Chillers

Commercial and Technical Data

- **Wide capacity range (160kW – 600kW)**
- **Indoor installations**
- **Independent refrigerant circuits with single screw compressor**
- **Water supply down to -8°C (optional)**
- **Two efficiency versions available**
- **New Microtech III controller**

Water cooled chiller

ECDEN10-419A

EWWD-G-
160~600 kW

R-134a

Daikin Europe N.V.

About Daikin

Daikin has a worldwide reputation based on over 85 years' experience in the successful manufacture of high quality air conditioning equipment for industrial, commercial and residential use. Daikin's much envied quality quite simply stems from the close attention paid to design, production and testing, as well as aftersales support. To this end, every component is carefully selected and rigorously tested to verify its contribution to product quality and reliability.

New Daikin EWWD-G- water cooled chiller range with upgraded controller

In order to upgrade the chiller portfolio with a superior control logic, Daikin enhances today the EWWD-G- series incorporating the new Microtech III controller.

Microtech III ensures maximum efficiency and reliability, stable operating conditions and protection of critical components.

The EWWD-G- range is composed of 10 sizes and available in two efficiency versions (standard and high). Each unit is equipped with one or two R-134a refrigerant circuits, featuring shell & tube heat exchangers and single screw compressors with stepless capacity control, allowing the chiller to modulate its capacity from 100% to 12.5%.

Moreover, the range features an extensive option list, including the heat recovery and the low water leaving temperature version.

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Chiller features

Application flexibility

The EWWD-G- series is available in a wide range of capacities (160 - 600kW), making the chiller models suitable for comfort and process cooling applications.
The most commonly serviced parts are easily accessible, simplifying maintenance and service. Moreover, the new chillers allow flexible integration into a wide range of control and building management systems.

Large operation range

With the 'brine' option the new range is able to provide water down to -8°C, making the chiller models suitable also for some typical industrial applications.

Superior control logic

The new Microtech III controller provides an easy to use control environmental. The control logic is designed to provide maximum efficiency, to continue operation in unusual operating conditions and to provide a history of unit operation. One of the greatest benefits is the easy interface with Lonwork, BACnet, Ethernet TCP/IP or Modbus communications.

Extensive option list

The base model includes several standard factory mounted options such as: electronic expansion valve, suction line shut off valve, wye – delta starter, etc. Moreover, the new range features an extensive option list, including heat recovery, evaporator and condenser flow switch, soft starter, energy meter, etc.

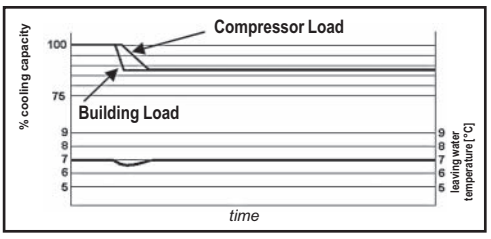
1 Features and advantages

Features and advantages

The water cooled screw chillers EWWD~G- are equipped with single screw compressors.
They are manufactured to satisfy the requirements of the consultants and the end user. Units are designed to minimise energy costs while maximising the refrigeration capacities.
Daikin's chiller design experience combined with outstanding features makes the EWWD~G- chiller unmatched in the industry.

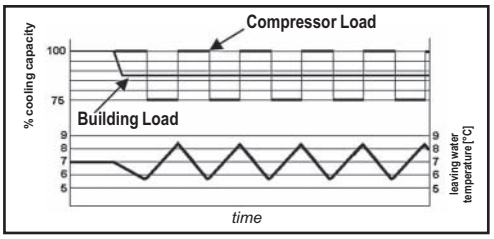
Seasonal quietness
The compressor design with a single screw and twin rotors allows a constant gas flow. This compression process completely eliminates gas pulsations. The oil injection also results in significant mechanical noise reduction.
The twin gas compressor discharge chambers are designed to act as attenuators, based on the harmonic wave principle with destructive interference, thus always resulting equal to zero. The extremely low noise compressor performance affords the use of EWWD~G- chiller for all applications.
The reduced number of vibrations produced from the EWWD~G- chiller offers a surprisingly quiet operation eliminating the noise transmission through the structure and the chilled water piping system.

Infinitely capacity control
Cooling capacity control is infinitely variable by means of a screw compressor controlled by microprocessor system. Each unit has infinitely variable capacity control from 100% down to 25% (one compressor unit), down to 12.5% (two compressors units). This modulation allows the compressor capacity to exactly match the building cooling load without any leaving evaporator water temperature fluctuation. This chilled water temperature fluctuation is avoided only with a stepless control.



ELWT fluctuation with stepless capacity control

With a compressor load step control in fact, the compressor capacity, at partial loads, will be too high or too low compared to the building cooling load. The result is an increase in chiller energy costs, particularly at the part-load conditions at which the chiller operates most of the time.



ELWT fluctuation with steps capacity control (4 steps)

Units with stepless regulation offer benefits that the units with step regulation are unable to match. The ability to follow the system energy demand at any time and the possibility to provide steady outlet water temperature without deviations from the set-point, are the two points that allow you to understand how the optimum operating conditions of a system can be met only through the use of a unit with stepless regulation.

Unmatched serviceability
Field serviceability has not been sacrificed. Inspection covers allows visual inspection of the main screw and gaterotors.

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1 Features and advantages

Outstanding reliability features

Unsurpassed Efficiency

• Zero clearance fit between the two gaterotors and main screw rotor virtually eliminates leakage between the high and low-pressure sides during compression. Special gaterotor material made from an advanced composite, temperature stable material makes a zero clearance design possible.

• The chiller is equipped with the most advanced means of refrigerant flow control available. An electronic expansion valve coupled with the MicroTech II C Plus controller's control logic provides excellent operating efficiencies both at full and part load operation.

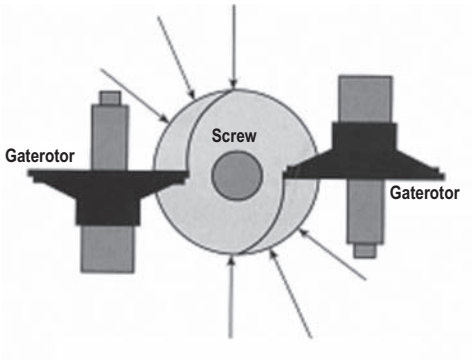
• Infinite unloading matches compressor capacity to load.

• Full factory testing of the unit with water hookups helps provides a trouble-free start-up. Extensive quality control checks during testing means that each equipment protection and operating control is properly adjusted and operates correctly before it leaves the factory. Factory-installed options minimize field expenses and startup labor.

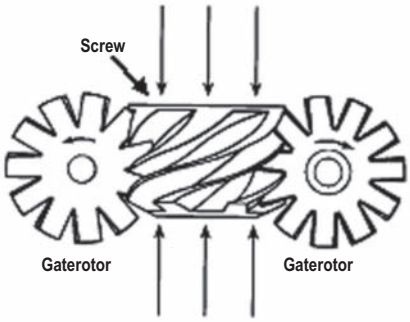
• The rugged design of the single-screw compressor allows it to be tolerant of liquid slugging.

• Very low loading enhances the bearing and compressor reliability. Due to symmetrical compression taking place on both sides of the main screw rotor, balanced forces result in the elimination of the large radial force loads inherent in twin-screw compressors.

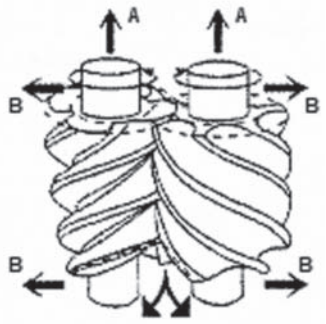
• Integral to the basic design of the single-screw compressor, the main screw rotor shaft and the gaterotor shafts cross at right angles in the compressor. The result is ample space to locate heavy duty bearings and increase compressor reliability since no limitations are placed on bearing design as found in twin-screw compressors.



Balance radial forces



Balanced axial forces



High Axial and Radial thrusts in TwinScrew Compressor

Code requirements – Safety and observant of laws/directives

All water cooled units are designed and manufactured in accordance with applicable selections of the following:

Construction of pressure vessel	97/23/EC (PED)
Machinery Directive	2006/42/EC
Low Voltage	2006/95/EC
Electromagnetic Compatibility	2004/108/EC
Electrical & Safety codes	EN 60204–1 / EN 60335-2-40
Manufacturing Quality Stds	UNI – EN ISO 9001:2004

Certifications

All units manufactured are CE marked, complying with European directives in force, concerning manufacturing and safety. On request units can be produced complying with laws in force in non European countries (ASME, GOST, etc.), and with other applications, such as naval (RINA, etc.).

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1 Features and advantages

Versions

EWWD~G- is available in two different Efficiency Versions:

S: Standard Efficiency

10 sizes to cover a range from 166 up to 556 kW with an EER up to 4.00 and an ESEER up to 5.33

X: High Efficiency

10 sizes to cover a range from 186 up to 604 kW with an EER up to 4.73 and an ESEER up to 6.31

The EER (Energy Efficiency Ratio) is the ratio of the Cooling Capacity to the Power Input of the unit. The Power Input includes: the power input for operation of the compressor, the power input of all control and safety devices, the power input for fans.

The ESEER (European Seasonal Energy Efficiency Ratio) is a weighed formula enabling to take into account the variation of EER with the load rate and the variation of water inlet condenser temperature.

$ESEER = A \times EER_{100\%} + B \times EER_{75\%} + C \times EER_{50\%} + D \times EER_{25\%}$

	A	B	C	D
Coefficient	0.03 (3%)	0.33 (33%)	0.41 (41%)	0.23 (23%)
Condenser water inlet temperature (°C)	30	26	22	18

Sound Configuration

EWWD~G- is available in Standard sound level configurations:

S: Standard Noise

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2 General Characteristics

General characteristics

Cabinet and structure

The cabinet is made of galvanized steel sheet and painted to provide a high resistance to corrosion. Colour Ivory White (Munsell code 5Y7.5/1) (±RAL7044).The base frame has eye-hook for lifting the unit with ropes for an easy installation. The weight is uniformly distributed along the profiles of the base and this facilitates the arrangement of the unit.

Screw compressors

The single-screw compressor has a well balanced compression mechanism which cancels the screw rotor load in both the radial and axial directions. Inherent to the basic single-screw compressor design is the virtually load-free operation that gives main bearing design life of 3-4 times greater than twin-screws, and eliminates expensive and complicated thrust balancing schemes. The two exactly opposed gate rotors create two exactly opposed compression cycles. Compression is made at the lower and upper parts of the screw rotor at the same time, thus cancelling the radial loads. Also, both ends of the screw rotor are subjected to suction pressure only, which cancels the axial loads and eliminates the huge thrust loads inherent in twin-screw compressors.

Oil injection is used for these compressors in order to get EER at high condensing pressure. The units are provided with a high efficiency oil separator to maximise oil extraction.

Compressors have an infinitely variable capacity control down to 25% of its total capacity. This control is made by means of capacity slides controlled by microprocessors.

Standard start is star-delta type; soft start type is available as option.

Ecological R-134a refrigerant

The compressors have been designed to operate with R-134a, ecological refrigerant with zero ODP (Ozone Depletion Potential) and very low GWP (Global Warming Potential) that means low TEWI (Total Equivalent Warming Impact).

Evaporator

The units are equipped with a Direct Expansion shell&tube evaporator with copper tubes rolled into steel tubesheets. The evaporators are single-pass on both the refrigerant and water sides for pure counter-flow heat exchange and low refrigerant pressure drops. Both attributes contribute to the heat exchanger effectiveness and total unit's outstanding efficiency.

The external shell is covered with a 10mm closed cell insulation material. Each evaporator has 1 circuit for each compressor and is manufactured in accordance to PED approval. The evaporator water outlet connections are provided with Victaulic Kit (as standard).

Condensers

The units are equipped with Direct Expansion shell&tube condensers, with copper tubes rolled into steel tubesheets. The unit has independent condensers, one per circuit. The condenser is manufactured in accordance to PED approval.

Condensers are provided with liquid shut-off valve and spring loaded relief valve.

Electronic expansion valve

The unit is equipped with the most advanced electronic expansion valves to achieve precise control of refrigerant mass flow. As today's system requires improved energy efficiency, tighter temperature control, wider range of operating conditions and incorporate features like remote monitoring and diagnostics, the application of electronic expansion valves becomes mandatory. Electronic expansion valve proposes features that make it unique: short opening and closing time, high resolution, positive shut-off function to eliminate use of additional solenoid valve, highly linear flow capacity, continuous modulation of mass flow without stress in the refrigerant circuit and corrosion resistance stainless steel body.

EEXV strength point is the capacity to work with lower ΔP between high and low pressure side, than a thermostatic expansion valve. The electronic expansion valve allows the system to work with low condenser pressure (winter time) without any refrigerant flow problems and with a perfect chilled water leaving temperature control.

Refrigerant Circuit

Each unit has independent refrigerant circuits and each one includes:

- Single screw compressor with external cyclonic oil separator
- (Common) Evaporator

GNC_1-2-3-4-5_Rev.00_1

2 General Characteristics

- Condenser
- Oil pressure transducer
- High pressure switches
- High pressure transducer
- Low pressure transducer
- Moisture liquid indicator
- High efficiency oil separator
- Replaceable core filter-drier
- Electronic expansion valve

Electrical control panel

Power and control are located in the main panel that is manufactured to ensure protection against all weather conditions. The electrical panel is IP54 and (when opening the doors) internally protected with Plexiglas panel against possible accidental contact with electrical components (IP20). The main panel is fitted with a main switch interlocked door.

Power Section

The power section includes compressors fuses and control circuit transformer.

MicroTech III controller

MicroTech III controller is installed as standard; it can be used to modify unit set-points and check control parameters. A built-in display shows chiller operating status plus temperatures and pressures of water, refrigerant, programmable values, set-points. A sophisticated software with predictive logic, selects the most energy efficient combination of compressors and EEXV to keep stable operating conditions to maximise chiller energy efficiency and reliability.
MicroTech III is able to protect critical components based on external signs from its system (such as motor temperatures, refrigerant gas and oil pressures, correct phase sequence, pressure switches and evaporator). The input coming from the high pressure switch cuts all digital output from the controller in less than 50ms, this is an additional security for the equipment.
Fast program cycle (200ms) for a precise monitoring of the system. Floating point calculations supported for increased accuracy in P/T conversions.

Control section - main features

- Management of the compressor stepless capacity.
- Chiller enabled to work in partial failure condition.
- Full routine operation at condition of:
  - high ambient temperature value
  - high thermal load
  - high evaporator entering water temperature (start-up)
- Display of evaporator entering/leaving water temperatures.
- Display of condensing-evaporating temperatures and pressures, suction and discharge superheat for each circuit.
- Leaving water evaporator temperature regulation. Temperature tolerance = 0.1°C.
- Compressor and evaporator pumps hour counters.
- Display of Status Safety Devices.
- Number of starts and compressor working hours.
- Optimized management of compressor load.
- Re-start in case of power failure (automatic / manual).
- Soft Load (optimized management of the compressor load during the start-up).
- Start at high evaporator water temperature.
- Return Reset (Set Point Reset based on return water temperature).
- Set point Reset (optional).
- Application and system upgrade with commercial SD cards.
- Ethernet port for remote or local servicing using standard web browsers

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2 General Characteristics

- Two different sets of default parameters could be stored for easy restore.

Safety device / logic for each refrigerant circuit
- High pressure (pressure switch).
- High pressure (transducer).
- Low pressure (transducer).
- High compressor discharge temperature.
- High motor winding temperature.
- Phase Monitor.
- Low pressure ratio.
- High oil pressure drop
- Low oil pressure.
- No pressure change at start.

System security
- Phase monitor.
- Low Ambient temperature lock-out.
- Freeze protection.

Regulation type
Proportional + integral + derivative regulation on the evaporator leaving water output probe.

MicroTech III
MicroTech III built-in terminal has the following features.
- 164x44 dots liquid crystal display with white back lighting. Supports Unicode fonts for multi-lingual.
- Key-pad consisting of 3 keys.
- Push'n'Roll control for an increased usability.
- Memory to protect the data.
- General faults alarm relays.
- Password access to modify the setting.
- Application security to prevent application tampering or hardware usability with third party applications.
- Service report displaying all running hours and general conditions.
- Alarm history memory to allow an easy fault analysis.

Supervising systems (on request)

MicroTech III remote control
MicroTech III is able to communicate to BMS (Building Management System) based on the most common protocols as:

- ModbusRTU
- LonWorks, now also based on the international 8040 Standard Chiller Profile and LonMark Technology
- BacNet BTP certifief over IP and MS/TP (class 4) (Native)

Chiller Sequencing
MicroTech III controller allows an easy plug-in sequencing technology based on digital or serial panel

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2 General Characteristics

Digital Sequencing Panel
This panel is basically a step inserter that switches ON/OFF up to 11 units (chillers or heat pumps operating in the same cooling/heating mode) depending on the selected set point; the units are connected with the panel through standard cables and no serial card is requested.

Serial Sequencing Panel
Basically this panel sequences a chiller plant by switching on/off the units (up to 7 chillers) taking into account their running hours and the requested plant load, in order to optimise the number of working units for each condition; serial cards and shielded cables are requested to connect the panel with the units and, if installed, a BMS.

Standard accessories (supplied on basic unit)

Evaporator Victaulic Kit - Hydraulic joint with gasket for an easy and quick water connection.
Evaporator Water side design pressure 10 bar
Condenser Water side design pressure 16 bar
Electronic Expansion Device
Suction line shut off valve - Suction shut-off valve installed on the suction of the compressor to facilitate maintenance operation.
Y-D starter - Star Delta starter is the standard type
Double set-point - Dual leaving water temperature set-points.
Phase monitor - The phase monitor controls that phases sequence is correct and controls phase loss.
High Pressure Side Manometers
Hour Run meter - Digital compressors hour run meter
General fault contactor - Contactor for alarm warning.
Set-point reset, demand limit and alarm from external device - The leaving water temperature set-point can be overwritten with the following options: 4-20mA from external source (by user); outside ambient temperature; evaporator water temperature Δt. Moreover the device allow the user to limit the load of the unit by 4-20mA signal or by network system and the microprocessor is able to receive an alarm signal from an external device (pump etc… - user can decide if this alarm signal will stop the unit or not).

Options (on request)

100% total heat recovery - Produced with tube bundle placed in a single shell with the water condensers. Heat exchangers heads are provided with 2 connections for entering/leaving heat recovery water and 2 separate connections for condensing water.
Partial heat recovery - Produced with plate to plate heat exchangers installed on discharge side of compressor hot gas. These allow hot water to be produced up to a maximum temperature of +50°C.
Heat pump version
Brine version - Allows the unit to operate down to -8°C leaving liquid temperature (antifreeze required).
Condenser double flanges kit
20mm Evaporator/ Condenser Insulation
Condenser Victaulic Kit
Cu-Ni 90-10 exchangers - to work with sea water the heat exchangers are fitted with Cu-Ni tubes and special protection inside the end covers.
Sound proof system - Made of sheet metal and internally insulated, the cabinet is “integral kind” (around the whole chiller, not only around the compressors) to reach the best performance in noise reduction.
Dual pressure relief valve on evaporator
Soft start - Electronic starting device to reduce the mechanical stress during compressor start-up
Compressor thermal overload relays - Safety devices against compressor motor overloading in addition to the normal protection envisaged by the electrical windings.

GNC_1-2-3-4-5_Rev.00_4

2 General Characteristics

Under/Over Voltage - This device control the voltage value of power supply and stop the chiller if the value exceeds the allowed operating limits.
Energy Meter - This device allows to measure the energy absorbed by the chiller during its life. It is installed inside the control box mounted on a DIN rail and show on a digital display: Line-to-Line Voltage, Phase and Average Current, Active and Reactive Power, Active Energy, Frequency.
Capacitors Cosfi 0.9 - Installed on the electrical control panel to ensure it conforms to the plant rules (advise: maximum 0,9).
Current Limit - To limit maximum absorbed current of the unit whenever is required.
Evaporator / Condenser flow switch for the water piping
Rubber type antivibration mounts - Supplied separately, these are positioned under the base of the unit during installation. Ideal to reduce the vibrations when the unit is floor mounted.
Forklift kit
Witness test - Every unit is always tested at the test bench prior to the shipment. On request, a second test can be carried out, at customer's presence, in accordance with the procedures indicated on the test form. (Not available for units with glycol mixtures).
Acoustic test

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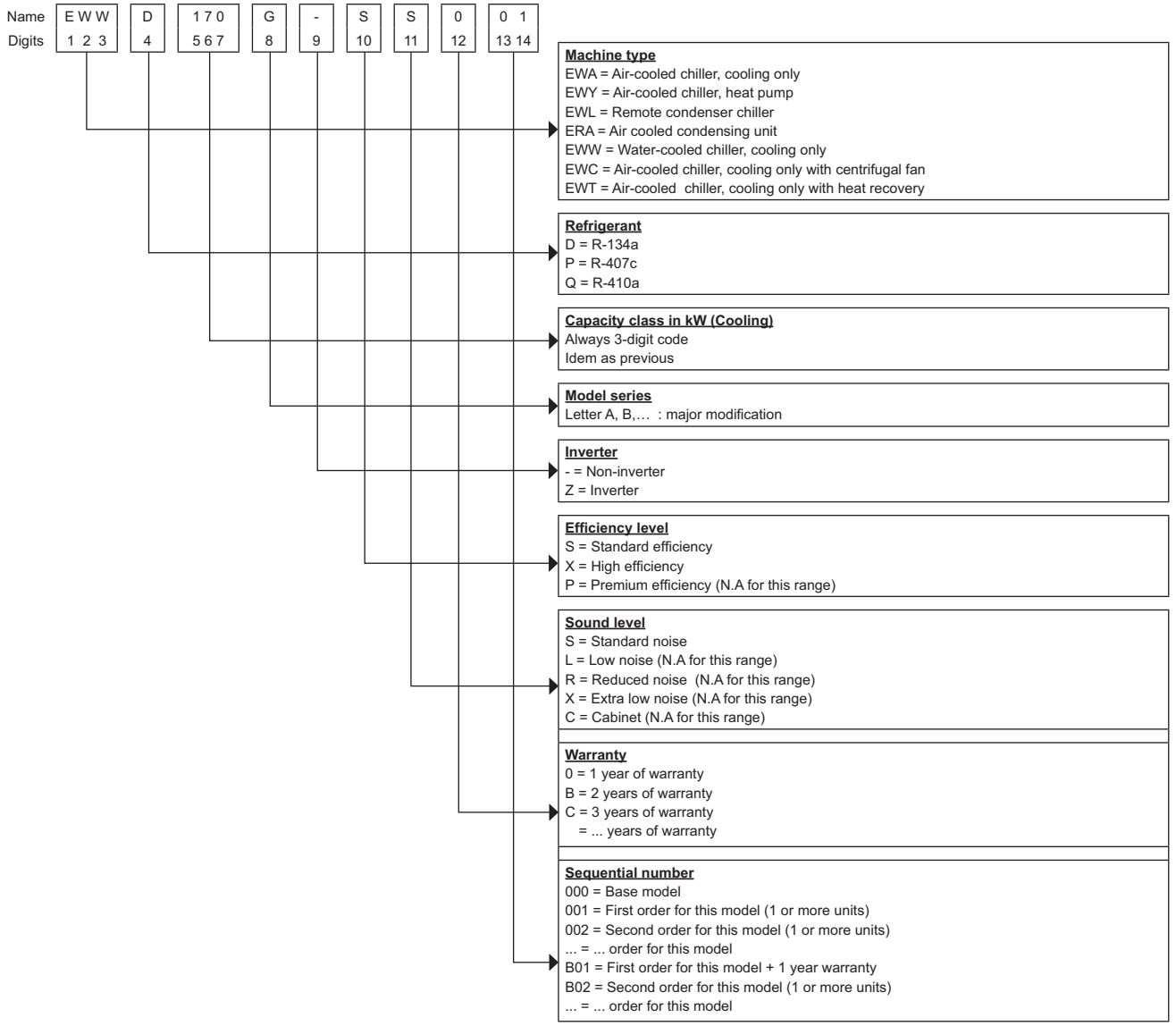
3 Nomenclature



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4 Specifications

4-1 Technical Specifications EWWD~G-SS					170	210	260	300	320	380	420	460	500	600
Cooling capacity	Nom.			kW	166 (1)	201 (1)	253 (1)	280 (1)	334 (1)	372 (1)	403 (1)	448 (1)	494 (1)	556 (1)
Heating capacity	Nom.			kW	204 (2)	247 (2)	310 (2)	343 (2)	410 (2)	456 (2)	494 (2)	552 (2)	610 (2)	674 (2)
Capacity control	Method				Stepless									
	Minimum capacity			%	25				12.5					
Power input	Cooling	Nom.		kW	42.2 (1)	50.6 (1)	64.9 (1)	75.3 (1)	84.3 (1)	93 (1)	101 (1)	115 (1)	129 (1)	150 (1)
	Heating	Nom.		kW	52.7 (2)	63.5 (2)	80.8 (2)	89.2 (2)	106 (2)	117 (2)	127 (2)	144 (2)	161 (2)	177 (2)
EER					3.93 (1)	3.97 (1)	3.90 (1)	3.72 (1)	3.96 (1)	4.00 (1)	3.97 (1)	3.89 (1)	3.83 (1)	3.70 (1)
COP					3.87 (2)	3.89 (2)	3.84 (2)		3.88 (2)	3.91 (2)	3.89 (2)	3.84 (2)	3.79 (2)	3.81 (2)
ESEER					5.00	5.04	4.95	4.72	5.28	5.33	5.29	5.19	5.1	4.93
Casing	Colour				Ivory white									
	Material				Galvanized and painted steel sheet									
Dimensions	Unit	Height		mm	1,860				1,880					
		Width		mm	920				860					
		Depth		mm	3,435				4,305					
Weight	Unit			kg	1,393	1,410	1,503		2,687	2,697	2,702	2,757	2,762	
	Operation weight			kg	1,470	1,480	1,650		2,840	2,850	2,860	2,970		
Water heat exchanger - evaporator	Type				Single pass shell and tube									
	Water volume			l	60	56	123		118	113		173	168	
	Water flow rate	Nom.		l/s	7.93	9.60	12.09	13.38	15.96	17.77	19.25	21.40	23.60	26.56
	Nominal water pressure drop	Cooling	Total	kPa	48	69	43	53	64	63	72	54		68
	Insulation material				Closed cell									
Water heat exchanger - condenser	Type				Single pass shell and tube									
	Water flow rate	Nom.		l/s	9.95	12.02	15.19	16.98	19.99	22.22	24.08	26.90	29.77	33.73
	Nominal water pressure drop	Cooling		kPa	39	41	63	77	40	41		57	60	75
	Insulation material				Closed cell									
	Model	Quantity			1				2					
Sound power level	Cooling	Nom.		dBA	87.7 (3)				90.2 (3)					
Sound pressure level	Cooling	Nom.		dBA	69.7 (3)				71.7 (3)					
Compressor	Type				Semi-hermetic single screw compressor									
	Quantity				1				2					
	Oil	Charged volume		l	16				32					
Refrigerant	Type				R-134a									
	Charge			kg	50		55		110	50		55		110
	Circuits	Quantity			1				2					
Piping connections	Evaporator water inlet/outlet				88.9		114.3					139.7mm		
	Condenser water inlet/outlet				5"									
Safety devices	Item	01			High discharge pressure (pressure switch)									
		02			High discharge pressure (pressure transducer)									
		03			Low suction pressure (pressure transducer)									
		04			Compressor motor protection									
		05			High discharge temperature									
		06			Refrigerant in oil sump									
		07			Low oil pressure									
		08			Low pressure ratio									
		09			High oil filter pressure drop									
		10			Phase monitor									
		11			Flowswitch									
		12			Emergency stop									
		13			Water freeze protection controller									

4 Specifications

4-2 Electrical Specifications EWWD~G-SS				170	210	260	300	320	380	420	460	500	600
Compressor	Phase			3~									
	Voltage		V	400									
	Voltage range	Min.	%	-10									
		Max.	%	10									
	Maximum running current		A	112	134	161	182	112		134		161	182
	Starting method			Wye-delta									
Compressor 2	Maximum running current		A	-				112	134		161	182	
Power supply	Phase			3									
	Frequency		Hz	50									
	Voltage		V	400									
	Voltage range	Min.	%	-10									
		Max.	%	10									
Unit	Maximum starting current		A	288				378	395		417	434	
	Nominal running current (RLA)	Cooling	A	81	92	111	131	16	174	184	202	221	260
	Maximum running current		A	112	134	161	182	224	246	268	295	343	364
	Max unit current for wires sizing		A	123	147	177	200	246	271	295	325	377	400

Notes

(1) Cooling: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; entering condenser water temp. 30ºC; leaving condenser water temp. 35ºC; full load operation.

(2) Heating: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; entering condenser water temp. 40ºC; leaving condenser water temp. 45ºC; unit at full load operation

(3) Sound level data are measured at entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; entering condenser water temp. 30ºC; leaving condenser water temp. 35ºC; full load operation; standard: ISO3744

(4) Allowed voltage tolerance ± 10%. Voltage unbalance between phases must be within ± 3%.

(5) Maximum starting current: starting current of biggest compressor + current of the other compressor at 75 % of maximum load

(6) Nominal current in cooling mode: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; entering condenser water temp. 30ºC; leaving condenser water temp. 35ºC; compressors.

(7) Maximum running current is based on max compressor absorbed current in its envelope

(8) Maximum unit current for wires sizing is based on minimum allowed voltage.

(9) Maximum current for wires sizing: (compressors full load ampere + fans current) x 1.1

4 Specifications

4-3 Technical Specifications EWWD~G-XS					190	230	280	320	380	400	460	500	550	650
Cooling capacity	Nom.			kW	186 (1)	223 (1)	277 (1)	307 (1)	366 (1)	408 (1)	444 (1)	496 (1)	541 (1)	604 (1)
Heating capacity	Nom.			kW	220 (2)	264 (2)	326 (2)	354 (2)	434 (2)	482 (2)	524 (2)	585 (2)	638 (2)	712 (2)
Capacity control	Method				Stepless									
	Minimum capacity			%	25				12.5					
Power input	Cooling	Min.		kW	39.6 (1)	48.1 (1)	59.4 (1)	71.4 (1)	79.2 (1)	87.2 (1)	95.1 (1)	105 (1)	115 (1)	137 (1)
	Heating	Nom.		kW	50.1 (2)	60.6 (2)	74.5 (2)	83.7 (2)	99.9 (2)	110 (2)	120 (2)	132 (2)	144 (2)	162 (2)
EER					4.70 (1)	4.64 (1)	4.66 (1)	4.30 (1)	4.62 (1)	4.68 (1)	4.67 (1)	4.73 (1)	4.72 (1)	4.39 (1)
COP					4.38 (2)	4.35 (2)	4.38 (2)	4.23 (2)	4.34 (2)	4.38 (2)		4.42 (2)	4.43 (2)	4.40 (2)
ESEER					5.97	5.9	5.92	5.46	6.15	6.24	6.23	6.31	6.30	5.85
Casing	Colour				Ivory white									
	Material				Galvanized and painted steel sheet									
Dimensions	Unit	Height		mm	1,860				1,880					
		Width		mm	920				860					
		Depth		mm	3,435				4,305					
Weight	Unit			kg	1,650	1,665	1,680		2,800	2,945	2,955	2,975	2,990	
	Operation weight			kg	1,800	1,810	1,820		3,020	3,280	3,290	3,315	3,340	
Water heat exchanger - evaporator	Type				Single pass shell and tube									
	Water volume			l	125	120	110		170	285		280		
	Water flow rate	Nom.		l/s	8.89	10.65	13.23	14.67	17.49	19.49	21.21	23.70	25.85	28.86
	Nominal water pressure drop	Cooling	Total	kPa	25	35		44	30	24	28	39	46	57
	Insulation material				Closed cell									
Water heat exchanger - condenser	Type				Single pass shell and tube									
	Water flow rate	Nom.		l/s	10.78	12.95	16.07	18.08	21.27	23.66	25.76	28.71	31.34	35.40
	Nominal water pressure drop	Cooling		kPa	17	20	25	28	17			16	15	19
	Insulation material				Closed cell									
	Model	Quantity			1				2					
Sound power level	Cooling	Nom.		dBA	88.2 (3)				90.9 (3)					
Sound pressure level	Cooling	Nom.		dBA	69.7 (3)				71.7 (3)					
Compressor	Type				Semi-hermetic single screw compressor									
	Quantity				1				2					
	Oil	Charged volume		l	16				32					
Refrigerant	Type				R-134a									
	Charge			kg	55				110	105	100			
	Circuits	Quantity			1				2					
Piping connections	Evaporator water inlet/outlet				114.3				139.7	168.3mm				
	Condenser water inlet/outlet				5"									
Safety devices	Item	01			High discharge pressure (pressure switch)									
		02			High discharge pressure (pressure transducer)									
		03			Low suction pressure (pressure transducer)									
		04			Compressor motor protection									
		05			High discharge temperature									
		06			Refrigerant in oil sump									
		07			Low oil pressure									
		08			Low pressure ratio									
		09			High oil filter pressure drop									
		10			Phase monitor									
		11			Flowswitch									
		12			Emergency stop									
		13			Water freeze protection controller									

4 Specifications

4-4 Electrical Specifications EWWD~G-XS				190	230	280	320	380	400	460	500	550	650
Compressor	Phase			3~									
	Voltage		V	400									
	Voltage range	Min.	%	-10									
		Max.	%	10									
	Maximum running current		A	112	134	161	182	112		134		161	182
	Starting method			Wye-delta									
Compressor 2	Maximum running current		A	-				112	134		161	182	
Power supply	Phase			3									
	Frequency		Hz	50									
	Voltage		V	400									
	Voltage range	Min.	%	-10									
		Max.	%	10									
Unit	Maximum starting current		A	288				378	395		417	434	
	Nominal running current (RLA)	Cooling	A	79	89	103	124	157	167	175	188	201	238
	Maximum running current		A	112	134	161	182	224	246	268	295	343	364
	Max unit current for wires sizing		A	123	147	177	200	246	271	295	325	377	400

Notes

(1) Cooling: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; entering condenser water temp. 30ºC; leaving condenser water temp. 35ºC; full load operation.

(2) Heating: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; entering condenser water temp. 40ºC; leaving condenser water temp. 45ºC; unit at full load operation

(3) Sound level data are measured at entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; entering condenser water temp. 30ºC; leaving condenser water temp. 35ºC; full load operation; standard: ISO3744

(4) Allowed voltage tolerance ± 10%. Voltage unbalance between phases must be within ± 3%.

(5) Maximum starting current: starting current of biggest compressor + current of the other compressor at 75 % of maximum load

(6) Nominal current in cooling mode: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; entering condenser water temp. 30ºC; leaving condenser water temp. 35ºC; compressors.

(7) Maximum running current is based on max compressor absorbed current in its envelope

(8) Maximum unit current for wires sizing is based on minimum allowed voltage.

(9) Maximum current for wires sizing: (compressors full load ampere + fans current) x 1.1

5 Sound Data

5 - 1 Sound Level Data

Noise Level

EWWD~G-SS	EWWD~G-XS	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
170	**190**	58.0	58.0	63.5	68.5	63.0	64.0	53.0	49.5	**69.7**	**87.7**
210	**230**	58.0	58.0	63.5	68.5	63.0	64.0	53.0	49.5	**69.7**	**87.7**
260	**280**	58.0	58.0	63.5	68.5	63.0	64.0	53.0	49.5	**69.7**	**87.7**
300	**320**	58.0	58.0	63.5	68.5	63.0	64.0	53.0	49.5	**69.7**	**87.7**
320	**380**	60.0	60.0	65.5	70.5	65.0	66.0	55.0	51.5	**71.7**	**90.2**
380	**400**	60.0	60.0	65.5	70.5	65.0	66.0	55.0	51.5	**71.7**	**90.2**
420	**460**	60.0	60.0	65.5	70.5	65.0	66.0	55.0	51.5	**71.7**	**90.2**
460	**500**	60.0	60.0	65.5	70.5	65.0	66.0	55.0	51.5	**71.7**	**90.2**
500	**550**	60.0	60.0	65.5	70.5	65.0	66.0	55.0	51.5	**71.7**	**90.2**
600	**650**	60.0	60.0	65.5	70.5	65.0	66.0	55.0	51.5	**71.7**	**90.2**

NOTES

Note: The values are according to ISO 3744 and are referred to: evaporator 12/7° C, condenser 30/35° C, full load operation

EWWD~G-SS +OPLN	EWWD~G-XS +OPLN	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
170	**190**	55.9	55.2	59.6	63.9	57.7	58.5	47.7	44.2	**64.7**	**82.7**
210	**230**	55.9	55.2	59.6	63.9	57.7	58.5	47.7	44.2	**64.7**	**82.7**
260	**280**	55.9	55.2	59.6	63.9	57.7	58.5	47.7	44.2	**64.7**	**82.7**
300	**320**	55.9	55.2	59.6	63.9	57.7	58.5	47.7	44.2	**64.7**	**82.7**
320	**380**	57.9	57.2	61.6	65.9	59.7	60.5	49.7	46.2	**66.7**	**85.2**
380	**400**	57.9	57.2	61.6	65.9	59.7	60.5	49.7	46.2	**66.7**	**85.2**
420	**460**	57.9	57.2	61.6	65.9	59.7	60.5	49.7	46.2	**66.7**	**85.2**
460	**500**	57.9	57.2	61.6	65.9	59.7	60.5	49.7	46.2	**66.7**	**85.2**
500	**550**	57.9	57.2	61.6	65.9	59.7	60.5	49.7	46.2	**66.7**	**85.2**
600	**650**	57.9	57.2	61.6	65.9	59.7	60.5	49.7	46.2	**66.7**	**85.2**

NOTES

Note: The values are according to ISO 3744 and are referred to: evaporator 12/7° C, condenser 30/35° C, full load operation

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5 Sound Data

5 - 1 Sound Level Data

Sound pressure reduction values for different distances

EWWD~G-SS	EWWD~G-XS	Distance					
		1m	5m	10m	15m	20m	25m
170	190	0.0	-8.7	-13.7	-16.9	-19.2	-21.1
210	230	0.0	-8.7	-13.7	-16.9	-19.2	-21.1
260	280	0.0	-8.7	-13.7	-16.9	-19.2	-21.1
300	320	0.0	-8.7	-13.7	-16.9	-19.2	-21.1
320	380	0.0	-8.7	-13.7	-16.9	-19.2	-21.1
380	400	0.0	-8.4	-13.4	-16.5	-18.8	-20.6
420	460	0.0	-8.3	-13.3	-16.4	-18.7	-20.5
460	500	0.0	-8.3	-13.3	-16.4	-18.7	-20.5
500	550	0.0	-8.3	-13.3	-16.4	-18.7	-20.5
600	650	0.0	-8.3	-13.3	-16.4	-18.7	-20.5

NOTES

The values are dB(A) (pressure level).

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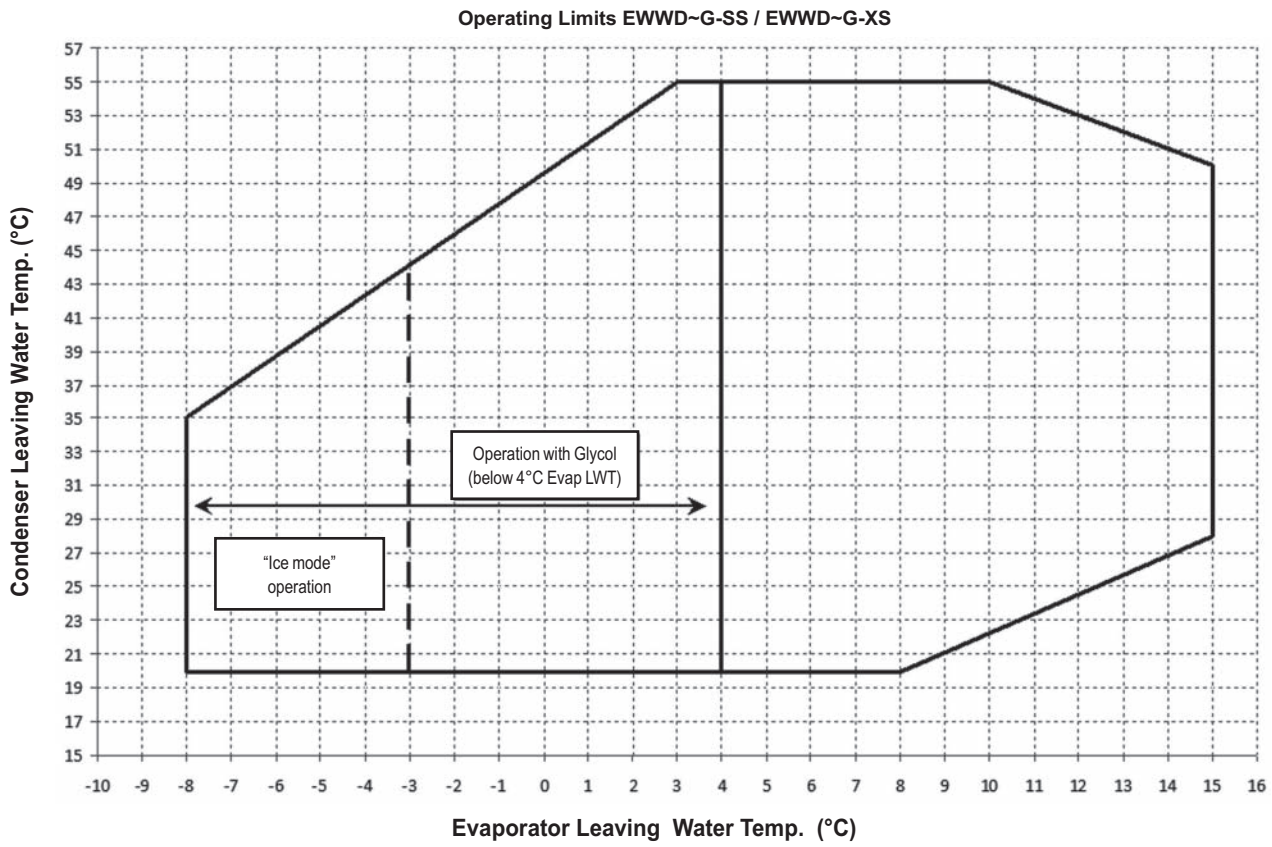
6 Operation Range

6 - 1 Operation Range

EWWD~G-SS / XS



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6 Operation Range

6 - 1 Operation Range

Table 1 - Evaporator minimum and maximum water Δt

Max evaporator water Δt	°C	8
Min evaporator water Δt	°C	4
Min condenser water Δt (1 pass, 2 passes, Δt 4÷8°C)	°C	4
Max condenser water Δt (1 pass, 2 passes, Δt 4÷8°C)	°C	8

Table 2 - Evaporator fouling factors

Fouling factors m² °C / kW	Cooling capacity correction factor	Power input correction factor	EER correction factor
0.0176	1.000	1.000	1.000
0.0440	0.978	0.986	0.992
0.0880	0.957	0.974	0.983
0.1320	0.938	0.962	0.975

Table 3 - Condenser fouling factors

Fouling factors m² °C / kW	Cooling capacity correction factor	Power input correction factor	EER correction factor
0.0176	1.000	1.000	1.000
0.0440	0.978	0.986	0.992
0.0880	0.957	0.974	0.983
0.1320	0.938	0.962	0.975

Table 4.1 - Minimum glycol percentage for low water temperature

Evaporator Leaving Water Temperature (°C)	2	0	-2	-4	-6	-8
Ethylene glycol (%)	10	20	20	20	30	30
Propylene glycol (%)	10	20	20	30	30	30

Note: Minimum glycol percentage to be used with evaporator leaving water temperature below 4°C to prevent freezing of water circuit.

Table 4.2 Minimum glycol percentage for low air ambient temperature

Air Ambient Temperature (°C) (2)	-3	-8	-15	-23	-35
Ethylene glycol (%) (1)	10%	20%	30%	40%	50%
Air Ambient Temperature (°C) (2)	-3	-7	-12	-20	-32
Propylene glycol (%) (1)	10%	20%	30%	40%	50%

Note (1): Minimum glycol percentage to prevent freezing of water circuit at indicated air ambient temperature.

Note (2): Air ambient temperature do exceed the operating limits of the unit, as protection of water circuit may be needed in winter season at non-working conditions.

Table 5 - Correction factors for low evaporator leaving water temperature

Evaporator Leaving Water Temperature (°C)	2	0	-2	-4	-6	-8
Cooling Capacity	0.842	0.785	0.725	0.670	0.613	0.562
Compressor Power Input	0.950	0.940	0.920	0.890	0.870	0.840

Note: Correction factors have to be applied at working conditions: evaporator leaving water temperature 7°C.

Table 6 - Correction factors for water and glycol mixture

	Ethylene Glycol (%)	10%	20%	30%	40%	50%
Ethylene Glycol	Cooling Capacity	0.991	0.982	0.972	0.961	0.946
	Compressor Power Input	0.996	0.992	0.986	0.976	0.966
	Flow Rate (Δt)	1.013	1.04	1.074	1.121	1.178
	Evaporator Pressure Drop	1.070	1.129	1.181	1.263	1.308
Propylene Glycol	Cooling Capacity	0.985	0.964	0.932	0.889	0.846
	Compressor Power Input	0.993	0.983	0.969	0.948	0.929
	Flow Rate (Δt)	1.017	1.032	1.056	1.092	1.139
	Evaporator Pressure Drop	1.120	1.272	1.496	1.792	2.128

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6 Operation Range

6 - 1 Operation Range

How to use the Correction factors proposed in the previous tables

A) Mixture Water and Glycol --- Evaporator leaving water temperature > 4°C

- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.2 and 6)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporator Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size:	**EWWD170G-SS**
Mixture:	Water
Working condition:	ELWT 12/7°C – CLWT30/35°C
- Cooling capacity:	166 kW
- Power input:	42 kW
- Flow rate (Δt 5°C):	7.91 l/s
- Evaporator pressure drop:	48 kPa
Mixture:	Water + Ethylene Glycol 30% (for a winter air temperature up to -15°C)
Working condition:	ELWT 12/7°C – CLWT 30/35°C
- Cooling capacity:	166 x 0.972 = 161 kW
- Power input:	42 x 0.986 = 41.4 kW
- Flow rate (Δt 5°C):	7.69 (referred to 161 kW) x 1.074 = 8.25 l/s
- Evaporator pressure drop:	52 (referred to 8.25 l/s) x 1.181 =61 kPa

B) Mixture Water and Glycol --- Evaporator leaving water temperature < 4°C

- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.1 and 4.2 and table 6)
- depending from the evaporator leaving water temperature (see table 5)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 5 and Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporator Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size:	**EWWD170G-SS**
Mixture:	Water
Standard working condition	ELWT 12/7°C – CLWT 35/40°C
- Cooling capacity:	158 kW
- Power input:	47 kW
- Flow rate (Δt 5°C):	7.57 l/s
- Evaporator pressure drop:	44
Mixture:	Water + Glycol 30% (for a low evaporator leaving temperature of -1/-6°C)
Working condition:	ELWT 0/-5°C – CLWT 35/40°C
- Cooling capacity:	158 x 0.670 x 0.972 = 103 kW
- Power input:	47 x 0.890 x 0.986 = 41.2 kW
- Flow rate (Δt 5°C):	4.92 l/s (referred to103 kW) x 1.074 = 5.29 l/s
- Evaporator pressure drop:	23 kPa (referred to 5.29 l/s) x 1.181 = 27kPa

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6 Operation Range

6 - 1 Operation Range

Water charge, flow and quality

Items (1) (5)			Cooling Water			Cooled Water		Heated water (2)				Tendency if out of criteria
			Circulating System		Once Flow			Low temperature		High temperature		
			Circulating water	Supply water (4)	Flowing water	Circulating water [Below 20°C]	Supply water (4)	Circulating water [20°C ~ 60°C]	Supply water (4)	Circulating water [60°C ~ 80°C]	Supply water (4)	
Items to be controlled:	pH	at 25°C	6.5 ~ 8.2	6.0 ~ 8.0	6.0 ~ 8.0	6.0 ~ 8.0	6.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	Corrosion + Scale
	Electrical conductivity	[mS/m] at 25°C	Below 80	Below 30	Below 40	Below 40	Below 30	Below 30	Below 30	Below 30	Below 30	Corrosion + Scale
		(µS/cm) at 25°C	(Below 800)	(Below 300)	(Below 400)	(Below 400)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	Corrosion + Scale
	Chloride ion	[mgCl^{2}-/l]	Below 200	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	Sulfate ion	[mgSO^{2}-4/l]	Below 200	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	M-alkalinity (pH4.8)	[mg$CaCO_3$/l]	Below 100	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Total hardness	[mg$CaCO_3$/l]	Below 200	Below 70	Below 70	Below 70	Below 70	Below 70	Below 70	Below 70	Below 70	Scale
	Calcium harness	[mg$CaCO_3$/l]	Below 150	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Silca ion	[mgSiO_2/l]	Below 50	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Scale
Items to be referred to	Iron	[mgFe/l]	Below 1.0	Below 0.3	Below 1.0	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Corrosion + Scale
	Copper	[mgCu/l]	Below 0.3	Below 0.1	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 0.1	Below 1.0	Below 0.1	Corrosion
	Sulfite ion	[mgS^{2}-/l]	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Corrosion
	Ammonium ion	[mg$NH+_4$/l]	Below 1.0	Below 0.1	Below 1.0	Below 1.0	Below 0.1	Below 0.3	Below 0.1	Below 0.1	Below 0.1	Corrosion
	Remaining chloride	[mgCL/l]	Below 0.3	Below 0.3	Below 0.3	Below 0.3	Below 0.3	Below 0.25	Below 0.3	Below 0.1	Below 0.3	Corrosion
	Free carbide	[mgCO_2/l]	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 0.4	Below 4.0	Below 0.4	Below 4.0	Corrosion
	Stability index		6.0 ~ 7.0	---	---	---	---	---	---	---	---	Corrosion + Scale

NOTES

1. Names, definitions and units are according to JIS K 0101. Units and figures between brackets are old units published as reference only.
2. In case of using heated water (more than 40°C), corrosion is generally noticeable.
   Especially when the iron materials is in direct contact with water without any protection shields, it is desireable to give the valid measure for corrosion. E.g. chemical measure.
3. In the cooling water using hermetic cooling tower, close circuit water is according to heated water standard, and scattered water is according to cooling water standard.
4. Supply water is considered drink water, industrial water and ground water except for genuine water, neutral water and soft water.
5. The above mentioned items are representable items in corrosion and scale cases.

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6 Operation Range

6 - 1 Operation Range

Water content in cooling circuits

The cooled water distribution circuits should have minimum water content to avoid excessive compressors start and stop.
In fact, each time the compressor starts up, an excessive quantity of oil goes from the compressor sump and simultaneously there is a rise in the temperature of the compressor motor's stator due to the inrush current during the start-up.
To prevent damage to the compressors, it has been envisaged the application of a device to limit frequent stops and restarts.

During the span of one hour there will be no more than 6 starts of the compressor. The plant side should therefore ensure that the overall water content allows a more constant functioning of the unit and consequently greater environmental comfort.
The minimum water content per unit should be calculated using this simplified formula:

For 1 compressor unit
M (liters) = (0.94 x ΔT(°C) + 5.87) x P(kW)

For 2 compressors unit
M (liters) = (0.1595 x ΔT(°C) + 3.0825) x P(kW)

For 3 compressors unit
M (liters) = (0.0443 x ΔT(°C) + 1.6202) x P(kW)

where:

M	minimum water content per unit expressed in litres
P	Cooling Capacity of the unit expressed in kW
ΔT	evaporator entering / leaving water temperature difference expressed in °C

This formula is valid for:
- standard microprocessor parameters

For more accurate determination of quantity of water, it is advisable to contact the designer of the plant.

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7 Capacity Tables

7 - 1 Cooling Capacity Tables

EWWD170~320G-SS

Size	ELWT (°C)	Entering Condenser Water Temperature (°C)											
		15			20			25			30		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
170	4	169	28.3	198	163	32.4	196	158	36.5	194	151	41.2	192
	5	175	28.5	203	168	32.6	201	162	36.8	199	156	41.5	197
	6	180	28.7	209	173	32.8	206	167	37.0	204	161	41.8	202
	7	185	28.8	214	179	33.0	212	172	37.3	210	166	42.1	208
	8	191	29.0	220	184	33.3	217	178	37.6	215	171	42.3	213
	9				189	33.5	223	183	37.8	220	176	42.6	218
	10				195	33.7	229	188	38.3	226	180	43.2	224
	11				201	33.9	234	193	38.6	232	186	43.6	229
	12							199	38.9	238	191	43.9	235
	13							204	39.2	244	197	44.2	241
	14							210	39.5	250	202	44.5	247
	15							216	39.7	256	208	44.9	253
210	4	199	34.0	233	192	38.8	231	192	44.0	236	184	49.6	233
	5	205	34.2	239	198	39.0	237	197	44.3	242	189	50.0	239
	6	211	34.4	245	204	39.3	243	203	44.7	248	195	50.4	246
	7	217	34.6	252	210	39.6	249	210	45.0	255	201	50.7	252
	8	223	34.9	258	216	39.9	256	216	45.3	261	207	51.1	258
	9				222	40.1	262	222	45.6	268	213	51.5	265
	10				228	40.4	269	227	45.9	273	218	51.7	270
	11				235	40.7	275	233	46.2	279	224	52.1	276
	12							239	46.5	286	230	52.5	283
	13							246	46.9	293	237	52.9	290
	14							253	47.2	300	243	53.3	297
	15							260	47.5	307	250	53.6	304
260	4	253	43.8	297	243	49.8	293	241	56.3	297	230	63.3	294
	5	261	44.2	305	251	50.2	301	248	56.8	305	238	63.8	302
	6	268	44.5	313	258	50.7	309	256	57.3	313	245	64.4	310
	7	276	44.9	321	266	51.1	317	264	57.8	321	253	64.9	318
	8	284	45.3	330	274	51.6	326	272	58.3	330	260	65.5	326
	9				282	52.0	334	280	58.8	338	268	66.1	334
	10				290	52.5	343	288	59.3	347	276	66.6	343
	11				299	52.9	351	296	59.9	356	284	67.2	351
	12							304	60.4	365	292	67.8	360
	13							313	60.9	374	301	68.5	369
	14							322	61.5	383	309	69.1	378
	15							331	62.1	393	318	69.7	387
300	4	278	56.7	334	267	61.2	329	267	66.3	334	256	72.1	328
	5	286	57.8	344	275	62.3	338	276	67.5	343	263	73.2	337
	6	294	58.9	353	284	63.4	347	285	68.6	353	272	74.3	346
	7	303	60.1	363	292	64.5	356	294	69.8	363	280	75.4	356
	8	311	61.2	372	300	65.6	366	305	71.3	376	289	76.6	366
	9				309	66.8	376	314	72.6	387	301	78.2	379
	10				317	68.0	385	318	73.1	391	305	78.8	384
	11				326	69.3	395	323	74.3	398	313	80.0	393
	12							332	75.5	408	319	81.3	400
	13							341	76.8	418	328	82.5	410
	14							351	78.1	429	337	83.8	421
	15							360	79.5	439	346	85.2	431
320	4	333	56.4	389	321	64.5	385	318	73.2	391	305	82.5	387
	5	343	56.8	400	331	64.9	396	328	73.7	401	314	83.1	397
	6	353	57.1	410	341	65.4	406	338	74.2	412	324	83.7	408
	7	363	57.4	421	351	65.8	417	348	74.7	423	334	84.3	418
	8	374	57.8	432	361	66.3	428	358	75.3	434	344	84.9	429
	9				372	66.7	438	369	75.8	445	354	85.5	440
	10				382	67.1	450	380	76.3	456	365	86.1	451
	11				393	67.6	461	390	76.9	467	375	86.7	462
	12							402	77.4	479	386	87.4	474
	13							413	78.0	491	397	88.0	485
	14							424	78.5	503	408	88.6	497
	15							436	79.1	515	420	89.3	509

NOTES

Cc (cooling capacity) - Pi (unit power input) – Hc (heating capacity) - ELWT (evaporator leaving water temperature – Δt 5°C) - Condenser Water temperature Δt 5°C
Data are referred to 0.0176 m² °C/kW evaporator fouling factor
Data are referred to 0.0440 m² °C/kW condenser fouling factor

SRC_1-2-3-4_Rev.00_1_(1-2)

7 Capacity Tables

7 - 1 Cooling Capacity Tables

EWWD170~320G-SS

Size	ELWT (°C)	Entering Condenser Water Temperature (°C)											
		35			40			45			50		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
170	4	144	46.2	191	137	51.7	189	130	57.6	188	121	64.3	186
	5	149	46.5	195	142	52.0	194	134	58.0	192	126	64.7	190
	6	154	46.8	200	146	52.4	199	139	58.3	197	130	65.0	195
	7	158	47.2	206	151	52.7	204	143	58.7	202	134	65.4	200
	8	163	47.5	211	156	53.0	209	148	59.0	207	139	65.8	205
	9	168	47.8	216	161	53.4	214	152	59.4	212	143	66.2	210
	10	173	48.5	221	165	54.1	219	157	60.1	217			
	11	178	48.8	227	170	54.5	224	161	60.5	222			
	12	183	49.2	232	175	54.9	230	166	60.9	227			
	13	188	49.6	238	180	55.3	235	171	61.4	233			
	14	194	49.9	244	185	55.7	241	177	61.8	238			
	15	199	50.3	250	191	56.1	247	182	62.3	244			
210	4	176	55.7	231	167	62.3	229	158	69.4	227	143	77.0	220
	5	181	56.1	237	172	62.7	235	163	69.8	233	148	77.4	225
	6	187	56.5	243	178	63.1	241	168	70.2	239	153	77.8	230
	7	193	56.9	249	183	63.5	247	174	70.6	244	158	78.2	236
	8	198	57.3	256	189	63.9	253	179	71.1	250	163	78.6	241
	9	204	57.7	262	195	64.4	259	185	71.5	256	168	79.1	247
	10	209	58.0	267	199	64.7	264	189	71.9	261			
	11	215	58.4	273	205	65.2	270	195	72.4	267			
	12	221	58.8	280	211	65.6	277	201	72.8	274			
	13	227	59.3	287	217	66.1	283	207	73.3	280			
	14	234	59.7	293	223	66.5	290	213	73.8	286			
	15	240	60.1	300	230	67.0	297	219	74.3	293			
260	4	220	70.8	291	209	79.0	288	197	87.8	284	179	97.2	276
	5	227	71.4	298	215	79.6	295	203	88.4	292	185	97.8	282
	6	234	72.0	306	222	80.2	303	210	89.0	299	191	98.4	289
	7	241	72.6	314	229	80.8	310	217	89.6	306	197	99.1	296
	8	249	73.2	322	237	81.4	318	224	90.3	314	204	99.7	303
	9	256	73.8	330	244	82.1	326	231	91.0	322	210	100	311
	10	264	74.4	338	251	82.8	334	238	91.7	329			
	11	272	75.1	347	259	83.4	342	245	92.4	337			
	12	280	75.7	355	266	84.1	351	252	93.1	345			
	13	288	76.4	364	274	84.9	359	260	93.8	354			
	14	296	77.1	373	282	85.6	368	267	94.6	362			
	15	304	77.8	382	290	86.3	376	275	95.4	370			
300	4	244	78.7	322	231	86.1	317	218	94.4	312	197	104	300
	5	251	79.7	331	238	87.1	325	225	95.3	320	203	105	308
	6	259	80.8	340	246	88.1	334	232	96.3	328	210	106	315
	7	267	81.9	349	254	89.2	343	240	97.4	337	217	107	323
	8	275	83.0	358	261	90.3	352	247	98.5	346	224	108	331
	9	284	84.2	368	269	91.4	361	255	100	354	231	109	339
	10	291	85.3	377	277	92.6	370	263	101	363			
	11	300	86.5	386	285	93.8	379	271	102	372			
	12	308	87.7	396	294	95.0	389	279	103	382			
	13	317	89.0	406	302	96.2	398	287	104	391			
	14	326	90.3	416	310	97.5	408	295	106	400			
	15	334	91.6	426	319	98.8	418	303	107	410			
320	4	291	92.6	384	277	104	380	262	115	377	240	128	368
	5	300	93.2	394	286	104	390	271	116	387	248	129	377
	6	310	93.9	404	295	105	400	280	117	397	256	130	386
	7	320	94.5	414	305	106	410	289	118	406	265	131	395
	8	329	95.2	425	314	106	420	298	118	416	273	131	405
	9	339	95.9	435	324	107	431	308	119	427	282	132	414
	10	349	96.5	446	334	108	441	317	120	437			
	11	360	97.2	457	344	109	452	327	121	447			
	12	370	97.9	468	354	109	463	337	121	458			
	13	381	98.7	480	364	110	474	347	122	469			
	14	392	99.4	491	375	111	486	357	123	480			
	15	403	100	503	386	112	497	368	124	492			

NOTES

Cc (cooling capacity) - Pi (unit power input) – Hc (heating capacity) - ELWT (evaporator leaving water temperature – Δt 5°C) - Condenser Water temperature Δt 5°C
Data are referred to 0.0176 m² °C/kW evaporator fouling factor
Data are referred to 0.0440 m² °C/kW condenser fouling factor

SRC_1-2-3-4_Rev.00_1_(2-2)

7 Capacity Tables

7 - 1 Cooling Capacity Tables

EWWD380~600G-SS

Size	ELWT (°C)	Entering Condenser Water Temperature (°C)											
		15			20			25			30		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
380	4	371	62.4	433	358	71.3	429	354	80.8	435	340	91.1	431
	5	382	62.8	445	369	71.8	441	365	81.4	447	350	91.8	442
	6	394	63.2	457	380	72.3	452	377	82.0	459	361	92.4	454
	7	405	63.6	469	391	72.8	464	388	82.6	470	372	93.1	465
	8	417	64.0	481	403	73.3	476	399	83.2	483	384	93.8	477
	9				415	73.8	488	411	83.8	495	395	94.5	490
	10				427	74.3	501	423	84.4	495	407	95.2	490
	11				439	74.8	513	435	85.0	508	419	95.9	502
	12							448	85.6	520	431	96.6	515
	13							460	86.2	533	443	97.3	527
	14							473	86.8	546	455	98.0	540
	15							486	87.5	560	468	98.8	553
420	4	401	68.1	469	387	77.7	464	383	88.1	471	368	99.3	467
	5	413	68.5	482	399	78.2	477	395	88.7	484	379	100	479
	6	425	69.0	494	410	78.8	489	407	89.3	496	391	101	491
	7	438	69.4	507	423	79.3	502	419	90.0	509	403	101	504
	8	451	69.8	520	435	79.9	515	432	90.6	522	415	102	517
	9				448	80.4	528	444	91.3	535	427	103	530
	10				460	81.0	541	457	91.9	549	439	104	543
	11				473	81.5	555	470	92.6	563	452	104	556
	12							483	93.3	576	465	105	570
	13							497	93.9	590	478	106	584
	14							510	94.6	605	491	107	598
	15							524	95.3	619	504	108	612
460	4	448	77.5	525	431	88.3	520	427	99.9	527	409	113	522
	5	461	78.1	539	444	88.9	533	440	101	541	422	113	535
	6	475	78.6	553	458	89.6	547	453	102	555	435	114	549
	7	488	79.2	568	471	90.3	561	467	102	569	448	115	563
	8	502	79.8	582	485	91.0	576	481	103	584	462	116	578
	9				499	91.7	591	495	104	599	475	117	592
	10				513	92.4	605	509	105	614	489	118	607
	11				527	93.2	621	524	106	629	503	119	622
	12							538	106	645	518	120	637
	13							553	107	661	532	121	653
	14							568	108	676	547	122	669
	15							584	109	693	562	123	684
500	4	494	87.0	581	475	98.9	574	471	112	582	451	126	577
	5	508	87.7	596	490	99.8	590	485	113	598	465	127	592
	6	523	88.4	612	504	101	605	500	114	613	479	128	607
	7	538	89.1	627	519	102	621	515	115	629	494	129	623
	8	554	89.8	644	534	102	637	530	116	645	508	130	639
	9				550	103	653	545	117	662	523	131	655
	10				565	104	669	561	118	679	539	132	671
	11				581	105	686	577	119	695	554	133	688
	12							593	120	713	570	135	704
	13							609	121	730	586	136	722
	14							626	122	748	602	137	739
	15							643	123	766	618	138	757
600	4	541	112	652	521	121	642	501	131	632	480	143	623
	5	556	114	670	537	123	659	516	133	649	495	145	639
	6	572	116	688	552	125	677	531	135	666	509	147	656
	7	588	118	706	568	127	695	547	137	684	524	149	673
	8	605	120	725	584	129	713	562	139	702	540	151	691
	9				600	131	732	578	142	720	555	153	708
	10				617	134	751	594	144	738	571	155	726
	11				634	136	770	611	146	757	587	158	744
	12							627	148	776	603	160	763
	13							644	151	795	619	162	782
	14							661	153	814	636	165	801
	15							678	156	834	652	167	820

NOTES

Cc (cooling capacity) - Pi (unit power input) – Hc (heating capacity) - ELWT (evaporator leaving water temperature – Δt 5°C) - Condenser Water temperature Δt 5°C
Data are referred to 0.0176 m^2 °C/kW evaporator fouling factor
Data are referred to 0.0440 m^2 °C/kW condenser fouling factor

SRC_1-2-3-4_Rev.00_2_(1-2)

7 Capacity Tables

7 - 1 Cooling Capacity Tables

EWWD380~600G-SS

Size	ELWT (°C)	Entering Condenser Water Temperature (°C)											
		35			40			45			50		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
380	4	324	102	426	308	114	423	292	127	419	266	141	407
	5	335	103	438	318	115	433	301	128	429	275	142	417
	6	345	104	449	329	116	445	311	129	440	284	143	427
	7	356	104	461	339	117	456	321	130	451	294	144	438
	8	367	105	472	350	117	467	332	131	462	304	145	448
	9	378	106	484	361	118	479	342	131	474	313	146	459
	10	390	107	485	372	119	480	353	132	475			
	11	401	108	497	383	120	492	364	133	486			
	12	413	108	509	394	121	503	375	134	498			
	13	425	109	522	406	122	516	386	135	510			
	14	437	110	534	418	123	528	397	136	522			
	15	449	111	547	430	123	540	409	137	534			
420	4	351	112	463	334	125	459	316	139	454	287	154	442
	5	362	112	475	345	125	470	326	140	466	297	155	452
	6	374	113	487	356	126	482	337	140	477	307	156	463
	7	385	114	499	367	127	494	348	141	489	318	157	474
	8	397	115	512	378	128	506	359	142	501	328	158	485
	9	409	115	524	390	129	519	370	143	513	338	158	497
	10	421	116	537	402	130	531	381	144	525			
	11	433	117	550	414	131	544	393	145	538			
	12	446	118	564	426	132	557	405	146	551			
	13	458	119	577	438	132	570	417	147	563			
	14	471	120	591	451	133	584	429	148	577			
	15	484	121	605	463	134	597	441	149	590			
460	4	391	126	517	371	141	512	351	157	508	319	174	493
	5	403	127	530	383	142	525	362	158	520	330	175	505
	6	416	128	544	396	143	538	374	159	533	341	176	517
	7	429	129	558	408	144	552	386	160	546	352	177	529
	8	442	130	572	421	145	566	398	161	559	364	178	542
	9	455	131	586	433	146	579	411	162	573	375	179	554
	10	468	132	600	447	147	594	423	163	586			
	11	482	133	615	460	148	608	436	164	600			
	12	496	134	630	473	149	622	449	165	614			
	13	510	135	645	487	150	637	462	167	629			
	14	524	136	661	501	152	652	476	168	644			
	15	539	137	676	515	153	667	489	169	658			
500	4	430	141	571	409	157	566	386	175	560	351	194	544
	5	444	142	586	422	158	580	398	176	574	362	195	557
	6	458	143	601	435	160	595	411	177	588	374	196	571
	7	472	144	616	449	161	610	424	178	603	387	197	584
	8	486	145	632	463	162	625	438	180	617	399	199	598
	9	501	147	647	477	163	640	451	181	632	412	200	612
	10	516	148	663	491	165	656	465	182	647			
	11	530	149	680	506	166	671	479	184	663			
	12	546	150	696	520	167	687	493	185	678			
	13	561	152	713	535	169	704	507	187	694			
	14	577	153	730	550	170	720	522	188	710			
	15	593	154	747	566	171	737	537	189	726			
600	4	458	156	614	435	171	606	411	188	598	385	206	591
	5	472	158	630	449	173	621	424	190	613	398	208	606
	6	487	160	647	463	175	637	437	191	629	411	210	621
	7	501	162	663	477	177	653	451	193	644	424	212	636
	8	516	164	680	491	179	670	465	195	660	438	214	651
	9	531	166	697	506	181	687	479	198	676	451	216	667
	10	546	169	715	520	183	704	493	200	693			
	11	562	171	732	535	186	721	508	202	710			
	12	577	173	750	550	188	738	522	204	727			
	13	593	176	769	566	190	756	537	207	744			
	14	609	178	787	581	193	774	552	209	761			
	15	625	181	806	597	195	792	568	211	779			

NOTES

Cc (cooling capacity) - Pi (unit power input) – Hc (heating capacity) - ELWT (evaporator leaving water temperature – Δt 5°C) - Condenser Water temperature Δt 5°C
Data are referred to 0.0176 m² °C/kW evaporator fouling factor
Data are referred to 0.0440 m² °C/kW condenser fouling factor

SRC_1-2-3-4_Rev.00_2_(2-2)

7 Capacity Tables

7 - 1 Cooling Capacity Tables

EWWD190~380G-XS

Size	ELWT (°C)	Entering Condenser Water Temperature (°C)											
		15			20			25			30		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
190	4	185	26.2	211	178	30.3	209	176	34.6	211	169	39.1	208
	5	191	26.2	217	184	30.4	215	182	34.7	217	175	39.3	214
	6	197	26.3	224	190	30.5	221	188	34.9	223	181	39.5	220
	7	204	26.3	230	196	30.6	227	195	35.0	230	186	39.7	226
	8	210	26.4	237	203	30.7	233	201	35.2	236	193	39.9	233
	9				209	30.8	240	207	35.3	243	199	40.1	239
	10				216	30.9	247	214	35.5	249	205	40.3	246
	11				222	30.9	253	221	35.6	256	212	40.5	252
	12							227	35.8	263	218	40.7	259
	13							234	35.9	270	225	40.9	266
	14							242	36.0	278	232	41.1	273
	15							249	36.2	285	239	41.3	281
230	4	220	31.9	252	212	36.7	248	211	41.9	253	203	47.3	250
	5	227	32.0	259	218	36.8	255	218	42.1	261	209	47.6	257
	6	234	32.1	266	225	37.0	262	226	42.3	268	216	47.9	264
	7	241	32.2	274	233	37.2	270	233	42.5	275	223	48.1	271
	8	249	32.3	281	240	37.3	277	240	42.7	283	231	48.4	279
	9				247	37.4	285	248	42.9	291	238	48.7	287
	10				255	37.6	292	253	43.0	296	243	48.8	292
	11				263	37.7	300	260	43.2	304	250	49.1	299
	12							268	43.4	312	258	49.3	307
	13							276	43.6	320	266	49.6	315
	14							284	43.8	328	273	49.9	323
	15							293	44.0	337	281	50.1	332
280	4	273	39.4	312	263	45.3	308	262	51.6	313	251	58.3	309
	5	282	39.6	321	271	45.5	317	270	51.9	322	259	58.6	318
	6	291	39.7	330	280	45.7	326	279	52.2	331	268	59.0	327
	7	300	39.9	340	289	45.9	335	288	52.5	341	277	59.3	336
	8	309	40.0	349	298	46.2	344	298	52.8	350	285	59.7	345
	9				307	46.4	354	307	53.0	360	295	60.1	355
	10				317	46.6	363	314	53.3	367	302	60.3	362
	11				326	46.8	373	324	53.5	377	311	60.7	372
	12							334	53.8	387	321	61.0	382
	13							344	54.1	398	330	61.4	392
	14							354	54.4	408	340	61.7	402
	15							364	54.6	419	350	62.1	412
320	4	302	54.8	357	291	58.7	350	291	63.1	354	279	68.3	347
	5	311	55.9	367	300	59.7	360	300	64.2	365	288	69.3	357
	6	321	57.1	378	310	60.8	371	310	65.2	375	297	70.3	368
	7	331	58.2	389	319	61.9	381	320	66.3	386	307	71.4	378
	8	341	59.4	400	329	63.1	392	330	67.4	397	316	72.4	389
	9				339	64.3	403	340	68.6	408	326	73.5	400
	10				349	65.5	415	347	69.8	416	333	74.7	408
	11				360	66.8	426	357	71.0	428	343	75.9	419
	12							367	72.2	440	353	77.1	430
	13							378	73.5	452	364	78.3	442
	14							389	74.8	464	374	79.6	454
	15							400	76.2	476	385	80.9	466
380	4	363	52.3	416	350	60.4	411	347	68.9	416	332	78.1	410
	5	375	52.4	428	362	60.6	422	358	69.3	427	343	78.5	422
	6	387	52.5	440	373	60.8	434	370	69.6	439	355	78.9	434
	7	399	52.6	452	385	61.0	446	382	69.9	452	366	79.3	446
	8	412	52.7	465	397	61.2	459	394	70.2	464	378	79.7	458
	9				410	61.4	471	406	70.5	477	390	80.0	470
	10				423	61.6	484	419	70.8	490	403	80.4	483
	11				435	61.8	497	432	71.1	503	415	80.8	496
	12							445	71.3	517	428	81.2	509
	13							459	71.6	530	441	81.6	523
	14							472	71.9	544	455	82.0	537
	15							486	72.1	559	468	82.3	550

NOTES

Cc (cooling capacity) - Pi (unit power input) – Hc (heating capacity) - ELWT (evaporator leaving water temperature – Δt 5°C) - Condenser Water temperature Δt 5°C
Data are referred to 0.0176 m² °C/kW evaporator fouling factor
Data are referred to 0.0440 m² °C/kW condenser fouling factor

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7 Capacity Tables

7 - 1 Cooling Capacity Tables

EWWD190~380G-XS

Size	ELWT (°C)	Entering Condenser Water Temperature (°C)											
		35			40			45			50		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
190	4	161	44.0	205	153	49.3	202	145	55.0	200	132	61.2	194
	5	167	44.3	211	158	49.6	208	150	55.3	205	137	61.4	199
	6	172	44.5	217	164	49.8	214	155	55.5	211	142	61.7	204
	7	178	44.7	223	170	50.1	220	161	55.8	217	147	62.0	209
	8	184	45.0	229	175	50.4	226	166	56.1	222	153	62.3	215
	9	190	45.2	235	181	50.6	232	172	56.4	228	158	62.6	221
	10	196	45.5	242	187	50.9	238	178	56.7	235			
	11	203	45.7	248	193	51.2	245	184	57.0	241			
	12	209	46.0	255	200	51.5	251	190	57.3	247			
	13	216	46.2	262	206	51.8	258	196	57.7	254			
	14	223	46.4	269	213	52.1	265	202	58.0	260			
	15	229	46.7	276	219	52.3	272	209	58.3	267			
230	4	193	53.2	247	184	59.6	243	174	66.5	240	157	73.7	231
	5	200	53.5	253	190	59.9	250	180	66.8	247	163	74.1	237
	6	207	53.8	261	197	60.3	257	186	67.1	253	169	74.4	243
	7	214	54.1	268	203	60.6	264	193	67.5	260	175	74.8	249
	8	221	54.5	275	210	60.9	271	199	67.8	267	181	75.1	256
	9	228	54.8	282	217	61.3	278	206	68.2	274	187	75.5	262
	10	232	55.0	287	222	61.5	283	211	68.5	279			
	11	240	55.3	295	229	61.9	291	217	68.9	286			
	12	247	55.6	303	236	62.2	298	224	69.2	294			
	13	255	55.9	311	243	62.6	306	231	69.6	301			
	14	262	56.2	319	251	62.9	314	239	70.0	309			
	15	270	56.5	327	258	63.3	322	246	70.4	316			
280	4	239	65.5	305	227	73.2	301	215	81.6	296	195	90.5	285
	5	247	65.9	313	235	73.7	309	223	82.0	305	202	91.0	293
	6	256	66.3	322	243	74.1	317	230	82.5	313	209	91.4	300
	7	264	66.7	331	252	74.5	326	238	82.9	321	216	91.9	308
	8	273	67.1	340	260	75.0	335	246	83.4	330	224	92.3	316
	9	282	67.5	349	269	75.4	344	255	83.9	338	231	92.8	324
	10	289	67.8	357	275	75.8	351	261	84.3	346			
	11	298	68.2	366	284	76.3	360	270	84.8	355			
	12	307	68.7	376	293	76.7	370	278	85.3	364			
	13	317	69.1	386	302	77.2	379	287	85.8	373			
	14	326	69.5	396	312	77.7	389	296	86.3	382			
	15	336	69.9	406	321	78.2	399	305	86.9	392			
320	4	266	74.2	340	253	80.9	334	239	88.4	327	216	96.8	313
	5	275	75.2	350	262	81.8	343	247	89.3	337	224	97.6	321
	6	284	76.1	360	270	82.7	353	256	90.2	346	232	98.5	330
	7	293	77.1	370	279	83.7	363	264	91.1	356	240	99.4	339
	8	303	78.2	381	288	84.7	373	273	92.1	365	248	100	348
	9	312	79.3	391	297	85.7	383	282	93.1	375	256	101	357
	10	319	80.4	399	304	86.8	391	288	94.1	383			
	11	328	81.5	410	313	87.9	401	298	95.2	393			
	12	338	82.7	421	323	89.1	412	307	96.3	403			
	13	349	83.9	432	333	90.2	423	316	97.4	414			
	14	359	85.1	444	343	91.4	434	326	98.6	425			
	15	369	86.4	456	353	92.7	446	336	100	436			
380	4	317	87.8	405	302	98.4	400	285	110	395	261	122	383
	5	328	88.3	416	312	98.9	411	296	110	406	271	123	393
	6	339	88.8	428	323	99.4	422	306	111	417	280	123	403
	7	350	89.2	439	334	100	434	317	111	428	290	124	414
	8	362	89.7	451	345	100	445	327	112	439	300	124	425
	9	374	90.2	464	356	101	457	338	113	451	311	125	436
	10	386	90.6	476	368	102	469	350	113	463			
	11	398	91.1	489	380	102	482	361	114	475			
	12	410	91.6	502	392	103	495	373	114	487			
	13	423	92.1	515	404	103	507	385	115	500			
	14	436	92.6	529	417	104	521	397	116	513			
	15	449	93.0	542	430	104	534	410	116	526			

NOTES

Cc (cooling capacity) - Pi (unit power input) – Hc (heating capacity) - ELWT (evaporator leaving water temperature – Δt 5°C) - Condenser Water temperature Δt 5°C
Data are referred to 0.0176 m² °C/kW evaporator fouling factor
Data are referred to 0.0440 m² °C/kW condenser fouling factor

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7 Capacity Tables

7 - 1 Cooling Capacity Tables

EWWD400~650G-XS

Size	ELWT (°C)	Entering Condenser Water Temperature (°C)											
		15			20			25			30		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
400	4	405	57.7	463	390	66.5	457	386	75.9	462	370	85.9	456
	5	419	57.8	476	403	66.8	470	399	76.2	475	382	86.4	469
	6	432	58.0	490	416	67.0	483	412	76.6	489	395	86.8	482
	7	446	58.1	504	430	67.2	497	426	76.9	502	408	87.2	495
	8	460	58.1	518	443	67.5	511	439	77.3	517	422	87.7	509
	9				457	67.7	525	453	77.6	531	435	88.1	523
	10				471	67.9	539	467	77.9	545	449	88.6	537
	11				486	68.1	554	482	78.3	560	463	89.0	552
	12							497	78.6	575	477	89.4	567
	13							511	78.9	590	492	89.8	582
	14							527	79.2	606	507	90.3	597
	15							542	79.5	622	522	90.7	612
460	4	441	63.1	504	424	72.5	497	420	82.7	503	403	93.6	496
	5	455	63.2	518	438	72.8	511	434	83.1	517	416	94.1	510
	6	469	63.4	533	452	73.1	525	448	83.4	531	430	94.5	524
	7	484	63.5	548	467	73.3	540	462	83.8	546	444	95.0	539
	8	499	63.6	563	481	73.6	555	477	84.2	561	458	95.5	553
	9				496	73.8	570	492	84.6	577	473	96.0	569
	10				511	74.1	585	507	84.9	592	487	96.4	584
	11				527	74.3	601	523	85.3	608	502	96.9	599
	12							538	85.6	624	518	97.4	615
	13							554	86.0	640	533	97.8	631
	14							571	86.3	657	549	98.3	647
	15							587	86.6	674	565	98.8	664
500	4	493	69.5	562	474	80.0	554	469	91.2	561	450	103	553
	5	508	69.7	578	490	80.3	570	485	91.6	576	465	104	569
	6	524	69.8	594	505	80.6	586	501	92.1	593	480	104	585
	7	541	70.0	611	521	80.9	602	517	92.5	609	496	105	601
	8	558	70.1	628	538	81.1	619	533	92.9	626	512	105	617
	9				554	81.4	636	550	93.3	643	528	106	634
	10				571	81.6	653	567	93.6	661	545	106	651
	11				589	81.8	670	584	94.0	678	562	107	669
	12							602	94.4	696	579	107	686
	13							620	94.7	715	596	108	704
	14							638	95.1	733	614	108	723
	15							657	95.4	752	632	109	741
550	4	536	75.9	612	517	87.3	604	512	99.6	611	491	113	604
	5	553	76.1	629	533	87.6	621	528	100	628	507	113	620
	6	571	76.2	647	550	88.0	638	545	100	646	524	114	638
	7	588	76.4	665	567	88.2	656	563	101	664	541	114	655
	8	606	76.5	683	585	88.5	673	580	101	682	558	115	673
	9				603	88.8	692	598	102	700	575	115	691
	10				621	89.0	710	617	102	719	593	116	709
	11				640	89.3	729	635	103	738	611	117	728
	12							654	103	757	630	117	747
	13							674	103	777	649	118	766
	14							693	104	797	668	118	786
	15							713	104	817	687	119	806
650	4	592	106	698	571	113	685	571	122	693	548	132	680
	5	610	108	718	589	115	704	590	124	714	566	134	699
	6	629	110	739	608	117	725	610	126	736	584	136	720
	7	648	112	760	626	119	745	630	128	758	604	138	742
	8	667	114	781	645	121	766	651	130	781	624	140	764
	9				664	124	788	672	132	804	644	142	786
	10				684	126	810	680	134	814	654	144	798
	11				704	128	832	700	136	836	674	146	819
	12							720	139	859	693	148	841
	13							741	141	882	714	150	864
	14							762	143	905	734	153	887
	15							783	146	929	755	155	910

NOTES

Cc (cooling capacity) - Pi (unit power input) – Hc (heating capacity) - ELWT (evaporator leaving water temperature – Δt 5°C) - Condenser Water temperature Δt 5°C
Data are referred to 0.0176 m² °C/kW evaporator fouling factor
Data are referred to 0.0440 m² °C/kW condenser fouling factor

SRC_1-2-3-4_Rev.00_4_(1-2)

7 Capacity Tables

7 - 1 Cooling Capacity Tables

EWWD400~650G-XS

Size	ELWT (°C)	Entering Condenser Water Temperature (°C)											
		35			40			45			50		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
400	4	353	96.7	450	336	108	444	318	121	439	290	134	424
	5	365	97.2	463	348	109	456	329	121	451	301	135	436
	6	378	97.7	475	360	109	469	341	122	463	312	136	447
	7	390	98.2	489	372	110	482	353	123	475	323	136	459
	8	403	98.7	502	384	111	495	365	123	488	334	137	471
	9	416	99.3	516	397	111	508	377	124	501	346	137	483
	10	430	99.8	530	410	112	522	389	125	514			
	11	443	100	544	423	112	536	402	125	528			
	12	457	101	558	437	113	550	415	126	541			
	13	471	101	573	451	114	564	429	127	555			
	14	486	102	588	465	114	579	442	127	569			
	15	501	102	603	479	115	594	456	128	584			
460	4	385	105	490	366	118	484	346	132	478	316	146	462
	5	398	106	504	378	119	497	358	132	490	327	147	474
	6	411	106	517	391	119	511	371	133	504	339	148	486
	7	425	107	532	405	120	524	384	134	517	351	148	499
	8	438	108	546	418	120	538	396	134	531	363	149	512
	9	452	108	561	432	121	553	410	135	545	375	150	525
	10	467	109	575	446	122	567	423	136	559			
	11	481	109	591	460	122	582	437	136	573			
	12	496	110	606	474	123	597	451	137	588			
	13	511	110	622	489	124	613	465	138	603			
	14	527	111	638	504	124	628	480	139	618			
	15	543	112	654	519	125	644	495	139	634			
500	4	430	116	546	409	130	539	387	145	533	354	162	515
	5	445	117	562	423	131	554	401	146	547	366	162	529
	6	460	117	577	438	132	569	415	147	562	379	163	542
	7	475	118	593	453	132	585	429	147	577	393	164	556
	8	490	119	609	468	133	600	444	148	592	406	164	571
	9	506	119	625	483	134	616	459	149	607	420	165	585
	10	522	120	642	499	134	633	474	150	623			
	11	539	121	659	514	135	649	489	150	639			
	12	555	121	676	531	136	666	505	151	656			
	13	572	122	694	547	136	683	521	152	673			
	14	590	122	712	564	137	701	537	153	690			
	15	607	123	730	581	138	719	553	154	707			
550	4	470	127	596	447	142	589	424	159	582	387	176	564
	5	485	128	613	463	143	605	439	159	598	401	177	578
	6	501	128	630	478	144	622	454	160	614	415	178	593
	7	518	129	647	494	144	638	469	161	630	430	179	608
	8	535	129	664	510	145	655	485	162	646	444	179	624
	9	552	130	682	527	146	672	501	162	663	459	180	639
	10	569	131	700	544	146	690	517	163	680			
	11	587	131	718	561	147	708	534	164	698			
	12	605	132	737	578	148	726	550	165	715			
	13	623	133	756	596	149	745	568	166	733			
	14	642	133	775	614	149	763	585	166	752			
	15	661	134	795	633	150	783	603	167	770			
650	4	524	144	667	499	157	655	472	172	644	429	188	617
	5	541	145	686	515	158	674	488	173	662	444	190	634
	6	559	147	706	532	160	692	505	175	680	460	191	651
	7	577	149	726	550	162	712	522	176	698	475	193	668
	8	596	151	747	568	164	731	539	178	717	491	194	686
	9	616	153	769	586	166	751	557	180	736	507	196	704
	10	627	155	782	599	168	767	570	182	752			
	11	646	157	803	618	169	787	588	184	772			
	12	666	159	825	637	172	808	606	186	792			
	13	685	161	847	656	174	829	625	188	813			
	14	705	163	869	675	176	851	644	190	834			
	15	726	166	891	695	178	873	663	192	855			

NOTES

Cc (cooling capacity) - Pi (unit power input) – Hc (heating capacity) - ELWT (evaporator leaving water temperature – Δt 5°C) - Condenser Water temperature Δt 5°C
Data are referred to 0.0176 m² °C/kW evaporator fouling factor
Data are referred to 0.0440 m² °C/kW condenser fouling factor

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7 Capacity Tables

7 - 2 Partial Heat Recovery Capacity tables

Partial Heat Recovery Ratings

EWWD~G-SS	EWWD~G-XS	Leaving desuper-heater water temp.°C	Leaving Condenser Water Temperature (°C)				
			35	40	45	50	55
			Hc (kW)	Hc (kW)	Hc (kW)	Hc (kW)	Hc (kW)
170	190	**45**	21.0	22.0	23.0	24.0	25.0
		50	10.0	18.0	22.0	23.0	24.0
		55	6.00	11.0	17.0	20.0	21.0
210	230	**45**	22.0	29.0	30.0	31.0	32.0
		50	17.0	23.0	28.0	29.0	30.0
		55	10.0	16.0	24.0	26.0	27.0
260	280	**45**	35.0	36.0	37.0	38.0	39.0
		50	28.0	34.0	35.0	36.0	37.0
		55	19.0	30.0	31.0	32.0	33.0
300	320	**45**	48.0	43.0	44.0	45.0	46.0
		50	39.0	45.0	42.0	43.0	44.0
		55	28.0	44.0	38.0	38.0	39.0
320	380	**45**	42.0	44.0	46.0	48.0	50.0
		50	20.0	36.0	44.0	46.0	48.0
		55	12.0	22.0	34.0	40.0	42.0
380	400	**45**	43.0	51.0	53.0	55.0	57.0
		50	27.0	41.0	50.0	52.0	54.0
		55	16.0	27.0	41.0	46.0	48.0
420	460	**45**	44.0	58.0	60.0	62.0	64.0
		50	34.0	46.0	56.0	58.0	60.0
		55	20.0	32.0	48.0	52.0	54.0
460	500	**45**	57.0	65.0	67.0	69.0	71.0
		50	45.0	57.0	63.0	65.0	67.0
		55	29.0	46.0	55.0	58.0	60.0
500	550	**45**	70.0	72.0	74.0	76.0	78.0
		50	56.0	68.0	70.0	72.0	74.0
		55	38.0	60.0	62.0	64.0	66.0
600	650	**45**	96.0	86.0	88.0	90.0	92.0
		50	78.0	90.0	84.0	86.0	88.0
		55	56.0	88.0	76.0	76.0	78.0

NOTES

Leaving Evaporator Water Temperature 7°C. ΔT 5°C; ΔT Condenser Water Temperature 5°C
Hc (heating heat recovery capacity)

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7 Capacity Tables

7 - 3 Total Heat Recovery Capacity Tables

Total Heat Recovery Ratings
EWWD170~320G-SS

Size	ELWT (°C)	Heat Recovery Water Temperature (°C)											
		30/35			35/40			40/45			45/50		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
170	4	152	37.5	189	145	42.3	188	139	47.5	186	132	53.1	185
	5	156	37.7	194	150	42.5	192	143	47.6	191	136	53.3	189
	6	161	37.8	199	155	42.6	197	148	47.8	196	141	53.5	194
	7	166	38.0	204	160	42.8	202	153	48.0	201	145	53.7	199
	8	172	38.1	210	165	43.0	208	157	48.2	206	150	53.9	204
	9	177	38.3	215	170	43.2	213	162	48.5	211	155	54.1	209
210	4	185	45.0	230	177	50.8	228	169	57.0	226	160	63.7	224
	5	190	45.2	236	183	51.0	234	174	57.2	232	166	64.0	230
	6	196	45.4	242	188	51.2	240	180	57.5	238	171	64.2	235
	7	203	45.6	248	194	51.4	246	186	57.7	244	177	64.5	241
	8	209	45.8	255	200	51.7	252	192	58.0	250	183	64.7	247
	9	215	46.0	261	207	51.9	258	198	58.2	256	188	65.0	253
260	4	234	55.9	290	224	63.0	287	214	70.6	284	203	78.8	282
	5	242	56.2	298	232	63.3	295	221	70.9	292	210	79.1	289
	6	250	56.5	306	239	63.6	303	228	71.3	300	217	79.5	296
	7	258	56.8	314	247	63.9	311	236	71.6	307	224	79.9	304
	8	266	57.0	323	255	64.3	319	243	72.0	315	231	80.3	312
	9	274	57.3	331	263	64.6	327	251	72.4	323	239	80.7	320
300	4	270	65.4	335	257	71.1	329	245	77.7	323	232	85.1	318
	5	279	66.3	345	266	72.0	338	253	78.5	332	240	85.9	326
	6	288	67.3	356	275	72.9	348	262	79.4	341	249	86.7	335
	7	298	68.3	366	285	73.9	359	271	80.3	351	257	87.5	344
	8	308	69.3	377	294	74.9	369	280	81.2	361	265	88.4	354
	9	317	70.3	388	304	75.9	380	289	82.2	371	274	89.3	364
320	4	306	75.1	381	293	84.7	378	280	95.0	375	266	106	372
	5	316	75.4	391	303	85.0	388	289	95.4	384	275	107	381
	6	326	75.7	401	312	85.4	398	298	95.8	394	284	107	391
	7	336	76.0	412	322	85.7	408	308	96.2	404	293	108	401
	8	346	76.3	423	332	86.1	418	318	96.6	414	303	108	411
	9	357	76.6	433	343	86.5	429	328	97.0	425	312	108	421

NOTES

Nominal cooling capacity and power input are based on ΔT = 5°C entering/leaving evaporator and heat recovery condenser water temperature; evaporator fouling factor = 0.0176 m² °C/kW; condenser fouling factor = 0.0440 m² °C/kW
Cc (cooling capacity
Pi (unit power input)
Hc (heating heat recovery capacity)

OPT_1-2-3-4-5-6_Rev.00_1 (1-2)

7 Capacity Tables

7 - 3 Total Heat Recovery Capacity Tables

Total Heat Recovery Ratings
EWWD380~600G-SS

Size	ELWT (°C)	Heat Recovery Water Temperature (°C)											
		30/35			35/40			40/45			45/50		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
380	4	341	82.7	424	327	93.2	420	312	105	416	296	117	413
	5	352	83.1	435	338	93.6	431	322	105	427	306	117	423
	6	363	83.4	447	348	94.1	443	333	106	438	316	118	434
	7	375	83.8	459	360	94.5	454	344	106	450	327	118	445
	8	387	84.1	471	371	94.9	466	355	106	461	338	119	456
	9	398	84.4	483	382	95.3	478	366	107	473	348	119	468
420	4	369	90.1	459	354	102	455	338	114	452	321	128	448
	5	381	90.5	472	365	102	467	349	115	463	331	128	459
	6	393	90.8	484	377	102	479	360	115	475	343	128	471
	7	405	91.2	496	389	103	492	372	115	487	354	129	483
	8	418	91.6	509	401	103	504	384	116	499	365	130	495
	9	430	92.0	522	413	104	517	396	116	512	377	130	507
460	4	413	101	514	396	114	509	378	127	505	359	142	501
	5	427	101	528	409	114	523	390	128	518	371	143	514
	6	440	102	542	422	115	537	403	129	532	383	144	527
	7	454	102	556	435	115	550	416	129	545	396	144	540
	8	468	103	570	449	116	564	429	130	559	409	145	553
	9	482	103	585	463	116	579	443	130	573	422	145	567
500	4	457	111	569	438	126	564	418	141	559	397	157	554
	5	472	112	584	452	126	578	432	141	573	410	158	568
	6	487	113	599	467	127	594	446	142	588	424	159	582
	7	502	113	615	482	127	609	460	143	603	438	159	597
	8	517	114	631	497	128	625	475	143	618	452	160	612
	9	533	114	647	512	129	640	490	144	634	466	161	627
600	4	530	130	659	505	141	647	481	155	635	454	169	624
	5	547	132	679	523	143	666	497	156	653	470	171	641
	6	565	133	698	540	145	685	514	158	672	487	172	659
	7	583	135	718	558	147	705	531	160	691	504	174	678
	8	602	137	739	576	148	724	549	161	710	521	176	696
	9	621	139	760	594	150	745	567	163	730	538	178	716

NOTES

Nominal cooling capacity and power input are based on ΔT = 5°C entering/leaving evaporator and heat recovery condenser water temperature; evaporator fouling factor = 0.0440 m² °C/kW; condenser fouling factor = 0.0440 m² °C/kW
Cc (cooling capacity
Pi (unit power input)
Hc (heating heat recovery capacity)

OPT_1-2-3-4-5-6_Rev.00_1 (2-2)

7 Capacity Tables

7 - 3 Total Heat Recovery Capacity Tables

Total Heat Recovery Ratings
EWWD190~380G-XS

Size	ELWT (°C)	Heat Recovery Water Temperature (°C)											
		30/35			35/40			40/45			45/50		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
190	4	167	37.1	204	160	41.9	202	152	47.0	199	144	52.6	197
	5	173	37.2	210	165	42.0	207	157	47.2	205	149	52.8	202
	6	179	37.3	216	171	42.2	213	163	47.4	210	155	53.0	208
	7	185	37.4	222	177	42.3	219	169	47.5	216	160	53.1	213
	8	191	37.5	229	183	42.5	225	174	47.7	222	166	53.3	219
	9	197	37.6	235	189	42.6	232	180	47.9	228	172	53.5	225
230	4	201	44.6	245	192	50.4	242	183	56.6	239	173	63.2	236
	5	208	44.8	253	199	50.6	249	189	56.8	246	180	63.4	243
	6	215	44.9	260	206	50.7	256	196	57.0	253	186	63.7	250
	7	222	45.1	267	212	50.9	263	203	57.2	260	192	63.9	256
	8	229	45.2	274	220	51.1	271	210	57.4	267	199	64.1	263
	9	237	45.3	282	227	51.3	278	217	57.6	274	206	64.4	270
280	4	249	54.7	304	238	61.7	300	227	69.3	296	215	77.4	292
	5	257	54.9	312	246	62.0	308	235	69.5	304	222	77.7	300
	6	266	55.1	321	255	62.2	317	243	69.8	313	230	78.0	308
	7	275	55.3	330	263	62.5	326	251	70.1	321	238	78.3	317
	8	284	55.5	340	272	62.7	335	260	70.4	330	247	78.6	325
	9	293	55.7	349	281	63.0	344	268	70.7	339	255	78.9	334
320	4	287	64.6	352	275	70.1	345	262	76.3	338	248	83.4	332
	5	297	65.5	362	284	71.0	355	271	77.1	348	257	84.1	341
	6	307	66.5	373	294	71.8	365	280	78.0	358	266	84.9	351
	7	317	67.5	384	303	72.8	376	289	78.8	368	275	85.7	361
	8	327	68.5	395	313	73.7	387	299	79.7	379	284	86.6	371
	9	337	69.5	407	323	74.7	398	309	80.7	390	294	87.5	381
380	4	328	74.1	403	314	83.7	398	299	93.9	393	284	105	389
	5	340	74.3	414	325	83.9	409	310	94.3	404	294	105	399
	6	351	74.5	426	336	84.2	420	320	94.6	415	304	106	410
	7	363	74.7	438	347	84.5	432	331	94.9	426	315	106	421
	8	375	74.9	450	359	84.8	444	343	95.2	438	326	107	432
	9	387	75.1	462	371	85.0	456	354	95.6	450	337	107	444

NOTES

Nominal cooling capacity and power input are based on ΔT = 5°C entering/leaving evaporator and heat recovery condenser water temperature; evaporator fouling factor = 0.0176 m² °C/kW; condenser fouling factor = 0.0440 m² °C/kW
Cc (cooling capacity
Pi (unit power input)
Hc (heating heat recovery capacity)

OPT_1-2-3-4-5-6_Rev.00_2 (1-2)

7 Capacity Tables

7 - 3 Total Heat Recovery Capacity Tables

Total Heat Recovery Ratings
EWWD400~650G-XS

Size	ELWT (°C)	Heat Recovery Water Temperature (°C)											
		30/35			35/40			40/45			45/50		
		Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)	Cc (kW)	Pi (kW)	Hc (kW)
400	4	366	81.5	448	350	92.0	442	333	103	437	316	116	431
	5	379	81.8	460	362	92.3	454	345	104	449	327	116	443
	6	391	82.0	473	375	92.7	467	357	104	461	339	116	455
	7	404	82.2	487	387	93.0	480	369	104	474	351	117	468
	8	418	82.5	500	400	93.3	494	382	105	487	363	117	480
	9	431	82.7	514	413	93.6	507	395	105	500	376	118	493
460	4	398	88.8	487	381	100	481	363	113	475	344	126	470
	5	412	89.1	501	394	101	494	376	113	489	356	126	483
	6	425	89.4	515	407	101	508	389	113	502	369	127	496
	7	439	89.6	529	421	101	522	402	114	516	382	127	509
	8	454	89.8	544	435	102	536	415	114	529	395	128	522
	9	468	90.1	558	449	102	551	429	115	544	408	128	536
500	4	445	98.1	543	426	111	536	406	124	530	385	139	524
	5	460	98.4	558	440	111	551	420	125	545	398	140	538
	6	475	98.7	574	455	112	567	434	125	560	413	140	553
	7	491	99.0	590	470	112	582	449	126	575	427	141	567
	8	507	99.2	606	486	112	598	464	126	590	442	141	583
	9	523	99.5	623	502	113	615	480	127	606	457	142	598
550	4	485	107	592	464	121	585	443	136	579	420	152	572
	5	501	108	609	480	122	601	458	137	595	435	153	588
	6	518	108	626	496	122	618	474	137	611	450	153	603
	7	535	108	643	513	122	635	490	137	627	466	154	619
	8	552	109	660	529	123	652	506	138	644	482	154	636
	9	569	109	678	546	123	670	523	138	661	498	155	652
650	4	561	126	687	537	137	674	512	149	662	486	163	650
	5	580	128	708	555	139	694	530	151	681	503	165	668
	6	600	130	730	574	140	714	548	152	700	521	166	687
	7	621	132	753	594	142	736	566	154	720	538	168	706
	8	642	134	775	614	144	758	585	156	741	556	169	726
	9	663	136	799	635	146	781	606	157	763	575	171	745

NOTES

Nominal cooling capacity and power input are based on ΔT = 5°C entering/leaving evaporator and heat recovery condenser water temperature; evaporator fouling factor = 0.0176 m² °C/kW; condenser fouling factor = 0.0440 m² °C/kW
Cc (cooling capacity
Pi (unit power input)
Hc (heating heat recovery capacity)

OPT_1-2-3-4-5-6_Rev.00_2 (2-2)

8 Hydraulic Performance

8 - 1 Evaporator pressure drop

Evaporating Pressure Drops

EWWD~G-SS

Size	170	210	260	300	320	380	420	460	500	600
Cooling Capacity (kW)	166	201	253	280	334	372	403	448	494	556
Water Flow (l/s) - Evaporator	7.93	9.60	12.1	13.4	16.0	17.8	19.3	21.4	23.6	26.6
Evaporator Pressure Drops (kPa)	48	69	43	53	64	63	72	54	54	68
Water Flow (l/s) - Condenser	9.95	12.0	15.2	17.0	20.0	22.2	24.1	26.9	29.8	33.7
Condenser Pressure Drops (kPa)	39	41	63	77	40	41	41	50	60	75

Water flow and pressure drop referred to nominal condition: evaporator water in/out: 12/7°C – condenser water in/out: 30/35°C

EWWD~G-XS

Size	190	230	280	320	380	400	460	500	550	650
Cooling Capacity (kW)	186	223	277	307	366	408	444	496	541	604
Water Flow (l/s) - Evaporator	8.89	10.7	13.2	14.7	17.5	19.5	21.2	23.7	25.8	28.9
Evaporator Pressure Drops (kPa)	25	35	35	44	30	24	28	39	46	57
Water Flow (l/s) - Condenser	10.8	13.0	16.1	18.1	21.3	23.7	25.8	28.7	31.3	35.4
Condenser Pressure Drops (kPa)	17	20	25	28	17	17	17	16	15	19

Water flow and pressure drop referred to nominal condition: evaporator water in/out: 12/7°C – condenser water in/out: 30/35°C

EPD_1-2_Rev.00_1

Evaporator and Condenser Pressure Drops

To determinate the evaporator or condenser pressure drop for different versions or at different working condition, please refer to the following formula:

$$PD_2\ (kPa) = PD_1\ (kPa) \times \left(\frac{Q_2\ (l/s)}{Q_1\ (l/s)} \right)^{1.8}$$

where:

- PD_2 Pressure drop to be determinated (kPa)
- PD_1 Pressure drop at nominal condition (kPa)
- Q_2 water flow at new working condition (l/s)
- Q_1 water flow at nominal condition (l/s)

How to use the formula: Example (evaporator)

The unit EWWD170G-SS has been selected for working at the following conditions:
- evaporator water in/out: 11/6°C
- condenser water in/out: 28/33°C

The cooling capacity at these working conditions is: 163 kW
The water flow at these working conditions is: 9.71 l/s

The unit EWWD170G-SS at nominal working conditions has the following data:
- evaporator water in/out: 12/7°C
- condenser water in/out: 30/35°C

The cooling capacity at these working conditions is: 166 kW
The water flow at these working conditions is: 7.90 l/s
The pressure drop at these working conditions is: 48 kPa

The evaporator pressure drop at the selected working condition will be:

$$PD_2\ (kPa) = \mathbf{48}\ (kPa) \times \left(\frac{\mathbf{7.80}\ (l/s)}{\mathbf{7.91}\ (l/s)} \right)^{1.8}$$

$$PD_2\ (kPa) = \mathbf{47}\ (kPa)$$

NOTE - Important
If the calculated evaporator water pressure drop is below 10 kPa or above 100 kPa please contact the factory for dedicated evaporator.

EPD_1-2_Rev.00_2

8 Hydraulic Performance

8 - 2 Total and Partial Heat Recovery Pressure Drop

Total Heat Recovery pressure drops

EWWD~G-SS

EWWD~G-SS	170	200	250	280	330	370	400	450	490	560
Heating Capacity (kW)	201	244	307	351	404	450	487	545	603	691
Water Flow (l/s)	9.58	11.63	14.7	16.8	19.3	21.5	23.3	26.0	28.8	33.0
Heat Recovery Pressure Drops (kPa)	36	39	59	76	37	39	38	47	56	72

NOTES

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – condenser water in/out:30/35°C – water heat recovery in/out 40/45°C

EWWD~G-XS

EWWD~G-XS	190	220	280	310	370	410	440	500	540	600
Heating Capacity (kW)	216	260	321	368	426	474	516	575	627	720
Water Flow (l/s)	10.32	12.4	15.4	17.6	20.4	22.6	24.6	27.5	30.0	34.4
Heat Recovery Pressure Drops (kPa)	16	18	23	29	15	16	15	15	14	18

NOTES

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – condenser water in/out:30/35°C – water heat recovery in/out 40/45°C

OPT_1-2-3-4-5-6_Rev.00_4

Partial Heat Recovery pressure drops

EWWD~G-SS	170	200	250	280	330	370	400	450	490	560
EWWD~G-XS	190	220	280	310	370	410	440	500	540	600
Heating Capacity (kW)	21	22	35	48	42	43	44	57	70	96
Water Flow (l/s)	1.00	1.05	1.7	2.3	2.0	2.1	2.1	2.7	3.3	4.6
Heat Recovery Pressure Drops (kPa)	2	1	2	3	2	1	1	1	2	3

NOTES

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – condenser water in/out:30/35°C – water heat recovery in/out 40/45°C

OPT_1-2-3-4-5-6_Rev.00_5

8 Hydraulic Performance

8 - 2 Total and Partial Heat Recovery Pressure Drop

Total and Partial Heat Recovery Pressure Drops

To determinate the pressure drop for different versions or at different working condition, please refer to the following formula:

$$PD_2\ (kPa) = PD_1\ (kPa) \times \left(\frac{Q_2\ (l/s)}{Q_1\ (l/s)} \right)^{1.80}$$

where:

- PD_2 Pressure drop to be determinate (kPa)
- PD_1 Pressure drop at nominal condition (kPa)
- Q_2 water flow at new working condition (l/s)
- Q_1 water flow at nominal condition (l/s)

How to use the formula: Example

The unit EWWD170G-SS has been selected for working at the following conditions:
- evaporator water in/out: 12/7°C
- condenser water in/out: 30/35°C
- Partial heat recovery leaving water temperature 45/50°C

The heating capacity at these working conditions is: 10 kW
The water flow at these working conditions is: 0.48 l/s

The unit EWWD170G-SS at nominal working conditions has the following data:
- evaporator water in/out: 12/7°C
- condenser water in/out: 30/35°C
- Partial heat recovery leaving water temperature 40/45°C

The heating capacity at these working conditions is: 21 kW
The water flow at these working conditions is: 1.00 l/s
The pressure drop at these working conditions is: 2 kPa

The pressure drop at the selected working condition will be:

$$PD_2\ (kPa) = \mathbf{2}\ (kPa) \times \left(\frac{\mathbf{0.48}\ (l/s)}{\mathbf{1.0}\ (l/s)} \right)^{1.80}$$

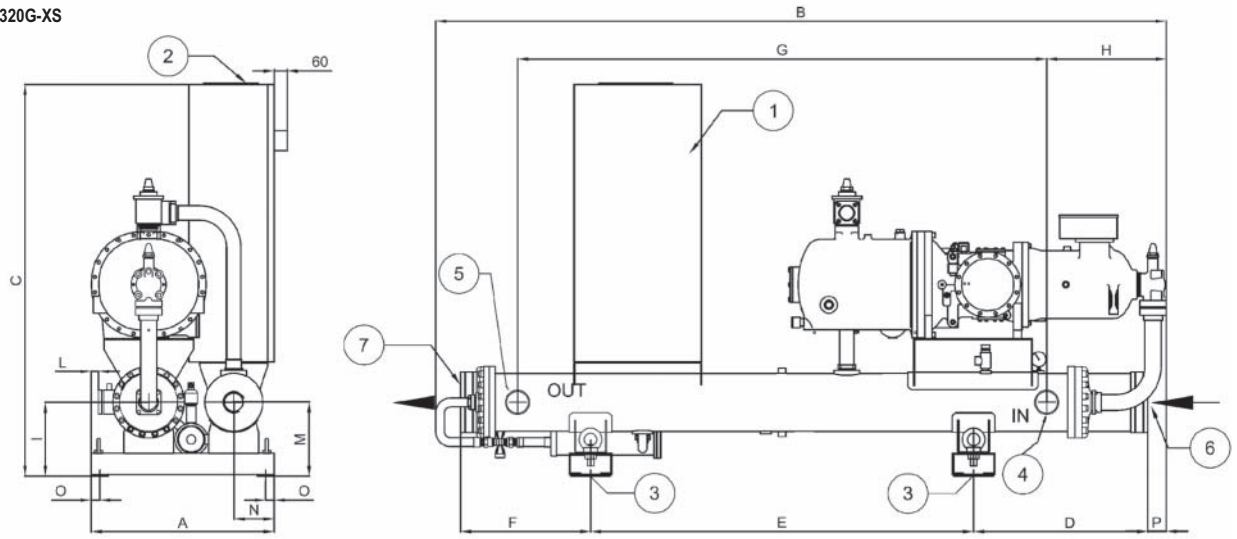
$$PD_2\ (kPa) = \mathbf{1}\ (kPa)$$

OPT_1-2-3-4-5-6_Rev.00_6

9 Dimensional Drawings

9 - 1 Dimensional Drawings

EWWD170~300G-SS
EWWD190~320G-XS



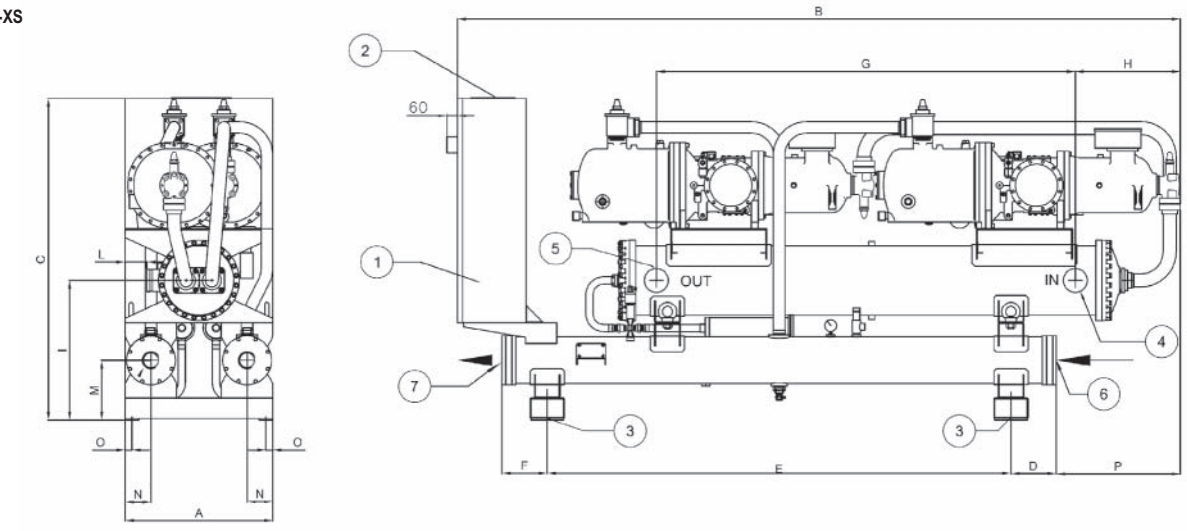
	Dimensions													
EWWD~G-	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**L**	**M**	**N**	**O**	**P**
170-210G-SS	860	3435	1860	818	1800	610	2526	564	350	77	350	190	40	87
260-300G-SS	860	3435	1860	818	1800	610	2486	564	350	33	350	190	40	87
190-320G-XS	860	3435	1860	850	1800	580	2486	564	350	33	350	190	40	87

LEGEND

1 - Electrical Panel
2 - Power connections slot 150x260
3 - Four (4) holes Ø25 for isolator mounting
4 - Evaporator water inlet (Victaulic connection)
5 - Evaporator water outlet (Victaulic connection)
6 - Condenser water inlet connection
7 - Condenser water oulet connection

DMN_1-2-3-4-5-6_Rev.00_1

EWWD320~600G-SS
EWWD380~650G-XS



	Dimensions													
EWWD~G-	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**L**	**M**	**N**	**O**	**P**
320-420G-SS	860	4245	1880	264	2700	264	2486	564	815	127	350	190	40	723
460-600G-SS, 380G-XS	860	4245	1880	264	2700	264	2450	582	815	122	350	190	40	723
400-460G-XS	860	4245	1880	264	2700	264	2412	601	815	122	350	190	40	723
500-650G-XS	860	4245	1880	264	2700	264	2412	601	815	110	350	190	40	723

LEGEND

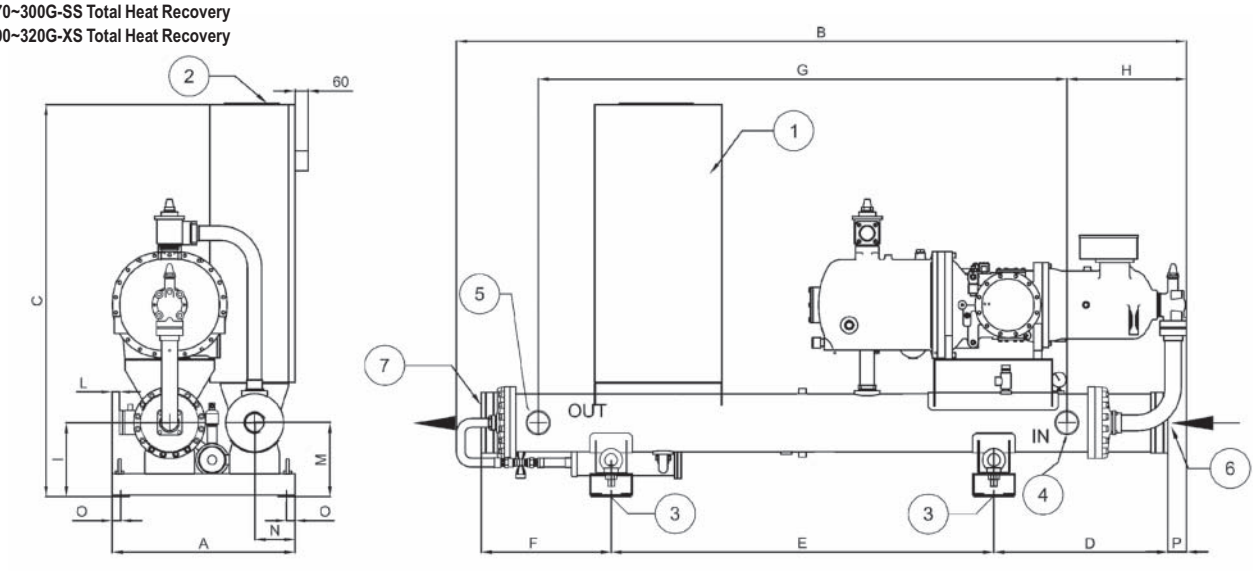
1 - Electrical Panel
2 - Power connections slot 150x260
3 - Four (4) holes Ø25 for isolator mounting
4 - Evaporator water inlet (Victaulic connection)
5 - Evaporator water outlet (Victaulic connection)
6 - Condenser water inlet connection
7 - Condenser water oulet connection

DMN_1-2-3-4-5-6_Rev.00_2

9 Dimensional Drawings

9 - 1 Dimensional Drawings

EWWD170~300G-SS Total Heat Recovery
EWWD190~320G-XS Total Heat Recovery



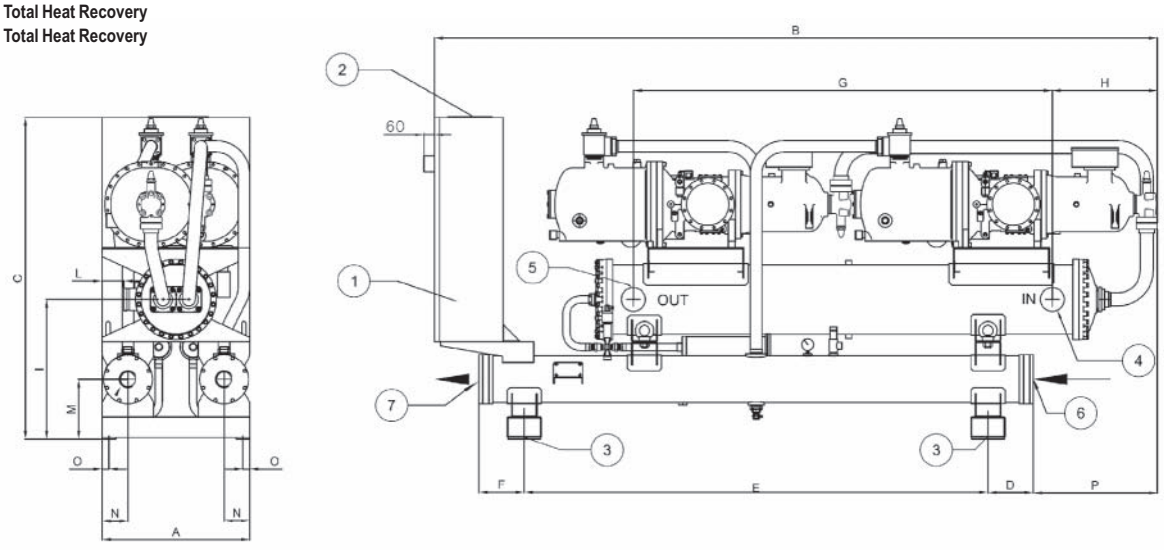
	Dimensions														
EWWD~G-	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**L**	**M**	**N**	**O**	**P**	**Q**
170-210G-SS	860	3435	1860	818	1800	610	2526	554	350	77	350	115	40	87	150
260-300G-SS	860	3435	1860	818	1800	610	2486	554	350	33	350	115	40	87	150
190-320G-XS	860	3435	1860	818	1800	580	2486	554	350	33	350	115	40	87	150

LEGEND

1 - Electrical Panel
2 - Power connections slot 150x260
3 - Four (4) holes Ø25 for isolator mounting
4 - Evaporator water inlet (Victaulic connection)
5 - Evaporator water outlet (Victaulic connection)
6 - Condenser water inlet connection
7 - Condenser water oulet connection

DMN_1-2-3-4-5-6_Rev.00_3

EWWD320~600G-SS Total Heat Recovery
EWWD380~460G-XS Total Heat Recovery



	Dimensions														
EWWD~G-	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**L**	**M**	**N**	**O**	**P**	**Q**
320-420G-SS	860	4220	1880	264	2700	264	2486	564	815	127	350	75	40	612	150
460-600G-SS, 380G-XS	860	4220	1880	264	2700	264	2450	582	815	127	350	75	40	612	150
400-460G-XS	1020	4245	1935	264	2700	264	2412	601	815	187	350	110	40	612	200

LEGEND

1 - Electrical Panel
2 - Power connections slot 150x260
3 - Four (4) holes Ø25 for isolator mounting
4 - Evaporator water inlet (Victaulic connection)
5 - Evaporator water outlet (Victaulic connection)
6 - Condenser water inlet connection
7 - Condenser water oulet connection

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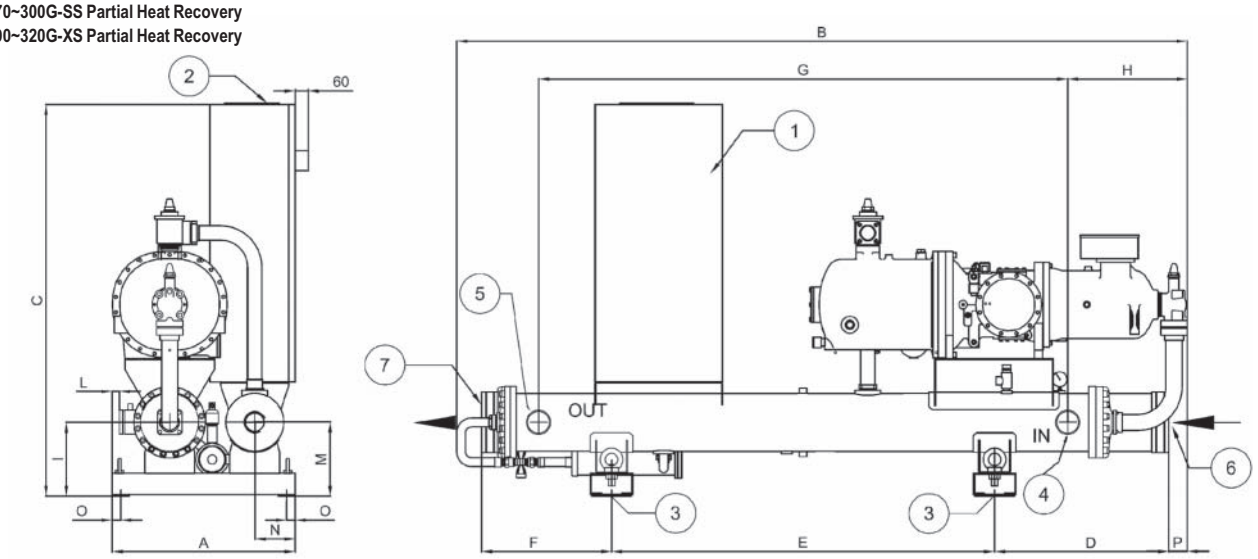
9 Dimensional Drawings

9 - 1 Dimensional Drawings

EWWD170~300G-SS Partial Heat Recovery
EWWD190~320G-XS Partial Heat Recovery



	Dimensions													
EWWD~G-	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**L**	**M**	**N**	**O**	**P**
170-210G-SS	860	3435	1860	818	1800	610	2526	564	350	77	350	190	40	87
260-300G-SS	860	3435	1860	818	1800	610	2486	564	350	33	350	190	40	87
190-320G-XS	860	3435	1860	850	1800	580	2486	564	350	33	350	190	40	57

LEGEND

1 - Electrical Panel
2 - Power connections slot 150x260
3 - Four (4) holes Ø25 for isolator mounting
4 - Evaporator water inlet (Victaulic connection)
5 - Evaporator water outlet (Victaulic connection)
6 - Condenser water inlet connection
7 - Condenser water oulet connection

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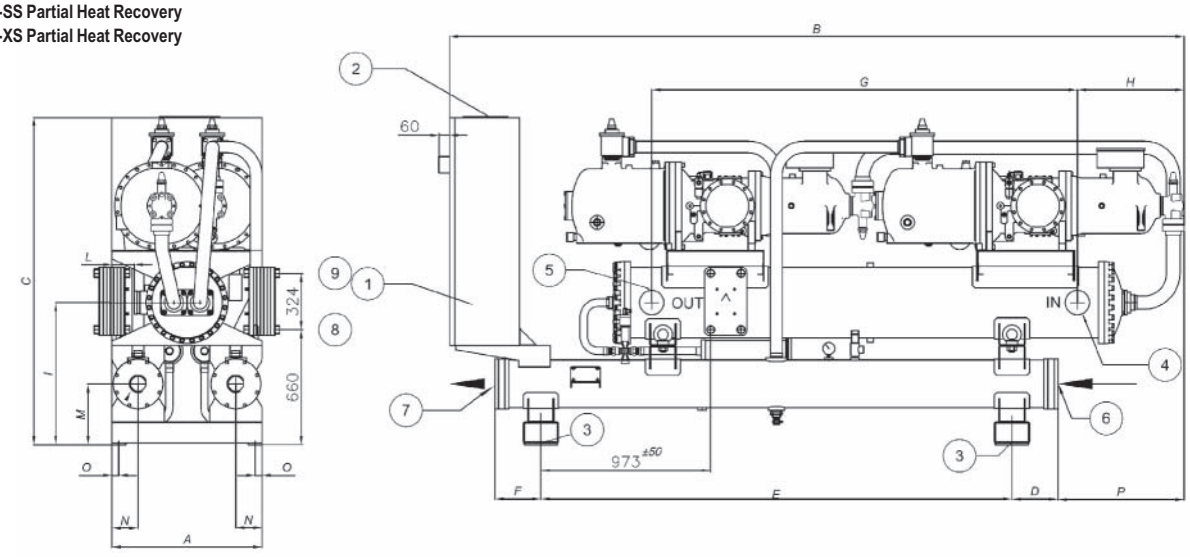
EWWD320~600G-SS Partial Heat Recovery
EWWD380~650G-XS Partial Heat Recovery



	Dimensions													
EWWD~G-	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**L**	**M**	**N**	**O**	**P**
320-420G-SS	860	4245	1880	264	2700	264	2486	564	815	127	350	190	40	723
460-600G-SS, 380G-XS	860	4245	1880	264	2700	264	2450	582	815	122	350	190	40	723
400-460G-XS	860	4245	1880	264	2700	264	2412	601	815	122	350	190	40	723
500-650G-XS	860	4245	1880	264	2700	264	2412	601	815	110	350	190	40	723

LEGEND

1 - Electrical Panel
2 - Power connections slot 150x260
3 - Four (4) holes Ø25 for isolator mounting
4 - Evaporator water inlet (Victaulic connection)
5 - Evaporator water outlet (Victaulic connection)
6 - Condenser water inlet connection
7 - Condenser water oulet connection

DMN_1-2-3-4-5-6_Rev.00_6

10 Installation

10 - 1 Installation Method

Installation notes

Warning

Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and who are experienced with this type of equipment. Must be avoided the unit installation in places that could be considered dangerous for all the maintenance operations.

Handling

The chiller is mounted on heavy wooden skids to protect the unit from accidental damage and to permit easy handling and moving. It is recommended that all moving and handling be performed with the skids under the unit when possible and that the skids not be removed until the unit is in the final location.

If the unit must be hoisted, it is necessary to lift the unit by attaching cables or chains at the lifting holes in the evaporator tube sheets. Spreader bars must be used to protect the control cabinet and the other areas of the chiller.

Location

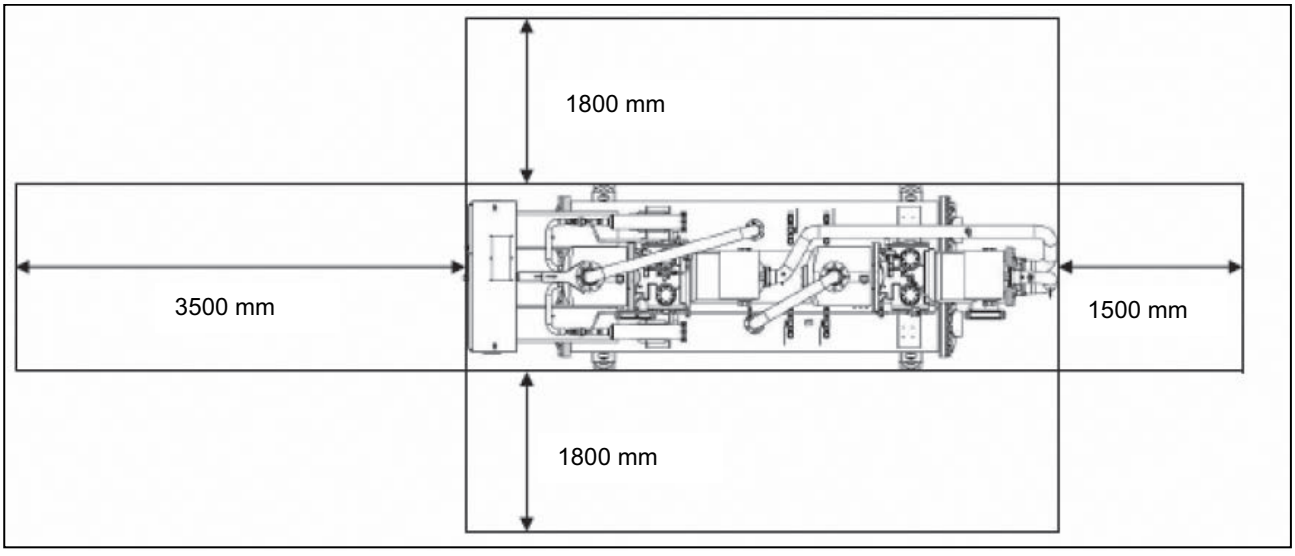
A leveled and sufficiently strong floor is required. If necessary, additional structural members should be provided to transfer the weight of the unit to the nearest beams.

Rubber-in-shear isolators can be furnished and field placed under each corner of the package. A rubber anti–skid pad should be used under isolators if hold-down bolts are not used. Vibration isolator in all water piping connected to the chiller is recommended to avoid straining the piping and transmitting vibration and noise.

Minimum space requirements

Every side of the machine must be accessible for all post-installation maintenance activities. The minimum space required is shown on the following drawing.

Minimum clearance requirements for machine maintenance



INN_1_Rev.00_1

11 Specification Text

11 - 1 Specification Text

Technical Specification for Water Cooled Screw Chiller

GENERAL

The water cooled screw chiller will be designed and manufactured in accordance with following European directives:

Construction of pressure vessel	97/23/EC (PED)
Machinery Directive	2006/42/EC
Low Voltage	2006/95/EC
Electromagnetic Compatibility	2004/108/EC
Electrical & Safety codes	EN 60204–1 / EN 60335-2-40
Manufacturing Quality Stds	UNI – EN ISO 9001:2004

The unit will be tested at full load in the factory at the nominal working conditions and water temperatures. Before shipment a full test will be held to avoid any losses.

Chiller will be delivered to the job site completely assembled and charged with right refrigerant and oil quantity.
Comply with the manufacturer instructions for rigging and handling equipment.

The unit will be able to start up and operate as standard at full load and condenser entering fluid temperature from …. °C to …. °C with an evaporator leaving fluid temperature between …. °C and …. °C.

All units published performances have to be certified by **Eurovent**.

REFRIGERANT

Only R-134a will be accepted.

PERFORMANCE

- ✓ Number of water cooled screw chiller: .....
- ✓ Cooling capacity for single water cooled screw chiller: ..... kW
- ✓ Power input for single water cooled screw chiller in cooling mode: ..... kW
- ✓ Shell & tube evaporator entering water temperature in cooling mode: ..... °C
- ✓ Shell & tube evaporator leaving water temperature in cooling mode: ..... °C
- ✓ Shell & tube evaporator water flow: ..... l/s
- ✓ Shell & tube condenser entering water temperature in cooling mode: ..... °C
- ✓ Shell & tube condenser leaving water temperature in cooling mode: ..... °C
- ✓ Shell & tube condenser water flow: ..... l/s
- ✓ The unit should work with electricity in range 400V ±10%, 3ph, 50Hz without neutral and shall only have one power connection point.

UNIT DESCRIPTION

Chiller shall include as standard: 1 or 2 independent refrigerant circuits, semi-hermetic rotary single screw compressors, refrigerant direct expansion shell & tube heat exchangers, R-134a refrigerant, lubrication system, motor starting components, control system and all components necessary for safe and stable unit operation.

NOISE LEVEL AND VIBRATIONS

Sound pressure level at 1 meter distance in free field, semispheric conditions, shall not exceed ……dB(A). The sound pressure levels must be rated in accordance to ISO 3744.
Other types of rating unacceptable. Vibration level should not exceed 2 mm/s.

DIMENSIONS

Unit dimensions shall not exceed following indications:

- ✓ unit length ..... mm,
- ✓ unit width ..... mm,
- ✓ unit height ..... mm.

SPC_1-2-3_Rev.00_1

11 Specification Text

11 - 1 Specification Text

CHILLER COMPONENTS

Compressors

- ✓ Semi-hermetic, single-screw type with one main helical rotor meshing with gaterotor. The gaterotor will be constructed of a carbon impregnated engineered composite material. The gaterotor supports will be constructed of cast iron.
- ✓ The oil injection shall be used in order to get high EER (Energy Efficiency Ratio) also at high condensing pressure and low sound pressure levels in each load condition.
- ✓ Refrigerant system differential pressure shall provide oil flow throught service replaceble, 0.5 micron, full flow, cartridge type oil filter internal to compressor.
- ✓ Refrigerant system differential pressure shall provide oil injection on all moving compressor parts to correctly lubricate them. Electrical oil pump lubricating system is not acceptable.
- ✓ The compressor's oil cooling must be realized, when necessary, by refrigerant liquid injection. External dedicated heat exchanger and additional piping to carry the oil from the compressor to heat exchanger and viceversa will be not accepted.
- ✓ The compressor shall be provided with an external, high efficiency, cyclonic type oil separator and with built-in oil filter, cartridge type.
- ✓ The compressor shall be direct electrical driven, without gear transmission between the screw and the electrical motor.
- ✓ Shall be present two thermal protection realized by a thermistor for high temperature protection: one temperature sensor to protect electrical motor and another sensor to protect unit and lubricating oil from high discharge gas temperature.
- ✓ Compressor shall be fully field serviceable. Compressor that must be removed and returned to the factory for service shall be unacceptable.

Cooling capacity control system

- ✓ Each unit will have a microprocessor for the control of compressor slide valve's position and the instantaneous RPM value of the motor.
- ✓ The unit capacity control shall be infinitely modulating, from 100% down to 25% for each circuit (from 100% down to 12.5% of full load for unit with 2 compressors). The chiller shall be capable of stable operation to a minimum of 12.5% of full load without hot gas bypass.
- ✓ Step unloading unacceptable because of evaporator leaving water temperature fluctuation and low unit efficiency at partial load.
- ✓ The system shall stage the unit based on the leaving evaporator water temperature that shall be controlled by a PID (Proportional Integral Derivative) loop.
- ✓ Unit control logic shall to manage frequency level of the compressor electric motor to exactly match plant load request in order to keep constant the set point for delivered chilled water temperature. In this operating condition unit control logic shall modulate electrical frequency level in a range lower and upper the nominal electrical network value fixed at 50 Hz.
- ✓ The microprocessor unit control shall detect conditions that approach protective limits and take self-corrective action prior to an alarm occurring. The system shall automatically reduce chiller capacity when any of the following parameters are outside their normal operating range:
    - o High condenser pressure
    - o Low evaporation refrigerant temperature
    - o High compressor motor amps

Evaporator

- ✓ The units shall be supplied with shell and tubes counter-flow heat exchanger with single refrigerant pass. It will be refrigerant direct expansion type with refrigerant inside the tubes and water outside (shell side). It will include carbon steel tube sheets, with straight copper tubes internally wound for higher efficiencies, expanded on the tube plates.
- ✓ The evaporator will have 2 circuits, one for each compressor and shall be single refrigerant pass.
- ✓ The water connections shall be VICTAULIC type connections as standard to ensure quick mechanical disconnection between the unit and the hydronic network.
- ✓ Evaporator is manufactured in accordance to PED approval.

SPC_1-2-3_Rev.00_2

11 Specification Text

11 - 1 Specification Text

Condensers

- ✓ Condensers will be shell and cleanable, through-tube type.
- ✓ The unit will have one condenser per circuit.
- ✓ Each condenser shall have a carbon steel and seamless, integrally finned high efficiency copper tubes, roll expanded into heavy carbon steel tube sheets.
- ✓ Water heads shall be removable and include vent and drain plugs.
- ✓ Condensers will come complete with liquid shut-off valve, spring loaded relief valve.

Refrigerant circuit

Each circuit shall include as standard: electronic expansion device piloted by unit's microprocessor control, suction line shut-off valve, replaceable core filter-drier, sight glass with moisture indicator and insulated suction line.

Control panel

- ✓ Field power connection, control interlock terminals, and unit control system should be centrally located in an electric panel (IP 54). Power and starting controls should be separate from safety and operating controls in different compartments of the same panel.
- ✓ Starting shall be Wye-Delta type as standard.
- ✓ Operating and safety controls should include energy saving control; emergency stop switch; overload protection for compressor motor; high and low pressure cut-out switch (for each refrigerant circuit); anti-freeze thermostat; cut-out switch for each compressor.
- ✓ All of the information regarding the unit will be reported on a display and with the internal built-in calendar and clock that will switch the unit ON/OFF during day time all year long.
- ✓ The following features and functions shall be included:

  - resetting chilled water temperature by controlling the return water temperature or by a remote 4-20 mA DC signal or by controlling the external ambient temperature;
  - soft load function to prevent the system from operating at full load during the chilled fluid pulldown period;
  - password protection of critical parameters of control;
  - start-to-start and stop-to-star timers to provide minimum compressor off-time with maximum motor protection;
  - communication capability with a PC or remote monitoring;
  - discharge pressure control through intelligent cycling of condenser fans;
  - lead-lag selection by manual or automatically by circuit run hours;
  - double set point for brine unit version;
  - scheduling via internal time clock to allow programming of a yearly start-stop schedule accommodating weekends and holidays.

Optional High Level Communications Interface

The controller as a minimum shall be capable of providing the data shown in the above list, using the following options:

- RS485 Serial card
- RS232 Serial card
- LonWorks interface to FTT10A Transceiver.
- Bacnet Compatible
- Use of Compass Points (manufactured by North Communications) to allow communications with such as Honeywell, Satchwell, Johnson Controls, Trend etc.

SPC_1-2-3_Rev.00_3

Notes

Daikin's unique position as a manufacturer of air conditioning equipment, compressors and refrigerants has led to its close involvement in environmental issues. For several years Daikin has had the intention to become a leader in the provision of products that have limited impact on the environment. This challenge demands the eco design and development of a wide range of products and an energy management system, resulting in energy conservation and a reduction of waste.

Daikin products are distributed by:

Daikin Europe N.V. participates in the Eurovent Certification Programme for Air Conditioners (AC), Liquid Chilling Packages (LCP) and Fan Coil Units (FC); the certified data of certified models are listed in the Eurovent Directory. Multi units are Eurovent certified for combinations up to 2 indoor units.

DAIKIN EUROPE N.V. Naamloze Vennootschap - Zandvoordestraat 300, B-8400 Oostende - Belgium - www.daikin.eu - BE 0412 120 336 - RPR Oostende

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