WRHN 292-422

WATER TO WATER HEAT PUMP REVERSIBLE ON THE REFRIGERANT CIRCUIT FOR INDOOR INSTALLATION

PRELIMINARY

WRHN 292 - 422 (R-407C)		
Size	Cooling [kW]	Heating [kW]
292	86.5	102
322	102	123
362	118	141
422	144	173

The WRHN series water-water heat pumps with hermetic compressors are suitable for indoor installation, designed for medium and low cooling and heating capacity requirements. They can be used in modern civil and industrial systems, with compact dimensions and low sound levels, and only require the electrical and water connections for installation: the units in fact are completely assembled and tested in the factory. They are fitted with reverse-cycle valve on the refrigerant circuit, so as to significantly reduce the installation and maintenance costs.

B1R071002CB-01

CERTIFIED QUALITY SYSTEM UNI EN ISO 9001:2008

STANDARD UNIT SPECIFICATIONS

COMPRESSOR
Scroll compressor complete with: overload thermal protection, high refrigerant discharge temperature, rubber antivibration mounts, oil charge, acoustic and weather proof cabinet.
An oil heater prevents excessive dilution of the oil by the refrigerant, and is automatically activated at all stages where the compressor is switched off.

STRUCTURE
The base is assembled with a hot-galvanized steel frame (Z 200 g/m2). The internal structure is a frame made from «ALUZINK» metal plate. The alloy coating the Aluzink ensures excellent corrosion strength, thanks to the galvanic protection typical of the combination of aluminium and zinc.

PANELLING
Pre-painted plate easy panelling external that can be removed for complete access to the internal components. Lined with class 1 heat insulation and soundproofing material.

INTERNAL EXCHANGER
Direct expansion heat exchanger, braze-welded AISI 316 stainless steel plates with large exchange surface and complete with external heat and anti-condensate insulation.
The differential pressure switch on the water side is supplied as standard.
On sizes 292-322-362-422 the exchanger is provided with two independent circuits on the refrigerant side with dual alternating refrigerant channels to reach maximum heat transfer and balanced circuit operation.

EXTERNAL EXCHANGER
Direct expansion heat exchanger, braze-welded AISI 316 stainless steel plates with large exchange surface and complete with external heat and anti-condensate insulation.
The differential pressure switch on the water side is supplied as standard.
On sizes 292-322-362-422 the exchanger is provided with two independent circuits on the refrigerant side with dual alternating refrigerant channels to reach maximum heat transfer and balanced circuit operation.

REFRIGERANT CIRCUIT
The circuit is complete with:
- sight glass with moisture indicator
- thermostatic expansion valves with equalizer
- high pressure switch
- low pressure switch
- high pressure safety
- filter dryer
- high pressure safety valve
- 4-way reverse cycle valve

ELECTRICAL PANEL
The Power Section includes:
- compressor thermal overload relay
- main door lock isolator switch
- compressor fuses
- compressor control contactor

The control section includes:
- water pump control
- automatic compressor start rotation control
- centralised alarms with remote signalling
- self-diagnosis system with immediate display of the error code
- serial port with MODBUS (RS 485) output for remote communication
- antifreeze protection
- unit status parameter display

In addition, contacts auxiliary are available for:
- heating / cooling operation command
- remote ON/OFF control
- free contacts for enabling water circuit pump

Control keypad, including:
- buttons to display the parameter index and the status list
- ON/OFF and alarm reset buttons
- UP and DOWN buttons to increase and decrease the values
- heating and cooling operating mode buttons
- Compressor timer / operation signal LED

ACCESSORIES
- Steel mesh filter on the water side
- phase monitor
- pressure switch kit, to control the water flow at the external exchanger inlet. Standard calibration 3bar, other calibrations availables upon request.
- serial communication module to supervisor (MODBUS)
- Free contacts for compressor state
- daily and weekly programming clock
- disposal for inrush current reduction, for unit 400/3/50
- power factor correction capacitors (cosfi > 0.9)
- Remote control with remote microprocessor control

CONFIGURATION CODE

	(1)		(2)	(3)	(4)	(5)
WRHN	S	292	400T	-	-	-
	S (Standard)	**292**	**400T**	**-** (Standard)	**-** (Standard)	**-** (Standard)
	B	**322**		**SFSTR4**	**CLS**	**PFCP**
	BS	**362**				
		422				

(1) LOW TEMPERATURE
Water low temperature(B)
this version permits units operation with glycol solution temperature from +5°C to -8°C.
Low temperature: not required(-)
standard
Water low temperature source side(BS)
Prearrangement for use of source side water, with temperature conditions lower than +5°C.

(2) VOLTAGE
Supply voltage 400/3/50 without neutral(400T)
Standard power supply

(3) SOFT STARTER
Disposal for inrush current reduction: not required(-)
standard
disposal for inrush current reduction, for unit 400/3/50(SFSTR4)
disposal for inrush current reduction, for unit 400/3/50

(4) FREE CONTACTS HEATING EXTERNAL SIGNAL
Additional free contacts: not required(-)
free contacts for alarm(CLS)
free contacts for alarm

(5) POWER FACTOR CORRECTION CAPACITORS (COSFI > 0.9)
power factor correction capacitors (cosfi > 0.9)(PFCP)
power factor correction capacitors (cosfi > 0.9)
Power factor correction capacitors: not required(-)

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GENERAL TECHNICAL SPECIFICATIONS

Size			292	322	362	422
COOLING						
Cooling capacity	1	kW	86.5	102	118	144
Compressor power input	1	kW	22.9	27.1	31.2	38.4
Total power input	1	kW	22.9	27.1	31.2	38.4
EER	1		3.77	3.76	3.78	3.75
ESEER			4.55	4.09	3.93	4.2
HEATING						
Heat output	2	kW	102	123	141	173
Compressor power input	2	kW	27.9	32.8	37.6	46.2
Total power input	2	kW	27.9	32.8	37.6	46.2
COP			3.65	3.75	3.75	3.74
COMPRESSOR						
Type of compressors	3		SCROLL	SCROLL	SCROLL	SCROLL
No. of Compressors		Nr	2	2	2	2
Std Capacity control steps		Nr	2	2	2	2
Oil charge (C1)		l	4	4	8	8
Oil charge (C2)		l	4	8	8	8
Type of oil			POE	POE	POE	POE
Refrigerant charge (C1)		kg	9.3	8.5	10.3	10.4
Refrigerant charge (C2)		kg	9.3	8.5	10.3	10.4
Refrigerant circuits		Nr	2	2	2	2
INTERNAL EXCHANGER						
Type of internal exchanger	4		PHE	PHE	PHE	PHE
No. of internal exchangers		Nr	1	1	1	1
Water flow rate (Internal Exchanger)	1	l/s	4.1	4.9	5.6	6.9
Max water flow-rate		l/s	7.1	8.2	9.1	10.2
internal exchanger pressure drop	1	kPa	32	33	31	34
EXTERNAL EXCHANGER						
type of external exchanger	4		PHE	PHE	PHE	PHE
Water flow rate (External Exchanger)		l/s	4.1	4.9	5.6	6.9
Max water flow-rate		l/s	7.1	8.2	9.1	10.2
External exchanger pressure drop		kPa	32	33	31	34
Quantity		Nr	1	1	1	1
CONNECTIONS						
Water fittings			2 1/2"	2 1/2"	2 1/2"	2 1/2"
POWER SUPPLY						
Standard power supply		V	400/3/50	400/3/50	400/3/50	400/3/50
NOISE LEVELS						
Sound pressure level (1 m)		dB(A)	66	66	66	66
DIMENSIONS						
Length		mm	1062	1062	1062	1062
Depth		mm	580	580	580	580
Height		mm	1538	1538	1538	1538
Packing volume		m3	2.36	2.36	2.36	2.36
STANDARD UNIT WEIGHTS						
Shipping weight		kg	480	520	550	610
Operating weight		kg	470	510	540	600

(1) data referred to the following conditions :
internal exchanger water = 12/7°C
External exchanger outlet water temperature = 35°C
(2) data referred to the following conditions :
internal exchanger water = 40/45°C
External exchanger inlet water = 10°C
(3) SCROLL = scroll compressor
(4) PHE = plates

OPERATING LIMITS (COOLING)

Size			292	322	362	422
EXTERNAL EXCHANGER						
Max water inlet temperature		°C	48	48	48	48
Min. water inlet temperature	1	°C	10	10	10	10
Min. water inlet temperature	2	°C	18	18	18	18
Max water outlet temperature		°C	54	54	54	54
Min. water outlet temperature	1	°C	26	26	26	26
Min. water outlet temperature	2	°C	28	28	28	28
Water thermal head (min / max)		°C	8 / 16	8 / 16	8 / 16	8 / 16
INTERNAL EXCHANGER						
Max water inlet temperature		°C	24	24	24	24
Min. water outlet temperature	3	°C	5	5	5	5
Water thermal head (min / max)		°C	3 / 8	3 / 8	3 / 8	3 / 8

OPERATING LIMITS (HEATING)

EXTERNAL EXCHANGER						
Min. water inlet temperature		°C	16	16	16	16
Min. water outlet temperature		°C	5	5	5	5
INTERNAL EXCHANGER						
Max water inlet temperature		°C	48	48	48	48
Min. water inlet temperature		°C	10	10	10	10
Min. water outlet temperature		°C	26	26	26	26
Max water outlet temperature		°C	54	54	54	54
Water thermal head (min / max)		°C	3 / 8	3 / 8	3 / 8	3 / 8

(1) well water
(2) tower water
(3) data refers to units in capacity-controlled operation

Voltage: 400/3/50

ELECTRICAL DATA

Size			292	322	362	422
F.L.A. - FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS						
F.L.A. - Total		A	60.6	68.8	77	94.4
F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION						
F.L.I. - Total		kW	34.7	41.2	47.4	58.1
M.I.C. MAXIMUM INRUSH CURRENT						
M.I.C. - Value		A	205.3	245.3	253.5	262.2

power supply: 400/3/50 Hz +/-6%
voltage unbalance: max 2 %

SOUND LEVELS

Acoustic configuration: Standard (ST)

Size	Sound Power Level (dB)								Sound pressure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
292	98	81	77	81	77	72	60	60	66	82
322	98	81	77	81	76	72	60	59	66	82
362	98	81	77	81	76	72	60	59	66	82
422	88	89	86	76	68	69	54	59	66	80

The sound pressure level is measured 1 metre from the external surface of the unit operating in an open field. Data refer to the following conditions: internal exchanger water = 12/7°C

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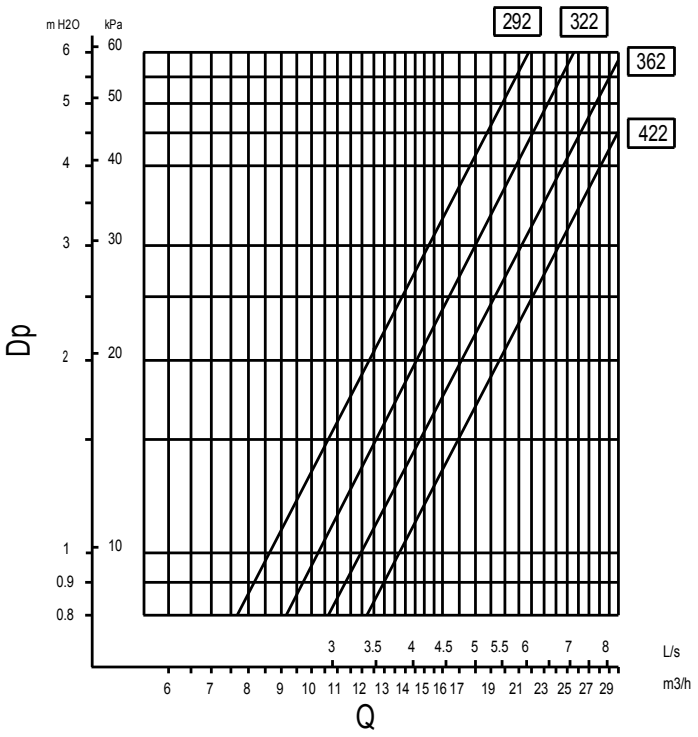
EXCHANGER PRESSURE DROPS



Q[L/S]= WATER-FLOW RATE
DP = PRESSURE DROP

CORRECTION FACTOR FOR ANTIFREEZE SOLUTIONS

% ethylene glycol by weight			5%	10%	15%	20%	25%	30%	35%	40%
Freezing temperature		°C	-2.0	-3.9	-6.5	-8.9	-11.8	-15.6	-19.0	-23.4
Safety temperature		°C	3.0	1.0	-1.0	-4.0	-6.0	-10.0	-14.0	-19.0
Cooling Capacity Factor		Nr	0.995	0.990	0.985	0.981	0.977	0.974	0.971	0.968
Compressor input Factor		Nr	0.997	0.993	0.990	0.988	0.986	0.984	0.982	0.981
Internal exchanger Glycol solution flow Factor		Nr	1.003	1.010	1.020	1.033	1.050	1.072	1.095	1.124
Pressure drop Factor		Nr	1.029	1.060	1.090	1.118	1.149	1.182	1.211	1.243

The correction factors shown refer to water and glycol ethylene mixes used to prevent the formation of frost on the exchangers in the water circuit during inactivity in winter.

FOULING CORRECTION FACTOR

	INTERNAL EXCHANGER	
m² °C/W	F1	FK1
0.44 x 10^(-4)	1.00	1.00
0.88 x 10^(-4)	0.97	0.99
1.76 x 10^(-4)	0.94	0.98

F1 = Cooling capacity correction factors
FK1 = Compressor power input correction factor

EXCHANGER OPERATING LIMITS

	INTERNAL EXCHANGER					EXTERNAL EXCHANGER	
	DPr	DPw	Dteo (S - B)		Dtei	Dtci	Dtco
	kPa	kPa	°C		°C	°C	°C
PED (CE)	3000	3000	5	-8	24	10	54

DPr = Maximum operating pressure on refrigerant side
DPw = Maximum operating pressure on water side
DTeo = Minimum water temperature at internal exchanger outlet
DTei = Maximum water temperature at internal exchanger inlet
DTci = Minimum water temperature at external exchanger inlet
DTco = Maximum water temperature at external exchanger outlet

COOLING PERFORMANCE

Size	To (ºC)	EXTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C)														
		30			35			40			45			50		
		kWf	kWe	kWt	kWf	kWe	kWt	kWf	kWe	kWt	kWf	kWe	kWt	kWf	kWe	kWt
292	5	82.3	21.1	103.4	79.3	22.7	102.0	75.4	24.9	100.3	70.5	27.7	98.2	64.6	31.1	95.7
	6	86.2	21.2	107.4	83.1	22.8	105.9	79.0	25.0	104.0	73.9	27.8	101.7	67.7	31.2	98.9
	7	89.8	21.2	111.0	86.5	22.9	109.4	82.2	25.1	107.3	76.9	28.0	104.9	70.5	31.4	101.9
	9	95.5	21.4	116.9	92.0	23.1	115.1	87.4	25.3	112.7	81.7	28.2	109.9	74.9	31.7	106.6
	11	99.6	21.4	121.0	95.9	23.2	119.1	91.0	25.5	116.5	85.1	28.4	113.5	78.0	31.8	109.8
	13	101.9	21.5	123.4	98.0	23.2	121.2	93.0	25.6	118.6	86.9	28.5	115.4	79.6	31.9	111.5
	15	102.5	21.5	124.0	98.6	23.3	121.9	93.5	25.6	119.1	87.2	28.5	115.7	79.8	31.9	111.7
322	5	96.7	25.0	121.7	93.3	26.9	120.2	88.9	29.4	118.3	83.6	32.6	116.2	77.3	36.5	113.8
	6	101.6	25.1	126.7	98.0	27.0	125.0	93.5	29.6	123.1	87.9	32.8	120.7	81.3	36.7	118.0
	7	105.9	25.2	131.1	102.2	27.2	129.4	97.4	29.8	127.2	91.6	33.0	124.6	84.8	36.9	121.7
	9	112.9	25.4	138.3	108.9	27.4	136.3	103.8	30.0	133.8	97.6	33.3	130.9	90.3	37.3	127.6
	11	117.6	25.5	143.1	113.4	27.6	141.0	108.0	30.2	138.2	101.5	33.6	135.1	93.9	37.5	131.4
	13	120.1	25.6	145.7	115.7	27.6	143.3	110.1	30.3	140.4	103.4	33.7	137.1	95.5	37.7	133.2
	15	120.3	25.6	145.9	115.8	27.7	143.5	110.1	30.3	140.4	103.3	33.7	137.0	95.3	37.7	133.0
362	5	112.1	28.8	140.9	108.4	30.8	139.2	103.7	33.7	137.4	97.9	37.2	135.1	91.0	41.5	132.5
	6	117.8	29.0	146.8	113.9	31.1	145.0	108.9	33.9	142.8	102.8	37.5	140.3	95.6	41.9	137.5
	7	122.8	29.1	151.9	118.8	31.3	150.1	113.5	34.1	147.6	107.1	37.8	144.9	99.5	42.2	141.7
	9	131.0	29.4	160.4	126.6	31.6	158.2	120.9	34.5	155.4	114.0	38.2	152.2	105.9	42.7	148.6
	11	136.5	29.5	166.0	131.8	31.8	163.6	125.8	34.8	160.6	118.6	38.5	157.1	110.1	43.0	153.1
	13	139.3	29.6	168.9	134.5	31.9	166.4	128.3	34.9	163.2	120.9	38.6	159.5	112.1	43.2	155.3
	15	139.6	29.6	169.2	134.6	31.9	166.5	128.4	34.9	163.3	120.8	38.6	159.4	112.0	43.1	155.1
422	5	136.7	35.1	171.8	132.7	37.8	170.5	126.9	41.4	168.3	119.4	46.0	165.4	110.2	51.5	161.7
	6	143.2	35.4	178.6	139.0	38.1	177.1	133.0	41.8	174.8	125.3	46.3	171.6	115.8	51.8	167.6
	7	149.0	35.6	184.6	144.6	38.4	183.0	138.4	42.1	180.5	130.5	46.7	177.2	120.8	52.1	172.9
	9	158.5	36.0	194.5	153.7	38.9	192.6	147.1	42.6	189.7	138.9	47.1	186.0	128.8	52.5	181.3
	11	165.2	36.3	201.5	160.1	39.2	199.3	153.2	43.0	196.2	144.6	47.5	192.1	134.3	52.8	187.1
	13	169.0	36.5	205.5	163.7	39.4	203.1	156.6	43.2	199.8	147.8	47.7	195.5	137.1	53.0	190.1
	15	170.0	36.5	206.5	164.6	39.5	204.1	157.3	43.2	200.5	148.3	47.7	196.0	137.4	53.1	190.5

kWf = Cooling capacity in kW
kWe = Compressor power input in kW
kWt = Heating capacity to the external exchanger(kW)
To = Internal exchanger water outlet temperature in° C
With To = 5°C we recommend using 10% glycol solution

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HEATING PERFORMANCE

Size	To (ºC)	INTERNAL EXCHANGER WATER OUTLET TEMPERATURE (°C)											
		30		35		40		45		50		54	
		kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe	kWt	kWe
292	5	104.7	21.2	103.1	22.8	101.2	25.0	99.2	27.8	97.0	31.1	95.1	34.1
	6	108.6	21.2	106.7	22.9	104.6	25.1	102.4	27.9	100.1	31.2	98.3	34.3
	7	112.1	21.3	109.9	22.9	107.6	25.2	105.3	28.0	102.9	31.4	101.0	34.5
	9	117.7	21.4	115.2	23.0	112.6	25.3	110.0	28.2	107.5	31.6	105.5	34.8
	11	121.7	21.4	119.0	23.1	116.3	25.4	113.5	28.3	110.7	31.8	108.4	35.0
	13	124.0	21.5	121.4	23.2	118.6	25.5	115.6	28.4	112.5	31.9	110.0	35.1
	15	124.6	21.5	122.2	23.2	119.5	25.5	116.5	28.4	113.0	31.9	110.0	35.1
322	5	122.7	25.0	121.1	26.9	119.3	29.5	117.3	32.7	115.3	36.5	113.5	40.0
	6	126.9	25.1	124.9	27.0	122.9	29.6	120.7	32.8	118.5	36.7	116.6	40.2
	7	130.6	25.2	128.4	27.1	126.1	29.7	123.8	33.0	121.4	36.9	119.4	40.5
	9	136.8	25.3	134.2	27.3	131.6	29.9	129.0	33.2	126.2	37.2	124.0	40.8
	11	141.3	25.4	138.6	27.4	135.8	30.1	132.9	33.4	129.8	37.4	127.2	41.0
	13	144.2	25.5	141.6	27.5	138.7	30.2	135.5	33.5	132.0	37.5	129.0	41.2
	15	145.4	25.6	143.1	27.6	140.2	30.3	136.8	33.6	132.9	37.6	129.5	41.2
362	5	141.8	28.8	140.3	30.9	138.6	33.8	136.7	37.3	134.6	41.6	132.9	45.6
	6	148.0	29.0	145.8	31.1	143.5	34.0	141.3	37.6	139.2	41.9	137.4	46.0
	7	153.5	29.1	150.7	31.3	148.0	34.1	145.5	37.8	143.2	42.2	141.5	46.3
	9	162.4	29.3	158.6	31.5	155.3	34.4	152.3	38.2	149.8	42.7	148.0	46.8
	11	168.3	29.5	164.2	31.7	160.5	34.6	157.2	38.4	154.5	43.0	152.6	47.2
	13	171.4	29.6	167.3	31.8	163.6	34.8	160.2	38.6	157.2	43.1	155.1	47.4
	15	171.7	29.6	168.0	31.8	164.5	34.8	161.2	38.6	158.1	43.2	155.6	47.4
422	5	174.1	35.4	172.3	38.1	170.1	41.6	167.3	45.9	163.9	50.8	160.9	55.3
	6	181.0	35.6	178.8	38.4	176.1	41.9	173.0	46.2	169.4	51.2	166.2	55.8
	7	187.2	35.8	184.5	38.6	181.5	42.2	178.0	46.5	174.2	51.6	170.9	56.1
	9	197.0	36.1	193.7	39.0	190.1	42.6	186.2	47.0	182.2	52.1	178.7	56.8
	11	203.6	36.3	199.8	39.2	195.9	42.9	191.9	47.3	187.7	52.5	184.2	57.2
	13	206.9	36.5	203.0	39.3	199.0	43.0	194.9	47.5	190.8	52.7	187.4	57.5
	15	206.9	36.5	203.1	39.4	199.3	43.0	195.4	47.5	191.5	52.7	188.3	57.5

kWt = internal exchanger heat power (kW)
kWe = Compressor power input in kW
To= external exchanger outlet water temperature (°C)
With To = 5°C we recommend using 10% glycol solution

(IFWX)Steel mesh filter on the water side

Steel mesh mechanical filter positioned at the exchanger inlet. Suitable for filtering water and trapping the impurities present in the water circuit.

separately supplied accessories

(PMX)Phase monitor

Phase monitor to check the presence and correct sequence of the power supply phases

separately supplied accessories

(SFSTR4)Disposal for inrush current reduction, for unit 400/3/50

The disposal for inrush current reduction allows to graduate current during compressor start, avoiding to reach peaks which can create criticalities to the electrical system.

optional accessory

(PCDWX)Daily and weekly programming clock

Time band, clock and programming display

separately supplied accessories

(CMMBX)Serial communication module to supervisor (MODBUS)

The serial communication module to supervisor (MODBUS) is connected with the principal module through a comb connection (see lay-out on electrical panel). In this way the remote assistance and supervision are available through standard MODBUS protocol.It is possible to connect to a single supervisor system up to 127 units. The connection to PC must be obtained through a converter RS485/232; the serial port RS232 admits as maximum a 10 m length.The serial communication module to supervisor (MODBUS) is necessary when the unit is connected to ELFOCONTROL.

separately supplied accessories

(RCMRX)Remote control with remote microprocessor control

The remote control allows the remote display and operation of functions of the microprocessor on the unit

separately supplied accessories

(CLS)Free contacts for alarm

Free contacts for compressor state

optional accessory

(PFCP)Power factor correction capacitors (cosfi > 0.9)

The power factor correction capacitors increase the cosF value, reducing the apparent current on the supply line to the chiller assembly

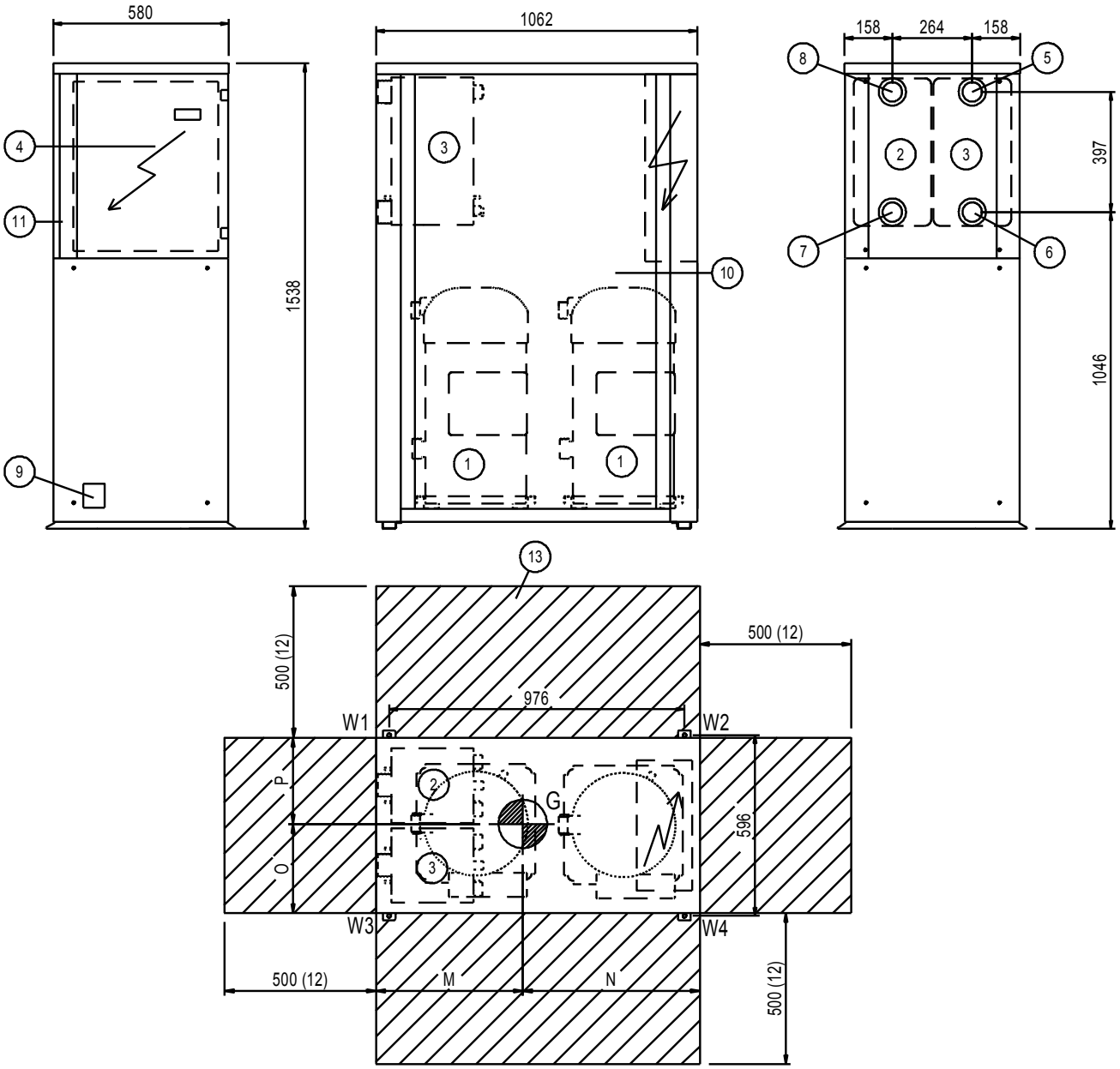
optional accessory

(PVSX)Water flow valve

Pressure switch kit, to control the water flow at the external exchanger inlet. Standard calibration 3bar, other calibrations availables upon request.
for systems with once-through water, the pressure-operated valve must be used to limit water consumption in cooling operation

separately supplied accessories

DIMENSIONAL DRAWING



(1) COMPRESSOR
(2) EXTERNAL EXCHANGER = SOURCE SIDE EXCHANGER
(3) INTERNAL EXCHANGER = UTILITY SIDE EXCHANGER
(4) ELECTRICAL PANEL
(5) INTERNAL EXCHANGER WATER INLET
(6) INTERNAL EXCHANGER WATER OUTLET
(7) EXTERNAL EXCHANGER WATER OUTLET
(8) EXTERNAL EXCHANGER WATER INLET
(9) POWER INPUT
(10) REMOVABLE PANEL FOR ACCESS TO THE TECHNICAL COMPARTMENT
(11) ACCESS TO THE ELECTRICAL PANEL
(12) MINIMUM DIMENSION FOR A SAFE PASSAGE.
(13) CLEARANCE ACCESS RECOMMENDED
(G) POSITION OF THE UNIT'S CENTRE OF GRAVITY

Size			292	322	362	422
M		mm	490	470	530	530
N		mm	572	592	532	532
O		mm	290	290	290	290
P		mm	290	290	290	290
Length		mm	1062	1062	1062	1062
Depth		mm	580	580	580	580
Height		mm	1538	1538	1538	1538
W1		kg	135	145	153	168
W2		kg	95	105	113	128
W3		kg	137	148	155	170
W4		kg	93	102	109	124
Operating weight		kg	470	510	540	600
Shipping weight		kg	480	520	550	610

CLIVET SPA
Feltre (BL) ITALY
Tel. + 39 0439 3131
Fax + 39 0439 313300
info@clivet.it

CLIVET ESPANA S.A.
(Madrid) SPAIN
Tel. + 34 91 6658280
Fax + 34 91 6657806
info@clivet.es

CLIVET UK LTD
Fareham (Hampshire) U.K.
Tel. + 44 (0) 1489 572238
Fax + 44 (0) 1489 573033
info@clivet-uk.co.uk

CLIVET NEDERLAND B.V.
Amersfoort - Netherlands
Tel. + 31 (0) 33 7503420
Fax + 31 (0) 33 7503424
info@clivet.nl

CLIVET TFA (PVT) LTD
Bangalore - INDIA
Tel. + 91 80 25351617
Fax + 91 80 25351392
sales@clivettfa.com