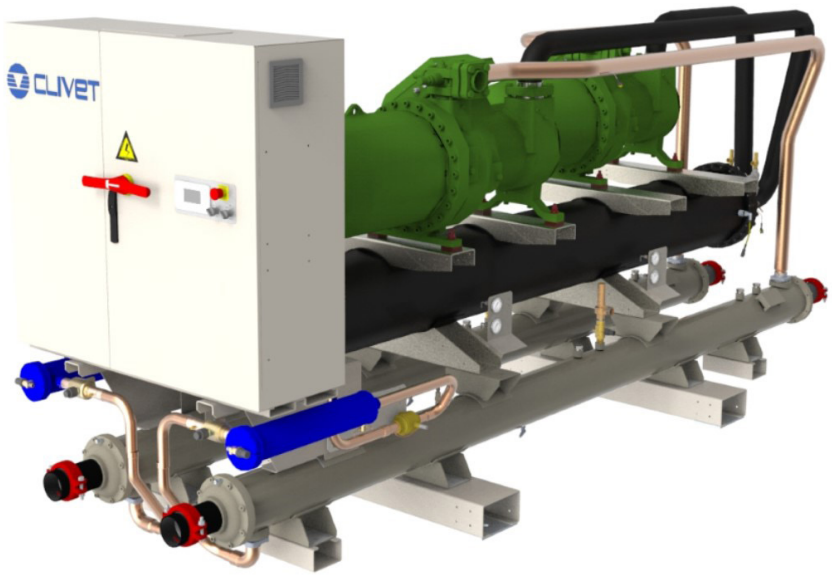
SCREWLine^3

WDH-SB3 220.2-580.2 RANGE

Water-cooled liquid chillers for indoor installation



Size	220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
Cooling capacity kW	573	614	711	848	979	1128	1309	1404	1502

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

ErP

R-134a

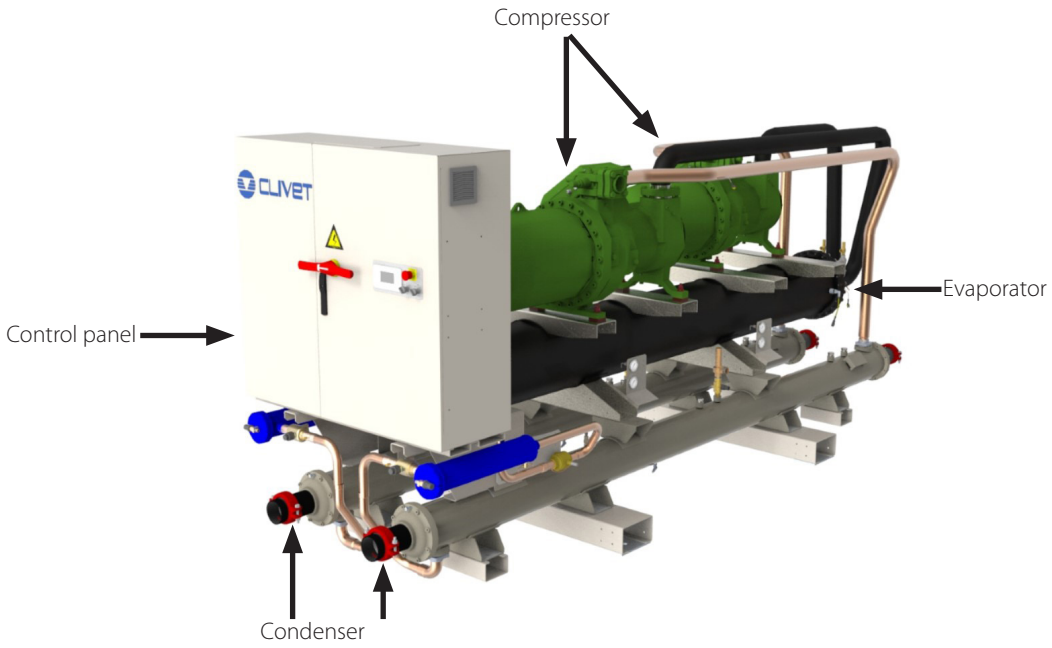
Pagina

Clivet is taking part in the EUROVENT certification programme
The products concerned appear in the certified products list of the EUROVENT www.eurovent-certification.com site.

Features and benefits

WDH-SB3 Liquid chiller with water source 573-1502 kW

Indoor unit for the production of chilled water with semi-hermetic screw compressors optimized for working with low compression ratios, condenser and evaporator tube bundle, electronic control valve, R-134a refrigerant



Energy efficiency

The WDH-SB3 series offers high-efficiency performance with both full and partial load, guaranteeing minimum operating costs and a quick return on investment:

- EER of up to 5,26
- SEER up to 6,36 which makes it compliant with Directive ERP 2018

Installation flexibility

Compact design that allows greater flexibility during installation both for new and existing systems and greater ease of handling and positioning in small spaces.

Adaptability

Maximum adaptability to the needs of the system:

- Minimum capacity modulation up to 25%
- Two versions available: only cold operation or operation with reversibility on the hydraulic circuit
- Energy-saving solutions thanks to partial or total heat recovery
- Ideal for industrial applications, thanks to the production of chilled water up to -8°C (BRINE option)
- Extended operating range
- Two levels of silence: Standard and Super Silenced

Reliability

The WDH-SB3 series is made with:

- Two independent refrigerating circuits that guarantee continuous operation
- Double-screw compressors with long-life bearings, gradual star-delta or part-winding start-up, oil separator that guarantees correct lubrication in all operating conditions, non-return valve that prevents counter-rotation and wear of the screw
- Evaporator with double antifreeze protection: temperature probes and differential pressure switch

Features and benefits

Integrated microprocessor control

- Automatic operation with best efficiency control
- Integrated diagnostics and alarm management
- Automatic compressor sequencer to equalize operating time

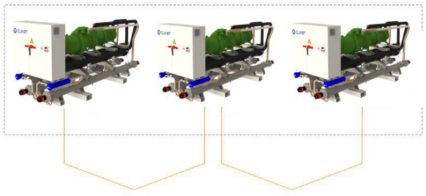
Integrated Energy management

- Operation scheduler: the unit is activated only when capacity is needed
- Double set-point
- Demand limit to limit the unit capacity to a predefined value

ECOSHARE function (option) for automatic teamworking (up to 7 units):

- Further saving: the group of units matches the load with global maximum efficiency
- Higher reliability: any fault on one unit does not stop operation on other units

MODULAR SYSTEM THAT ENHANCES SREWLine³ TECHNOLOGY ADVANTAGES



ECOSHARE NETWORK

Remote system management:

- Standard volt-free contacts: remote on/off, compressor mode, refrigeration circuit enabled/disabled, set-point change, alarm
- Communication protocols to BMS: Modbus, BACnet-IP, LonWorks

Modbus®

LONWORKS

BACnet™

Semplified maintenance

Fast operation on components:

- Simplified access to all section requiring routine maintenance
- Pump-Down integrated function, with no-leak electronic expansion valve, discharge line shut-off valve, liquid line shut-off valve: refrigerant is stored in the condenser for simplified maintenance on the refrigeration circuit

Fast access to unit information

- Double reading of refrigerant pressures: digital on the user interface, analog on high pressure and low pressure manometers
- Ethernet connection to provide diagnostics and monitoring via PC

Perfect for LEED certification

Models below 1000 kW capacity, satisfy both prerequisites 2 (Minimum Energy Performance) and 3 (Fundamental Refrigerant Management) of Energy and Atmosphere section.
Thei also meet Credit 4 parameters (Enhanced Refrigerant Management) allowing 1 point acquisition.

GREEN BUILDING COUNCIL ITALIA

Standard unit specifications

Compressor

Compact semi-hermetic compressor with double helical screw: the main rotor (male, with five lobes) is directly driven by the electric motor, while the secondary rotor (female, with six vanes) is driven by the primary rotor. Continuous modulation of the dispensed cooling capacity, with no-load start-up. Tightness is guaranteed by precisely fitting clearances in the mechanical processing of all moving parts and by a special system of oil circulation between the rotors. Spontaneous-circulation lubrication system through pressure difference, coupled with a high-efficiency separator, level indicator and oil filter (replaceable). Oil heater with electric element for preventing excessive dilution of the refrigerant, automatically inserted in all phases during which the compressor is turned off.

Three-phase asynchronous motor with two poles, cooled by the extracted gas, with star/delta reduced-load start-up. Integrated electronic protection module with discharge temperature safety sensor, maximum temperature sensors for windings, motor rotation sensor and phase monitoring device. Cut-off valve on refrigerant discharge line. Filter on suction line at compressor input point. Integrated silencer and non-return valve on compressor discharge outlet. Automatic safety valve inside compressor between high (HP) and low (LP) pressure areas.

Structure

Structure and base made entirely of sturdy sheet steel, thickness of 30/10 or 40/10, with the surface treatment in Zinc–Magnesium painted, for the parts in view, with polyester powder RAL 9001 that guarantees excellent mechanical characteristics and high corrosion strength over time.

Evaporator

Direct expansion exchanger with refrigerant side independent circuit for each compressor. The exchanger is composed of a cover made of carbon steel. The tubes, anchored to the tube plate by mechanical expansion, are made of copper, high efficiency, internally rifled to improve thermal exchange and specially designed for use with modern ecological refrigerants. It also includes a water side protection differential switch, an anti-freeze heating element to protect against icing, and covering in closed-cell thermo-insulating material that prevents the formation of condensation and heat exchange with the exterior.

The water connections of the exchanger are quick-release with splined joint.

Condenser

Direct expansion shell and tube evaporator (refrigerant on jacket side and water inside pipes). Carbon-steel jacket with high-efficiency copper pipes fully threaded to optimise the exchange of heat and anchored mechanically to a pipe plate by mandrel, specially designed for use with modern environmentally friendly refrigerants. Removable heads to enable cleaning and maintenance on the exchanger. Max. exchanger operating pressure water side: 10 bar. Quick-fit plumbing connections with grooved joint.

Refrigeration circuit

Two independent refrigeration circuits made of copper, brazed and factory-assembled, complete with:

- anti-acid dehydrator filter with solid cartridge complete with quick-fit connector for refrigerant;
- high-pressure safety pressure switch;
- low pressure transducer;
- refrigerant temperature probe
- electronic expansion valve;
- high and low pressure gauges;
- high pressure safety valve (safety valve with sealed tap open for inspection);
- low pressure safety valve (safety valve with sealed tap open for inspection);
- liquid flow and humidity indicator;
- cut-off valve on compressor supply circuit;
- cut-off valve on liquid line.

Suction pipes thermally insulated with highly flexible EPDM rubber closed-cell elastomer insulation. Each cooling circuit is tested under pressure for leaks and is supplied complete with load of refrigerant gas.

Electrical panel

Entirely manufactured and wired in conformity to the EN 60204 standard. The power section includes:

- door locking main circuit breaker;
- main power supply terminals (400 V/3 Ph/50 Hz);
- insulation transformer for powering the auxiliary circuit (230 V/24 V);
- fuses and thermal relays for protecting the compressors;
- compressor control contactor;

The control section includes:

- interface terminal with graphic display;
- set values, error codes and parameters can be displayed;
- proportional-integral-derivative adjustment of water temperature;
- management of unit start-up from local or remote device;
- ON/OFF keys and alarm reset;
- daily, weekly temperature set point and start-up/shutdown scheduler;
- anti-freeze protection water side;
- compressor protection and timer;
- pre-alarm function for water anti-frost and refrigerant gas high pressure functions;
- self-diagnosis system with instant error code visualisation;
- control of compressor start-up automatic rotation;
- visualisation of no. of hours of compressor operation;
- remote ON/OFF control;
- remote relay to signal cumulative alarms;
- demand limit input (absorbed power limit depending on external signal 0÷10V or 4÷20 mA);
- potential-free contacts for compressor status;
- digital input to enable double set point;;
- multifunctional phase monitor;
- refrigerant gas high pressure pre-alarm function (prevents automatic unit shutdown in many cases);
- remote HEAT/COOL command.

All device functions can be replicated with a normal laptop computer connected to the unit via an Ethernet cable and with a browser. All electrical cables are coloured and numbered according to the wiring diagram.

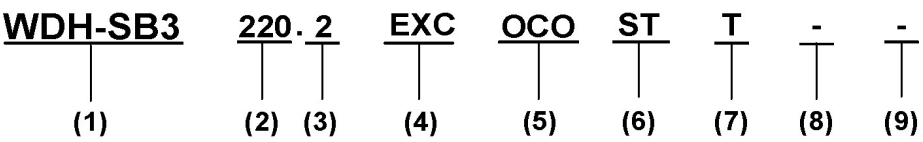
Accessories

- Rubber antivibration mounts (separately supplied accessories)
- Progressive compressor start-up device
- Compressor overload circuit breakers
- Power factor correction capacitors (cosfi > 0.9)
- Energy meter
- Set-point compensation with outdoor air temperature probe
- Set-point compensation with signal 0-10 V
- Set-point compensation with signal 4-20 mA
- BACnet-IP serial communication module
- LonWorks serial communication module
- Modbus serial communication module
- Remote microprocessor control unit (separately supplied accessories)
- Mains power supply unit (accessory separately supplied)
- ECOSHARE function
- Modulating valve source side (accessory separately supplied)
- Pressure valve (accessory separately supplied)

Test

Unit subjected to factory-tested in specific steps and test pressure of the piping of the refrigerant circuit (with nitrogen and hydrogen), before shipping them. After the approval, the moisture contents present in all circuits are analyzed, in order to ensure the respect of the limits set by the manufacturers of the different components.

Unit configurability



(1) Range

WDH = Liquid chiller, water cooled, with screw compressors

SB3 = SCREWLine3 range

(2) Size

220 = Nominal compressor capacity (HP)

3) Compressors

2 = Compressors

(4) Energy version

EXC = EXCELLENCE version: high energy efficiency

(5) Operation

OCO = Cooling only operation (standard)

OHI = Operation with water circuit change-over

6) Acoustic configuration

ST = Standard acoustic configuration (standard)

EN = Super-silenced acoustic configuration

(7) Application

T = Cooling tower application (standard)

P = Groundwater application

(8) Energy recovery

(-) = Energy recovery: not required (standard)

D = Partial energy recovery (5% off condensing heat)

R = Total energy recovery (100% off condensing heat)

Information → Configurations page 18

(9) Low evaporator water temperature

(-) = Low water temperature: not required (standard)

B = Low water temperature, down to –8°C (Brine)

Information → Configurations page 18

General technical data

Performance

Size			220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
Cooling											
Cooling capacity	1	[kW]	573	614	711	848	979	1128	1309	1404	1502
Compressor power input	1	[kW]	108	118	136	164	187	208	238	269	293
Total power input	2	[kW]	108	119	136	165	188	209	239	269	294
Partial recovery heating capacity	3	[kW]	34,1	36,6	42,3	50,6	58,3	66,8	77,4	83,6	89,8
Total recovery heating capacity	3	[kW]	651	703	811	966	1106	1285	1472	1579	1701
EER	1		5,30	5,18	5,23	5,15	5,22	5,41	5,48	5,22	5,12
Water flow rate (User side)	1	[l/s]	27,4	29,4	34,0	40,5	46,8	53,9	62,5	67,1	71,8
Pressure drops (User side)	1	[kPa]	37	42	45	61	47	58	46	52	31
Water flow rate (Source side)	1	[l/s]	32,5	35,0	40,5	48,4	55,7	63,8	73,9	79,9	85,87
Pressure drops (Source side)	1	[kPa]	25	29	38	32	42	38	51	50	57
Cooling capacity (EN14511:2013)	4	[kW]	572	612	709	844	976	1123	1305	1399	1499
Total power input (EN14511:2013)	4	[kW]	111	122	141	171	194	217	248	279	304
EER (EN 14511:2013)	4		5,14	5,01	5,03	4,95	5,02	5,19	5,26	5,01	4,94
SEER	8		6,11	6,20	6,23	5,92	6,09	6,23	6,36	6,15	6,26
SEPR			7,37	7,34	7,40	6,84	6,99	7,19	7,31	7,14	7,22
Cooling capacity (AHRI 551/591)	5	[kW]	573	614	711	848	979	1128	1309	1404	1502
Total power input (AHRI 551/591)	5	[kW]	108	119	136	165	188	209	239	269	294
COP_R	5		5,30	5,18	5,23	5,15	5,22	5,41	5,48	5,22	5,12
IPLV	5		6,67	6,93	6,98	6,71	6,84	7,04	7,14	6,91	6,90
Heating											
Heating capacity	6	[kW]	651	703	811	966	1106	1286	1472	1579	1702
Compressor power input	6	[kW]	137	151	173	207	235	262	299	335	365
Total power input	2	[kW]	138	151	174	207	236	263	300	335	365
COP	6		4,73	4,65	4,67	4,66	4,69	4,90	4,91	4,71	4,66
Water flow rate (User side)	6	[l/s]	24,6	24,6	30,5	36,3	41,6	48,9	56,1	59,4	63,8
Pressure drops (User side)	6	[kPa]	31	35	37	50	38	49	39	42	25
Water flow rate (Source side)	6	[l/s]	31,1	33,6	38,8	46,2	52,8	61,4	70,3	75,4	81,3
Pressure drops (Source side)	6	[kPa]	23	26	35	29	38	35	47	44	52
Heating capacity (EN14511:2013)	7	[kW]	653	705	813	969	1109	1289	1477	1583	1708
Total power input (EN14511:2013)	7	[kW]	140	154	178	212	241	269	308	343	374
COP (EN 14511:2013)	7		4,65	4,57	4,58	4,56	4,59	4,78	4,80	4,61	4,57

The Product is compliant with the Erp (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 2016/2281, also known as Ecodesign LOT21

1. *Data referred to the following conditions: Internal exchanger water temperature = 12/7 °C. External exchanger water temperature = 30/35 °C. . Evaporator fouling factor = 0.44 x 10^(-4) m^2 K/W*
2. *The Total Power Input value does not take into account the part related to the pumps and required to overcome the pressure drops for the circulation of the solution inside the exchangers.*
3. *Option. Recovery exchanger water=40/45°C*
4. *Data calculated in conformity to the EN 14511:2013 referred to the following conditions: Internal exchanger water temperature = 12/7°C External exchanger water temperature = 30/35°C*
5. *Data compliant to Standard AHRI 551/591 referred to the following conditions: Internal exchanger water 12/7°C. Water flow rate 0,043 l/s per kW. Water entering the external exchanger 30/35°C. Fattore di incrostazione evaporatore = 0.18 x 10^(-4) m^2 K/W*
6. *Data referred to the following conditions: Internal exchanger water temperature = 40/45°C External exchanger water temperature =12/7°C Evaporator fouling factor 0.44 x 10^(-4) m^2 K/W*
7. *Data calculated in conformity to the EN 14511:2013 referred to the following conditions: Internal exchanger water temperature = 40/45°C External exchanger water temperature = 12/7°C*
8. *Data calculated in compliance with Standard EN 14825:2016*

General technical data

Construction

Size			220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
Compressor											
Type of compressors	1		DSW								
Refrigerant			R-134a								
No. of compressors		[Nr]	2	2	2	2	2	2	2	2	2
Rated power (C1)		[HP]	110	125	140	160	180	210	240	280	320
Rated power (C2)		[HP]	110	125	140	160	180	210	240	280	320
Std Capacity control steps	2		25-100%	25-100%	25-100%	25-100%	25-100%	25-100%	25-100%	25-100%	25-100%
Oil charge (C1)		l	22	19	19	30	30	30	30	32	32
Oil charge (C2)		l	22	19	19	30	30	30	30	32	32
Refrigerant charge (C1)	3	[Kg]	45	45	50	65	65	70	75	75	80
Refrigerant charge (C2)	3	[Kg]	45	45	50	65	65	70	75	75	80
Refrigeration circuits		[Nr]	2	2	2	2	2	2	2	2	2
Internal exchanger (evaporator)											
No. of exchanger			1	1	1	1	1	1	1	1	1
Type of internal exchanger	4		S&T								
Water content		l	307	307	280	280	481	514	917	917	917
Minimum system water content	5		5963	6389	7396	8820	10181	11728	13615	14605	15607
External exchanger (condenser)											
No. of exchanger		[Nr]	2	2	2	2	2	2	2	2	2
Type of external exchanger	4		S&T								
Water content		l	112	112	112	146	146	182	182	192	192
Connections											
Internal exchanger water connections (Evaporator)			6"	6"	6"	6"	8"	8"	10"	10"	10"
External exchanger water connections (Condenser)			4"	4"	4"	5"	5"	5"	5"	5"	5"
Power supply											
Standard power supply		[V]	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50	400/3~/50

The Product is compliant with the Erp (Energy Related Products) European Directive. It includes the Commission delegated Regulation (EU) No 2016/2281, also known as Ecodesign LOT21
«It contains fluorinated greenhouse gases» (GWP 1430)

1. *DSW = Double-screw compressors*
2. *The unit is able to modulate STEPLESS continuously. The following data refers to a continuous operation of the unit.*
3. *Indicative values for standard units with possible variation / - 10%. Actual data are shown on the unit's matricular label.*
4. *S&T = Shell and tube*
5. *The calculated water volume to the system does not consider the volume of water contained in the internal exchanger. With applications at low outdoor air temperature or low average loads requested, the minimum water volume to the system is obtained by increasing the indicated value by 40%.*

Electrical data

Size			220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
F.L.A. - Full load current at max admissible conditions											
F.L.A. - Total		[A]	309	335	379	430	476	562	634	748	776
F.L.I. - Full load power input at max admissible conditions											
F.L.I. - Total		[kW]	188	202	230	265	298	344	389	459	474
M.I.C. Maximum inrush current											
M.I.C. - Value		[A]	632	738	807	533	644	797	888	1187	1208
M.I.C. with soft start accessory		[A]	409	500	597	622	624	766	981	1122	1143

Power supply: 400/3/50 Hz. Voltage variation: max. +/-10%)
Voltage unbalance between phases: max 2 %
Electrical data refer to standard units; according to the installed accessories, the data can suffer some variations.

General technical data

Sound levels - 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)
220.2	72	70	93	101	91	88	75	63	80	99
240.2	70	74	92	100	96	91	78	70	81	100
280.2	65	75	92	97	97	94	77	64	81	100
320.2	74	84	98	98	98	91	89	76	82	101
360.2	75	85	98	99	98	92	87	77	82	101
440.2	82	73	101	98	100	92	83	74	83	103
500.2	103	96	93	103	99	94	83	77	83	103
540.2	77	87	99	103	102	96	82	64	85	105
580.2	81	76	99	103	102	94	83	70	85	105

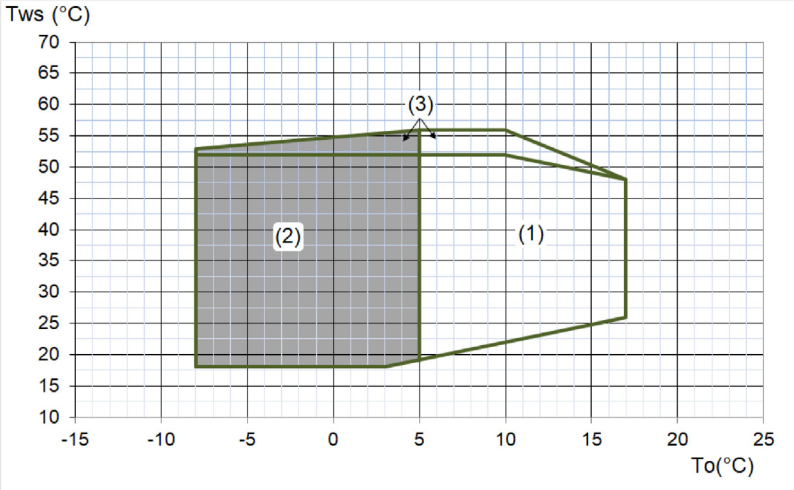
Sound levels - EN

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)
220.2	71	69	96	95	88	78	71	60	76	95
240.2	68	72	95	94	93	81	75	67	77	96
280.2	63	74	95	91	94	84	73	60	77	96
320.2	72	83	100	92	95	81	85	72	78	98
360.2	73	84	101	93	94	81	83	73	78	98
440.2	80	72	103	92	97	82	80	70	80	100
500.2	102	96	98	98	97	85	81	75	80	100
540.2	75	85	102	97	98	86	79	60	81	101
580.2	79	74	101	97	99	84	79	66	81	101

Sound levels refer to full load units, in test nominal conditions. The sound pressure level refers to 1 m. from the unit outer surface operating in open field. Measurements are carried out according to the UNI EN ISO 9614-2 standard, in compliance with the EUROVENT 8/1 certification. Data referred to the following conditions: internal exchanger water = 12/7°C; external exchanger water = 30/35°C.

General technical data

Operating range



1 Standard unit
2 Operation range extension for unit in 'Low water temperature (Brine)' configuration'
3 Operating range with automatic staging of the compressor capacity.

To (°C) = Internal exchanger outlet water temperature (evaporator)
Tws (°C) = External exchanger outlet water temperature (condenser)

Minimum system water content

For a proper functioning of the unit a minimum water content has to the provided to the system, using the formula:

Minimum water content [l] = 10 x kWf (air conditioning application)
= 14 x kWf (application with low outdoor temperature or low loads required))

kWf = Nominal cooling capacity unit

!! *Volume calculated does not consider internal heat exchanger (evaporator) water content.*

General technical data

Correction factors for glycol use - Internal exchanger (evaporator)

% 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	0,989	0,983	0,977	0,971	0,964	0,956	0,949
Compressor power input Factor	Nr	1,022	1,022	1,033	1,044	1,055	1,066	1,077	1,088
Internal exchanger glycol solution flow factor	Nr	1,013	1,026	1,039	1,053	1,067	1,082	1,097	1,113
Pressure drop Factor	Nr	1,078	1,153	1,233	1,318	1,408	1,503	1,603	1,708

Correction factors for glycol use - External exchanger (condenser)

% 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	0,998	0,996	0,994	0,992	0,99	0,988	0,986	0,984
Compressor power input Factor	Nr	1,003	1,006	1,009	1,012	1,015	1,018	1,021	1,024
Internal exchanger glycol solution flow factor	Nr	1,015	1,031	1,047	1,064	1,081	1,099	1,117	1,136
Pressure drop Factor	Nr	1,121	1,225	1,339	1,463	1,597	1,741	1,895	2,059

Fouling Correction Factors

Size	Internal exchanger (evaporator)		External exchanger (condenser)	
m2 C / W	F1	FK1	F2	FK2
0.44 x 10 (-4)	1,0	1,0	1,0	1,0
0.88 x 10 (-4)	0,97	0,99	0,97	1,08
1.76 x 10 (-4)	0,94	0,98	0,92	1,05

F1 = Cooling capacity correction factors
FK1 = Compressor power input correction factor
F2 = Cooling capacity correction factors
FK2 = Compressors input power correction factors

Exchanger operating range

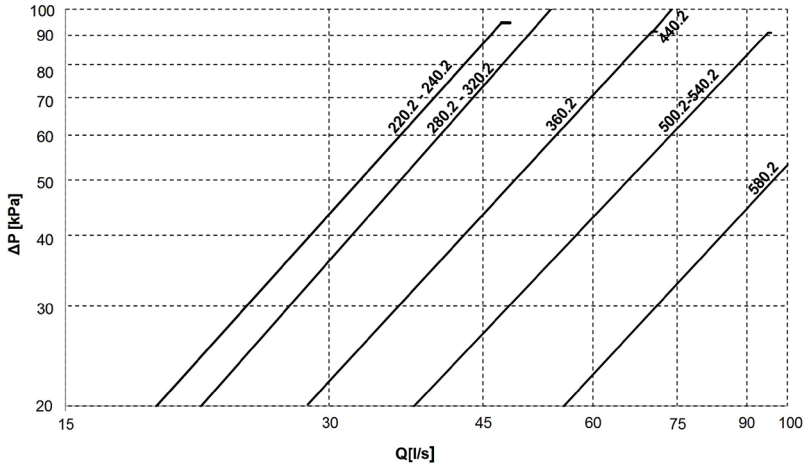
	Internal exchanger		External exchanger	
	DPr (500.2-540.2-580.2)	DPw	DPr	DPw
PED (CE)	1650 (1600)	1050	2500	1600

DPr = Max. operating pressure referigerant gas side
DPw = Max. operating pressure water side (utility)

Overload and control device calibrations

		Apre	chiude	Valore
High pressure switch	[kPa]	1580	1280	-
Antifreeze protection	[°C]	4	5,5	-
High pressure safety valve	[kPa]	-	-	2500
Low pressure safety valve	[kPa]	-	-	1650 (1600)
Max no. of compressor starts per hour	[n°]	-	-	6
Discharge safety thermostat	[°C]	-	-	120

Internal exchanger (evaporator) pressure drops



The pressure drops are calculated considering a water temperature of 7°C

Q = Water flow rate[l/s]
DP = Water side pressure drops (kPa)

The water flow rate must be calculated with the following formula

Q [l/s] = kWt / (4,186 x DT)

kWt = Heating capacity in kW
DT = Temperature difference between inlet / outlet water

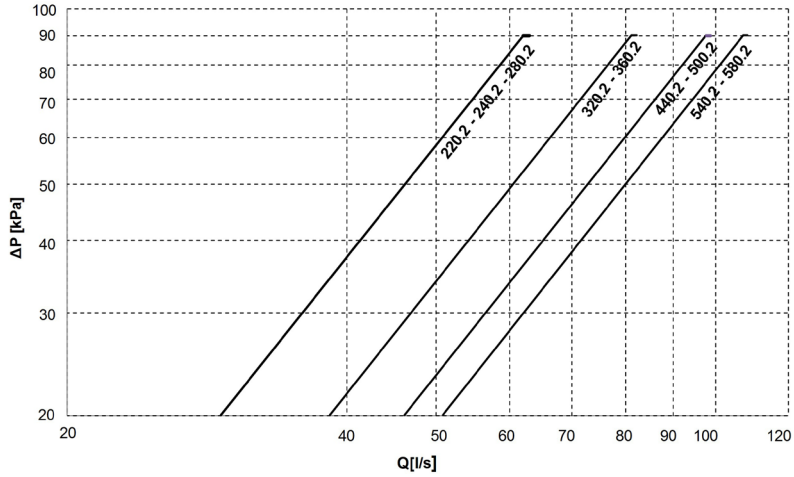
Admissible water flow rates

Min. (Qmin) and max. (Qmax) water flow-rates admissibles for the correct unit operation.

Size		220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
Qmin	[l/s]	19,0	19,0	21,4	21,4	28,2	28,7	37,5	37,5	55,6
Qmin	[l/s]	47,2	47,2	59,2	59,2	70,0	76,7	95,0	95,0	127,2

General technical data

External exchanger (condenser) pressure drop



The pressure drops are calculated considering a water temperature of 7°C

Q = Water flow rate[l/s]
DP = Water side pressure drops (kPa)

The water flow rate must be calculated with the following formula

Q [l/s] = kWt / (4,186 x DT)

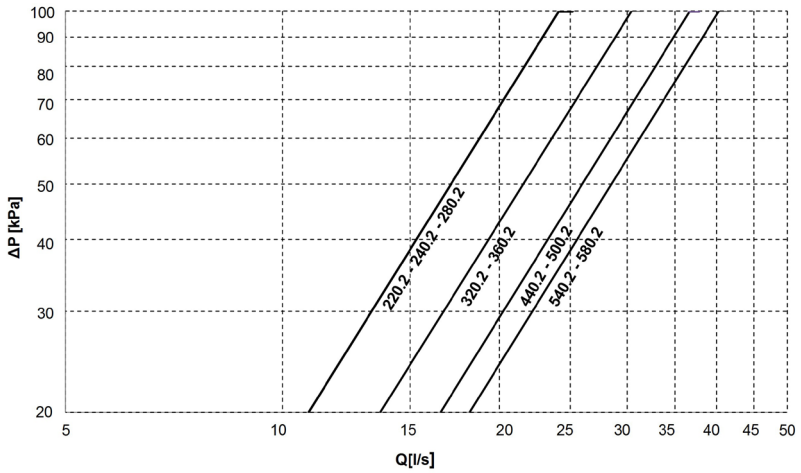
kWt = Heating capacity in kW
DT = Temperature difference between inlet / outlet water

Admissible water flow rates

Min. (Qmin) and max. (Qmax) water flow-rates admissibles for the correct unit operation.

Size		220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
Qmin	[l/s]	29,3	29,3	29,3	38,3	38,3	46,2	46,2	50,8	50,8
Qmax	[l/s]	62,0	62,0	62,0	81,2	81,2	97,7	97,7	107,2	107,2

External exchanger pressure drop with groundwater



The pressure drops are calculated considering a water temperature of 7°C

Q = Water flow rate[l/s]
DP = Water side pressure drops (kPa)

The water flow rate must be calculated with the following formula

Q [l/s] = kWt / (4,186 x DT)

kWt = Heating capacity in kW
DT = Temperature difference between inlet / outlet water

Admissible water flow rates

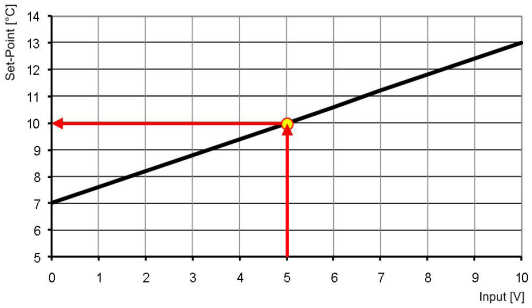
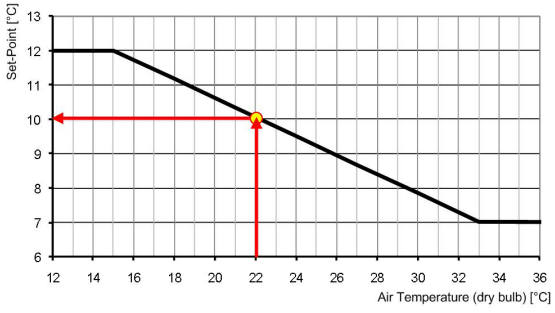
Min. (Qmin) and max. (Qmax) water flow-rates admissibles for the correct unit operation.

Size		220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
Qmin	[l/s]	10,9	10,9	10,9	13,7	13,7	16,5	16,5	18,1	18,1
Qmax	[l/s]	24,2	24,2	24,2	30,5	30,5	36,7	36,7	40,2	40,2

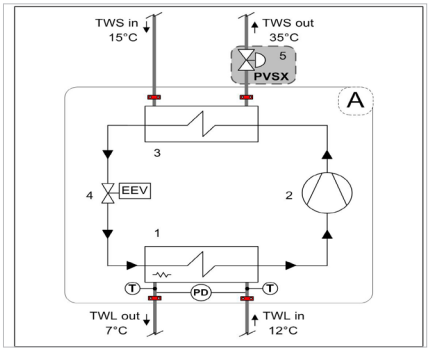
Built-in options

Accessory		Description
PFCP	Power-factor correction capacitors (cosfi >0.9)	The component is necessary to lower the phase difference between current and voltage in the electromagnetic components of the unit (e.g. asynchronous motors). The component allows to put the cosfi power factor to values on average higher than 0.90, reducing the network reactive power. This often leads to an economic benefit which the energy provider grants to the final user. The device is installed and wired built-in the unit.
CMSC9	Serial communication module for Modbus supervisor	This enables the serial connection of the supervision system, using Modbus as the communication protocol. It enables access to the complete list of operational variables, commands and alarms. Using this accessory every unit can dialogue with the main supervision systems. The device is installed and wired built-in the unit. !! *The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)*
CMSC10	Serial communication module for LonWorks supervisor	This enables the serial connection of the supervision system which uses the LonWorks communication protocol. It enables access to a list of operating variables, commands and alarms which comply with the Echelon® standard. The device is installed and wired built-in the unit. !! *The configuration and management activities for the LonWorks networks are the responsibility of the client.* !! *LonWorks technology uses the LonTalk® protocol for communicating between the network nodes. Contact the service supplier for further information.* !! *The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)*
CMSC11	Serial communication module for BACnet-IP supervisor	Allows the serial connection to supervision systems by using BACnet-IP as a communication protocol. It allows the access to the entire list of operating variables, controls and alarms. With this accessory every unit can communicate with the main supervision systems. The device is installed and wired built-in the unit. !! *The configuration and management activities for the BACnet networks are the responsibility of the client.* !! *The total length of each serial line do not exceed 1000 meters and the line must be connected in bus typology (in/out)*
ECS	ECOSHARE function for the automatic management of a group of units	The device allows automatic management of units that operate on the same hydraulic circuit, by creating a local communication network. There are two control modes that can be set via a parameter during the activation stage. They both distribute the heat load on the available units by following the distribution logic to benefit from efficiency levels at part load. Moreover: Mode 1 - it keeps all the pumps active Mode 2 - it activates only the pumps of the unit required to operate The device allows for rotation based on the criterion of minimum wear and management of units in stand-by. There are various unit sizes. Every unit must be fitted with the ECOSHARE feature. The set of units is controlled by a Master unit. The local network can be extended up to 7 units (1 Master and 6 Slave). !! *The unit supplied with this device can also be equipped at the same time with the RCMRX option and one of the CMSC9 / CMSC10 / CMSC11 options.*
CBS	Overload circuit brakers	The magnetothermic circuit breakers are inserted instead of the fuses for the protection against the short circuit and overload. In case of intervention they do not have to be replaced, as it happens with fuses.
SFSTR2	Progressive compressor start-up device	This option is also called 'Soft starter'. Electronic device that automatically and gradually starts the compressors, thereby reducing the current peak generated in star-triangle start-ups and therefore reduces the mechanical stress on the motor and the electrodynamic stress on the power cables and on the mains. The device is installed and wired built-in the unit. !! *Check availability and compatibility of 'SFSTR2 - Progressive compressor start-up device' with the other accessories in the "Option compatibility" table.*

Built-in options

Accessory		Description
CONTA2	Energy meter	Allows to display and record the unit's main electrical parameters. The data can be displayed with the user interface on the unit or via the supervisor through the specific protocol variables. It is possible to control: - voltage (V), - absorbed current (A), - frequency (Hz), - cosfi, - power input (KW), - absorbed energy (KWh), - harmonic components (%). The device is installed and wired built-in the unit. !! *Only the following parameters are available on the LonWorks protocol: power input (kW) and absorbed energy (kWh)*
SCP4	Set-point compensation with 0-10 V signal	This device enables the set-point to be varied which is pre-set using an external 0÷10 V signal. The device is installed and wired built-in the unit. 
SPC1	Set-point compensation with 4-20mA signal	This device enables the set-point to be varied which is pre-set using an external 4-20mA signal. The device is installed and wired built-in the unit. 
SPC2	Set-point compensation with outdoor air temperature probe	This device enables the set-point to be varied automatically which is pre-set depending on the outdoor air temperature. This device enables the liquid flow temperature to be obtained, which varies depending on external conditions, enabling energy savings throughout the entire system. The device is installed and wired built-in the unit. !! *The device includes a probe controlled remotely from outside to measure the outdoor air temperature. (installation to be carried out by the customer). The connection cable length is 16 m.* 

Accessories separately supplied

Accessory		Description
PVSX	Water flow valve	Recommended option in applications with disposable water with relatively low temperatures (well, groundwater, water mains). The two-way pressure valve with mechanical control is a modulating valve and is located at the output of the external exchanger (condenser). Using this device reduces water consumption levels and keeps the unit in the expected operating range. ‼ *Warning: to allow for correct opening and closure the differential pressure value must be at least 250 kPa and not exceed 400 kPa.* ‼ *Option not compatible with the unit in the 'OHI - Operation with reversibility in the water circuit' configuration.* ‼ *Option not compatible with sea water. In these cases fit an intermediate exchanger outside the unit.*  1. *Internal exchanger (evaporator)* 2. *Compressor* 3. *External exchanger (condenser)* 4. *Electronic expansion valve* 5. *Pressure valve (PVSX accessory)* *TWS - Water source side* *TWL - Water user side* *T - Temperature probe* *PD - Differential pressure switch*
IVMSX	Modulating valve source side	Recommended option in applications with disposable water with relatively low temperatures (well, groundwater, water mains). The two-way modulating motorised valve is located on the thermal source side and is controlled by the unit. It operates in conjunction with the refrigeration circuit: the modulation via the 0-10V signal - based on the pressure of the refrigerant in the exchanger on the source side - reduces water consumption and ensures the units stays in the expected operating range. ‼ *Warning: to allow for correct opening and closure the differential pressure value must be at least 200 kPa.* ‼ *Option to be installed outside the unit on the water outlet pipe on the source side. The Customer is responsible for conducting the hydraulic and electrical connection. The Customer is responsible for the 230V AC power supply.* ‼ *Option not compatible with sea water. In these cases fit an intermediate exchanger outside the unit.*
RCMRX	Remote control via microprocessor remote control	This option allows to have full control over all the unit functions from a remote position. It can be easily installed on the wall and has the same aspect and functions of the user interface on the unit. ‼ *All device functions can be repeated with a normal portable PC connected to the unit with an Ethernet cable and equipped with an internet navigation browser.* ‼ *The device must be installed on the wall with suitable plugs and connected to the unit (installation and wiring to be conducted by the Customer). Maximum remote control distance 350 m without auxiliary power supply. For distances greater than 350 m and in any case less than 700 m it is necessary to install the 'PSX - Mains power unit' accessory.* ‼ *Data and power supply serial connection cable n.1 twisted and shielded pair. Diameter of the individual conductor 0.8 mm.*
PSX	Mains power supply unit	The device allows the unit and the remote control to communicate with the user interface even when the serial line is longer than 350m. It must be connected to the serial line at a distance of 350m from the unit and allows to extend the length to 700m maximum in total. The device requires an external power supply at 230V AC. ‼ *Power supply at 230V AC provided by Customer*
AMRX	Rubber antivibration mounts	The rubber antivibration mounts must be fixed to designated housings on the support stringers and are used to dampen vibrations produced by the machine, thereby reducing the noise transmitted to the support structures.

Option compatibility

REFERENCE	DESCRIPTION	220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
CONFIGURATIONS AND MAIN ACCESSORIES										
B	*Water low temperature*	o	o	o	o	o	o	o	o	o
D	*Partial energy recovery*	o	o	o	o	o	o	o	o	o
R	*Total energy recovery*	o	o	o	o	o	o	o	o	o
B + D	*Low water temperature + Partial energy recovery*	o	o	o	o	o	o	o	o	o
B + R	*Low water temperature + Total energy recovery*	o	o	o	o	o	o	o	o	o
D + R	*Partial energy recovery + Total energy recovery*	X	X	X	X	X	X	X	X	X
T	*Cooling tower application*	o	o	o	o	o	o	o	o	o
P	*Groundwater application*	o	o	o	o	o	o	o	o	o
D + P	*Partial energy recovery + Groundwater application*	X	X	X	X	X	X	X	X	X
T + P	*Cooling tower application + Groundwater application*	X	X	X	X	X	X	X	X	X
T + OCO	*Cooling tower application + Cool only operation*	o	o	o	o	o	o	o	o	o
T + OHI	*Cooling tower application + Operation with water circuit change-over*	o	o	o	o	o	o	o	o	o
P + OCO	*Groundwater application + Cool only operation*	o	o	o	o	o	o	o	o	o
P + OHI	*Groundwater application + Operation with water circuit change-over*	X	X	X	X	X	X	X	X	X
PVSX + T + OCO	*Pressure valve + Cooling tower application + Cool only operation*	X	X	X	X	X	X	X	X	X
PVSX + T + OHI	*Pressure valve + Cooling tower application + Operation with water circuit change-over*	o	o	o	o	o	o	o	o	o
PVSX + P + OCO	*Pressure valve + Groundwater application + Cool only operation*	o	o	o	o	o	o	o	o	o
IVMSX + T + OCO	*Modulating valve source side + Cooling tower application + Cool only operation*	o	o	o	o	o	o	o	o	o
IVMSX + T + OHI	*Modulating valve source side + Cooling tower application + Operation with water circuit change-over*	o	o	o	o	o	o	o	o	o
IVMSX + P + OCO	*Modulating valve source side + Groundwater application + Cool only operation*	o	o	o	o	o	o	o	o	o

X Not available
o Optional

Configurations

<table>
<tr><th colspan="2">Configuration</th><th>Description</th></tr>
<tr><td>OCO</td><td>Cool only operation (Standard)</td><td>Configuration that allows the water - water unit to operate with the thermoregulation active when chilled water is produced at a controlled temperature..</td></tr>
<tr><td>OHI</td><td>Operation with water circuit change-over</td><td>
Configuration that allows operation as water-water heat pump to produce hot water for civil and industrial use.
It consists of:
• suitable exchangers with extra-thick closed-cell insulation
• temperature probes at the exchanger's water inlet and outlet.
The system must be fitted with switching valves. The hydraulic switching must be carried out when the unit's operating mode is changed. In summer operation mode, the unit automatically controls the evaporation temperature based on the selected set-point value. Likewise, in winter operation mode, the unit automatically adjusts the condensation temperature based on the selected set-point value and checks the temperature on the evaporator to prevent the water from freezing.

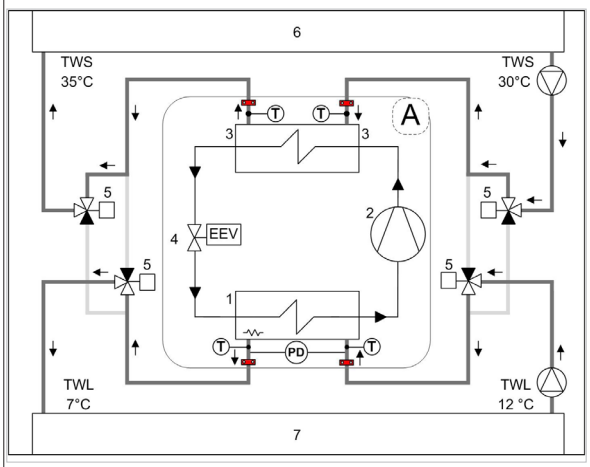
!! The Customer is responsible for installing and managing the hydraulic switching valve

!! The Customer can change the operating mode using the interface on board the machine or the designated potential-free contact.

!! Possible non-freeze solutions must be fitted both on the utilisation circuit and the source circuit, as hydraulic switching involves mixing fluids.

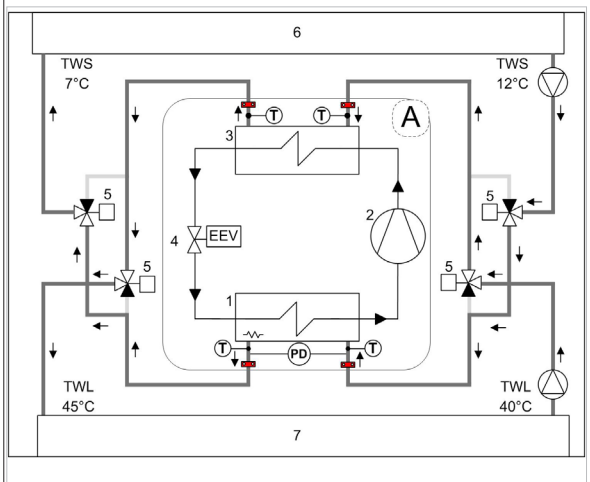
!! During operation with Dry coolers or Evaporative towers, the temperatures of the fluid on the source side need to be always positive as there is no defrosting function.

!! The device includes two temperature probes to be positioned at the input and output of the connection manifold between the two condensers. The manifolds and the probe installation are provided by the Customer. The connection cable length is 3m.

Operation mode: cooling


1. Internal exchanger (evaporator)
2. Compressor
3. External exchanger (condenser)
4. Electronic expansion valve
5. Switching valves (provided by Customer)
6. Thermal source (heat rejection)
7. Use (cold)

T - Water temperature probe
PD - Differential pressure switch
TWS - Water source side
TWL - Water user side

Operation mode: heating


1. Internal exchanger (evaporator)
2. Compressor
3. External exchanger (condenser)
4. Electronic expansion valve
5. Switching valves (provided by Customer)
6. Thermal source (heat withdrawal)
7. Use (heat)

T - Water temperature probe
PD - Differential pressure switch
TWS - Water source side
TWL - Water user side
</td></tr>
</table>

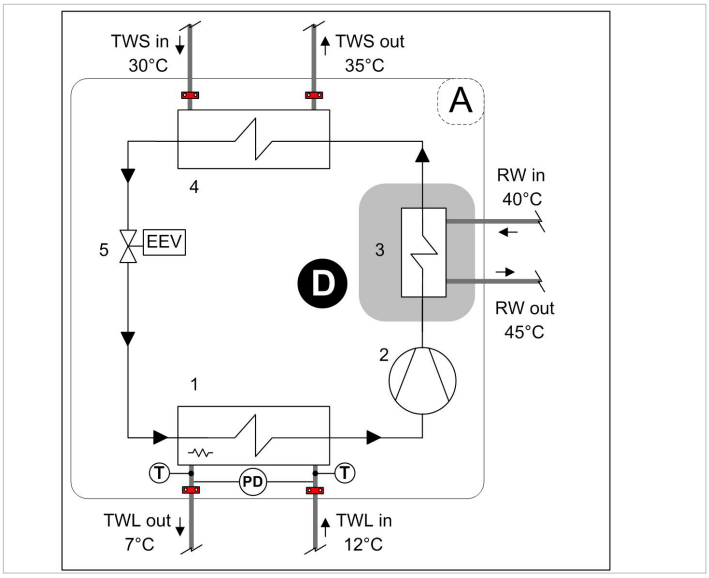
Configurations

Configuration		Description
EN	Super-silenced acoustic configuration	Configuration used to increase the unit's silent operation by acting on the source of the noise. It consists of suitable steel casings lined with high-density material designed to provide sound insulation. Equipped with sound-proof cover coating which envelop the compressors. !! *To assess the quality of the soundproofing benefit, refer to the 'Sound levels' tables.*
T	Application with cooling tower (Standard)	This is the configuration in which the unit is sized to operate with a rated temperature differential of 5°C on the source side exchanger (condenser) and therefore, with water flow-rates typical of cooling towers and evaporative coolers. !! *In 'OHI - Operation with reversability on the water circuit' mode and source water temperature relatively low provide the 'IVMSX - Modulating valve source side' accessory.*
P	Application with groundwater	This is the configuration in which the unit is sized to operate with an high temperature differential (usually DT = 15°C) on the source side exchanger (condenser) and therefore, with reduced water flow-rates typical of the disposable water applications (well, ground water or aqueduct). It consists of a source side exchanger where the water passes through a number of times before being released to the source. !! *Option not compatible with 'OHI - Operation with water circuit change-over'.* !! *In the 'OHI = Operation with water circuit change-over' mode and relatively low source water temperatures (well, groundwater, water mains), configure the unit with the 'IVMSX - Source side modulating valve' accessory together with the standard configuration, 'T - Application with cooling tower'.*

Configurations

D - Partial energy recovery

A configuration which enables the production of hot water free-of-charge while operating in the cooling mode, thanks to the partial recovery of condensation heat that would otherwise be disposed of into the external heat source.
This option is also called 'desuperheater'. It consists of shell and tube heat exchangers, suitable to recover part of the unit heating capacity (equal to the sum of the cooling capacity and the capacity absorbed by the compressors).
The partial recovery device is considered to be operating when it is powered by the water flow which is to be heated. This condition improves the unit performance, since it reduces the condensation temperature: in nominal conditions the cooling capacity increases indicatively by 3.2% and the power input of the compressors is reduced by 3.6%.
When the temperature of the water to be heated is particularly low, it is wise to insert a flow control valve into the system hydraulic circuit, in order to maintain the temperature at the recovery output at above 35°C and thus avoid the condensation of the refrigerant into the partial energy recovery device.



D - Partial recovery device

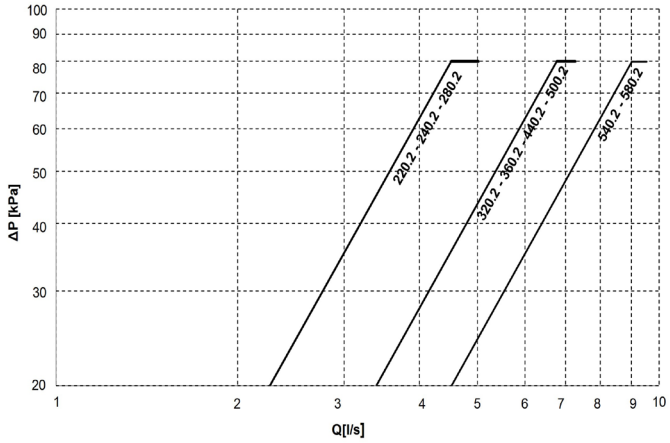
A - Unit supply limit
1 - Internal exchanger (evaporator)
2 - Compressor
3 - Recovery exchanger
4 - External exchanger (condenser)
5 - Expansion electronic valve

TWS in - Water inlet source side
TWS out - Water outlet source side
TWL in - Water inlet utility side
TWL out - Water output utility side

RW in - Recovery water inlet
RW out - Recovery water outlet

T - Temperature probe
PD - Differential pressure switch

Pressure drops of partial energy recovery exchanger



Q = Water flow rate (l/s)
DP = Water side pressure drops (kPa)

!! *The maximum capacity available from the partial recovery is equal to the 5% of the rejected heating capacity (cooling capacity + compressor power input)*

Admissible water flow rates

Min. (Qmin) and max. (Qmax) water flow-rates admissibles for the correct unit operation.

Size		220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
Qmin	[l/s]	2,3	2,3	2,3	3,4	3,4	3,4	3,5	4,5	4,5
Qmax	[l/s]	4,5	4,5	4,5	6,8	6,8	6,8	6,8	9,0	9,0

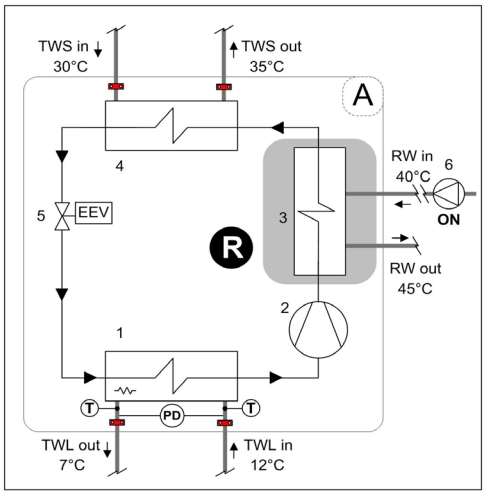
Configurations

R - Total energy recovery

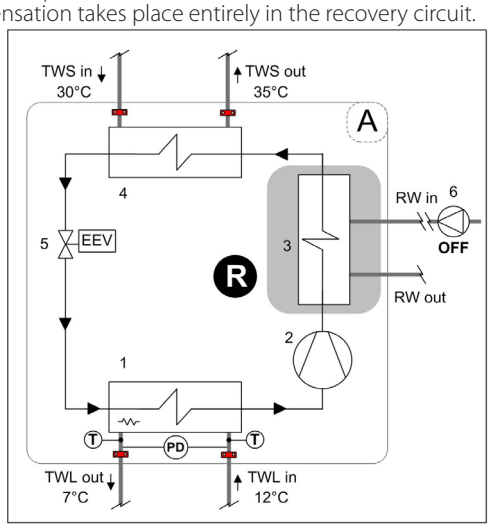
Configuration that allows to produce free hot water during the cooling operation, thanks to the total condensation heat recovery of all that would otherwise be disposed of on the external thermal source. This solution increases the system's overall efficiency in all cases where large amounts of hot water need to be generated.
It consists of shell and tube exchangers suitable to recover all the heating capacity of the unit (equal to the sum of the cooling capacity and the electrical power absorbed by the compressors).
Hot water availability is always subordinate to the production of chilled water.
See the following example:

1. cooling capacity request = 100% / Heating capacity request = 0% >Production only of cooling capacity;
2. cooling capacity request = 100% / Heating capacity request = 0% >Production of cooling and heating capacity by recovery;
3. cooling capacity request = 50% / Heating capacity request = 100% >Production of cooling and heating capacity by recovery, equal to the 50% of the requested heating capacity.

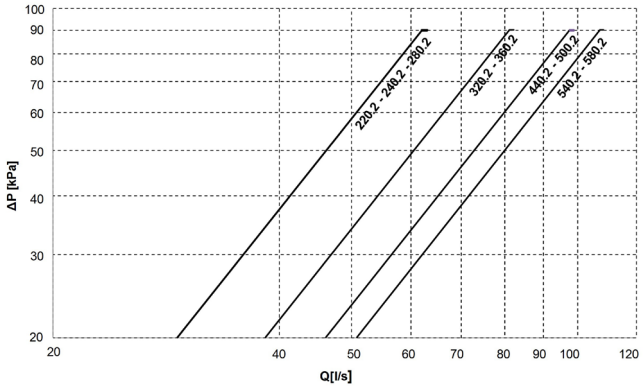
TOTAL OPERATING ENERGY RECOVERY
The pump on the recovery exchanger must be activated when hot water is required.
Condensation takes place entirely in the recovery circuit.



TOTAL OPERATING ENERGY RECOVERY
The pump on the recovery exchanger must be activated when hot water is required.
Condensation takes place entirely in the recovery circuit.



Pressure drops of the total energy recovery exchanger



Q = Water flow rate (l/s)
DP = Water side pressure drops (kPa)

R - Total recovery device

A - Unit supply limit
1 - Internal exchanger (evaporator)
2 - Compressor
3 - Recovery exchanger
4 - External exchanger (condenser)
5 - Expansion electronic valve

TWS in - Water inlet source side
TWS out - Water outlet source side
TWL in - Water inlet utility side
TWL out - Water output utility side

RW in - Recovery water inlet
RW out - Recovery water outlet

T - Temperature probe
PD - Differential pressure switch

!! *The return exchanger outlet water has the same temperature limits shown in the operating range of the standard unit under this entry: "TWS (°C) = external exchanger leaving water temperature (condenser)".*

Admissible water flow rates

Min. (Qmin) and max. (Qmax) water flow-rates admissibles for the correct unit operation.

Size		220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
Qmin	[l/s]	29,3	29,3	29,3	38,3	38,3	46,2	46,2	50,8	50,8
Qmax	[l/s]	62,0	62,0	62,0	81,2	81,2	97,7	97,7	107,2	107,2

Configurations

B - Water low temperature (Brine)

Configuration also known as "Brine". Enables an "unfreezable" solution to be cooled (for example, water and ethylene glycol in suitable quantities) up to a temperature of between +4°C and –8°C.
It includes:

- suitable exchangers with extra-thick closed-cell insulation
- electronic expansion valve, functional calibration and safety devices suitable for particular uses.

‼ *During the selection phase it is necessary to indicate the required operating type, the unit will be optimised on the basis of this: - Unit with single operating set-point (only at low temperature) - Unit with double operating set-point*

‼ *The unit in this configuration has a different operating field, which was reported in the previous pages.*

‼ *In low temperature operation, some staging steps could not be available.*

‼ *The glycol concentration must be chosen based on the minimum temperature the water can reach. The presence of glycol influences pressure drops on the water side and the unit's output as indicated in the table reporting the "correction factors for use with glycol".*

Correction factor for water low temperature

Evaporator outlet water temperature factor	2	0	-2	-4
Cooling capacity factor	0.860	0.803	0.749	0.691
Compressor power input factor	0.896	0.878	0.859	0.840

‼ *The correction coefficients must be applied to condition: internal exchanger water (evaporator) = 12 / 7 °C.*

Example: Determine the performance with leaving water temperature –4°C per l'unità WDH-SB3 280.2 EXC-B ('Excellence' version, 'Water low temperature' configuration) with external exchanger water (condenser) 30 / 35 °C, 25% glycol

From the performance table referred to condenser entering / leaving water temperature 30/35°C and the internal exchanger leaving water temperature (evaporator) 7°C)
Cooling capacity = 711 kW, Compressor power input = 136 kW

From the glycol correction factor: 0.691 for the cooling capacity and 0.84 for the compressor power input (leaving water temperature –4°C).

From the glycol correction factor:
0.971 for the cooling capacity, 1.055 for the compressor power input, 1.067 for the glycol solution flow, 1.408 for the evaporator pressure drop (glycol 25%).

Calculation WDH-SB3: Cooling capacity = 711 x 0.691 x 0.971 = 477 kW, Compressor power input = 136 x 0.84 x 1.055 = 120 kW, Water flow rate = 22.8 (calculated on 477 kW) x 1.067 = 24.3 l/s, Evaporator pressure drop = 25 (calculated on 24.3 l/s) x 1.408 = 35 kPa

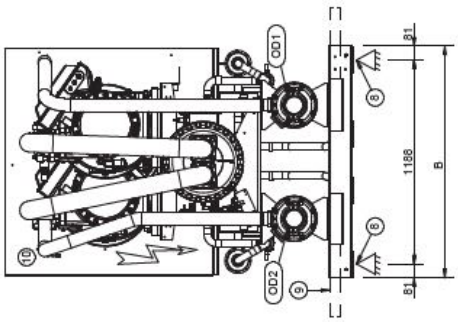
Performance

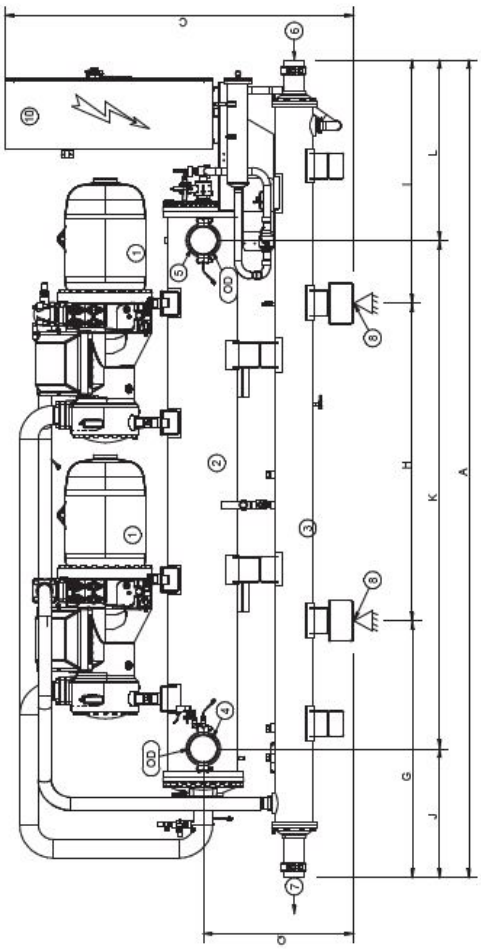
Performances in cooling / heating

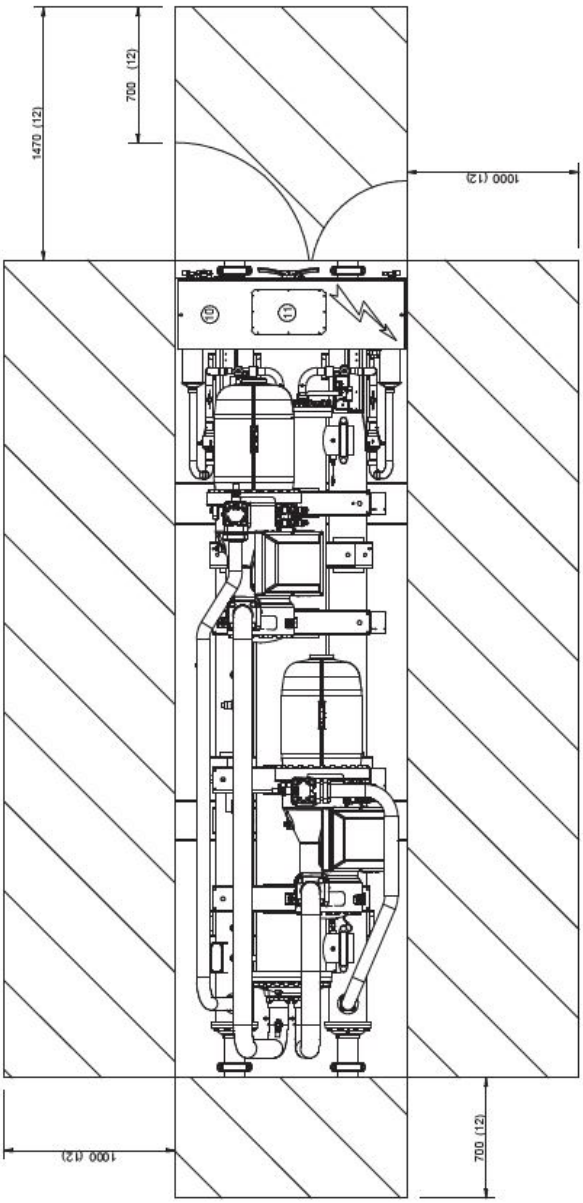
Size	To (°C)	External exchanger (condenser) entering / leaving water temperature (°C)																	
		25 / 30			30 / 35			35 / 40			40 / 45			45 / 50			47 / 52		
		kWf	kWe	kWt	kWf	kWe	kWt	kWf	kWe	kWt	kWf	kWe	kWt	kWf	kWe	kWt	kWf	kWe	kWt
220.2	5	562	95,0	657	535	108	643	507	122	628	478	137	615	440	156	596	425	164	589
	6	580	95,0	675	550	108	658	521	122	642	490	137	627	456	156	612	442	164	606
	7	601	95,0	696	573	108	681	544	122	666	514	137	651	476	157	633	461	164	626
	10	667	95,1	762	638	108	746	604	122	726	572	138	710	532	158	689	516	165	681
	15	779	95,2	875	746	109	855	712	123	835	678	139	817	635	160	794	-	-	-
	17	841	95,5	937	802	109	911	762	124	886	717	140	857	669	160	829	-	-	-
240.2	5	598	104	702	571	118	689	542	133	675	511	150	661	478	173	650	465	182	646
	6	621	104	725	593	118	710	562	133	695	532	151	683	494	173	667	479	182	660
	7	643	104	747	614	118	732	584	134	717	552	151	703	518	173	691	505	182	687
	10	712	105	816	682	119	800	650	134	784	617	151	768	577	174	750	561	183	743
	15	833	106	938	796	120	916	762	135	897	726	153	879	686	176	861	-	-	-
	17	900	106	1007	855	121	975	818	136	954	776	154	930	731	176	907	-	-	-
280.2	5	696	119	815	663	135	798	624	153	777	589	173	762	550	198	748	535	208	743
	6	714	119	834	681	135	816	647	153	800	613	173	786	573	198	771	557	209	765
	7	739	120	859	711	136	846	669	153	823	638	173	811	594	199	792	576	209	785
	10	824	121	945	787	137	924	750	155	904	707	174	882	665	200	865	648	210	858
	15	960	123	1082	919	139	1058	872	157	1029	835	178	1012	788	202	990	-	-	-
	17	1025	123	1149	983	140	1123	932	158	1090	885	179	1064	835	203	1038	-	-	-
320.2	5	834	145	979	792	163	955	748	184	932	702	206	908	647	234	881	626	245	871
	6	858	145	1003	817	164	981	769	184	953	723	206	929	671	234	906	651	246	896
	7	889	146	1035	848	164	1012	802	184	987	759	207	966	700	235	935	676	246	922
	10	985	147	1132	942	166	1107	895	186	1081	850	209	1059	789	237	1026	764	248	1012
	15	1152	150	1302	1100	169	1269	1049	190	1239	993	213	1206	930	241	1171	-	-	-
	17	1247	151	1398	1188	170	1359	1127	192	1319	1066	215	1282	995	243	1238	-	-	-
360.2	5	961	165	1126	913	186	1098	862	209	1070	809	234	1043	747	266	1013	722	279	1001
	6	996	166	1162	946	186	1132	894	209	1103	840	235	1075	777	267	1043	751	279	1031
	7	1031	166	1197	979	187	1166	926	210	1136	871	235	1106	806	267	1074	780	280	1060
	10	1145	168	1314	1094	190	1284	1037	213	1250	977	239	1216	905	270	1175	876	283	1158
	15	1345	172	1517	1283	194	1477	1220	218	1438	1153	244	1398	1084	275	1359	-	-	-
	17	1435	173	1608	1362	195	1557	1294	220	1514	1222	247	1468	1144	277	1421	-	-	-
440.2	5	1114	183	1298	1062	207	1268	1000	232	1233	945	260	1205	883	296	1179	859	310	1169
	6	1141	184	1325	1088	207	1296	1028	233	1261	972	261	1233	909	297	1206	884	311	1195
	7	1188	185	1373	1128	208	1336	1075	234	1308	1024	262	1286	952	298	1250	923	312	1235
	10	1311	187	1498	1255	210	1466	1203	236	1440	1133	265	1398	1069	301	1370	1043	316	1359
	15	1529	190	1719	1466	215	1681	1402	241	1643	1345	271	1615	1266	307	1573	-	-	-
	17	1659	193	1851	1581	217	1799	1502	244	1746	1428	274	1702	1342	309	1651	-	-	-
500.2	5	1283	210	1493	1221	236	1457	1154	265	1419	1084	297	1380	1011	337	1348	981	353	1335
	6	1329	211	1539	1265	237	1502	1197	266	1463	1133	298	1431	1051	338	1390	1019	354	1373
	7	1374	212	1586	1309	238	1547	1241	267	1508	1173	299	1472	1094	340	1433	1062	356	1418
	10	1533	215	1748	1461	242	1703	1389	272	1661	1311	304	1616	1230	344	1575	1198	360	1558
	15	1794	220	2014	1713	248	1961	1631	279	1910	1552	313	1864	1459	352	1811	-	-	-
	17	1900	222	2123	1813	251	2064	1720	281	2001	1629	315	1944	1533	354	1887	-	-	-
540.2	5	1382	237	1619	1299	266	1565	1237	298	1534	1152	332	1484	1068	375	1443	1034	392	1426
	6	1431	238	1669	1346	267	1613	1273	299	1572	1196	333	1529	1109	376	1485	1074	393	1467
	7	1480	240	1719	1404	269	1672	1328	300	1628	1245	335	1579	1151	378	1529	1114	395	1509
	10	1651	243	1894	1564	273	1838	1474	305	1779	1394	341	1735	1300	383	1683	1262	401	1662
	15	1930	249	2178	1839	280	2119	1749	314	2063	1643	351	1994	1536	392	1928	-	-	-
	17	2046	251	2297	1937	283	2220	1837	317	2154	1730	354	2084	1617	395	2012	-	-	-
580.2	5	1476	258	1735	1401	290	1692	1326	324	1650	1249	361	1610	1152	408	1560	1114	426	1540
	6	1529	260	1789	1452	292	1743	1374	326	1699	1288	363	1651	1194	409	1603	1156	428	1584
	7	1582	261	1843	1502	293	1795	1422	328	1749	1337	365	1702	1245	411	1657	1209	430	1639
	10	1765	266	2030	1679	298	1977	1589	334	1922	1496	372	1868	1395	417	1812	1355	435	1790
	15	2058	272	2330	1966	306	2272	1859	343	2202	1757	383	2140	1648	427	2075	-	-	-
	17	2195	275	2470	2079	309	2388	1976	347	2322	1864	387	2251	1740	430	2170	-	-	-

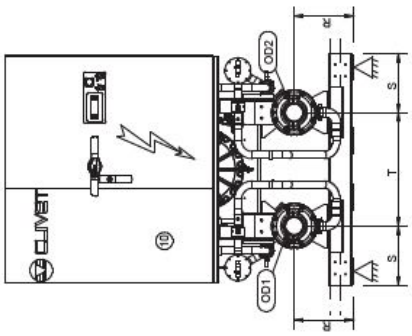
The data do not consider the pump share, required to overcome the pressure drop for the solution circulation inside the exchangers
kWf = Cooling capacity in kW
kWe = Electrical power absorbed by compressors (kW)
kWt = Thermal power in kW
To (°C) = internal exchanger (evaporator) water leaving temperature. Water temperature differential = 5°C

Dimensional Drawing









Size			220.2	240.2	280.2	320.2	360.2	440.2	500.2	540.2	580.2
A - Length		mm	4766	4766	4766	4900	4926	5027	5234	5234	5234
B - Depth		mm	1350	1350	1350	1350	1350	1350	1350	1350	1350
C - Height		mm	2028	2028	2028	2109	2182	2180	2299	2299	2299
G		mm	1498	1498	1498	1628	1654	1656	1863	1863	1863
H		mm	1850	1850	1850	1850	1850	1850	1850	1850	1850
I		mm	1418	1418	1418	1422	1422	1521	1521	1521	1521
J		mm	752	752	752	658	700	718	844	844	844
K		mm	2962	2962	2962	2962	2910	3210	3130	3130	3130
L		mm	1052	1052	1052	1280	1316	1099	1260	1260	1260
Q		mm	877	877	877	955	955	955	1025	1025	1025
R		mm	347	347	347	398	398	398	398	398	398
S		mm	344	344	344	344	344	344	344	344	344
T		mm	661	661	661	661	661	661	661	661	661
OD		mm	168,3	168,3	168,3	168,3	219,1	219,1	273	273	273
OD1		mm	114,3	114,3	114,3	139,7	139,7	139,7	139,7	139,7	139,7
OD2		mm	114,3	114,3	114,3	139,7	139,7	139,7	139,7	139,7	139,7
Operating weight - EXC-ST		kg	3939	3959	3996	5092	5557	5983	6796	6959	7072
Shipping weight - EXC-ST		kg	3590	3610	3674	4736	5000	5357	5767	5920	6033
Operating weight - EXC-EN		kg	4216	4236	4273	5369	5834	6267	7080	7243	7356
Shipping weight - EXC-EN		kg	3867	3887	3951	5013	5277	5641	6051	6204	6317

The presence of optional accessories may result in a substantial variation of the weights shown in the table

1. Compressor
2. Internal exchanger (Evaporator)
3. External exchanger (Condenser)
4. Internal exchanger water inlet
5. Internal exchanger water outlet
6. External exchanger water inlet
7. External exchanger water outlet
8. Anti-vibration mounting holes Ø25
9. Lifting tubes
10. Electrical panel
11. Power input
12. Minimum dimension for Maintenance.

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