DAIKIN

DAIKIN APPLIED (UK) LTD

Technically better...

EWAQ-E

Air cooled scroll chillers

Product manual

XS (High Efficiency - Standard Noise) - Cooling Capacity from 178 to 336 kW
XL (High Efficiency - Low Noise) - Cooling Capacity from 178 to 336 kW
XR (High Efficiency - Reduced Noise) - Cooling Capacity from 173 to 323 kW

Performance according to EN14511
Eurovent certified
Refrigerant: R410A

CODE	
Date	
Supersedes	

Table of content

EWAQ-E

Low operating cost and extended operating life This chiller range is the result of careful design, aimed to optimize the energy efficiency of the chillers, with the objective of bringing down operating costs and improving installation profitability, effectiveness and economical management.
The chillers feature a high efficiency scroll compressors, large condenser coil surface area for maximum heat transfer and low discharge pressure, advanced technology condenser fans and a 'plate to plate' evaporator with low refrigerant pressure drops.

Low operating sound levels Very low sound levels both at full load and part load conditions are achieved by the latest compressor design and by a unique new fan that moves large volume of air at exceptionally low sound levels and by the virtually vibration-free operation.

Outstanding reliability The chillers have two truly independent refrigerant circuits, in order to assure maximum safety for any maintenance, whether planned or not. They are equipped with hermetic orbiting scroll compressor complete with motor over-temperature and over-current devices and protection against excessive gas discharge temperature, a proactive control logic and are full factory-run-tested to optimized trouble-free operation.

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 LonWorks, Bacnet, Ethernet TCP/IP or Modbus communications.

Code requirements – Safety and observant of laws/directives 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 Units 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.).

Versions This range is available in one version:

HIGH EFFICIENCY
6 sizes to cover a range 178 up to 336 kW with an EER up to 3.11 and an ESEER up to 4.31 (data referred to Standard Noise).

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 air inlet condenser temperature.

ESEER = A x EER100% + B x EER75% + C x EER50% + D x EER25%

	A	B	C	D
K	0.03 (3%)	0.33 (33%)	0.41 (41%)	0.23 (23%)
T	35°C	30°C	25°C	20°C

K = Coefficient; T = Air inlet condenser temperature.

Sound configurations Standard, low and reduced sound configurations available as follows:

STANDARD SOUND
Condenser fan rotating at 900 rpm, rubber antivibration under compressor

LOW SOUND
Condenser fan rotating at 900 rpm, rubber antivibration under compressor, compressor sound enclosure.

REDUCED SOUND
Condenser fan rotating at 705 rpm, rubber antivibration under compressor, compressor sound enclosure.

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 an eye-hook to lift 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.

Compressor The compressor is hermetic orbiting scroll compressor complete with motor over-temperature and over-current devices. An oil heater, which starts automatically, keeps the oil from being diluted by the refrigerant when the compressor stops. The compressors are connected in Tandem or Trio on a single refrigerating circuit and are fitted on rubber antivibration mounts and complete with oil charge.

Refrigerant Units have been optimized to operates with R-410A, refrigerant with zero ODP (Ozone Depletion Potential). R-410A has been the logical choice for our multiple scroll chiller because today it is one of the most promising refrigerants in terms of efficiency, stability and environmental impact. R-410A offers a small swept volume, a good heat exchange capacity and leads to reduced component sizes of items such as heat exchangers and tubing.

Evaporator (Plate Heat Exchanger) The unit is equipped with a direct expansion plate to plate type evaporator. This heat exchanger is made of stainless steel brazed plates and is covered with a 20mm closed cell insulation material. The exchanger is equipped with an electric heater for protection against freezing down to –28°C and evaporator water connections are provided with victaulic kit (as standard). The evaporator is manufactured in accordance to PED approval. Flow switch on evaporator standard factory mounted. Water filter is standard(depending on the unit model it can be shipped loose or unit mounted).

Condenser The condenser is manufactured with internally enhanced seamless copper tubes arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminum condenser fins with full fin collars. An integral sub-cooler circuit provides sub-cooling to effectively eliminate liquid flashing and increase cooling capacity without increasing the power input.

Condenser fans (ø 800) The condenser fans are propeller type with high efficiency design blades to maximize performances. The material of the blades is glass reinforced resin and each fan is protected by a guard. Fan motors are internally protected from overtemperature and are IP54.

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 valves possess unique features: short opening and closing time, high resolution, positive shut-off function to eliminate use of additional solenoid valve, continuous modulation of mass flow without stress in the refrigerant circuit and corrosion resistance stainless steel body.

Electronic expansion valves are typically working 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 1 refrigerant circuit that includes:

- Compressors
- Refrigerant
- Evaporator
- Air Cooled Condenser
- Electronic expansion valve
- Liquid line shut off valve
- Sight glass with moisture indicator
- Filter drier
- Charging valves
- High pressure switch
- High pressure transducers
- Low pressure transducers
- Suction temperature sensor

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 against possible accidental contact with live parts. The main panel is fitted with a main switch interlocked door that shuts off power supply when opening.

Power Section

The power section includes compressors and fans protection devices, compressors and fans starters and control circuit power supply.

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 and air, programmable values, set-points. A sophisticated software with predictive logic, selects the most energy efficient combination of compressors, EEXV and condenser fans to keep stable operating conditions to maximise chiller energy efficiency and reliability.

MicroTech III is able to protect critical components based on external signals from its system (such as motor temperatures, refrigerant gas, correct phase sequence (option), 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 Pressure / Temperature conversions.

Control section - main features

Control Section has the following feature.

- Management of the refrigerant circuit capacity and fans modulation.
- 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 temperature.
- Display of Outdoor Ambient Temperature.
- Display of condensing-evaporating temperature and pressure, suction and superheat for each circuit.
- Leaving water evaporator temperature regulation.
- Compressor and evaporator pumps hours counter.
- Display of Status Safety Devices.
- Number of starts and compressor working hours.
- Optimized management of circuit load.
- Fan management according to condensing pressure.
- Re-start in case of power failure (automatic / manual).
- Start at high evaporator water temperature.
- Return Reset (Set Point Reset based on return water temperature).
- OAT (Outside Ambient temperature) Reset.
- Set point Reset (optional).
- Application and system upgrade with commercial SD cards.
- Ethernet port for remote or local servicing using standard web browsers.
- Two different sets of default parameters could be stored for easy restore.

Safety device / logic for each refrigerant circuit

The following devices / logics are available.

- High pressure (pressure switch).
- High pressure (transducer).
- Low pressure (transducer).
- High motor winding temperature.
- Low pressure ratio.
- No pressure change at start.

System security

The following securities are available.

- 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 communication

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).
- Ethernet TCP/IP.

Additional information related to F-GAS Regulation (EU) No 517/2014 OF THE European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006

Unit model	Refrigerant type	Refrigerant GWP	No. of circuits	Refrigerant charge circuit 1 (kg)	Refrigerant charge circuit 1 (TCO2Eq)
EWAQ180E-XS	R410A	2087,5	1	24,0	50,1
EWAQ200E-XS	R410A	2087,5	1	31,0	64,7
EWAQ230E-XS	R410A	2087,5	1	27,0	56,4
EWAQ260E-XS	R410A	2087,5	1	40,0	83,5
EWAQ320E-XS	R410A	2087,5	1	43,0	89,8
EWAQ340E-XS	R410A	2087,5	1	53,0	110,6

Unit model	Refrigerant type	Refrigerant GWP	No. of circuits	Refrigerant charge circuit 1 (kg)	Refrigerant charge circuit 1 (TCO2Eq)
EWAQ180E-XL	R410A	2087,5	1	28	58,5
EWAQ200E-XL	R410A	2087,5	1	31	64,7
EWAQ230E-XL	R410A	2087,5	1	27	56,4
EWAQ260E-XL	R410A	2087,5	1	40	83,5
EWAQ320E-XL	R410A	2087,5	1	43	89,8
EWAQ340E-XL	R410A	2087,5	1	53	110,6

Unit model	Refrigerant type	Refrigerant GWP	No. of circuits	Refrigerant charge circuit 1 (kg)	Refrigerant charge circuit 1 (TCO2Eq)
EWAQ170E-XR	R410A	2087,5	1	24,0	50,1
EWAQ190E-XR	R410A	2087,5	1	31,0	64,7
EWAQ220E-XR	R410A	2087,5	1	27,0	56,4
EWAQ260E-XR	R410A	2087,5	1	40,0	83,5
EWAQ300E-XR	R410A	2087,5	1	43,0	89,8
EWAQ320E-XR	R410A	2087,5	1	53,0	110,6

Note: Equipment contains fluorinated greenhouse gases. Actual refrigerant charge depends on the final unit construction, details can be found on the unit labels.

Standard Options (supplied on basic unit)

Direct on line starter (DOL)

Double setpoint - Dual leaving water temperature setpoints.

Evaporator victaulic kit - Hydraulic joint with gasket for an easy and quick water connection.

20mm evaporator insulation - The external shell is covered with a 20mm closed cell insulation material.

Evaporator electric heater - Electric heater (controlled by a thermostat) to protect the evaporator from freezing down to -28°C ambient temperature, providing the power supply is on.

Evaporator flow switch - Supplied separately to be wired and installed on the evaporator water piping (by the customer).

Electronic expansion valve

Ambient outside temperature sensor and setpoint reset

General fault contactor

Hour run meter

Main switch interlock door

Water filter - The water filter removes impurities from water by means of a fine physical barrier.

Options (on request)

MECHANICAL

Partial heat recovery - Plate to plate heat exchangers for hot water production.

Brine version - Allows the unit to operate down to -8°C leaving liquid temperature (antifreeze required). Reccomended below +4°C

Axial fans (250 Pa lift)

Condenser coil guards

Evaporator area guards

Cu-Cu condenser coil - To give better protection against corrosion by aggressive environments.

Cu-Cu-Sn condenser coil - To give better protection against corrosion in aggressive environments and by salty air.

Alucoat fins coil - Fins are protected by a special acrylic paint with a high resistance to corrosion.

Discharge line shut-off valve - Installed on the discharge port of the compressor to facilitate maintenance operation.

Suction line shut-off valve - Installed on the suction port of the compressor to facilitate maintenance operation.

High pressure side manometers

Low pressure side manometers

One centrifugal pump (low lift– 100 kPa available static pressure) - Hydronic kit consists of: single direct driven centrifugal pump, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pump are protected from freezing with an additional electrical heater.

One centrifugal pump (high lift– 200 kPa available static pressure) Hydronic kit consists of: single direct driven centrifugal pump, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pump are protected from freezing with an additional electrical heater.

Two centrifugal pump (low lift) - Hydronic kit consists of: twin direct driven centrifugal pumps, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pumps are protected from freezing with an additional electrical heater.

Two centrifugal pump (high lift) Hydronic kit consists of: twin direct driven centrifugal pumps, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pumps are protected from freezing with an additional electrical heater.

Double pressure relief valve with diverter

ELECTRICAL / CONTROL

Compressor thermal overload relays - Safety electronic devices that, added to the standard protection devices, protect compressor motors against overload and current unbalance.

Phase monitor - Device that monitors input voltage and stops the chiller in case of phase loss or wrong phase sequence.

Under / Over voltage control - Electronic device that monitors and displays input voltage, and stops the chiller in case of phase loss, wrong phase sequence, or voltage exceeding minimum and maximum allowed values.

Energy meter - Device installed inside the control box that displays all chiller electrical power parameters at line input such as line voltage and phase current, input active and reactive power, active and reactive energy. An integrated RS485 module allows a Modbus communication to an external BMS.

Capacitors for power factor correction - Devices that increase the power factor of the unit. The capacitors are "dry" self-regenerating type with over pressure disconnecting safety device insulated with a no toxic dielectric mix without PCB or PCT.

Speedtrol (fan speed control device - ON/OFF - up to -18°C) - Continuous fan speed regulation on the first fan (VFD driven) of each circuit. It allows unit operation down to -18ºC.

Setpoint reset, Demand limit and Alarm from external device - Setpoint Reset: The leaving water temperature set-point can be overwritten with an external 4-20mA, through the ambient temperature, or through the evaporator water temperature ΔT. Demand Limit: Chiller capacity can be limited through an external 4-20mA signal or via network. Alarm from external device: The unit controller is able to receive an external alarm signal. The user can decide whether this alarm signal will stop the unit or not.

Compressors circuit breakers Safety devices that include in a single device all safety functions otherwise provided by standard fuses and optional thermal relays, such as protection against overcurrent, overload, current unbalance.

Fans circuit breakers - Safety devices that, added to the standard protection devices, protect fan motors against overload and overcurrent.

Fans speed regulation (+ fan silent mode) - Continuous fan speed regulation of all fans (VFD driven) for improved sound level of the unit during low ambient temperature operation. At very low temperatures, all fans except the first are switched off thus allowing unit operation down to -18°C.

INSTALLATION

Rubber anti vibration 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.

Spring anti vibration mounts - Supplied separately, these are positioned under the base of the unit during installation. Ideal for dampening vibrations for installation on roofs and metallic structures.

External tank without cabinet (500 L)

External tank without cabinet (1000 L)

External tank with cabinet (500 L)

External tank with cabinet (1000 L)

OTHER

Container Kit

Witness test

Acoustic test

Machine type

EWA	= Air cooled chiller cool. only
EWY	= Air cooled chiller heat pump
ERA	= Air cooled condensing unit

Refrigerant

D	= R-134a
P	= R-407C
Q	= R-410A

Capacity class in kW (Cooling)

Always 3-digit
code

Model series

A, B, …..

Inverter

-	= Non inverter

Efficiency level

X	= Standard Efficiency
	= High Efficiency

Sound level

S	= Standard sound
L	= Low sound
R	= Reduced sound

EWAQ E-XS

MODEL		180	200	230	260	320	340		
Capacity - Cooling *	kW	178	200	226	263	315	334		
Capacity control - Type	---	Step	Step	Step	Step	Step	Step		
Capacity control - Minimum capacity	%	50.0	43.0	50.0	33.0	27.0	33.0		
Unit power input - Cooling *	kW	58.0	65.4	73.8	86.2	103	110		
EER *	---	3.06	3.06	3.06	3.05	3.05	3.05		
ESEER	---	4.02	4.11	3.91	4.18	4.17	4.14		
IPLV	---	4.50	4.68	4.51	4.83	4.76	4.66		
CASING									
Colour **	---	IW	IW	IW	IW	IW	IW		
Material **	---	GPSS	GPSS	GPSS	GPSS	GPSS	GPSS		
DIMENSIONS									
Height	mm	2271	2271	2271	2271	2447	2447		
Width	mm	1224	1224	1224	1224	1224	1224		
Length	mm	4413	4413	5313	5313	6213	6213		
WEIGHT									
Unit Weight	kg	1722	1807	1871	2173	2304	2492		
Operating Weight	kg	1734	1819	1885	2188	2318	2507		
WATER HEAT EXCHANGER									
Type **	---	PHE	PHE	PHE	PHE	PHE	PHE		
Water Volume	l	12	12	14	14	14	14		
Nominal water flow rate - Cooling	l/s	8.5	9.6	10.8	12.6	15.1	16.0		
Nominal Water pressure drop - Cooling ***	kPa	27	34	35	47	47	54		
Insulation material **		CC	CC	CC	CC	CC	CC		
AIR HEAT EXCHANGER									
Type **	---	HFP	HFP	HFP	HFP	HFP	HFP		
FAN									
Type **	---	DPT	DPT	DPT	DPT	DPT	DPT		
Drive **	---	DOL	DOL	DOL	DOL	DOL	DOL		
Diameter	mm	800	800	800	800	800	800		
Nominal air flow	l/s	21845	21148	26874	25884	32953	32065		
Quantity	No.	4	4	5	5	6	6		
Speed	rpm	900	900	900	900	900	900		
Motor input	kW	7.0	7.0	8.8	8.8	10.5	10.5		
COMPRESSOR									
Type	---	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll		
Oil charge	l	13	13	13	19	19	19		
Quantity	No.	2	2	2	3	3	3		
SOUND LEVEL ****									
Sound Power - Cooling	dB(A)	93	94	96	95	96	97		
Sound Pressure - Cooling	dB(A)	75	76	76	76	77	77		
REFRIGERANT CIRCUIT									
Refrigerant type	---	R410A	R410A	R410A	R410A	R410A	R410A		
Refrigerant charge	kg	24	31	30	40	43	53		
N. of circuits	No.	1	1	1	1	1	1		
PIPING CONNECTIONS									
Evaporator water inlet/outlet		3"	3"	3"	3"	3"	3"		

** Cooling capacity, unit power input in cooling and EER are based on the following conditions: evaporator 12.0/7.0°C; ambient 35.0°C, unit at full load operation;*
*** IW: Ivory White - GPSS: Galvanized and Painted Steel Sheet - PHE: Plate Heat Exchanger - S&T: Single Pass Shell & Tube.*
***CC: Closed Cell - HFP: High efficiency fin and tube type - DPT: Direct Propeller Type - DOL: Direct On Line - VFD: Inverter - BRS: Brushless.*
**** If red contact factory. **** Details on measurement metods in the Sound Data section*
Unit performances are referred to ideal running conditions that are reproducible in laboratory test environment in accordance to recognized industry standards (i.e. EN14511). Weights and dimensions are indicative –For specific values refer to certified drawing issued by factory.
Data are referred to unit with standard options only. For specific information about additional options refer to databook specific section.

EWAQ E-XL

MODEL		180	200	230	260	320	340		
Capacity - Cooling *	kW	178	200	226	263	315	334		
Capacity control - Type	---	Step	Step	Step	Step	Step	Step		
Capacity control - Minimum capacity	%	50.0	43.0	50.0	33.0	27.0	33.0		
Unit power input - Cooling *	kW	58.0	65.4	73.8	86.2	103	110		
EER *	---	3.06	3.06	3.06	3.05	3.05	3.05		
ESEER	---	4.02	4.11	3.91	4.18	4.17	4.14		
IPLV	---	4.50	4.68	4.51	4.83	4.76	4.66		
CASING									
Colour **	---	IW	IW	IW	IW	IW	IW		
Material **	---	GPSS	GPSS	GPSS	GPSS	GPSS	GPSS		
DIMENSIONS									
Height	mm	2271	2271	2271	2271	2447	2447		
Width	mm	1224	1224	1224	1224	1224	1224		
Length	mm	4413	4413	5313	5313	6213	6213		
WEIGHT									
Unit Weight	kg	1876	1965	2032	2370	2507	2705		
Operating Weight	kg	1889	1978	2047	2385	2522	2719		
WATER HEAT EXCHANGER									
Type **	---	PHE	PHE	PHE	PHE	PHE	PHE		
Water Volume	l	12	12	14	14	14	14		
Nominal water flow rate - Cooling	l/s	8.5	9.6	10.8	12.6	15.1	16.0		
Nominal Water pressure drop - Cooling ***	kPa	27	34	35	47	47	54		
Insulation material **		CC	CC	CC	CC	CC	CC		
AIR HEAT EXCHANGER									
Type **	---	HFP	HFP	HFP	HFP	HFP	HFP		
FAN									
Type **	---	DPT	DPT	DPT	DPT	DPT	DPT		
Drive **	---	DOL	DOL	DOL	DOL	DOL	DOL		
Diameter	mm	800	800	800	800	800	800		
Nominal air flow	l/s	21845	21148	26874	25884	32953	32065		
Quantity	No.	4	4	5	5	6	6		
Speed	rpm	900	900	900	900	900	900		
Motor input	kW	7.0	7.0	8.8	8.8	10.5	10.5		
COMPRESSOR									
Type	---	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll		
Oil charge	l	13	13	13	19	19	19		
Quantity	No.	2	2	2	3	3	3		
SOUND LEVEL ****									
Sound Power - Cooling	dB(A)	91	92	93	92	93	94		
Sound Pressure - Cooling	dB(A)	73	73	73	73	74	74		
REFRIGERANT CIRCUIT									
Refrigerant type	---	R410A	R410A	R410A	R410A	R410A	R410A		
Refrigerant charge	kg	28	31	27	40	43	53		
N. of circuits	No.	1	1	1	1	1	1		
PIPING CONNECTIONS									
Evaporator water inlet/outlet		3"	3"	3"	3"	3"	3"		

** Cooling capacity, unit power input in cooling and EER are based on the following conditions: evaporator 12.0/7.0°C; ambient 35.0°C, unit at full load operation;*
*** IW: Ivory White - GPSS: Galvanized and Painted Steel Sheet - PHE: Plate Heat Exchanger - S&T: Single Pass Shell & Tube.*
***CC: Closed Cell - HFP: High efficiency fin and tube type - DPT: Direct Propeller Type - DOL: Direct On Line - VFD: Inverter - BRS: Brushless.*
**** If red contact factory. **** Details on measurement metods in the Sound Data section*
Unit performances are referred to ideal running conditions that are reproducible in laboratory test environment in accordance to recognized industry standards (i.e. EN14511). Weights and dimensions are indicative –For specific values refer to certified drawing issued by factory.
Data are referred to unit with standard options only. For specific information about additional options refer to databook specific section.

EWAQ E-XR

MODEL		170	190	220	260	300	320		
Capacity - Cooling *	kW	172	186	219	254	302	303		
Capacity control - Type	---	Step	Step	Step	Step	Step	Step		
Capacity control - Minimum capacity	%	50.0	43.0	50.0	33.0	27.0	33.0		
Unit power input - Cooling *	kW	56.5	64.4	71.8	85.4	102	109		
EER *	---	3.05	2.89	3.05	2.97	2.96	2.78		
ESEER	---	4.45	4.57	4.33	4.65	4.62	4.50		
IPLV	---	5.09	5.00	4.90	5.04	5.07	5.20		
CASING									
Colour **	---	IW	IW	IW	IW	IW	IW		
Material **	---	GPSS	GPSS	GPSS	GPSS	GPSS	GPSS		
DIMENSIONS									
Height	mm	2271	2271	2271	2271	2447	2447		
Width	mm	1224	1224	1224	1224	1224	1224		
Length	mm	4413	4413	5313	5313	6213	6213		
WEIGHT									
Unit Weight	kg	1970	2064	2134	2489	2632	2840		
Operating Weight	kg	1982	2076	2148	2503	2647	2855		
WATER HEAT EXCHANGER									
Type **	---	PHE	PHE	PHE	PHE	PHE	PHE		
Water Volume	l	12	12	14	14	14	14		
Nominal water flow rate - Cooling	l/s	8.2	8.9	10.5	12.1	14.5	14.5		
Nominal Water pressure drop - Cooling ***	kPa	26	37	33	44	43	50		
Insulation material **		CC	CC	CC	CC	CC	CC		
AIR HEAT EXCHANGER									
Type **	---	HFP	HFP	HFP	HFP	HFP	HFP		
FAN									
Type **	---	DPT	DPT	DPT	DPT	DPT	DPT		
Drive **	---	DOL	DOL	DOL	DOL	DOL	DOL		
Diameter	mm	800	800	800	800	800	800		
Nominal air flow	l/s	16743	16285	20618	20056	25243	24604		
Quantity	No.	4	4	5	5	6	6		
Speed	rpm	705	705	705	705	705	705		
Motor input	kW	3.0	3.0	3.8	3.8	4.5	4.5		
COMPRESSOR									
Type	---	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll		
Oil charge	l	13	13	13	19	19	19		
Quantity	No.	2	2	2	3	3	3		
SOUND LEVEL ****									
Sound Power - Cooling	dB(A)	85	86	87	86	88	89		
Sound Pressure - Cooling	dB(A)	66	67	68	67	68	69		
REFRIGERANT CIRCUIT									
Refrigerant type	---	R410A	R410A	R410A	R410A	R410A	R410A		
Refrigerant charge	kg	24	31	30	35	43	53		
N. of circuits	No.	1	1	1	1	1	1		
PIPING CONNECTIONS									
Evaporator water inlet/outlet		3"	3"	3"	3"	3"	3"		

** Cooling capacity, unit power input in cooling and EER are based on the following conditions: evaporator 12.0/7.0°C; ambient 35.0°C, unit at full load operation;*
*** IW: Ivory White - GPSS: Galvanized and Painted Steel Sheet - PHE: Plate Heat Exchanger - S&T: Single Pass Shell & Tube.*
***CC: Closed Cell - HFP: High efficiency fin and tube type - DPT: Direct Propeller Type - DOL: Direct On Line - VFD: Inverter - BRS: Brushless.*
**** If red contact factory. **** Details on measurement metods in the Sound Data section*
Unit performances are referred to ideal running conditions that are reproducible in laboratory test environment in accordance to recognized industry standards (i.e. EN14511). Weights and dimensions are indicative –For specific values refer to certified drawing issued by factory.
Data are referred to unit with standard options only. For specific information about additional options refer to databook specific section.

EWAQ E-XS

MODEL		180	200	230	260	320	340		
POWER SUPPLY									
Phases	Nr	3	3	3	3	3	3		
Frequency	Hz	50	50	50	50	50	50		
Voltage	V	400	400	400	400	400	400		
Voltage tolerance Minimum	%	-10%	-10%	-10%	-10%	-10%	-10%		
Voltage tolerance Maximum	%	+10%	+10%	+10%	+10%	+10%	+10%		
UNIT									
Maximum starting current	A	445	557	576	576	639	653		
Nominal running current cooling	A	103	115	129	151	179	190		
Mximum running current	A	137	151	170	200	233	248		
Maximum current for wires sizing	A	151	166	187	220	256	273		
FANS									
Nominal running current cooling	A	16	16	20	20	24	24		
COMPRESSORS									
Phases	Nr	3	3	3	3	3	3		
Voltage	V	400	400	400	400	400	400		
Voltage tolerance Minimum	%	-10%	-10%	-10%	-10%	-10%	-10%		
Voltage tolerance Maximum	%	+10%	+10%	+10%	+10%	+10%	+10%		
Maximum running current	A	119	133	148	178	207	221		
Starting method	---	DOL	DOL	DOL	DOL	DOL	DOL		

Fluid: Water
Allowed voltage tolerance ± 10%. Voltage unbalance between phases must be within ± 3%.
Maximum starting current: starting current of biggest compressor + current of the other compressors at maximum load + fans current at maximum load. In case of inverter driven units, no inrush current at start up is experienced.
Nominal current in cooling mode is referred to the following conditions: evaporator 12/7°C; ambient 35°C; compressors + fans current.
Maximum running current is based on max compressor absorbed current in its envelope and max fans absorbed current
Maximum unit current for wires sizing is based on minimum allowed voltage
Maximum current for wires sizing: (compressors full load ampere + fans current) x 1,1.
Electrical data are subject to modification without notice. Please refer to unit nameplate data

EWAQ E-XL

MODEL		180	200	230	260	320	340		
POWER SUPPLY									
Phases	Nr	3	3	3	3	3	3		
Frequency	Hz	50	50	50	50	50	50		
Voltage	V	400	400	400	400	400	400		
Voltage tolerance Minimum	%	-10%	-10%	-10%	-10%	-10%	-10%		
Voltage tolerance Maximum	%	+10%	+10%	+10%	+10%	+10%	+10%		
UNIT									
Maximum starting current	A	445	557	576	576	639	653		
Nominal running current cooling	A	103	115	129	151	179	190		
Mximum running current	A	137	151	170	200	233	248		
Maximum current for wires sizing	A	151	166	187	220	256	273		
FANS									
Nominal running current cooling	A	16	16	20	20	24	24		
COMPRESSORS									
Phases	Nr	3	3	3	3	3	3		
Voltage	V	400	400	400	400	400	400		
Voltage tolerance Minimum	%	-10%	-10%	-10%	-10%	-10%	-10%		
Voltage tolerance Maximum	%	+10%	+10%	+10%	+10%	+10%	+10%		
Maximum running current	A	119	133	148	178	207	221		
Starting method	---	DOL	DOL	DOL	DOL	DOL	DOL		

Fluid: Water
Allowed voltage tolerance ± 10%. Voltage unbalance between phases must be within ± 3%.
Maximum starting current: starting current of biggest compressor + current of the other compressors at maximum load + fans current at maximum load. In case of inverter driven units, no inrush current at start up is experienced.
Nominal current in cooling mode is referred to the following conditions: evaporator 12/7°C; ambient 35°C; compressors + fans current.
Maximum running current is based on max compressor absorbed current in its envelope and max fans absorbed current
Maximum unit current for wires sizing is based on minimum allowed voltage
Maximum current for wires sizing: (compressors full load ampere + fans current) x 1,1.
Electrical data are subject to modification without notice. Please refer to unit nameplate data

EWAQ E-XR

MODEL		170	190	220	260	300	320		
POWER SUPPLY									
Phases	Nr	3	3	3	3	3	3		
Frequency	Hz	50	50	50	50	50	50		
Voltage	V	400	400	400	400	400	400		
Voltage tolerance Minimum	%	-10%	-10%	-10%	-10%	-10%	-10%		
Voltage tolerance Maximum	%	+10%	+10%	+10%	+10%	+10%	+10%		
UNIT									
Maximum starting current	A	439	551	569	569	630	644		
Nominal running current cooling	A	101	113	126	150	178	189		
Mximum running current	A	131	145	162	193	224	239		
Maximum current for wires sizing	A	144	160	178	212	246	263		
FANS									
Nominal running current cooling	A	10	10	13	13	15	15		
COMPRESSORS									
Phases	Nr	3	3	3	3	3	3		
Voltage	V	400	400	400	400	400	400		
Voltage tolerance Minimum	%	-10%	-10%	-10%	-10%	-10%	-10%		
Voltage tolerance Maximum	%	+10%	+10%	+10%	+10%	+10%	+10%		
Maximum running current	A	119	133	148	178	207	221		
Starting method	---	DOL	DOL	DOL	DOL	DOL	DOL		

Fluid: Water
Allowed voltage tolerance ± 10%. Voltage unbalance between phases must be within ± 3%.
Maximum starting current: starting current of biggest compressor + current of the other compressors at maximum load + fans current at maximum load. In case of inverter driven units, no inrush current at start up is experienced.
Nominal current in cooling mode is referred to the following conditions: evaporator 12/7°C; ambient 35°C; compressors + fans current.
Maximum running current is based on max compressor absorbed current in its envelope and max fans absorbed current
Maximum unit current for wires sizing is based on minimum allowed voltage
Maximum current for wires sizing: (compressors full load ampere + fans current) x 1,1.
Electrical data are subject to modification without notice. Please refer to unit nameplate data

EWAQ E-XL

	Sound pressure level at 1 m from the unit (rif. 2 x 10-5 Pa)								Power
MODEL	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
180	77.7	71.1	70.8	67.8	68.8	66.0	58.4	46.8	72.7	91.4
200	77.9	71.3	71.0	68.0	69.0	66.2	58.6	47.0	73.0	91.6
230	78.4	71.8	71.5	68.5	69.5	66.7	59.1	47.5	73.5	92.6
260	78.2	71.6	71.3	68.3	69.3	66.5	58.9	47.3	73.2	92.4
320	78.6	72.0	71.7	68.7	69.7	66.9	59.3	47.7	73.6	93.4
340	78.7	72.1	71.8	68.8	69.8	67.0	59.4	47.8	73.8	93.6

EWAQ E-XS

	Sound pressure level at 1 m from the unit (rif. 2 x 10-5 Pa)								Power
MODEL	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
180	79.8	73.2	72.9	69.9	70.9	68.1	60.5	48.9	74.9	93.5
200	80.7	74.1	73.8	70.8	71.8	69.0	61.4	49.8	75.7	94.3
230	81.3	74.7	74.4	71.4	72.4	69.6	62.0	50.4	76.4	95.5
260	80.5	73.9	73.6	70.6	71.6	68.8	61.2	49.6	75.5	94.7
320	81.5	74.9	74.6	71.6	72.6	69.8	62.2	50.6	76.5	96.3
340	81.9	75.3	75.0	72.0	73.0	70.2	62.6	51.0	77.0	96.8

EWAQ E-XR

	Sound pressure level at 1 m from the unit (rif. 2 x 10-5 Pa)								Power
MODEL	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
170	70.9	64.3	64.0	61.0	62.0	59.2	51.6	40.0	65.9	84.6
190	72.2	65.6	65.3	62.3	63.3	60.5	52.9	41.3	67.2	85.8
220	72.9	66.3	66.0	63.0	64.0	61.2	53.6	42.0	68.0	87.1
260	71.7	65.1	64.8	61.8	62.8	60.0	52.4	40.8	66.7	85.9
300	73.1	66.5	66.2	63.2	64.2	61.4	53.8	42.2	68.1	87.9
320	73.7	67.1	66.8	63.8	64.8	62.0	54.4	42.8	68.7	88.5

EWAQ E-XL

SOUND PRESSURE LEVEL FOR DIFFERENT DISTANCES (dB(A))							
MODEL	1 m	5 m	10 m	15 m	20 m	25 m	50 m
180	72.7	64.7	59.8	56.7	54.4	52.6	46.9
200	73.0	64.9	60.0	57.0	54.7	52.9	47.1
230	73.5	65.7	60.9	57.8	55.5	53.8	48.0
260	73.2	65.4	60.6	57.6	55.3	53.5	47.8
320	73.6	66.1	61.4	58.4	56.2	54.4	48.7
340	73.8	66.3	61.6	58.6	56.3	54.5	48.9

EWAQ E-XS

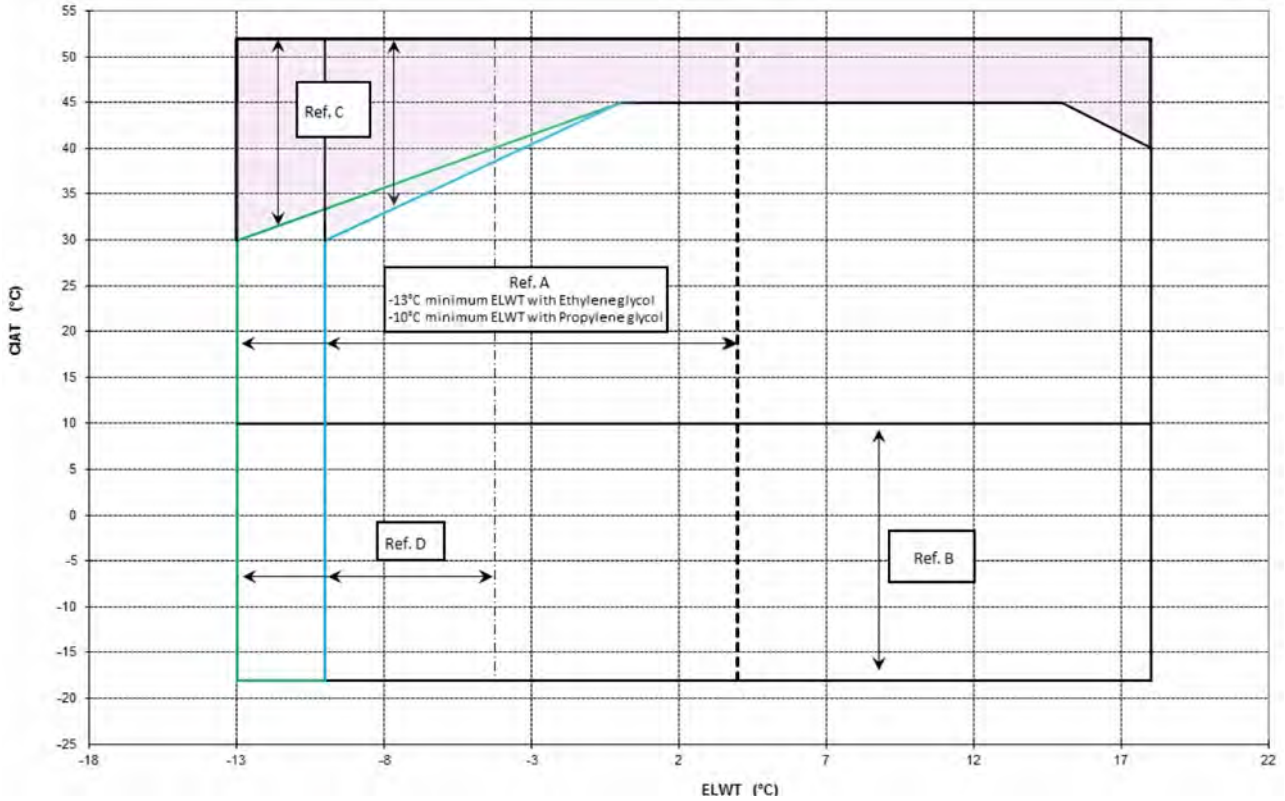
SOUND PRESSURE LEVEL FOR DIFFERENT DISTANCES (dB(A))							
MODEL	1 m	5 m	10 m	15 m	20 m	25 m	50 m
180	74.9	66.8	61.9	58.8	56.6	54.8	49.0
200	75.7	67.6	62.8	59.7	57.4	55.6	49.9
230	76.4	68.6	63.8	60.7	58.4	56.7	50.9
260	75.5	67.7	62.9	59.9	57.6	55.8	50.1
320	76.5	69.0	64.3	61.3	59.1	57.3	51.6
340	77.0	69.5	64.8	61.8	59.5	57.8	52.1

EWAQ E-XR

SOUND PRESSURE LEVEL FOR DIFFERENT DISTANCES (dB(A))							
MODEL	1 m	5 m	10 m	15 m	20 m	25 m	50 m
170	65.9	57.9	53.0	49.9	47.6	45.8	40.1
190	67.2	59.1	54.3	51.2	48.9	47.1	41.4
220	68.0	60.1	55.4	52.3	50.0	48.2	42.5
260	66.7	58.9	54.1	51.1	48.8	47.0	41.3
300	68.1	60.6	55.9	52.9	50.7	48.9	43.2
320	68.7	61.2	56.5	53.5	51.3	49.5	43.8

***** Value are referred to:evaporator 12/7°C, air ambient 35°C, full load operation. For aircooled Eurovent certified units,sound power level is measured in accordance with ISO9614 and Eurovent 8/1 and certified by Eurovent.Sound pressure level is calculated from sound power level. Eurovent certification refers to the overall sound power level only.Sound pressure in frequency bands is for information only and not considered binding. For other units,sound pressure level is measured in accordance with ISO3744.Sound power level is calculated from sound pressure level.***

Operating Limits



Note

The above graphic represents a guideline about the operating limits of the range. Please refer to Chiller Selection Software (CSS) for real operating limits working conditions for each size.

Legend:

ELWT = Evaporator Leaving Water Temperature (°C)
CIAT = Condenser Inlet Air Temperature (°C)

Ref.:

A = Operation with Glycol (below 4°C Evap ELWT, -13°C minimum ELWT with Ethylene glicol, -10°C minimum ELWT with Propylene glicol)
B = Fan speed modulation or Speedtroll required (below 10°C Condens. Air Temp.)
C = In this area units can work at partial load
D = In this area the unit minimum capacity might be higher than value shown in Technical Specification table

Table 1 - Water heat exchanger - Minimum and maximum water Δt

A - Δt	°C	8
B - Δt	°C	4

Legend:

A = Max evaporator water Δt
B = Min evaporator water Δt

Table 2 - Water heat exchanger - Fouling factors

A	B	C	D
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

Legend:
A = Fouling factors (m2 °C / kW)
B = Cooling capacity correction factor
C = Power input correction factor
D = EER correction factor

Table 3 - Air heat exchanger - Altitude correction factors

A	0	300	600	900	1200	1500	1800
B	1013	977	942	908	875	843	812
C	1.000	0.993	0.986	0.979	0.973	0.967	0.960
D	1.000	1.005	1.009	1.015	1.021	1.026	1.031

Legend:
A = Elevation above sea level (m)
B = Barometric pressure (mbar)
C = Cooling capacity correction factor
D = Power input correction factor

- Maximum operating altitude is 2000 m above sea level
- Contact factory in case the unit has to be installed at altitudes between 1000 and 2000 m above sea level

Table 4 - Minimum glycol percentage for low air ambient temperature

AAT (2)	-3	-8	-15	-20
A (1)	10%	20%	30%	40%
AAT (2)	-3	-7	-12	-20
B (1)	10%	20%	30%	40%

Legend:

AAT = Air Ambient Temperature (°C) (2)
A = Ethylene glycol (%) (1)
B = Propylene glycol (%) (1)

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

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

Table 5.1 - Available fan static pressure correction factors

A	0	10	20	30	40	50	60	70	80	90	100
B	1.000	0.998	0.996	0.995	0.993	0.992	0.991	0.989	0.986	0.985	0.982
C	1.000	1.004	1.009	1.012	1.018	1.021	1.024	1.027	1.034	1.039	1.045
D	1.0	-0.3	-0.5	-0.7	-1.0	-1.1	-1.3	-1.6	-1.8	2.1	-2.4

The above data are referred to:
- Fan 800 mm diameter
- Fan speed 890 rpm or 900 rpm

Legend:
A = External Static Pressure (Pa)
B = Cooling Capacity (kW) Correction factor
C = Compressor Power Input (kW) Correction factor
D = Reduction of Maximum Condenser Inlet Air Temperature (°C)

Table 5.2 - Available fan static pressure correction factors

A	0	10	20	30	40	50	60	70
B	1.000	0.996	0.991	0.985	0.978	0.970	0.954	0.927
C	1.000	1.005	1.012	1.020	1.028	1.039	1.058	1.092
D	1.0	-0.3	-0.7	-1.1	-1.6	-2.2	-3.3	-5.1

The above data are referred to:
- Fan 800 mm diameter
- Fan speed 700 rpm or 705 rpm

Legend:
A = External Static Pressure (Pa)
B = Cooling Capacity (kW) Correction factor
C = Compressor Power Input (kW) Correction factor
D = Reduction of Maximum Condenser Inlet Air Temperature (°C)

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, have 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 with a certain approximation using this simplified formula:

For 2 compressors unit
M (liters) = (12.153 x DT(°C) - 22.168) x P(kW)

For 3 compressors unit
M (liters) = (1.7321 x DT(°C) + 2.7749) 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.

Water charge, flow and quality

Water charge, flow and quality

Items (1) (6)			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	6.8 - 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 80	Below 80	Below 30	Below 30	Below 30	Below 30	Corrosion + Scale
		(μS/cm) at 25°C	(Below 800)	(Below 300)	(Below 400)	(Below 800)	(Below 800)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	Corrosion + Scale
	Chloride ion	[mgCl^{2-}/l]	Below 200	Below 50	Below 50	Below 200	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	Sulfate ion	[mgSO^{2-}_4/l]	Below 200	Below 50	Below 50	Below 200	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 100	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Total hardness	[mg$CaCO_3$/l]	Below 200	Below 70	Below 70	Below 200	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
	Oxygen	(mg O2 /l)	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Corrosion
	Particole size	(mm)	Below 0.5	Below 0.5	Below 0.5	Below 0.5	Below 0.6	Below 0.5	Below 0.6	Below 0.5	Below 0.6	Erosion
	Total dissolved solids	(mg / l)	Below 1000	Below 1000	Below 1000	Below 1000	Below 1001	Below 1000	Below 1001	Below 1000	Below 1001	Erosion
	Ethykene, Propylene Glycol (weight conc.)		Below 60%	Below 60%	—	Below 60%	Below 60%	Below 60%	Below 60%	Below 60%	Below 60%	–
Items to be referred to:	Nitrate ion	(mg NO3- /l)	Below 100	Below 100	Below 100	Below 100	Below 101	Below 100	Below 101	Below 100	Below 101	Corrosion
	TOC Total organic carbon	(mg /l)	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Scale
	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	[mgNH^+_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

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.

6 The limits above have to be considered as a general prescription and con not totallu assure the absence of corrossion and erosion.
Some particular combinations of elements or the presence of components not listed in the table or factors not considered may trigger corrosion phenomena.

EWAQ E-XS

			180						200					
Twout		**Ta**	**25**	**30**	**35**	**40**	**43**	**46**	**25**	**30**	**35**	**40**	**43**	**46**
5	CC	kW	187	178	168	157	150	143	211	200	189	177	169	161
	PI	kW	48.7	52.6	57.1	62.3	65.7	69.4	55.3	59.5	64.4	69.9	73.7	77.7
	qw	l/s	8.9	8.5	8.0	7.5	7.2	6.8	10.1	9.6	9.0	8.5	8.1	7.7
	dpw	kPa	30	27	24	21	20	18	38	34	31	27	24	22
7	CC	kW	198	188	178	166	159	152	223	212	200	187	179	171
	PI	kW	49.5	53.5	58	63.2	66.6	70.3	56.2	60.5	65.4	70.9	74.7	78.7
	qw	l/s	9.5	9.0	8.5	8.0	7.6	7.3	10.7	10.1	9.6	9.0	8.6	8.2
	dpw	kPa	34	31	27	24	22	20	43	38	34	30	27	25
9	CC	kW	209	199	188	176	168	160	236	224	211	198	189	180
	PI	kW	50.4	54.4	59	64.1	67.6	71.3	57.2	61.5	66.4	72	75.7	79.7
	qw	l/s	10.0	9.5	9.0	8.4	8.1	7.7	11.3	10.7	10.1	9.5	9.1	8.6
	dpw	kPa	38	34	31	27	25	22	48	43	38	34	31	28
11	CC	kW	221	210	198	185	177	169	248	236	223	208	199	190
	PI	kW	51.4	55.4	60	65.2	68.6	72.4	58.3	62.6	67.5	73	76.8	80.8
	qw	l/s	10.6	10.1	9.5	8.9	8.5	8.1	11.9	11.3	10.7	10.0	9.6	9.1
	dpw	kPa	42	38	34	30	27	25	53	48	43	37	34	31
13	CC	kW	233	221	208	195	187	178	261	248	234	219	210	200
	PI	kW	52.4	56.4	61	66.3	69.7	73.5	59.4	63.7	68.6	74.1	77.9	81.9
	qw	l/s	11.2	10.6	10.0	9.4	9.0	8.5	12.6	11.9	11.3	10.5	10.1	9.6
	dpw	kPa	47	42	38	33	30	28	59	53	47	41	38	34
15	CC	kW	245	232	219	205	196	187	275	261	246	231	221	211
	PI	kW	53.5	57.5	62.2	67.5	70.9	74.7	60.6	64.9	69.7	75.3	79	83
	qw	l/s	11.8	11.2	10.5	9.9	9.4	9.0	13.2	12.6	11.8	11.1	10.6	10.1
	dpw	kPa	52	47	42	37	34	31	65	59	52	46	42	38

			230						260					
Twout		**Ta**	**25**	**30**	**35**	**40**	**43**	**46**	**25**	**30**	**35**	**40**	**43**	**46**
5	CC	kW	239	227	214	200	191	182	277	263	249	233	223	212
	PI	kW	63.2	67.6	72.8	78.7	82.7	87.1	72	78	84.8	92.7	97.9	104
	qw	l/s	11.4	10.8	10.2	9.6	9.1	8.7	13.2	12.6	11.9	11.1	10.7	10.1
	dpw	kPa	39	35	32	28	25	23	52	47	42	37	34	30
7	CC	kW	252	240	226	212	202	193	292	278	263	246	236	224
	PI	kW	64.2	68.7	73.8	79.7	83.7	88.1	73.3	79.3	86.2	94.1	99.3	105
	qw	l/s	12.1	11.5	10.8	10.1	9.7	9.2	14.0	13.3	12.6	11.8	11.3	10.7
	dpw	kPa	44	40	35	31	28	26	58	52	47	41	38	34
9	CC	kW	266	253	239	223	214	204	308	293	277	260	249	237
	PI	kW	65.3	69.8	74.9	80.8	84.8	89.1	74.7	80.8	87.7	95.5	101	106
	qw	l/s	12.8	12.1	11.4	10.7	10.2	9.8	14.8	14.1	13.3	12.5	11.9	11.4
	dpw	kPa	49	44	39	35	32	29	65	58	52	46	42	38
11	CC	kW	281	267	252	236	226	215	325	309	292	274	262	250
	PI	kW	66.5	70.9	76	81.9	85.8	90.1	76.2	82.3	89.2	97.1	102	108
	qw	l/s	13.5	12.8	12.1	11.3	10.8	10.3	15.6	14.8	14.0	13.1	12.6	12.0
	dpw	kPa	55	49	44	39	35	32	72	65	58	51	47	42
13	CC	kW	296	281	265	248	238	227	342	325	307	288	275	263
	PI	kW	67.6	72.1	77.2	83	86.9	91.2	77.8	83.9	90.9	98.8	104	110
	qw	l/s	14.2	13.5	12.7	11.9	11.4	10.9	16.4	15.6	14.8	13.8	13.2	12.6
	dpw	kPa	61	55	49	43	39	36	80	72	64	56	52	47
15	CC	kW	311	295	279	261	250	239	359	341	322	302	289	276
	PI	kW	68.8	73.3	78.3	84.1	88	92.2	79.5	85.7	92.7	101	106	112
	qw	l/s	15.0	14.2	13.4	12.6	12.0	11.5	17.3	16.4	15.5	14.5	13.9	13.3
	dpw	kPa	67	61	54	47	43	40	88	80	71	62	57	52

EWAQ E-XS

			320						340					
Twout		**Ta**	**25**	**30**	**35**	**40**	**43**	**46**	**25**	**30**	**35**	**40**	**43**	**46**
5	CC	kW	333	316	298	279	266	253	353	336	317	296	283	270
	PI	kW	87.3	93.9	101	110	116	122	93.4	100	108	117	123	130
	qw	l/s	15.9	15.1	14.3	13.3	12.7	12.1	16.9	16.1	15.2	14.2	13.5	12.9
	dpw	kPa	52	47	42	37	33	30	60	54	48	42	39	35
7	CC	kW	351	334	315	294	281	268	373	354	334	313	299	285
	PI	kW	88.9	95.5	103	112	118	124	95.1	102	110	119	125	131
	qw	l/s	16.8	16.0	15.1	14.1	13.5	12.8	17.9	17.0	16.0	15.0	14.3	13.6
	dpw	kPa	58	53	47	41	37	34	67	61	54	47	43	39
9	CC	kW	370	352	332	311	297	283	393	373	352	330	316	301
	PI	kW	90.6	97.2	105	113	119	125	96.9	104	111	120	126	133
	qw	l/s	17.8	16.9	15.9	14.9	14.2	13.6	18.9	17.9	16.9	15.8	15.1	14.4
	dpw	kPa	65	59	52	46	42	38	75	67	60	53	48	44
11	CC	kW	390	370	349	327	313	298	413	393	371	347	333	317
	PI	kW	92.3	98.9	106	115	121	127	98.7	105	113	122	128	135
	qw	l/s	18.7	17.8	16.8	15.7	15.0	14.3	19.9	18.9	17.8	16.7	16.0	15.2
	dpw	kPa	72	65	58	51	47	42	83	75	67	58	54	49
13	CC	kW	410	389	367	344	329	314	434	413	390	365	350	334
	PI	kW	94.1	101	108	117	123	129	100	107	115	124	130	136
	qw	l/s	19.7	18.7	17.7	16.5	15.8	15.1	20.9	19.9	18.8	17.6	16.8	16.0
	dpw	kPa	80	72	64	56	52	47	92	83	74	65	59	54
15	CC	kW	430	408	386	361	346	241	455	433	409	384	368	351
	PI	kW	95.9	103	110	119	124	80.2	102	109	117	126	132	138
	qw	l/s	20.7	19.7	18.6	17.4	16.6	11.6	21.9	20.9	19.7	18.5	17.7	16.9
	dpw	kPa	88	80	71	62	57	28	101	91	82	72	66	60

Fluid: Water
Ta: Condenser inlet air temperature; Twout: Evaporator leaving water temperature (Δt 5°C)
CC: Cooling capacity; PI: Power input; qw: Fluid flow rate; dpw: Fluid pressure drop
** For working condition where dpw value is "Italic-Red Color" please contac factory*

EWAQ E-XL

			180						200					
Twout		**Ta**	**25**	**30**	**35**	**40**	**43**	**46**	**25**	**30**	**35**	**40**	**43**	**46**
5	CC	kW	187	178	168	157	150	143	211	200	189	177	169	161
	PI	kW	48.7	52.6	57.1	62.3	65.7	69.4	55.3	59.5	64.4	69.9	73.7	77.7
	qw	l/s	8.9	8.5	8.0	7.5	7.2	6.8	10.1	9.6	9.0	8.5	8.1	7.7
	dpw	kPa	30	27	24	21	20	18	38	34	31	27	24	22
7	CC	kW	198	188	178	166	159	152	223	212	200	187	179	171
	PI	kW	49.5	53.5	58	63.2	66.6	70.3	56.2	60.5	65.4	70.9	74.7	78.7
	qw	l/s	9.5	9.0	8.5	8.0	7.6	7.3	10.7	10.1	9.6	9.0	8.6	8.2
	dpw	kPa	34	31	27	24	22	20	43	38	34	30	27	25
9	CC	kW	209	199	188	176	168	160	236	224	211	198	189	180
	PI	kW	50.4	54.4	59	64.1	67.6	71.3	57.2	61.5	66.4	72	75.7	79.7
	qw	l/s	10.0	9.5	9.0	8.4	8.1	7.7	11.3	10.7	10.1	9.5	9.1	8.6
	dpw	kPa	38	34	31	27	25	22	48	43	38	34	31	28
11	CC	kW	221	210	198	185	177	169	248	236	223	208	199	190
	PI	kW	51.4	55.4	60	65.2	68.6	72.4	58.3	62.6	67.5	73	76.8	80.8
	qw	l/s	10.6	10.1	9.5	8.9	8.5	8.1	11.9	11.3	10.7	10.0	9.6	9.1
	dpw	kPa	42	38	34	30	27	25	53	48	43	37	34	31
13	CC	kW	233	221	208	195	187	178	261	248	234	219	210	200
	PI	kW	52.4	56.4	61	66.3	69.7	73.5	59.4	63.7	68.6	74.1	77.9	81.9
	qw	l/s	11.2	10.6	10.0	9.4	9.0	8.5	12.6	11.9	11.3	10.5	10.1	9.6
	dpw	kPa	47	42	38	33	30	28	59	53	47	41	38	34
15	CC	kW	245	232	219	205	196	187	275	261	246	231	221	211
	PI	kW	53.5	57.5	62.2	67.5	70.9	74.7	60.6	64.9	69.7	75.3	79	83
	qw	l/s	11.8	11.2	10.5	9.9	9.4	9.0	13.2	12.6	11.8	11.1	10.6	10.1
	dpw	kPa	52	47	42	37	34	31	65	59	52	46	42	38

			230						260					
Twout		**Ta**	**25**	**30**	**35**	**40**	**43**	**46**	**25**	**30**	**35**	**40**	**43**	**46**
5	CC	kW	239	227	214	200	191	182	277	263	249	233	223	212
	PI	kW	63.2	67.6	72.8	78.7	82.7	87.1	72	78	84.8	92.7	97.9	104
	qw	l/s	11.4	10.8	10.2	9.6	9.1	8.7	13.2	12.6	11.9	11.1	10.7	10.1
	dpw	kPa	39	35	32	28	25	23	52	47	42	37	34	30
7	CC	kW	252	240	226	212	202	193	292	278	263	246	236	224
	PI	kW	64.2	68.7	73.8	79.7	83.7	88.1	73.3	79.3	86.2	94.1	99.3	105
	qw	l/s	12.1	11.5	10.8	10.1	9.7	9.2	14.0	13.3	12.6	11.8	11.3	10.7
	dpw	kPa	44	40	35	31	28	26	58	52	47	41	38	34
9	CC	kW	266	253	239	223	214	204	308	293	277	260	249	237
	PI	kW	65.3	69.8	74.9	80.8	84.8	89.1	74.7	80.8	87.7	95.5	101	106
	qw	l/s	12.8	12.1	11.4	10.7	10.2	9.8	14.8	14.1	13.3	12.5	11.9	11.4
	dpw	kPa	49	44	39	35	32	29	65	58	52	46	42	38
11	CC	kW	281	267	252	236	226	215	325	309	292	274	262	250
	PI	kW	66.5	70.9	76	81.9	85.8	90.1	76.2	82.3	89.2	97.1	102	108
	qw	l/s	13.5	12.8	12.1	11.3	10.8	10.3	15.6	14.8	14.0	13.1	12.6	12.0
	dpw	kPa	55	49	44	39	35	32	72	65	58	51	47	42
13	CC	kW	296	281	265	248	238	227	342	325	307	288	275	263
	PI	kW	67.6	72.1	77.2	83	86.9	91.2	77.8	83.9	90.9	98.8	104	110
	qw	l/s	14.2	13.5	12.7	11.9	11.4	10.9	16.4	15.6	14.8	13.8	13.2	12.6
	dpw	kPa	61	55	49	43	39	36	80	72	64	56	52	47
15	CC	kW	311	295	279	261	250	239	359	341	322	302	289	276
	PI	kW	68.8	73.3	78.3	84.1	88	92.2	79.5	85.7	92.7	101	106	112
	qw	l/s	15.0	14.2	13.4	12.6	12.0	11.5	17.3	16.4	15.5	14.5	13.9	13.3
	dpw	kPa	67	61	54	47	43	40	88	80	71	62	57	52

EWAQ E-XL

			320						340					
Twout		**Ta**	**25**	**30**	**35**	**40**	**43**	**46**	**25**	**30**	**35**	**40**	**43**	**46**
5	CC	kW	333	316	298	279	266	253	353	336	317	296	283	270
	PI	kW	87.3	93.9	101	110	116	122	93.4	100	108	117	123	130
	qw	l/s	15.9	15.1	14.3	13.3	12.7	12.1	16.9	16.1	15.2	14.2	13.5	12.9
	dpw	kPa	52	47	42	37	33	30	60	54	48	42	39	35
7	CC	kW	351	334	315	294	281	268	373	354	334	313	299	285
	PI	kW	88.9	95.5	103	112	118	124	95.1	102	110	119	125	131
	qw	l/s	16.8	16.0	15.1	14.1	13.5	12.8	17.9	17.0	16.0	15.0	14.3	13.6
	dpw	kPa	58	53	47	41	37	34	67	61	54	47	43	39
9	CC	kW	370	352	332	311	297	283	393	373	352	330	316	301
	PI	kW	90.6	97.2	105	113	119	125	96.9	104	111	120	126	133
	qw	l/s	17.8	16.9	15.9	14.9	14.2	13.6	18.9	17.9	16.9	15.8	15.1	14.4
	dpw	kPa	65	59	52	46	42	38	75	67	60	53	48	44
11	CC	kW	390	370	349	327	313	298	413	393	371	347	333	317
	PI	kW	92.3	98.9	106	115	121	127	98.7	105	113	122	128	135
	qw	l/s	18.7	17.8	16.8	15.7	15.0	14.3	19.9	18.9	17.8	16.7	16.0	15.2
	dpw	kPa	72	65	58	51	47	42	83	75	67	58	54	49
13	CC	kW	410	389	367	344	329	314	434	413	390	365	350	334
	PI	kW	94.1	101	108	117	123	129	100	107	115	124	130	136
	qw	l/s	19.7	18.7	17.7	16.5	15.8	15.1	20.9	19.9	18.8	17.6	16.8	16.0
	dpw	kPa	80	72	64	56	52	47	92	83	74	65	59	54
15	CC	kW	430	408	386	361	346	241	455	433	409	384	368	351
	PI	kW	95.9	103	110	119	124	80.2	102	109	117	126	132	138
	qw	l/s	20.7	19.7	18.6	17.4	16.6	11.6	21.9	20.9	19.7	18.5	17.7	16.9
	dpw	kPa	88	80	71	62	57	28	101	91	82	72	66	60

Fluid: Water
Ta: Condenser inlet air temperature; Twout: Evaporator leaving water temperature (Δt 5°C)
CC: Cooling capacity; PI: Power input; qw: Fluid flow rate; dpw: Fluid pressure drop
** For working condition where dpw value is "Italic-Red Color" please contac factory*

EWAQ E-XR

			170						190					
Twout		**Ta**	**25**	**30**	**35**	**40**	**43**	**46**	**25**	**30**	**35**	**40**	**43**	**46**
5	CC	kW	182	173	163	152	145	138	198	188	176	164	157	149
	PI	kW	46.6	50.7	55.5	60.9	64.5	68.3	53.7	58.1	63.3	69.1	73.1	77.4
	qw	l/s	8.7	8.3	7.8	7.3	6.9	6.6	9.5	9.0	8.4	7.9	7.5	7.1
	dpw	kPa	29	26	23	20	18	16	42	38	33	29	26	24
7	CC	kW	193	183	172	161	153	146	209	198	186	173	165	157
	PI	kW	47.5	51.7	56.5	61.9	65.5	69.4	54.8	59.3	64.4	70.3	74.2	78.5
	qw	l/s	9.2	8.8	8.2	7.7	7.3	7.0	10.0	9.5	8.9	8.3	7.9	7.5
	dpw	kPa	32	29	26	22	20	18	47	42	37	32	29	27
9	CC	kW	203	193	182	169	162	154	221	209	196	183	174	108
	PI	kW	48.5	52.8	57.6	63	66.6	70.5	55.9	60.5	65.6	71.5	75.4	40.3
	qw	l/s	9.8	9.2	8.7	8.1	7.7	7.4	10.6	10.0	9.4	8.8	8.4	5.2
	dpw	kPa	36	32	29	25	23	20	53	47	42	36	33	13
11	CC	kW	214	203	191	178	170	96.3	232	220	207	192	184	114
	PI	kW	49.6	53.9	58.7	64.2	67.8	32.2	57.2	61.7	66.8	72.7	76.7	40.7
	qw	l/s	10.3	9.7	9.2	8.6	8.2	4.6	11.2	10.6	9.9	9.2	8.8	5.5
	dpw	kPa	40	36	32	28	25	8	58	52	46	40	36	14
13	CC	kW	226	214	201	188	179	102	244	231	217	202	193	121
	PI	kW	50.7	55.1	59.9	65.5	69.1	32.6	58.4	63	68.1	74	78	41.1
	qw	l/s	10.8	10.3	9.7	9.0	8.6	4.9	11.7	11.1	10.4	9.7	9.3	5.8
	dpw	kPa	44	40	35	31	28	9	65	58	51	44	40	16
15	CC	kW	237	224	211	197	188	108	256	242	228	212	203	128
	PI	kW	51.9	56.3	61.2	66.8	70.4	33.1	59.8	64.3	69.5	75.4	79.3	41.5
	qw	l/s	11.4	10.8	10.1	9.5	9.0	5.2	12.3	11.7	11.0	10.2	9.7	6.1
	dpw	kPa	49	44	39	34	31	10	71	64	56	49	45	18

			220						260					
Twout		**Ta**	**25**	**30**	**35**	**40**	**43**	**46**	**25**	**30**	**35**	**40**	**43**	**46**
5	CC	kW	233	220	207	193	184	175	269	255	240	224	214	203
	PI	kW	60.4	65.1	70.6	76.9	81.1	85.7	70.2	76.6	83.9	92.2	97.7	104
	qw	l/s	11.1	10.5	9.9	9.2	8.8	8.4	12.9	12.2	11.5	10.7	10.2	9.7
	dpw	kPa	37	33	30	26	23	21	49	44	39	34	31	28
7	CC	kW	246	233	219	204	195	185	284	269	254	237	226	214
	PI	kW	61.6	66.3	71.8	78	82.3	86.8	71.7	78.1	85.4	93.8	99.3	105
	qw	l/s	11.8	11.1	10.5	9.8	9.3	8.8	13.6	12.9	12.1	11.3	10.8	10.3
	dpw	kPa	42	37	33	29	26	24	55	49	44	38	35	31
9	CC	kW	259	245	231	215	205	195	299	284	267	249	238	170
	PI	kW	62.8	67.5	73	79.2	83.4	88	73.3	79.8	87.1	95.5	101	65.5
	qw	l/s	12.4	11.8	11.1	10.3	9.8	9.3	14.4	13.6	12.8	11.9	11.4	8.2
	dpw	kPa	46	42	37	32	29	26	61	55	48	42	38	20
11	CC	kW	273	258	243	227	216	123	315	298	281	262	250	180
	PI	kW	64.1	68.8	74.2	80.5	84.6	40.5	75	81.5	88.9	97.3	103	66.5
	qw	l/s	13.1	12.4	11.7	10.9	10.4	5.9	15.1	14.3	13.5	12.6	12.0	8.6
	dpw	kPa	52	46	41	36	32	10	68	61	54	47	43	22
13	CC	kW	286	271	255	238	228	130	330	313	295	275	262	190
	PI	kW	65.3	70.1	75.5	81.7	85.9	40.9	76.8	83.4	90.8	99.2	105	67.5
	qw	l/s	13.8	13.0	12.3	11.4	10.9	6.2	15.9	15.1	14.2	13.2	12.6	9.1
	dpw	kPa	57	51	45	39	36	12	75	67	59	52	47	25
15	CC	kW	301	285	268	250	239	138	346	328	309	288	275	200
	PI	kW	66.7	71.4	76.8	83	87.1	41.3	78.7	85.3	92.9	101	107	68.6
	qw	l/s	14.5	13.7	12.9	12.0	11.5	6.6	16.7	15.8	14.9	13.9	13.2	9.6
	dpw	kPa	63	57	50	44	40	13	82	74	65	57	52	27

EWAQ E-XR

			300						320					
Twout		**Ta**	**25**	**30**	**35**	**40**	**43**	**46**	**25**	**30**	**35**	**40**	**43**	**46**
5	CC	kW	322	305	287	267	254	241	323	306	288	268	255	242
	PI	kW	85.3	92.3	100	110	116	123	91.4	98.7	107	117	123	131
	qw	l/s	15.4	14.6	13.7	12.8	12.2	11.5	15.5	14.6	13.8	12.8	12.2	11.6
	dpw	kPa	49	44	39	34	30	27	57	51	45	39	35	32
7	CC	kW	340	322	302	281	268	186	340	322	303	282	269	192
	PI	kW	87.1	94.2	102	112	118	73.3	93.3	101	109	119	125	81.6
	qw	l/s	16.3	15.4	14.5	13.5	12.8	8.9	16.3	15.5	14.5	13.5	12.9	9.2
	dpw	kPa	55	49	43	37	34	16	63	56	50	43	39	20
9	CC	kW	358	339	318	296	282	197	358	339	319	297	284	204
	PI	kW	89	96	104	113	120	74.2	95.2	103	111	121	127	82.5
	qw	l/s	17.2	16.2	15.3	14.2	13.5	9.4	17.2	16.3	15.3	14.3	13.6	9.8
	dpw	kPa	61	54	48	42	38	18	70	63	55	48	44	22
11	CC	kW	376	356	334	312	297	208	376	356	335	313	298	215
	PI	kW	90.9	98	106	115	122	75.2	97.2	105	113	123	129	83.4
	qw	l/s	18.1	17.1	16.1	15.0	14.3	10.0	18.1	17.1	16.1	15.0	14.3	10.3
	dpw	kPa	67	60	53	46	42	21	77	69	61	53	48	25
13	CC	kW	395	373	351	327	312	220	395	374	352	328	313	227
	PI	kW	92.9	100	108	117	124	76.2	99.3	107	115	125	131	84.4
	qw	l/s	19.0	18.0	16.9	15.7	15.0	10.6	19.0	18.0	16.9	15.8	15.1	10.9
	dpw	kPa	74	66	59	51	46	23	85	76	68	59	53	28
15	CC	kW	413	391	368	343	243	232	413	392	369	344	251	240
	PI	kW	95	102	110	120	73.4	77.2	101	109	117	127	81.3	85.4
	qw	l/s	19.9	18.8	17.7	16.5	11.7	11.1	19.9	18.9	17.8	16.6	12.0	11.5
	dpw	kPa	82	73	65	56	28	26	94	84	74	65	34	31

Fluid: Water
Ta: Condenser inlet air temperature; Twout: Evaporator leaving water temperature (Δt 5°C)
CC: Cooling capacity; PI: Power input; qw: Fluid flow rate; dpw: Fluid pressure drop
** For working condition where dpw value is "Italic-Red Color" please contac factory*

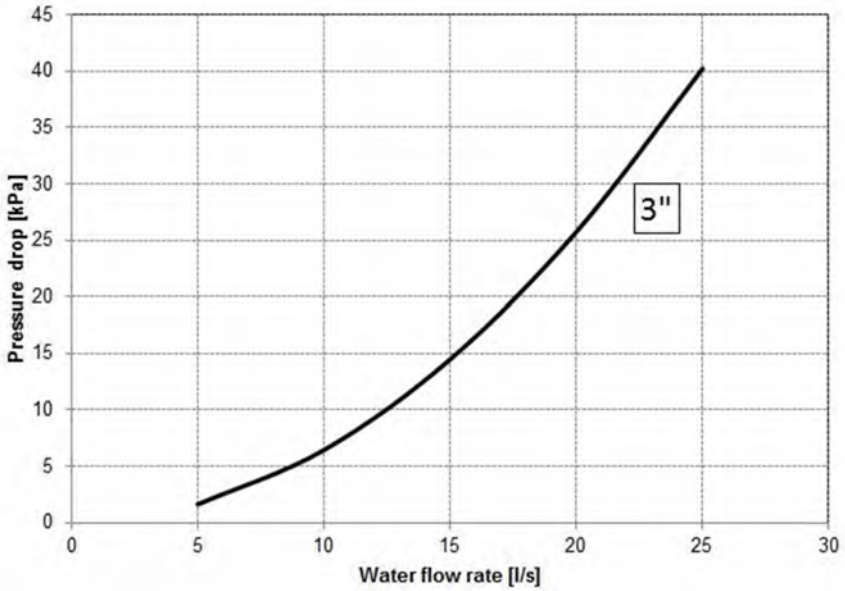
Water filter and piping diameter - Combination matrix

	Water filter size and piping diameter
	3"
EWAQ180E-XS	X
EWAQ200E-XS	X
EWAQ230E-XS	X
EWAQ260E-XS	X
EWAQ320E-XS	X
EWAQ340E-XS	X

	Water filter size and piping diameter
	3"
EWAQ180E-XL	X
EWAQ200E-XL	X
EWAQ230E-XL	X
EWAQ260E-XL	X
EWAQ320E-XL	X
EWAQ340E-XL	X

	Water filter size and piping diameter
	3"
EWAQ170E-XR	X
EWAQ190E-XR	X
EWAQ220E-XR	X
EWAQ260E-XR	X
EWAQ300E-XR	X
EWAQ320E-XR	X

Filter pressure drops



Note:
to calculate the pressure drops values introduced by the water filter, refer to the above curves.

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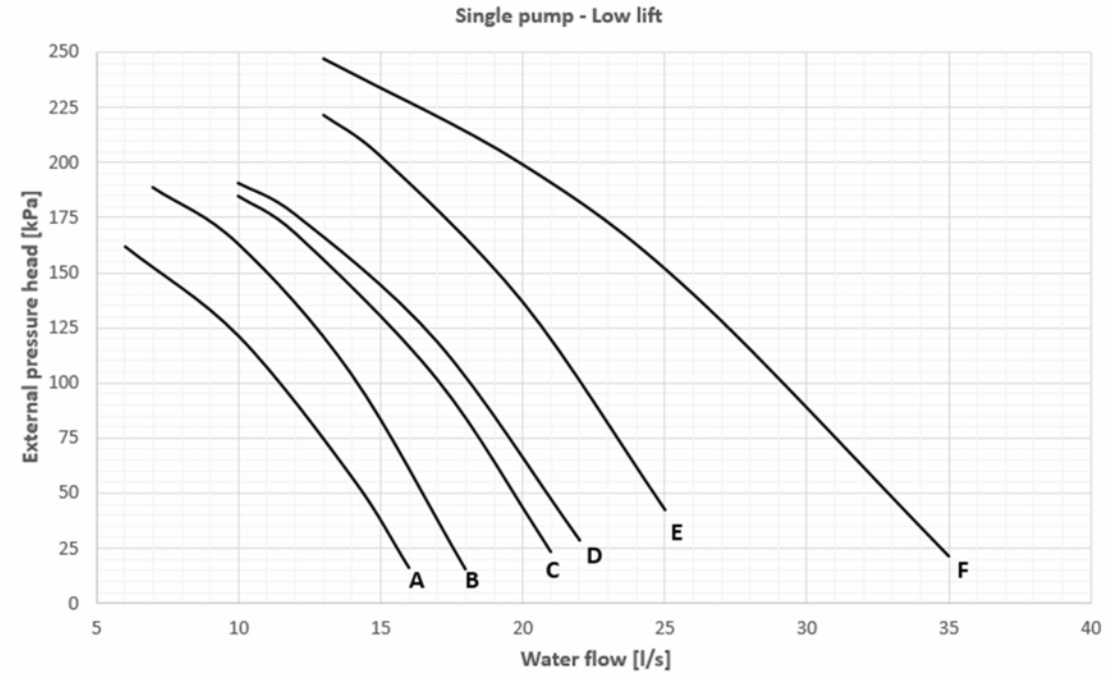
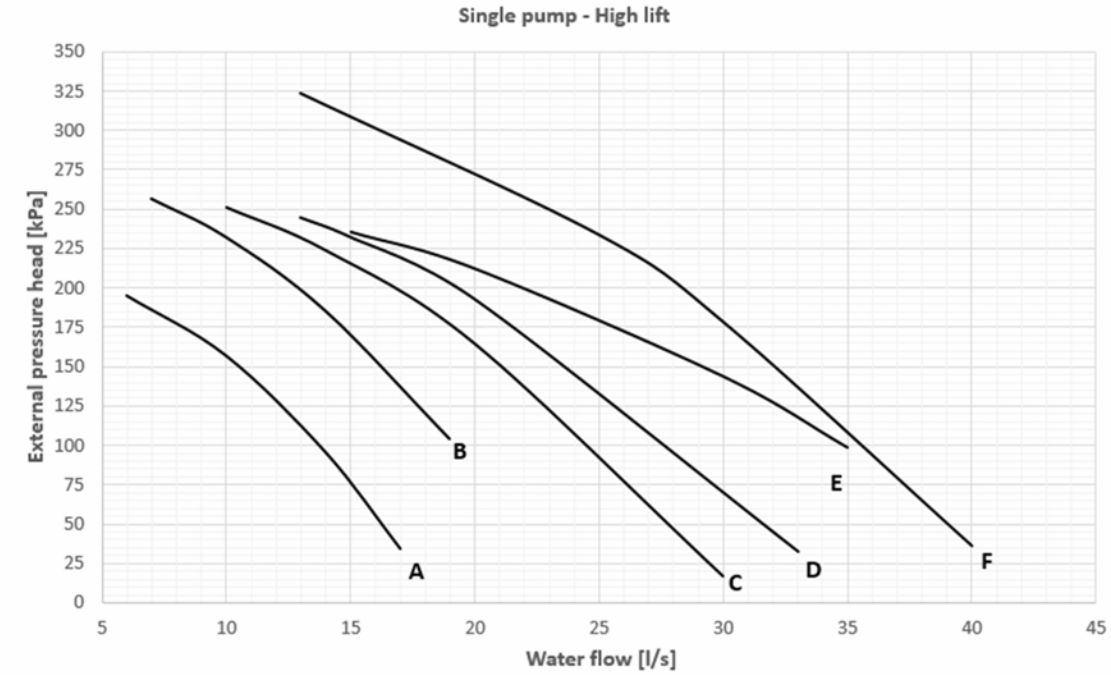
Single Pump (2 poles)

External pressure head





Note

- the above curves are referred to the discharge head of the pump only, not including pressure drops in the unit
- when using mixture of water and glycol please contact the factory as above specification can change

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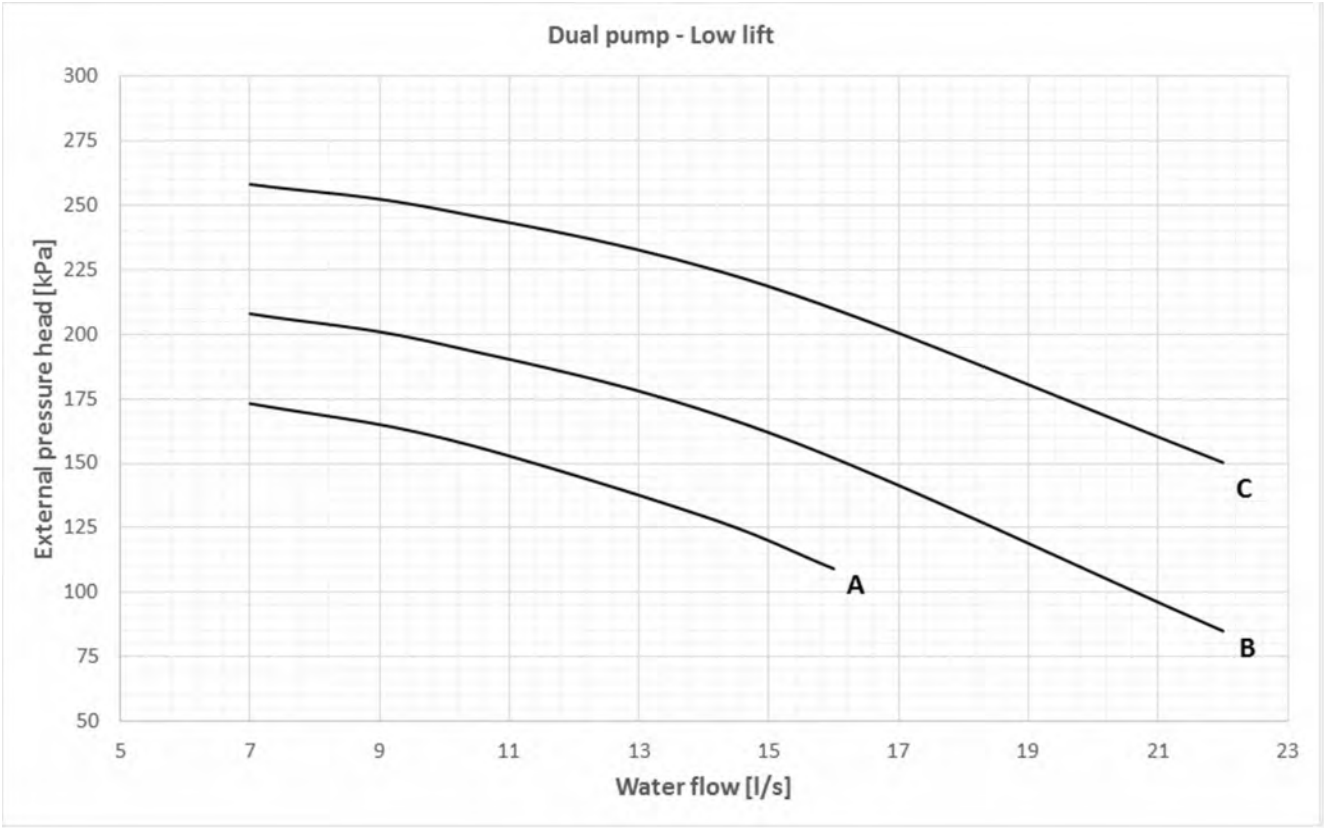
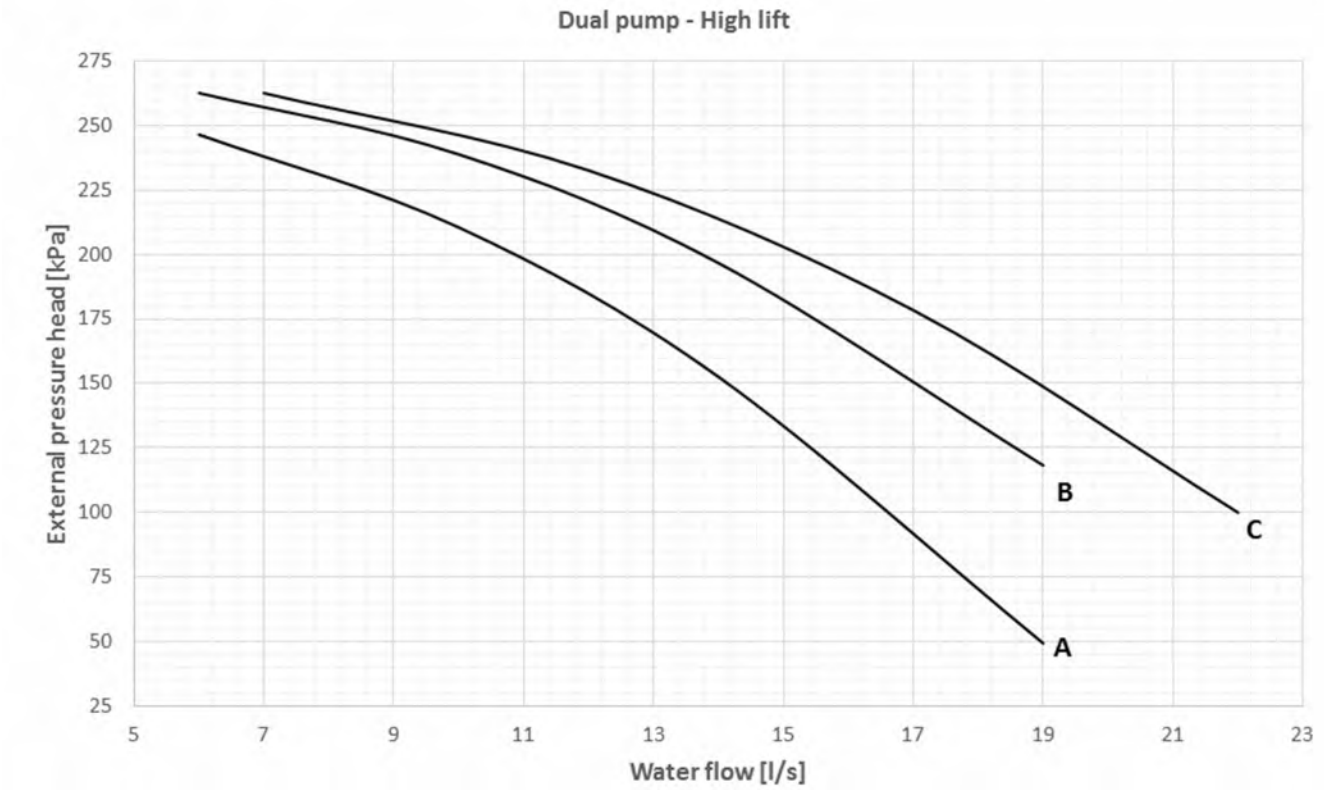
Twin Pump (2 poles)

External pressure head





Note
- the above curves are referred to the discharge head of the pump only, not including pressure drops in the unit
- when using mixture of water and glycol please contact the factory as above specification can change

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Water Pump Kit - Combination Matrix

Single Pump						
models			low lift		high lift	
			ref. curve	code	ref. curve	code
EWAQ180E-XS	EWAQ180E-XL	EWAQ170E-XR	A	SPK1	A	SPK8
EWAQ200E-XS	EWAQ200E-XL	EWAQ190E-XR	B	SPK2	A	SPK8
EWAQ230E-XS	EWAQ230E-XL	EWAQ220E-XR	C	SPK4	B	SPK8
EWAQ260E-XS	EWAQ260E-XL	EWAQ260E-XR	C	SPK5	B	SPK8
EWAQ320E-XS	EWAQ320E-XL	EWAQ300E-XR	D	SPK6	C	SPK8
EWAQ340E-XS	EWAQ340E-XL	EWAQ320E-XR	D	SPK6	C	SPK8

Dual Pump						
models			low lift		high lift	
			ref. curve	code	ref. curve	code
EWAQ180E-XS	EWAQ180E-XL	EWAQ170E-XR	NA	NA	NA	NA
EWAQ200E-XS	EWAQ200E-XL	EWAQ190E-XR	NA	NA	NA	NA
EWAQ230E-XS	EWAQ230E-XL	EWAQ220E-XR	A	DPK1	A	DPK3
EWAQ260E-XS	EWAQ260E-XL	EWAQ260E-XR	A	DPK1	B	DPK4
EWAQ320E-XS	EWAQ320E-XL	EWAQ300E-XR	B	DPK2	C	DPK4
EWAQ340E-XS	EWAQ340E-XL	EWAQ320E-XR	C	DPK3	C	DPK4

Legend:
SP = Single Pump; DP = Double Pump

Water Pump Kit - Technical Information

		Pump Motor Power[kW]	Pumo Motor Current[A]	Power Supply[V-ph-Hz]	PN	Motor Protection	ulation[Cla	Working Temperature[°C]
single pump	SPK1	2,2	5	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	SPK2	3	6	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	SPK4	4	8,1	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	SPK5	3	6	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	SPK6	4	8,1	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	SPK7	5,5	10,1	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	SPK8	7,5	13,7	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	SPK9	11	20	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	SPK10	11	20	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
dual pump	DPK1	3	6	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	DPK2	4	8,1	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	DPK3	5,5	10,1	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	DPK4	7,5	13,7	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120
	DPK5	11	20	400-3ph-50Hz	PN16	IP55	F	-25 ÷ 120

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How to calculate the overall chiller water side pressure drops (pump by others)

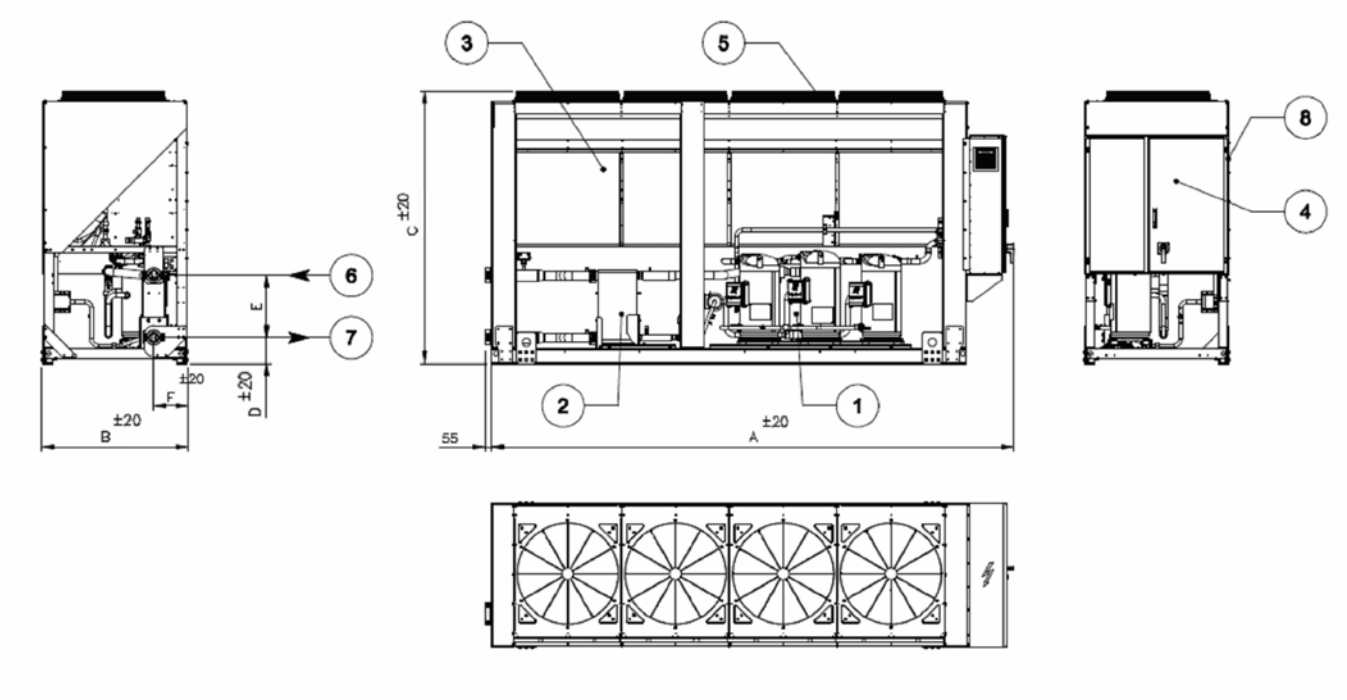
In order to calculate the overall pressure drops introduced by the chiller in an installation the following points have to be considered:

- The pressure drop value showed in CSS (Chiller Selection Software) are referred to chiller's evaporator only
- This multiscroll series is equipped as standard with water filter (factory supplied)

Overall chiller pressure drops = evaporator [kPa] + Filter pressure drop [kPa]

a) Select the chiller with CSS tool, you get easily the design water flow rate and the corresponding 'evaporator pressure drops' value (in CSS tool kPa figures are referred to evaporator only).
b) Refer to table "Water filter and piping diameter - Combination Matrix" to know what filter size and piping diameter correspond to the selected chiller.
c) Considering the design flow rate and water filter size and piping diameter, from graph "Filter pressure drops" get the corresponding kPa value.
d) By adding the values at point a and c, 'Overall chiller pressure drops' figure is got.

Note: when using mixture of water and glycol please contact the factory as above specification could change



LEGEND

1: Compressor
2: Evaporator
3: Condenser coil
4: Electrical panel
5: Fan
6: Evaporator water inlet
7: Evaporator water outlet
8: Slot for power and control panel connection

	A	B	C	D	E	F	G	H	I	L	M
EWAQ180E-XS	4413	1224	2271	215	519	320					
EWAQ200E-XS	4413	1224	2271	215	519	320					
EWAQ230E-XS	5313	1224	2271	215	519	320					
EWAQ260E-XS	5313	1224	2271	215	519	320					
EWAQ320E-XS	6213	1224	2447	215	519	320					
EWAQ340E-XS	6213	1224	2447	215	519	320					
EWAQ180E-XL	4413	1224	2271	212	519	286					
EWAQ200E-XL	4413	1224	2271	212	519	286					
EWAQ230E-XL	5313	1224	2271	212	519	286					
EWAQ260E-XL	5313	1224	2271	212	519	286					
EWAQ320E-XL	6213	1224	2271	212	519	286					
EWAQ340E-XL	6213	1224	2271	212	519	286					
EWAQ170E-XR	4413	1224	2271	212	519	286					
EWAQ190E-XR	4413	1224	2271	212	519	286					
EWAQ220E-XR	5313	1224	2271	212	519	286					
EWAQ260E-XR	5313	1224	2271	212	519	286					
EWAQ300E-XR	6213	1224	2271	212	519	286					
EWAQ320E-XR	6213	1224	2271	212	519	286					

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

Handling Care should be taken to avoid rough handling or shock due to dropping the unit. Do not push or pull the unit from anything other than the base frame. Never allow the unit to fall during unloading or moving as this may result in serious damage. To lift the unit, rings are provided in the base frame of the unit. Spreader bar and cables should be arranged to prevent damage to the condenser coil or unit cabinet.

Location The units are produced for outside installation on roofs, floors or below ground level on condition that the area is free from obstacles for the passage of the condenser air. The unit should be positioned on solid foundations and perfectly level; in the case of installation on roofs or floors, it may be advisable to arrange the use of suitable weight distribution beams. When the units are installed on the ground, a concrete base at least 250 mm wider and longer than the unit's footprint should be laid. Furthermore, this base should withstand the unit weight mentioned in the technical data table.

Space requirements The units are air-cooled, then it is important to respect the minimum distances which guarantee the best ventilation of the condenser coils. Limitations of space reducing the air flow could cause significant reductions in cooling capacity and an increase in electricity consumption.
To determinate unit placement, careful consideration must be given to assure a sufficient air flow across the condenser heat transfer surface. Two conditions must be avoided to achieve the best performance: warm air recirculation and coil starvation.
Both these conditions cause an increase of condensing pressures that results in reductions in unit efficiency and capacity.
Moreover the unique microprocessor has the ability to calculate the operating environment of the air cooled chiller and the capacity to optimize its performance staying on-line during abnormal conditions.
Each side of the unit must be accessible after installation for periodic service. 'Fig.1' shows you minimum recommended clearance requirements.
Vertical condenser air discharge must be unobstructed because the unit would have its capacity and efficiency significantly reduced.
If the units are positioned in places surrounded by walls or obstacles of the same height as the units, the units should follow the minimum recommended clearance requirements shown in 'Fig.2'. In the event the obstacles are higher than the units, the minimum recommended clearance requirements are shown in 'Fig.3'. Units installed closer than the minimum recommended distance to a wall or other vertical riser may experience a combination of coil starvation and warm air recirculation, thus causing reduction in unit capacity and efficiency reductions. The microprocessor control is proactive in response "of design condition". In the case of single or compounded influences restricting airflow to the unit, the microprocessor will act to keep the compressor(s) running (at reduced capacity) rather than allowing a shut-off on high discharge pressure.
When two or more units are positioned side by side it is recommended that the condenser coils are at a minimum distance from one another as shown in 'Fig.4'; strong wind could be the cause of air warm recirculation.
For other installation solutions, consult our technicians.

The above recommended information are representative of general installation. A specific evaluation should be done by contractor depending on the case.

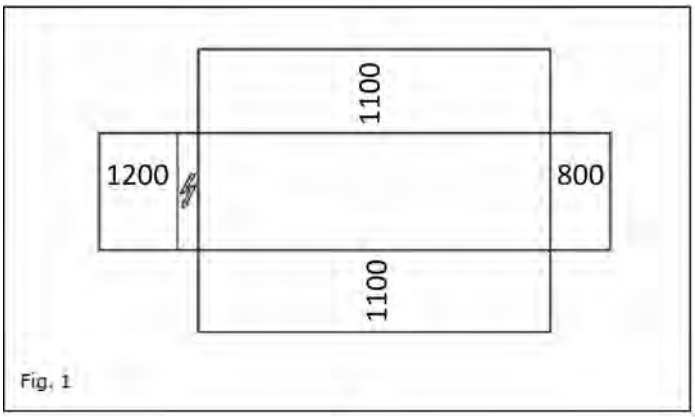


Fig. 1

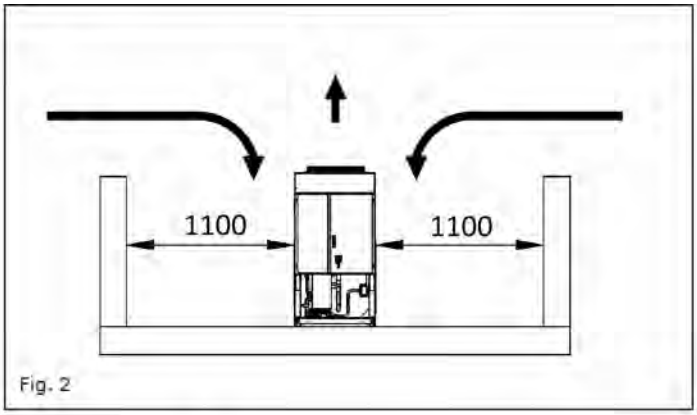


Fig. 2

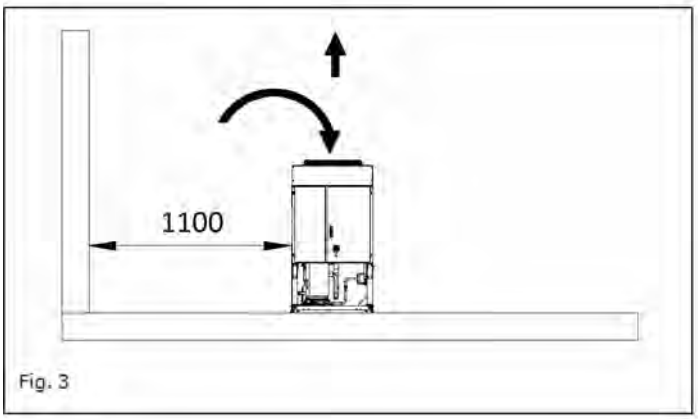


Fig. 3

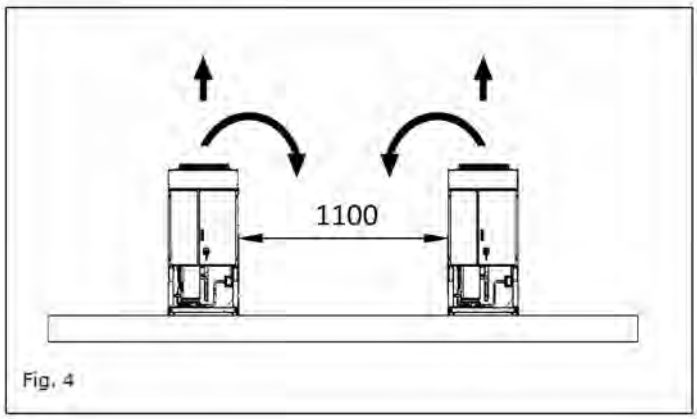


Fig. 4

Acoustic protection When noise level must meet special requirements, it is necessary to pay the maximum attention to ensure the perfect insulation of the unit from the support base by applying appropriate vibration-dampening devices on the unit, on the water pipes and on the electrical connections.

Storage The environment conditions have to be in the following limits:

Minimum ambient temperature:	-20°C
Maximum ambient temperature:	+42°C
Maximum R.H.:	95% not condensing

General The chiller will be designed and manufactured in accordance with the 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 Standards UNI – EN ISO 9001:2004

To avoid any losses, the unit will be tested at full load in the factory (at the nominal working conditions and water temperatures). The chiller will be delivered to the job site completely assembled and charged with refrigerant and oil. The installation of the chiller must comply with the manufacturer's instructions for rigging and handling equipment.

The unit will be able to start up and operate (as standard) at full load with:
- outside air temperature from ..... °C to ..... °C
- evaporator leaving fluid temperature between ..... °C and ..... °C

Refrigerant Only HFC 410A can be used.

Performance Chiller shall supply the following performances:
- Number of chiller(s) : ..... unit(s)
- Cooling capacity for single chiller : ..... kW
- Power input for single chiller in cooling mode : ..... kW
- Heat exchanger entering water temperature in cooling mode : ..... °C
- Heat exchanger leaving water temperature in cooling mode : ..... °C
- Heat exchanger water flow : ..... l/s
- Nominal outside working ambient temperature in cooling mode : ..... °C

Operating voltage range should be 400V ±10%, 3ph, 50Hz, voltage unbalance maximum 3%, without neutral conductor and shall only have one power connection point.

Unit description Chiller shall include as standard: one refrigerant circuit, two or three hermetic type rotary scroll compressors (depending on the size), electronic expansion device (EEXV), refrigerant direct expansion plate to plate heat exchanger, air-cooled condenser section, R-410A refrigerant, motor starting components, control system and all components necessary for a safe and stable unit operation.
The chiller will be factory assembled on a robust base frame made of galvanized steel, protected by an epoxy paint.

Sound 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 can not be used).
Vibration on the base frame should not exceed 2 mm/s.

Dimensions Unit dimensions shall not exceed following indications:
- Unit length ..... mm
- Unit width ..... mm
- Unit height ..... mm

Evaporator (PHE) The units shall be equipped with a direct expansion plate to plate type evaporator.
- The evaporator will be made of of stainless steel brazed plates and shall be linked with an electrical heater to prevent freezing down to -28°C ambient temperature, controlled by a thermostat and shall be insulated with flexible, closed cell polyurethane insulation material (20-mm thick).
- The evaporator will have 1 refrigerant circuit.
- The water connections shall be VICTAULIC type connections as standard to ensure quick mechanical disconnection between the unit and the hydronic network.
- The evaporator will be manufactured in accordance to PED approval.
- Flow switch will be standard factory mounted.
- Water filter will be standard (depending on the unit model it can be shipped loose or unit mounted).

Condenser coil The unit shall be equipped with condenser coils constructed with internally finned seamless copper tubes and arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminum fins with full fin collars for higher efficiencies. The space between the fins is given by a collar that will increase the surface area in connection with the tubes, protecting them from ambient corrosion.
- The condenser coils will have an integral subcooler circuit that provides sufficient subcooling to effectively eliminate the possibility of liquid flashing and increase the unit's efficiency with 5% to 7% without increasing in energy consumption.
- The condenser coils shall be leak-tested and submitted to a pressure test with dry air.

Condenser fans The condenser fans used in conjunction with the condenser coils, shall be propeller type with glass reinforced resin blades for higher efficiencies and lower sound. Each fan shall be protected by a fan guard.

- The air discharge shall be vertical and each fan must be coupled to the electrical motor, supplied as standard to IP54 and capable to work to ambient temperatures of - 20°C to + 65°C.
- The condenser fans shall have as a standard an internally protection from overtemperature.

Refrigerant circuit The unit shall have one refrigerant circuit.

- The circuit shall include as standard: electronic expansion device piloted by unit's microprocessor control, liquid line shut-off valve, sight glass with moisture indicator, replaceable filter drier, charging valves, high pressure switch, high and low pressure transducers and insulated suction line.

Condensation control The units will be provided with an automatic control for condensing pressure which ensures the working at low external temperatures down to - …… °C, to maintain condensing pressure.

- The unit automatically unloads when abnormal high condensing pressure is detected. This to prevent the shutdown of the refrigerant circuit (shutdown of the unit) due to a high-pressure fault.

Low sound unit configurations (on request) The unit compressor shall be connected with unit's metal base frame by rubber antivibration supports to prevent the transmission of vibrations to all metal unit structure, in order to control the unit sound.

- The chiller shall be provided with an acoustical compressor enclosure. This enclosure shall be realized with a light, corrosion resisting aluminum structure and metal panels. The compressor sound-proof enclosure shall be internally fitted with flexible, multi-layer, high density materials.

Hydronic kit options (on request) The hydronic module shall be integrated in the chiller chassis without increasing its dimensions and includes the following elements: centrifugal pump with motor protected by a circuit breaker installed in control panel, water filling system with pressure gauge, safety valve, drain valve.

- The hydronic module shall be assembled and wired to the control panel.
- The water piping shall be protected against corrosion and freezing and insulated to prevent condensation.
- A choice of two pump types shall be available:

- in-line single pump
- in-line twin pumps.

Electrical control panel Power and control shall be located in the main panel that will be manufactured to ensure protection against all weather conditions.

- The electrical panel shall be IP54 and (when opening the doors) internally protected against possible accidental contact with live parts.
- The main panel shall be fitted with a main switch interlocked door that shuts off power supply when opening.
- The power section will include compressors and funs protection devices, compressors and fans starters and control circuit power supply.

Controller The controller will be installed as standard and it will be used to modify unit set-points and check control parameters.

- A built-in display will shows chiller operating status plus temperatures and pressures of water, refrigerant and air, programmable values, set-points.
- A sophisticated software with predictive logic, will select the most energy efficient combination of compressors, EEXV and condenser fans to keep stable operating conditions to maximize chiller energy efficiency and reliability.
- The controller will be able to protect critical components based on external signals 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 will be 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.

Controller main features Controller shall be garantee following minimu functions:

- Management of the compressor stepless capacity and fans modulation.
- 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 temperature.
- Display of Outdoor Ambient Temperature.
- Display of condensing-evaporating temperature and pressure, suction and discharge superheat for each circuit.
- Leaving water evaporator temperature regulation (temperature tolerance = 0,1°C).
- Compressor and evaporator pumps hours counter.
- Display of Status Safety Devices.
- Number of starts and compressor working hours.
- Optimized management of compressor load.
- Fan management according to condensing pressure.
- 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).
- OAT (Outside Ambient temperature) Reset.
- Set point Reset (optional).
- Application and system upgrade with commercial SD cards.
- Ethernet port for remote or local servicing using standard web browsers.
- Two different sets of default parameters could be stored for easy restore.

High Level Communications Interface (on request) The chiller shall be 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)
- Ethernet TCP/IP.

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Daikin Europe N.V. participates in the Eurovent Certified Performance programme for Liquid Chilling Packages and Hydronic Heat Pumps, Fan Coil Units and Variable Refrigerant Flow systems. Check ongoing validity of certificate: www.eurovent-certification.com

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