW	Tj = operation limit temperature	COPd	---	-
Bivalent temperature	Tbiv	-7	°C	Tj = operation limit temperature	TOL	---	°C
Power consumption in modes other than active mode				Heating water operating limit temperature	WTOL	85	°C
Off mode	Poff	0.040	kW	Supplementary heater			
Thermostat-off mode	Pto	0.010	kW	Rated heat output	Psup	46.0	kW
Standby mode	Psb	0.010	kW	Type of energy input		electricity	
Crankcase heater mode	Pck	0.050	kW				
Other items							
Capacity control		multi-stage		For air-to-water heat pumps: Rated air flow rate, outdoors	-	---	m3/h
Sound power level				For water- or brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	-	6.84 ~ 54.73	m3/h
indoors	Lwa	74	dB				
outdoors	Lwa	---	dB				
Annual energy consumption	QHE	437578.8	kWh				

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WAMAK

TWW 440 WHR
HeavyDuty 2L4



55 °C

35 °C

A+++

A++

A+

A

B

C

D

A++

A+++



74 dB



--- dB

■ 223
■ 212
■ 208
kW

■ 248
■ 243
■ 231
kW



2019

811/2013

TWW 440 WHR
HeavyDuty 2L4

ErP Data

55 °C

35 °C

Energy class

A++

A+++

η [%]

142.7

158.8

P_{rated} [kW]

212

243

Q_{HE} [kWh/y]

437579

501625

SCOP [-]

3.57

3.97

$T_{bivalent}$ [°C]

-7

-7

CONTROLLER



+ QAA55/75

class VII

3.5% ↓

- QAA55/75

class III

1.5% ↓

Heating performance data

Heat recovery

Version: v202223.006-WW-WHR

ZR144KRE-TFD_R513A_8_WHR

Operating conditions	Qh	P	COP
W45 / W80	452.8	101.2	4.47
W30 / W70	336.5	83.3	4.04
W25 / W60	374.3	68.7	5.45

Normative data: water - water application

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

Operating conditions	Qh	P	COP
1 W10 / W30-35	242.8	41.2	5.89
2 W10 / W30-35 (MIN)	30.4	5.0	6.07
A W10 / Wxx-34	244.3	40.5	6.04
B W10 / Wxx-30	250.2	37.6	6.65
C W10 / Wxx-27	31.8	4.3	7.35
D W10 / Wxx-24	32.3	4.1	7.89
E W10 / Wxx-35	242.8	41.2	5.89
F W10 / Wxx-35	242.8	41.2	5.89

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

Operating conditions	Qh	P	COP
1 W10 / W47-55	211.8	60.5	3.50
2 W10 / W47-55 (MIN)	26.5	7.3	3.61
A W10 / Wxx-52	221.6	55.9	3.97
B W10 / Wxx-42	239.2	45.2	5.29
C W10 / Wxx-36	31.0	5.0	6.25
D W10 / Wxx-30	31.8	4.6	6.96
E W10 / Wxx-55	211.8	60.5	3.50
F W10 / Wxx-55	211.8	60.5	3.50

SCOP DATA EN 14825:2018

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

SCOPon	3.98
SCOPnet	7.66
SCOP	3.97
η [%]	158.82
Label	A+++
Qh [kWh]	501625
Pdesignh [kW]	242.8
Tbivalent [°C]	-7.00

SCOP DATA EN 14825:2018

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

SCOPon	3.58
SCOPnet	5.58
SCOP	3.57
η [%]	142.72
Label	A++
Qh [kWh]	437579
Pdesignh [kW]	211.8
Tbivalent [°C]	-7.00

Low temperature cooling W 12 / 7°C

Operating conditions		Qc	P	EER	SEER DATA EN 14825:2018 [W 12 / 7°C]	
A	W30-35 / W12-7	128.7	43.6	2.95	SEERon	3.64
B	W26-xx / W12-7	135.4	40.5	3.35	SEER	3.62
C	W22-xx / W12-7	141.9	37.6	3.77	Qc [kWh]	71880
D	W18-xx / W12-7	145.0	36.3	4.00	η [%]	144.75

Radiant cooling W 23 / 18°C

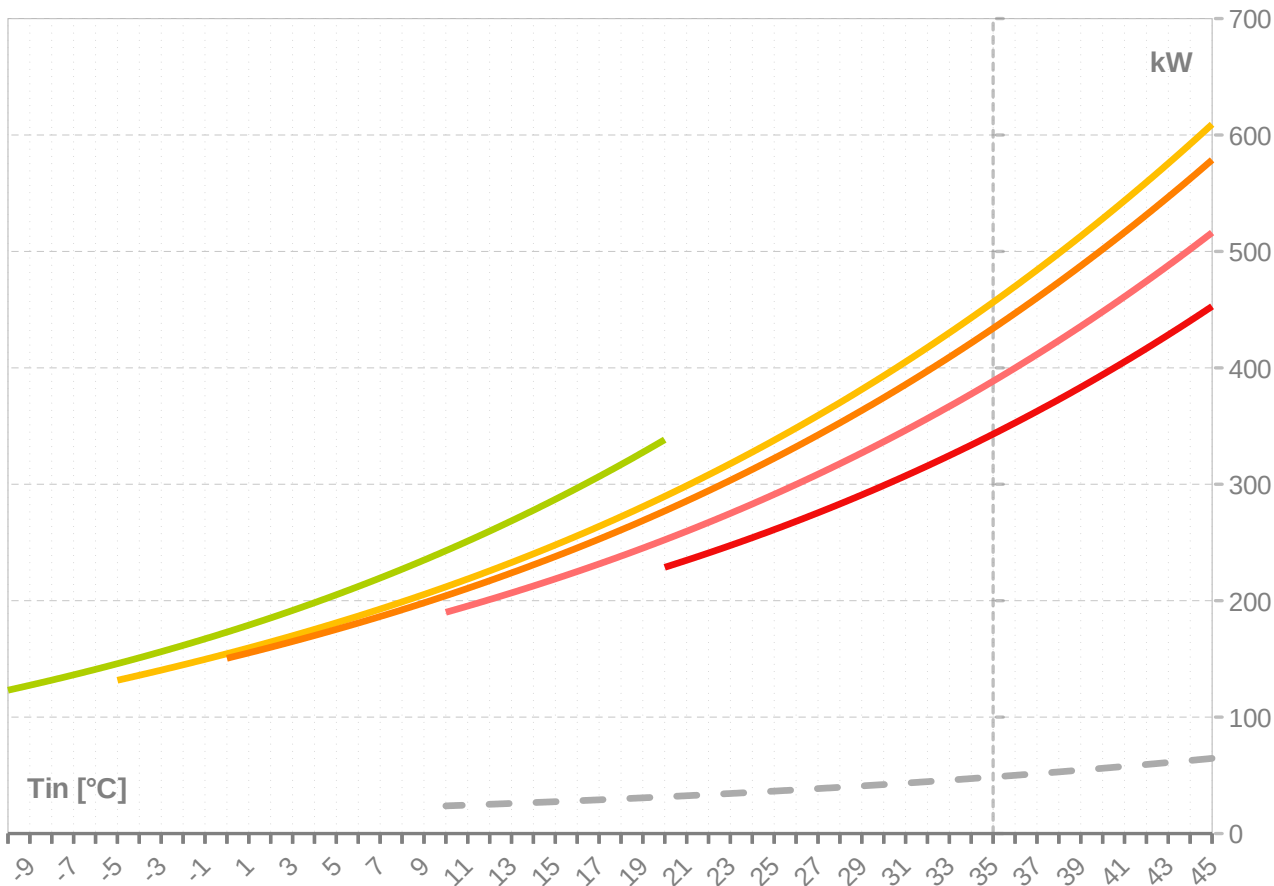
Operating conditions		Qc	P	EER	SEER DATA EN 14825:2018 [W 23 / 18°C]	
A	W50-xx / W23-18	144.7	65.6	2.21	SEERon	5.48
B	W40-xx / W23-18	171.4	53.1	3.23	SEER	5.43
C	W30-35 / W23-18	195.6	43.6	4.49	Qc [kWh]	71880
D	W26-xx / W23-18	204.6	40.5	5.06	η [%]	217.29

WAMAK TWW 440 WHR HeavyDuty 2L4

Performance lines - heating

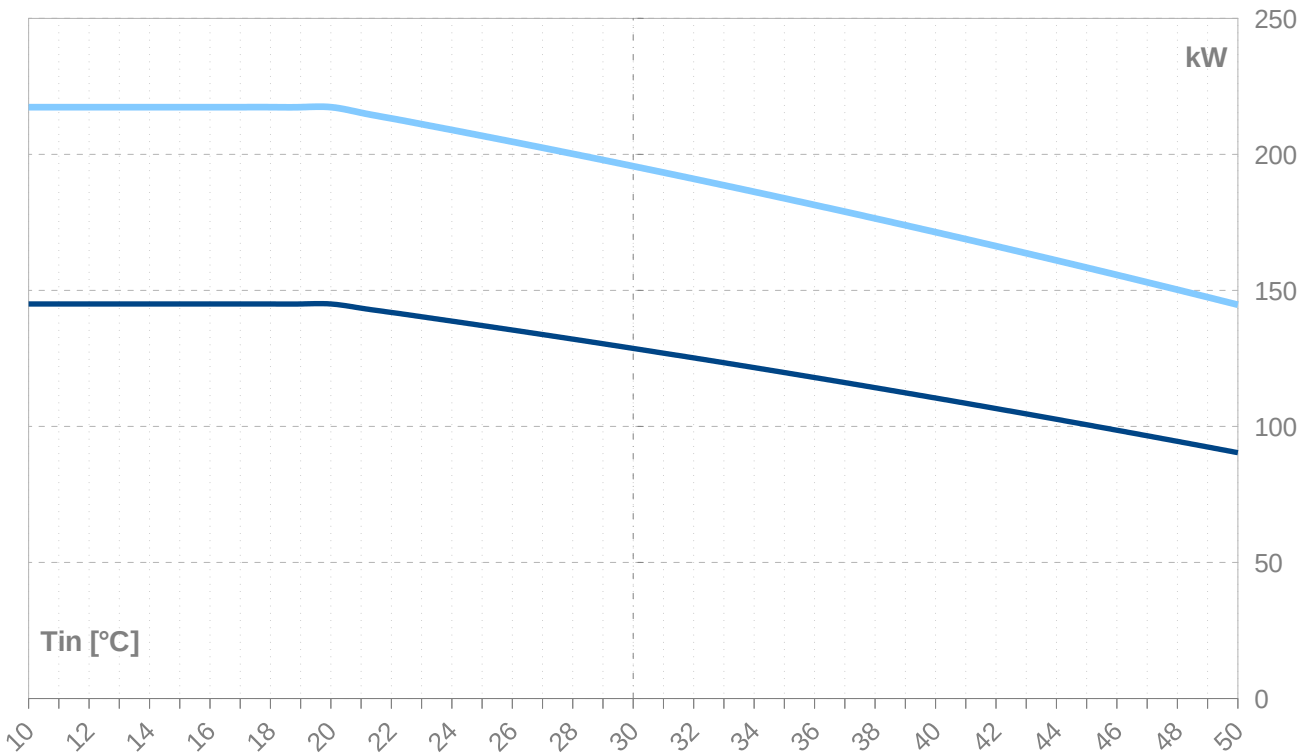
ZR144KRE-TFD_R513A_8_WHR

Qh-nom-35 Qh-nom-55 Qh-nom-60 Qh-nom-70 Qh-nom-80
Qh-min-70



Performance lines - cooling

Qc-nom-12-7 Qc-nom-23-18



WAMAK TWW 440 WHR HeavyDuty 2L4

Th -OU	55										
	°C]										
Ts -IN [°C]	Qh nom [kW]	Qh min [kW]	Qh max [kW]	Pin nom [kW]	Pin min [kW]	Pin max [kW]	COP nom kW / kW	Qc nom [kW]	Qc min [kW]	Qc max [kW]	I nom [A]
45	609.2	76.1	609.2	65.4	7.9	65.4	9.32	548.5	68.6	548.5	117.3
44	592.2	74.0	592.2	65.2	7.9	65.2	9.09	531.7	66.5	531.7	117.1
43	575.6	71.9	575.6	65.0	7.9	65.0	8.86	515.3	64.4	515.3	116.8
42	559.4	69.9	559.4	64.7	7.9	64.7	8.64	499.3	62.4	499.3	116.5
41	543.6	67.9	543.6	64.5	7.8	64.5	8.42	483.7	60.5	483.7	116.3
40	528.1	66.0	528.1	64.3	7.8	64.3	8.21	468.4	58.6	468.4	116.1
39	513.1	64.1	513.1	64.1	7.8	64.1	8.00	453.6	56.7	453.6	115.8
38	498.3	62.3	498.3	64.0	7.8	64.0	7.79	439.0	54.9	439.0	115.6
37	484.0	60.5	484.0	63.8	7.7	63.8	7.59	424.8	53.1	424.8	115.4
36	470.0	58.7	470.0	63.6	7.7	63.6	7.39	411.0	51.4	411.0	115.1
35	456.4	57.0	456.4	63.4	7.7	63.4	7.20	397.5	49.7	397.5	114.9
34	443.0	55.4	443.0	63.2	7.7	63.2	7.00	384.4	48.0	384.4	114.7
33	430.1	53.8	430.1	63.1	7.7	63.1	6.82	371.6	46.4	371.6	114.5
32	417.4	52.2	417.4	62.9	7.6	62.9	6.63	359.1	44.9	359.1	114.3
31	405.1	50.6	405.1	62.8	7.6	62.8	6.45	346.9	43.4	346.9	114.2
30	393.1	49.1	393.1	62.6	7.6	62.6	6.28	335.1	41.9	335.1	114.0
29	381.4	47.7	381.4	62.5	7.6	62.5	6.11	323.5	40.4	323.5	113.8
28	370.1	46.3	370.1	62.3	7.6	62.3	5.94	312.3	39.0	312.3	113.6
27	359.0	44.9	359.0	62.2	7.5	62.2	5.77	301.3	37.7	301.3	113.5
26	348.2	43.5	348.2	62.0	7.5	62.0	5.61	290.7	36.3	290.7	113.3
25	337.8	42.2	337.8	61.9	7.5	61.9	5.45	280.3	35.0	280.3	113.2
24	327.6	40.9	327.6	61.8	7.5	61.8	5.30	270.3	33.8	270.3	113.0
23	317.7	39.7	317.7	61.7	7.5	61.7	5.15	260.5	32.6	260.5	112.9
22	308.0	38.5	308.0	61.6	7.5	61.6	5.00	250.9	31.4	250.9	112.7
21	298.7	37.3	298.7	61.4	7.5	61.4	4.86	241.7	30.2	241.7	112.6
20	289.6	36.2	289.6	61.3	7.4	61.3	4.72	232.7	29.1	232.7	112.5
19	280.7	35.1	280.7	61.2	7.4	61.2	4.58	223.9	28.0	223.9	112.4
18	272.1	34.0	272.1	61.1	7.4	61.1	4.45	215.4	26.9	215.4	112.3
17	263.8	33.0	263.8	61.1	7.4	61.1	4.32	207.2	25.9	207.2	112.2
16	255.7	32.0	255.7	61.0	7.4	61.0	4.19	199.1	24.9	199.1	112.1
15	247.8	31.0	247.8	60.9	7.4	60.9	4.07	191.3	23.9	191.3	112.0
14	240.2	30.0	240.2	60.8	7.4	60.8	3.95	183.8	23.0	183.8	111.9
13	232.8	29.1	232.8	60.7	7.4	60.7	3.83	176.4	22.1	176.4	111.8
12	225.6	28.2	225.6	60.7	7.4	60.7	3.72	169.3	21.2	169.3	111.7
11	218.6	27.3	218.6	60.6	7.4	60.6	3.61	162.4	20.3	162.4	111.6
10	211.8	26.5	211.8	60.5	7.3	60.5	3.50	155.7	19.5	155.7	111.6
9	205.3	25.7	205.3	60.5	7.3	60.5	3.39	149.2	18.6	149.2	111.5
8	198.9	24.9	198.9	60.4	7.3	60.4	3.29	142.9	17.9	142.9	111.5
7	192.7	24.1	192.7	60.4	7.3	60.4	3.19	136.7	17.1	136.7	111.4
6	186.8	23.3	186.8	60.4	7.3	60.4	3.09	130.8	16.3	130.8	111.4
5	180.9	22.6	180.9	60.3	7.3	60.3	3.00	125.0	15.6	125.0	111.3
4	175.3	21.9	175.3	60.3	7.3	60.3	2.91	119.4	14.9	119.4	111.3
3	169.9	21.2	169.9	60.3	7.3	60.3	2.82	114.0	14.2	114.0	111.3
2	164.6	20.6	164.6	60.2	7.3	60.2	2.73	108.7	13.6	108.7	111.2
1	159.4	19.9	159.4	60.2	7.3	60.2	2.65	103.6	12.9	103.6	111.2
0	154.4	19.3	154.4	60.2	7.3	60.2	2.57	98.6	12.3	98.6	111.2
-1	149.6	18.7	149.6	60.2	7.3	60.2	2.48	93.8	11.7	93.8	111.2
-2	144.9	18.1	144.9	60.2	7.3	60.2	2.41	89.1	11.1	89.1	111.2
-3	140.3	17.5	140.3	60.2	7.3	60.2	2.33	84.5	10.6	84.5	111.2
-4	135.9	17.0	135.9	60.2	7.3	60.2	2.26	80.1	10.0	80.1	111.2
-5	131.6	16.4	131.6	60.2	7.3	60.2	2.19	75.7	9.5	75.7	111.2

-- attention: operating limits not reflected in performance table

ZR144KRE-TFD_R513A_8_WHR

WAMAK TWW 440 WHR HeavyDuty 2L4

Th -OU	60										
[°C]	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]
45	578.6	72.3	578.6	70.9	8.6	70.9	8.16	512.8	64.1	512.8	124.0
44	562.5	70.3	562.5	70.7	8.6	70.7	7.95	496.9	62.1	496.9	123.8
43	546.7	68.3	546.7	70.5	8.6	70.5	7.75	481.3	60.2	481.3	123.6
42	531.4	66.4	531.4	70.4	8.5	70.4	7.55	466.1	58.3	466.1	123.4
41	516.4	64.6	516.4	70.2	8.5	70.2	7.36	451.3	56.4	451.3	123.2
40	501.8	62.7	501.8	70.0	8.5	70.0	7.16	436.8	54.6	436.8	123.0
39	487.5	60.9	487.5	69.9	8.5	69.9	6.98	422.7	52.8	422.7	122.8
38	473.6	59.2	473.6	69.7	8.5	69.7	6.79	409.0	51.1	409.0	122.6
37	460.1	57.5	460.1	69.6	8.4	69.6	6.61	395.5	49.4	395.5	122.4
36	446.8	55.9	446.8	69.4	8.4	69.4	6.44	382.4	47.8	382.4	122.2
35	434.0	54.2	434.0	69.3	8.4	69.3	6.26	369.7	46.2	369.7	122.1
34	421.4	52.7	421.4	69.2	8.4	69.2	6.09	357.3	44.7	357.3	121.9
33	409.2	51.1	409.2	69.0	8.4	69.0	5.93	345.1	43.1	345.1	121.7
32	397.3	49.7	397.3	68.9	8.4	68.9	5.77	333.3	41.7	333.3	121.6
31	385.6	48.2	385.6	68.8	8.3	68.8	5.61	321.9	40.2	321.9	121.4
30	374.3	46.8	374.3	68.7	8.3	68.7	5.45	310.7	38.8	310.7	121.3
29	363.4	45.4	363.4	68.5	8.3	68.5	5.30	299.8	37.5	299.8	121.2
28	352.7	44.1	352.7	68.4	8.3	68.4	5.15	289.2	36.1	289.2	121.0
27	342.2	42.8	342.2	68.3	8.3	68.3	5.01	278.9	34.9	278.9	120.9
26	332.1	41.5	332.1	68.2	8.3	68.2	4.87	268.8	33.6	268.8	120.8
25	322.3	40.3	322.3	68.1	8.3	68.1	4.73	259.1	32.4	259.1	120.7
24	312.7	39.1	312.7	68.0	8.3	68.0	4.60	249.6	31.2	249.6	120.6
23	303.4	37.9	303.4	67.9	8.2	67.9	4.47	240.4	30.0	240.4	120.5
22	294.3	36.8	294.3	67.9	8.2	67.9	4.34	231.4	28.9	231.4	120.4
21	285.6	35.7	285.6	67.8	8.2	67.8	4.21	222.7	27.8	222.7	120.3
20	277.0	34.6	277.0	67.7	8.2	67.7	4.09	214.2	26.8	214.2	120.2
19	268.7	33.6	268.7	67.6	8.2	67.6	3.97	206.0	25.7	206.0	120.1
18	260.7	32.6	260.7	67.6	8.2	67.6	3.86	198.0	24.8	198.0	120.0
17	252.9	31.6	252.9	67.5	8.2	67.5	3.75	190.3	23.8	190.3	120.0
16	245.3	30.7	245.3	67.4	8.2	67.4	3.64	182.7	22.8	182.7	119.9
15	237.9	29.7	237.9	67.4	8.2	67.4	3.53	175.4	21.9	175.4	119.8
14	230.8	28.8	230.8	67.3	8.2	67.3	3.43	168.3	21.0	168.3	119.8
13	223.8	28.0	223.8	67.3	8.2	67.3	3.33	161.4	20.2	161.4	119.7
12	217.1	27.1	217.1	67.2	8.2	67.2	3.23	154.7	19.3	154.7	119.7
11	210.6	26.3	210.6	67.2	8.2	67.2	3.13	148.2	18.5	148.2	119.6
10	204.2	25.5	204.2	67.2	8.1	67.2	3.04	141.9	17.7	141.9	119.6
9	198.1	24.8	198.1	67.2	8.1	67.2	2.95	135.8	17.0	135.8	119.6
8	192.1	24.0	192.1	67.1	8.1	67.1	2.86	129.9	16.2	129.9	119.5
7	186.4	23.3	186.4	67.1	8.1	67.1	2.78	124.1	15.5	124.1	119.5
6	180.8	22.6	180.8	67.1	8.1	67.1	2.69	118.5	14.8	118.5	119.5
5	175.3	21.9	175.3	67.1	8.1	67.1	2.61	113.1	14.1	113.1	119.5
4	170.0	21.3	170.0	67.1	8.1	67.1	2.54	107.8	13.5	107.8	119.5
3	164.9	20.6	164.9	67.1	8.1	67.1	2.46	102.7	12.8	102.7	119.5
2	160.0	20.0	160.0	67.1	8.1	67.1	2.39	97.8	12.2	97.8	119.5
1	155.1	19.4	155.1	67.1	8.1	67.1	2.31	92.9	11.6	92.9	119.5
0	150.5	18.8	150.5	67.1	8.1	67.1	2.24	88.2	11.0	88.2	119.5
-1											
-2											
-3											
-4											
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-- attention: operating limits not reflected in performance table

WAMAK TWW 440 WHR HeavyDuty 2L4

Th -OU	70										
	°C]										
Ts -IN [°C]	Qh nom [kW]	Qh min [kW]	Qh max [kW]	Pin nom [kW]	Pin min [kW]	Pin max [kW]	COP nom kW / kW	Qc nom [kW]	Qc min [kW]	Qc max [kW]	I nom [A]
45	516.1	64.5	516.1	84.2	10.2	84.2	6.13	438.1	54.8	438.1	141.1
44	501.9	62.7	501.9	84.1	10.2	84.1	5.97	423.9	53.0	423.9	141.0
43	487.9	61.0	487.9	84.0	10.2	84.0	5.81	410.0	51.3	410.0	140.9
42	474.4	59.3	474.4	83.9	10.2	83.9	5.65	396.5	49.6	396.5	140.8
41	461.1	57.6	461.1	83.9	10.2	83.9	5.50	383.3	47.9	383.3	140.7
40	448.2	56.0	448.2	83.8	10.2	83.8	5.35	370.5	46.3	370.5	140.6
39	435.6	54.5	435.6	83.7	10.2	83.7	5.20	358.0	44.7	358.0	140.5
38	423.4	52.9	423.4	83.7	10.1	83.7	5.06	345.8	43.2	345.8	140.4
37	411.5	51.4	411.5	83.6	10.1	83.6	4.92	333.9	41.7	333.9	140.3
36	399.9	50.0	399.9	83.5	10.1	83.5	4.79	322.4	40.3	322.4	140.2
35	388.6	48.6	388.6	83.5	10.1	83.5	4.65	311.1	38.9	311.1	140.2
34	377.6	47.2	377.6	83.4	10.1	83.4	4.52	300.2	37.5	300.2	140.1
33	366.9	45.9	366.9	83.4	10.1	83.4	4.40	289.5	36.2	289.5	140.0
32	356.4	44.6	356.4	83.4	10.1	83.4	4.28	279.1	34.9	279.1	140.0
31	346.3	43.3	346.3	83.3	10.1	83.3	4.16	269.0	33.6	269.0	139.9
30	336.5	42.1	336.5	83.3	10.1	83.3	4.04	259.2	32.4	259.2	139.9
29	326.9	40.9	326.9	83.3	10.1	83.3	3.93	249.7	31.2	249.7	139.9
28	317.6	39.7	317.6	83.2	10.1	83.2	3.82	240.4	30.1	240.4	139.8
27	308.6	38.6	308.6	83.2	10.1	83.2	3.71	231.4	28.9	231.4	139.8
26	299.8	37.5	299.8	83.2	10.1	83.2	3.60	222.6	27.8	222.6	139.8
25	291.3	36.4	291.3	83.2	10.1	83.2	3.50	214.1	26.8	214.1	139.8
24	283.0	35.4	283.0	83.1	10.1	83.1	3.40	205.9	25.7	205.9	139.7
23	275.0	34.4	275.0	83.1	10.1	83.1	3.31	197.8	24.7	197.8	139.7
22	267.2	33.4	267.2	83.1	10.1	83.1	3.21	190.1	23.8	190.1	139.7
21	259.6	32.4	259.6	83.1	10.1	83.1	3.12	182.5	22.8	182.5	139.7
20	252.2	31.5	252.2	83.1	10.1	83.1	3.03	175.1	21.9	175.1	139.7
19	245.1	30.6	245.1	83.1	10.1	83.1	2.95	168.0	21.0	168.0	139.7
18	238.2	29.8	238.2	83.1	10.1	83.1	2.87	161.1	20.1	161.1	139.8
17	231.5	28.9	231.5	83.2	10.1	83.2	2.78	154.4	19.3	154.4	139.8
16	225.0	28.1	225.0	83.2	10.1	83.2	2.71	147.9	18.5	147.9	139.8
15	218.7	27.3	218.7	83.2	10.1	83.2	2.63	141.6	17.7	141.6	139.8
14	212.6	26.6	212.6	83.2	10.1	83.2	2.55	135.4	16.9	135.4	139.9
13	206.7	25.8	206.7	83.2	10.1	83.2	2.48	129.5	16.2	129.5	139.9
12	200.9	25.1	200.9	83.3	10.1	83.3	2.41	123.7	15.5	123.7	139.9
11	195.4	24.4	195.4	83.3	10.1	83.3	2.35	118.1	14.8	118.1	140.0
10	190.0	23.7	190.0	83.3	10.1	83.3	2.28	112.7	14.1	112.7	140.0
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-- attention: operating limits not reflected in performance table

Th -OU	80										
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]
45	452.8	56.6	452.8	101.2	12.3	101.2	4.47	358.9	44.9	358.9	164.0
44	440.4	55.1	440.4	101.3	12.3	101.3	4.35	346.5	43.3	346.5	164.0
43	428.4	53.5	428.4	101.3	12.3	101.3	4.23	334.4	41.8	334.4	164.1
42	416.6	52.1	416.6	101.3	12.3	101.3	4.11	322.6	40.3	322.6	164.1
41	405.2	50.7	405.2	101.4	12.3	101.4	4.00	311.2	38.9	311.2	164.1
40	394.1	49.3	394.1	101.4	12.3	101.4	3.89	300.0	37.5	300.0	164.2
39	383.3	47.9	383.3	101.5	12.3	101.5	3.78	289.2	36.2	289.2	164.2
38	372.8	46.6	372.8	101.5	12.3	101.5	3.67	278.7	34.8	278.7	164.3
37	362.6	45.3	362.6	101.6	12.3	101.6	3.57	268.4	33.6	268.4	164.3
36	352.7	44.1	352.7	101.6	12.3	101.6	3.47	258.4	32.3	258.4	164.4
35	343.0	42.9	343.0	101.7	12.3	101.7	3.37	248.7	31.1	248.7	164.5
34	333.7	41.7	333.7	101.7	12.3	101.7	3.28	239.3	29.9	239.3	164.5
33	324.6	40.6	324.6	101.8	12.3	101.8	3.19	230.2	28.8	230.2	164.6
32	315.8	39.5	315.8	101.9	12.4	101.9	3.10	221.3	27.7	221.3	164.7
31	307.2	38.4	307.2	101.9	12.4	101.9	3.01	212.7	26.6	212.7	164.8
30	298.9	37.4	298.9	102.0	12.4	102.0	2.93	204.3	25.5	204.3	164.9
29	290.8	36.4	290.8	102.1	12.4	102.1	2.85	196.2	24.5	196.2	165.0
28	283.0	35.4	283.0	102.1	12.4	102.1	2.77	188.3	23.5	188.3	165.1
27	275.5	34.4	275.5	102.2	12.4	102.2	2.69	180.6	22.6	180.6	165.2
26	268.1	33.5	268.1	102.3	12.4	102.3	2.62	173.2	21.7	173.2	165.3
25	261.0	32.6	261.0	102.4	12.4	102.4	2.55	166.0	20.8	166.0	165.4
24	254.1	31.8	254.1	102.5	12.4	102.5	2.48	159.0	19.9	159.0	165.5
23	247.4	30.9	247.4	102.6	12.4	102.6	2.41	152.3	19.0	152.3	165.6
22	240.9	30.1	240.9	102.7	12.5	102.7	2.35	145.7	18.2	145.7	165.7
21	234.7	29.3	234.7	102.8	12.5	102.8	2.28	139.4	17.4	139.4	165.9
20	228.6	28.6	228.6	102.9	12.5	102.9	2.22	133.2	16.6	133.2	166.0
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-- attention: operating limits not reflected in performance table

WAMAK TWW 440 WHR HeavyDuty 2L4

Tc -OU		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	110.4	13.8	110.4	53.1	6.4	53.1	2.08	159.7	20.0	159.7	103.0
39	112.3	14.0	112.3	52.0	6.3	52.0	2.16	160.6	20.1	160.6	101.8
38	114.2	14.3	114.2	51.0	6.2	51.0	2.24	161.5	20.2	161.5	100.6
37	116.1	14.5	116.1	50.0	6.1	50.0	2.32	162.4	20.3	162.4	99.5
36	118.0	14.7	118.0	49.0	5.9	49.0	2.41	163.4	20.4	163.4	98.4
35	119.8	15.0	119.8	48.0	5.8	48.0	2.49	164.3	20.5	164.3	97.4
34	121.6	15.2	121.6	47.1	5.7	47.1	2.58	165.3	20.7	165.3	96.4
33	123.4	15.4	123.4	46.2	5.6	46.2	2.67	166.2	20.8	166.2	95.4
32	125.2	15.6	125.2	45.3	5.5	45.3	2.76	167.2	20.9	167.2	94.5
31	126.9	15.9	126.9	44.4	5.4	44.4	2.86	168.2	21.0	168.2	93.6
30	128.7	16.1	128.7	43.6	5.3	43.6	2.95	169.1	21.1	169.1	92.7
29	130.4	16.3	130.4	42.8	5.2	42.8	3.05	170.1	21.3	170.1	91.9
28	132.1	16.5	132.1	42.0	5.1	42.0	3.15	171.0	21.4	171.0	91.1
27	133.8	16.7	133.8	41.2	5.0	41.2	3.25	172.0	21.5	172.0	90.3
26	135.4	16.9	135.4	40.5	4.9	40.5	3.35	173.0	21.6	173.0	89.6
25	137.1	17.1	137.1	39.7	4.8	39.7	3.45	173.9	21.7	173.9	88.8
24	138.7	17.3	138.7	39.0	4.7	39.0	3.56	174.9	21.9	174.9	88.2
23	140.3	17.5	140.3	38.3	4.6	38.3	3.66	175.8	22.0	175.8	87.5
22	141.9	17.7	141.9	37.6	4.6	37.6	3.77	176.8	22.1	176.8	86.8
21	143.5	17.9	143.5	37.0	4.5	37.0	3.88	177.7	22.2	177.7	86.2
20	145.0	18.1	145.0	36.3	4.4	36.3	4.00	178.7	22.3	178.7	85.6

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	171.4	21.4	171.4	53.1	6.4	53.1	3.23	221.2	27.6	205.7	103.6
39	173.9	21.7	173.9	52.0	6.3	52.0	3.34	222.7	27.8	207.3	102.4
38	176.5	22.1	176.5	51.0	6.2	51.0	3.46	224.3	28.0	208.8	101.3
37	178.9	22.4	178.9	50.0	6.1	50.0	3.58	225.9	28.2	210.3	100.2
36	181.4	22.7	181.4	49.0	5.9	49.0	3.70	227.4	28.4	211.8	99.1
35	183.8	23.0	183.8	48.0	5.8	48.0	3.83	229.0	28.6	213.4	98.1
34	186.2	23.3	186.2	47.1	5.7	47.1	3.95	230.6	28.8	214.9	97.1
33	188.6	23.6	188.6	46.2	5.6	46.2	4.08	232.1	29.0	216.5	96.2
32	191.0	23.9	191.0	45.3	5.5	45.3	4.22	233.7	29.2	218.1	95.2
31	193.3	24.2	193.3	44.4	5.4	44.4	4.35	235.2	29.4	219.6	94.4
30	195.6	24.5	195.6	43.6	5.3	43.6	4.49	236.8	29.6	221.2	93.5
29	197.9	24.7	197.9	42.8	5.2	42.8	4.63	238.3	29.8	222.7	92.7
28	200.2	25.0	200.2	42.0	5.1	42.0	4.77	239.8	30.0	224.3	91.9
27	202.4	25.3	202.4	41.2	5.0	41.2	4.91	241.3	30.2	225.9	91.1
26	204.6	25.6	204.6	40.5	4.9	40.5	5.06	242.8	30.4	227.4	90.3
25	206.8	25.9	206.8	39.7	4.8	39.7	5.21	244.3	30.5	229.0	89.6
24	209.0	26.1	209.0	39.0	4.7	39.0	5.36	245.8	30.7	230.6	88.9
23	211.1	26.4	211.1	38.3	4.6	38.3	5.51	247.3	30.9	232.1	88.2
22	213.2	26.7	213.2	37.6	4.6	37.6	5.67	248.8	31.1	233.7	87.5
21	215.3	26.9	215.3	37.0	4.5	37.0	5.83	250.2	31.3	235.2	86.9
20	217.3	27.2	217.3	36.3	4.4	36.3	5.99	251.6	31.5	236.8	86.2

-- 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

