DAIKIN

DAIKIN APPLIED (UK) LTD

Technically better...

EWHQ-G

Water cooled scroll chiller & heat pump

Product manual

SS (Standard Efficiency - Standard Noise) - Heating Capacity from 110 to 440 kW

Performance according to EN14511
Eurovent certified
Refrigerant: R410A

CODE	
Date	
Supersedes	

Table of content

EWHQ-G

Low operating cost and extended operating life This 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.

Flexibility The reversible heat pump meets all the possible request in terms of plant needs for comfort and process applications. The units can provide chilled water production and hot water production reversing on refrigerant side. Partial recover version and hydronic version, with low or high pump head, are available on request.

Wide capacity range The reversible heat pump series covers a wide range of cooling capacities from 87 KW up to 352 . The introduction of the new 60 HP scroll compressor allows to reach very high capacity in the minimum space.

Wide operating range The extended operating range allows the unit to work in a very wide range of water temperatures. The electronic expansion valve (mounted as standard) guarantees a fine control of the refrigerant flow even at low condensing temperatures.

Compact Design The innovative design makes the unit easy to carry and position within technical room occupying the minimum footprint. The Modular conception allows to position one unit upon the other reaching the highest kW/m2 ratio on the market.

Plug & play installation The units is conceived in order to be connected quickly to the plant. Victaulic connection are available as option.

Superior control logic The unit 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. Master/Slave control is available as standard.

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:

STANDARD EFFICIENCY
11 sizes to cover a range 87 up to 352 kW EER up to 3.98 and an ESEER up to 4.90.

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 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	30°C	26°C	22°C	18°C

K = Coefficient; T = Water inlet condenser temperature.

Sound configurations STANDARD SOUND

(Compressor sound attenuation jacket or compressor sound enclosure available as option)

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.

Refrigerant Units have been optimized to operate with R-410A, refrigerant with zero ODP (Ozone Depletion Potential) and GWP (Global Warming Potential) 1890. 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.

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 on a single refrigerating circuit and are fitted on rubber antivibration mounts and complete with oil charge.

User side exchanger The unit is equipped with a reversible direct expansion plate to plate type exchanger. This heat exchanger is made of stainless steel brazed plates and is covered with a 20mm closed cell insulation material. The exchanger is manufactured in accordance to PED approval. Flow switch and victaulic kit are provided mounted as option.

Source side exchanger The unit is equipped with a reversible direct expansion plate to plate type exchanger. This heat exchanger is made of stainless steel brazed plates and is covered with a 20mm closed cell insulation material. The exchanger is manufactured in accordance to PED approval. Flow switch and victaulic kit are provided mounted as option.

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 without any refrigerant flow problems and with a perfect chilled water leaving temperature control.

Refrigerant circuit Each unit has 1 circuit, according to the capacity, that includes:

- Compressors
- Refrigerant
- Evaporator
- Condenser
- 4 ways valve
- Electronic expansion valve
- High pressure switch
- High pressure transducers
- Low pressure transducers
- Suction temperature sensor

Electrical control panel Power and control are located in the main panel. The electrical panel is IP54 and (when opening the doors) internally protected with plexiglass 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 protection devices, compressors starters and control circuit power supply.

Unit controller

Unit 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.

The unit controller 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 Pressure / Temperature conversions.

Control section - main features

Control Section has the following feature.

- Management of the refrigerant circuit capacity
- Full routine operation at condition of:
  - high thermal load
  - high evaporator entering water temperature (start-up)
- Display of evaporator entering/leaving water temperature.
- Display of condensing-evaporating temperature and pressure, suction superheat for each circuit.
- Compressor and pumps hours counter.
- 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.
- 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 pressureratio.
- No pressure change at start

System security

The following securities are available.

- Phase monitor.
- Freeze protection.

Regulation type

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

Unit controller

Unit controller 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.

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)
EWHQ100G-SS	R410A	2087,5	1	9,0	18,8
EWHQ120G-SS	R410A	2087,5	1	9,0	18,8
EWHQ130G-SS	R410A	2087,5	1	10,0	20,9
EWHQ150G-SS	R410A	2087,5	1	10,0	20,9
EWHQ160G-SS	R410A	2087,5	1	13,0	27,1
EWHQ190G-SS	R410A	2087,5	1	11,0	23,0
EWHQ210G-SS	R410A	2087,5	1	13,0	27,1
EWHQ240G-SS	R410A	2087,5	1	15,0	31,3
EWHQ270G-SS	R410A	2087,5	1	15,0	31,3
EWHQ340G-SS	R410A	2087,5	1	19,0	39,7
EWHQ400G-SS	R410A	2087,5	1	19,0	39,7

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

Standard Options (supplied on basic unit)

Direct on line starter (DOL)

Double setpoint - Dual leaving water temperature setpoints.

20mm user side exchanger insulation - The external shell is covered with a 20mm closed cell insulation material.

20mm source side exchanger insulation - The external shell is covered with a 20mm closed cell insulation material.

Electronic expansion valve

General fault contactor

Hour run meter

Main switch interlock door

Options (on request)

MECHANICAL

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

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

Flow switch (**)

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

Brine version - Allows the unit to operate down to -10°C leaving liquid temperature (antifreeze required). Recommended below +4°C

Suction and discharge line shut-off valve - Installed on the suction and discharge ports of the compressor's tandem to facilitate maintenance operation.

High pressure side manometers

Low pressure side manometers

Sound Proof System (Compressor jacket-Avarage reduction 3dB (A))

Sound Proof System (Compressor Enclosure- Avarage reduction 6dB (A))

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.

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.

Double pressure relief valve with diverter

(*) the installation of the filter is mandatory on both side, user and source.

(**) the installation of the flow switch is mandatory on both side, user and source.Refer to the Installation manual for the connection size.

ELECTRICAL / CONTROL

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.
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.

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.

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.

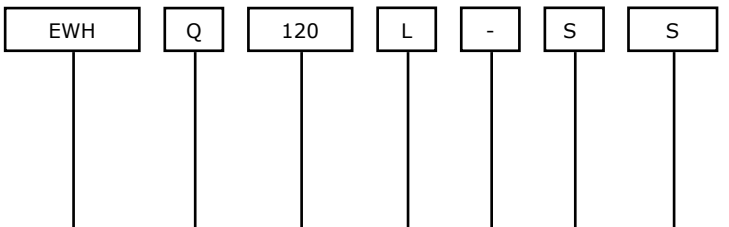
INSTALLATION

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.

Container Kit: wooden pallet structure positioned below the unit specially designed to ease the chiller (un)load in the container with a forklift.

Witness test

Acoustic test



Machine type

EWH	= Water cooled chiller reversing on refrigerant side

Refrigerant

Q	= R-410A

Capacity class in kW (Cooling)

Always 3-digit code	Always 3-digit code

Model series

G	G=single circuit

Inverter

-	= Non inverter

Efficiency level

S	= Standard Efficiency

Sound level

S	= Standard sound

EWHQ G-SS

MODEL		100	120	130	150	160	190	210	240
Capacity - Cooling *	kW	87.3	100.0	111	127	141	160	181	208
Capacity control - Type	---	Step	Step	Step	Step	Step	Step	Step	Step
Capacity control - Minimum capacity	%	50.0	43.0	50.0	44.0	50.0	45.0	50.0	43.0
Unit power input - Cooling *	kW	22.4	25.3	28.5	32.0	35.6	41.1	46.0	53.3
EER *	---	3.90	3.95	3.91	3.96	3.95	3.90	3.93	3.90
ESEER	---	4.73	4.84	4.66	4.88	4.81	4.91	4.87	5.07
IPLV	---	6.02	6.14	5.66	5.84	5.73	5.84	5.81	5.87
CASING									
Colour	---	IW	IW	IW	IW	IW	IW	IW	IW
Material **	---	GPSS	GPSS	GPSS	GPSS	GPSS	GPSS	GPSS	GPSS
DIMENSIONS									
Height	mm	1066	1066	1066	1066	1066	1066	1066	1066
Width	mm	928	928	928	928	928	928	928	928
Length	mm	2432	2432	2264	2264	2264	2432	2432	2432
WEIGHT									
Unit Weight	kg	519	608	728	770	808	838	880	930
Operating Weight	kg	558	654	782	830	873	908	955	1019
HEAT EXCHANGER - EVAPORATOR									
Type **	---	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
Water Volume	l	6	8	8	10	12	13	15	17
Nominal water flow rate	l/s	4.2	4.8	5.3	6.1	6.7	7.7	8.7	10.0
Nominal Water pressure drop	kPa	44	44	35	30	29	31	33	31
Insulation material **		CC	CC	CC	CC	CC	CC	CC	CC
HEAT EXCHANGER - CONDENSER									
Type **	---	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
Water Volume	l	6	8	8	10	12	13	15	17
Nominal water flow rate	l/s	5.2	6.0	6.7	7.7	8.5	9.7	10.9	12.5
Nominal Water pressure drop	kPa	69	69	55	49	48	51	54	32
COMPRESSOR									
Type	---	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Oil charge	l	7	8	9	11	14	13	13	13
Quantity	No.	2	2	2	2	2	2	2	2
SOUND LEVEL * **									
Sound Power - Cooling	dB(A)	80	83	85	87	88	88	88	90
Sound Pressure - Cooling	dB(A)	64	67	69	70	72	72	72	74
REFRIGERANT CIRCUIT									
Refrigerant type	---	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge	kg	7	9	10	10	13	11	15	15
N. of circuits	No.	1	1	1	1	1	1	1	1
PIPING CONNECTIONS									
Evaporator water inlet/outlet		1" 1/2	1" 1/2	2" 1/2	2" 1/2	2" 1/2	2" 1/2	2" 1/2	2" 1/2
Condenser water inlet/outlet		1" 1/2	1" 1/2	2" 1/2	2" 1/2	2" 1/2	2" 1/2	2" 1/2	2" 1/2

** Maximum cooling capacity, unit power input and EER are based on the following conditions: evaporator 12.0/7.0°C; condenser 30.0/35.0 °C, unit at full load operation. Minimum cooling capacity, unit power input and EER are based on the following conditions: evaporator 12.0/7.0°C; condenser 30.0/35.0 °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.*

**** 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.

EWHQ G-SS

MODEL		270	340	400					
Capacity - Cooling *	kW	232	291	352					
Capacity control - Type	---	Step	Step	Step					
Capacity control - Minimum capacity	%	50.0	40.0	50.0					
Unit power input - Cooling *	kW	59.1	73.7	88.4					
EER *	---	3.92	3.95	3.98					
ESEER	---	4.89	4.90	4.83					
IPLV	---	5.71	5.86	5.79					
CASING									
Colour	---	IW	IW	IW					
Material **	---	GPSS	GPSS	GPSS					
DIMENSIONS									
Height	mm	1066	1186	1186					
Width	mm	928	928	928					
Length	mm	2432	2432	2432					
WEIGHT									
Unit Weight	kg	941	1090	1203					
Operating Weight	kg	1031	1202	1334					
HEAT EXCHANGER - EVAPORATOR									
Type **	---	PHE	PHE	PHE					
Water Volume	l	17	27	34					
Nominal water flow rate	l/s	11.1	13.9	16.9					
Nominal Water pressure drop	kPa	38	42	43					
Insulation material **		CC	CC	CC					
HEAT EXCHANGER - CONDENSER									
Type **	---	PHE	PHE	PHE					
Water Volume	l	17	27	34					
Nominal water flow rate	l/s	13.9	17.4	21.1					
Nominal Water pressure drop	kPa	39	66	69					
COMPRESSOR									
Type	---	Scroll	Scroll	Scroll					
Oil charge	l	13	13	13					
Quantity	No.	2	2	2					
SOUND LEVEL * **									
Sound Power - Cooling	dB(A)	92	93	93					
Sound Pressure - Cooling	dB(A)	76	76	77					
REFRIGERANT CIRCUIT									
Refrigerant type	---	R410A	R410A	R410A					
Refrigerant charge	kg	16	25	30					
N. of circuits	No.	1	1	1					
PIPING CONNECTIONS									
Evaporator water inlet/outlet		2" 1/2	3"	3"					
Condenser water inlet/outlet		2" 1/2	3"	3"					

** Maximum cooling capacity, unit power input and EER are based on the following conditions: evaporator 12.0/7.0°C; condenser 30.0/35.0 °C, unit at full load operation. Minimum cooling capacity, unit power input and EER are based on the following conditions: evaporator 12.0/7.0°C; condenser 30.0/35.0 °C, unit at full load operation;*

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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.

EWHQ G-SS

MODEL		100	120	130	150	160	190	210	240
Capacity - Heating (1)	kW	112	128	144	162	179	205	233	266
Unit power input - Heating (1)	kW	27.0	30.9	35.2	39.3	43.6	50.4	56.6	64.7
COP (1)	---	4.15	4.16	4.09	4.12	4.11	4.07	4.11	4.10
Capacity - Cooling (1)	kW	87.3	100.0	111	127	141	160	181	208
HEAT EXCHANGER - EVAPORATOR									
Nominal water flow rate	l/s	4.1	4.7	5.2	5.9	6.5	7.4	8.5	9.6
Nominal Water pressure drop	kPa	42	42	33	28	27	29	32	29
HEAT EXCHANGER - CONDENSER									
Nominal water flow rate	l/s	5.4	6.2	7.0	7.8	8.7	9.9	11.2	12.7
Nominal Water pressure drop	kPa	73	73	59	51	50	53	57	33

EWHQ G-SS

MODEL		270	340	400					
Capacity - Heating (1)	kW	299	375	454					
Unit power input - Heating (1)	kW	72.2	90.3	109					
COP (1)	---	4.14	4.16	4.18					
Capacity - Cooling (1)	kW	232	291	352					
HEAT EXCHANGER - EVAPORATOR									
Nominal water flow rate	l/s	10.9	13.7	16.6					
Nominal Water pressure drop	kPa	37	41	42					
HEAT EXCHANGER - CONDENSER									
Nominal water flow rate	l/s	14.3	18.0	21.8					
Nominal Water pressure drop	kPa	42	70	73					

Fluid: Water

(1) Heating capacity, unit power input and COP are based on the following conditions: evaporator 15.0/10.0°C; condenser 40.0/45.0 °C, unit at full load operation;

EWHQ G-SS

MODEL		100	120	130	150	160	190	210	240
Power supply									
Phases	---	3	3	3	3	3	3	3	3
Frequency	Hz	50	50	50	50	50	50	50	50
Voltage	V	400	400	400	400	400	400	400	400
Voltage tollerance Minimum	%	-10%	-10%	-10%	-10%	-10%	-10%	-10%	-10%
Voltage tollerance Maximum	%	+10%	+10%	+10%	+10%	+10%	+10%	+10%	+10%
Unit									
Maximum starting current	A	204	255	261	308	316	354	368	466
Nominal running current cooling	A	43	46	50	56	63	71	78	88
Maximum running current	A	59	66	72	80	88	102	116	131
Maximum current for wires sizing	A	65	72	79	88	96	112	128	144
Compressors									
Phases	No.	3	3	3	3	3	3	3	3
Voltage	V	400	400	400	400	400	400	400	400
Voltage tollerance Minimum	%	-10%	-10%	-10%	-10%	-10%	-10%	-10%	-10%
Voltage tollerance Maximum	%	+10%	+10%	+10%	+10%	+10%	+10%	+10%	+10%
Maximum running current	A	59	66	72	80	88	102	116	131
Starting method	---	DOL	DOL	DOL	DOL	DOL	DOL	DOL	DOL

EWHQ G-SS

MODEL		270	340	400					
Power supply									
Phases	---	3	3	3					
Frequency	Hz	50	50	50					
Voltage	V	400	400	400					
Voltage tollerance Minimum	%	-10%	-10%	-10%					
Voltage tollerance Maximum	%	+10%	+10%	+10%					
Unit									
Maximum starting current	A	481	640	677					
Nominal running current cooling	A	97	123	148					
Maximum running current	A	145	183	221					
Maximum current for wires sizing	A	160	201	243					
Compressors									
Phases	No.	3	3	3					
Voltage	V	400	400	400					
Voltage tollerance Minimum	%	-10%	-10%	-10%					
Voltage tollerance Maximum	%	+10%	+10%	+10%					
Maximum running current	A	145	183	221					
Starting method	---	DOL	DOL+PW	PW					

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 compressor at full load
Nominal current in cooling mode is referred to the following conditions: evaporator 12/7°C; condenser 30/35°C; compressors current
Maximum running current is based on max compressor absorbed current in its envelope
Maximum unit current for wires sizing is based on minimum allowed voltage
Maximum current for wires sizing: (compressors full load ampere) x 1,1.
Electrical data are subject to modification without notice. Please refer to unit nameplate data

EWHQ G-SS

	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)
100	59.0	61.0	50.2	59.9	58.6	56.5	54.3	52.3	**64.0**	**80.0**
120	62.4	64.4	60.3	60.3	58.6	63.1	54.5	49.1	**67.0**	**83.0**
130	65.2	67.0	63.5	62.1	60.2	66.1	56.2	47.3	**69.0**	**85.0**
150	63.0	64.9	62.9	61.8	65.0	66.4	57.9	53.6	**70.0**	**87.0**
160	60.8	62.7	63.1	62.2	67.6	67.3	59.6	56.4	**72.0**	**88.0**
190	61.1	63.1	65.4	64.4	68.0	67.1	60.0	55.8	**72.0**	**88.0**
210	60.6	62.6	66.6	65.6	67.6	65.6	59.6	53.6	**72.0**	**88.0**
240	60.7	62.7	66.0	63.9	71.4	68.1	60.2	54.2	**74.0**	**90.0**
270	61.1	63.1	65.8	62.1	73.3	69.7	60.9	54.9	**76.0**	**92.0**
340	58.8	60.8	62.8	57.9	74.6	69.8	59.0	53.0	**76.0**	**93.0**
400	57.9	59.9	61.3	54.9	75.3	70.1	58.5	52.5	**77.0**	**93.0**

SOUND LEVEL AT DISTANCE ***

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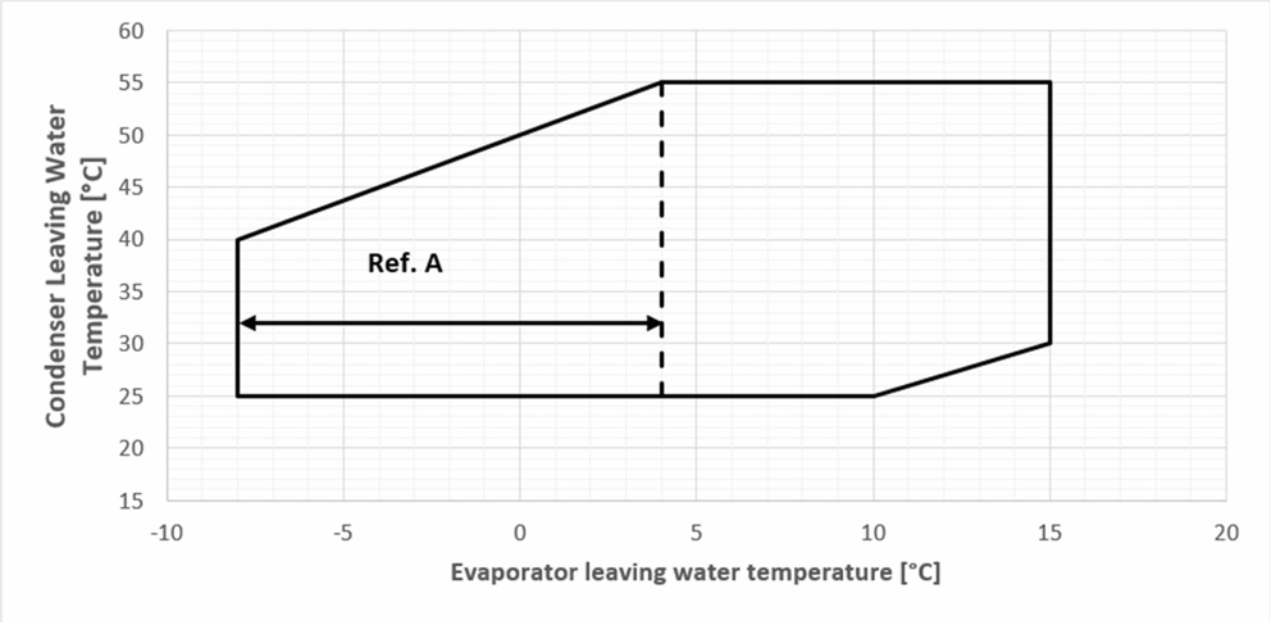
	DISTANCE						
MODEL	1 m	5 m	10 m	15 m	20 m	25 m	50 m
100	64.0	54.1	48.8	45.5	43.2	41.3	35.4
120	67.0	57.1	51.8	48.5	46.2	44.3	38.4
130	69.0	59.1	53.7	50.4	48.1	46.2	40.3
150	70.0	60.1	54.7	51.4	49.1	47.2	41.3
160	72.0	62.1	56.7	53.4	51.1	49.2	43.3
190	72.0	62.1	56.8	53.5	51.2	49.3	43.4
210	72.0	62.1	56.8	53.5	51.2	49.3	43.4
240	74.0	64.1	58.8	55.5	53.2	51.3	45.4
270	76.0	66.1	60.8	57.5	55.2	53.3	47.4
340	76.0	66.3	61.0	57.7	55.3	53.5	47.6
400	77.0	67.3	62.0	58.7	56.3	54.5	48.6

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.

Ref.:
A = operation with glycol (below 4°C Evaporator LWT)

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

A - Δt	°C	8
B - Δt	°C	4
C - Δt	°C	8
D - Δt	°C	4

Legend:
A = Max evaporator water Δt
B = Min evaporator water Δt
C = Max condenser water Δt
D = Min condenser water Δt

Table 2 - Water heat exchanger - Evaporator 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

Table 2 - Water heat exchanger - Condenser Fouling factors

A	B	C	D
0.0176	1.006	0.989	1.016
0.0440	1.000	1.000	1.000
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

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.

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.

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			100						120					
Twe		**Twc**	**30**	**35**	**40**	**45**	**50**	**55**	**30**	**35**	**40**	**45**	**50**	**55**
5	CC	kW	86.2	82	77.5	72.6	67.3	61.7	98.8	93.8	88.5	83	77.3	71.3
	PI	kW	20.3	22.1	24.1	26.2	28.7	31.6	22.9	25	27.3	30	33.2	36.9
	qwe	l/s	4.1	3.9	3.7	3.5	3.2	3.0	4.7	4.5	4.2	4.0	3.7	3.4
	dpwe	kPa	43	39	35	30	26	22	43	39	35	30	26	22
	HC	kW	106	103	101	98.2	95.4	92.7	121	118	115	112	110	108
	qwc	l/s	5.1	5.0	4.9	4.7	4.6	4.5	5.8	5.7	5.6	5.5	5.3	5.2
	dpwc	kPa	65	63	60	57	53	51	65	62	60	57	54	52
7	CC	kW	91.6	87.3	82.5	77.4	71.9	66	105	100	94.5	88.7	82.7	76.4
	PI	kW	20.5	22.4	24.4	26.5	29	31.8	23.2	25.3	27.7	30.3	33.5	37.1
	qwe	l/s	4.4	4.2	4.0	3.7	3.5	3.2	5.0	4.8	4.5	4.3	4.0	3.7
	dpwe	kPa	48.7	44.1	39.4	34.7	29.9	25.2	48.9	44.2	39.4	34.7	30.1	25.7
	HC	kW	111	109	106	103	100	97.2	127	124	121	118	115	113
	qwc	l/s	5	5	5	5	5	5	6	6	6	6	6	6
	dpwc	kPa	72	69	66	63	59	56	73	69	66	63	60	58
9	CC	kW	97.2	92.7	87.8	82.4	76.7	70.5	112	106	101	94.6	88.2	81.7
	PI	kW	20.8	22.7	24.7	26.9	29.3	32	23.6	25.7	28	30.7	33.8	37.4
	qwe	l/s	4.7	4.4	4.2	4.0	3.7	3.4	5.4	5.1	4.8	4.5	4.2	3.9
	dpwe	kPa	55	50	45	39	34	29	55	50	45	40	34	30
	HC	kW	117	115	112	109	105	102	134	131	128	124	121	118
	qwc	l/s	5.6	5.5	5.4	5.2	5.1	4.9	6.5	6.3	6.2	6.0	5.9	5.8
	dpwc	kPa	80	77	73	69	65	61	81	77	73	70	66	63
11	CC	kW	103	98.3	93.2	87.7	81.6	75.2	118	113	107	101	94.1	87.2
	PI	kW	21	23	25	27.2	29.6	32.3	23.9	26	28.4	31.1	34.1	37.7
	qwe	l/s	5.0	4.7	4.5	4.2	3.9	3.6	5.7	5.4	5.1	4.8	4.5	4.2
	dpwe	kPa	62	56	51	45	39	33	62	57	51	45	39	34
	HC	kW	123	120	117	114	110	107	141	138	134	131	127	124
	qwc	l/s	5.9	5.8	5.7	5.5	5.3	5.2	6.8	6.7	6.5	6.3	6.2	6.0
	dpwc	kPa	89	85	81	76	72	67	89	85	81	77	73	70
13	CC	kW	109	104	98.8	93	86.8	80.1	125	120	113	107	100	92.9
	PI	kW	21.3	23.3	25.4	27.5	29.9	32.6	24.3	26.4	28.8	31.4	34.5	38.1
	qwe	l/s	5.3	5.0	4.8	4.5	4.2	3.8	6.0	5.8	5.5	5.1	4.8	4.5
	dpwe	kPa	69	63	57	50	44	37	70	64	57	51	45	38
	HC	kW	129	126	123	120	116	112	148	145	141	137	134	130
	qwc	l/s	6.2	6.1	5.9	5.8	5.6	5.4	7.2	7.0	6.8	6.7	6.5	6.3
	dpwc	kPa	98	93	89	84	79	74	99	94	89	85	81	76
15	CC	kW	115	110	105	98.5	92.1	85.2	133	127	120	113	106	98.9
	PI	kW	21.5	23.6	25.7	27.9	30.3	32.9	24.7	26.9	29.2	31.9	34.9	38.4
	qwe	l/s	5.6	5.3	5.0	4.8	4.4	4.1	6.4	6.1	5.8	5.5	5.1	4.8
	dpwe	kPa	78	71	64	57	50	42	79	71	64	57	50	44
	HC	kW	136	133	129	125	121	117	156	152	148	144	140	136
	qwc	l/s	6.5	6.4	6.2	6.1	5.9	5.7	7.5	7.3	7.2	7.0	6.8	6.6
	dpwc	kPa	107	103	98	92	87	81	109	104	98	93	89	84

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			130						150					
Twe		**Twc**	**30**	**35**	**40**	**45**	**50**	**55**	**30**	**35**	**40**	**45**	**50**	**55**
5	CC	kW	110	104	98.3	92.2	85.9	79.6	126	119	112	104	95.9	87.5
	PI	kW	25.8	28.1	30.9	34.2	38.1	42.8	28.9	31.6	34.7	38.4	42.5	47.3
	qwe	l/s	5.3	5.0	4.7	4.4	4.1	3.8	6.0	5.7	5.3	5.0	4.6	4.2
	dpwe	kPa	34	31	27	24	21	18	29	26	23	20	17	14
	HC	kW	135	132	129	126	123	122	154	150	146	142	138	134
	qwc	l/s	6.5	6.4	6.2	6.1	6.0	6.0	7.4	7.3	7.1	6.9	6.7	6.6
	dpwc	kPa	52	50	47	45	44	43	46	44	42	40	38	36
7	CC	kW	117	111	105	98.5	92	85.3	134	127	119	111	103	93.7
	PI	kW	26.2	28.5	31.3	34.6	38.5	43.1	29.3	32	35.1	38.7	42.9	47.6
	qwe	l/s	5.6	5.3	5.0	4.7	4.4	4.1	6.4	6.1	5.7	5.3	4.9	4.5
	dpwe	kPa	38.8	34.9	31.0	27.3	23.8	20.4	33.2	29.7	26.2	22.7	19.4	16.2
	HC	kW	143	139	136	132	130	128	163	158	154	149	145	141
	qwc	l/s	7	7	7	6	6	6	8	8	7	7	7	7
	dpwc	kPa	58	55	53	50	48	47	52	49	46	44	42	39
9	CC	kW	125	119	112	105	98.2	91.2	143	135	127	119	110	100
	PI	kW	26.6	28.9	31.7	35	38.8	43.4	29.7	32.4	35.5	39.1	43.2	48
	qwe	l/s	6.0	5.7	5.4	5.0	4.7	4.4	6.8	6.5	6.1	5.7	5.3	4.8
	dpwe	kPa	44	40	35	31	27	23	38	34	30	26	22	19
	HC	kW	151	147	143	139	136	134	172	167	162	157	152	147
	qwc	l/s	7.3	7.1	6.9	6.8	6.7	6.6	8.3	8.1	7.8	7.6	7.4	7.2
	dpwc	kPa	65	61	58	56	53	52	58	55	52	49	46	43
11	CC	kW	133	126	119	112	105	97.4	152	144	135	126	117	107
	PI	kW	27	29.3	32.1	35.4	39.2	43.8	30.2	32.8	35.9	39.5	43.6	48.3
	qwe	l/s	6.4	6.1	5.7	5.4	5.0	4.7	7.3	6.9	6.5	6.1	5.6	5.1
	dpwe	kPa	50	45	40	35	31	27	43	38	34	30	25	21
	HC	kW	159	155	150	147	143	140	181	176	170	165	160	155
	qwc	l/s	7.7	7.5	7.3	7.1	7.0	6.9	8.7	8.5	8.3	8.0	7.8	7.6
	dpwc	kPa	72	68	65	62	59	57	64	61	57	54	51	47
13	CC	kW	141	134	127	119	112	104	161	153	144	135	125	114
	PI	kW	27.5	29.8	32.6	35.8	39.7	44.2	30.7	33.3	36.4	39.9	44	48.7
	qwe	l/s	6.8	6.4	6.1	5.7	5.4	5.0	7.8	7.3	6.9	6.5	6.0	5.5
	dpwe	kPa	56	51	45	40	35	30	48	43	38	34	29	24
	HC	kW	167	163	158	154	150	147	191	185	179	174	168	162
	qwc	l/s	8.1	7.9	7.7	7.5	7.3	7.2	9.2	9.0	8.7	8.4	8.2	7.9
	dpwc	kPa	80	75	72	68	65	62	71	67	63	59	56	52
15	CC	kW	150	142	134	127	119	111	171	162	153	143	133	122
	PI	kW	28.1	30.4	33.1	36.3	40.2	44.7	31.3	33.8	36.9	40.4	44.4	49.1
	qwe	l/s	7.2	6.8	6.5	6.1	5.7	5.3	8.2	7.8	7.3	6.9	6.4	5.8
	dpwe	kPa	64	57	51	46	40	35	54	49	43	38	33	28
	HC	kW	176	171	166	162	158	154	201	195	188	182	176	170
	qwc	l/s	8.5	8.3	8.1	7.9	7.7	7.5	9.7	9.4	9.1	8.9	8.6	8.3
	dpwc	kPa	88	84	79	75	72	69	79	74	70	66	61	57

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			160						190					
Twe		**Twc**	**30**	**35**	**40**	**45**	**50**	**55**	**30**	**35**	**40**	**45**	**50**	**55**
5	CC	kW	139	132	124	115	106	96.9	159	150	141	132	122	111
	PI	kW	32.2	35.2	38.7	42.7	47.1	52.2	37.1	40.6	44.7	49.3	54.6	60.6
	qwe	l/s	6.7	6.3	5.9	5.5	5.1	4.6	7.6	7.2	6.8	6.3	5.8	5.3
	dpwe	kPa	29	26	23	20	17	14	30	27	24	21	18	15
	HC	kW	171	166	162	157	153	148	195	190	185	181	176	171
	qwc	l/s	8.2	8.0	7.8	7.6	7.5	7.3	9.4	9.2	9.0	8.7	8.5	8.3
	dpwc	kPa	46	44	41	39	37	35	48	46	44	41	39	37
7	CC	kW	148	141	132	123	114	104	169	160	151	141	130	118
	PI	kW	32.6	35.6	39.1	43	47.5	52.5	37.6	41.1	45.1	49.7	55	61
	qwe	l/s	7.1	6.7	6.3	5.9	5.4	5.0	8.1	7.7	7.2	6.7	6.2	5.7
	dpwe	kPa	32.8	29.4	26.0	22.6	19.2	16.0	34.6	31.1	27.5	24.0	20.4	16.9
	HC	kW	180	175	170	166	161	156	206	200	195	190	184	179
	qwc	l/s	9	9	8	8	8	8	10	10	9	9	9	9
	dpwc	kPa	51	48	46	43	41	39	53	51	48	46	43	41
9	CC	kW	158	150	141	131	121	111	180	171	161	150	139	127
	PI	kW	33	36	39.5	43.4	47.8	52.8	38.1	41.6	45.6	50.2	55.4	61.4
	qwe	l/s	7.6	7.2	6.8	6.3	5.8	5.3	8.6	8.2	7.7	7.2	6.7	6.1
	dpwe	kPa	37	33	30	26	22	18	39	35	31	27	23	19
	HC	kW	190	185	179	174	169	163	217	211	205	199	193	187
	qwc	l/s	9.2	8.9	8.7	8.5	8.2	8.0	10.4	10.2	9.9	9.6	9.4	9.1
	dpwc	kPa	57	54	51	48	45	42	60	56	53	50	48	45
11	CC	kW	168	159	150	140	130	118	191	181	171	160	148	135
	PI	kW	33.5	36.5	39.9	43.8	48.2	53.2	38.7	42.2	46.1	50.7	55.9	61.8
	qwe	l/s	8.1	7.6	7.2	6.7	6.2	5.7	9.2	8.7	8.2	7.7	7.1	6.5
	dpwe	kPa	42	38	34	29	25	21	44	40	36	31	27	22
	HC	kW	200	195	189	183	177	171	229	222	216	209	203	196
	qwc	l/s	9.7	9.4	9.1	8.9	8.6	8.3	11.0	10.7	10.4	10.1	9.8	9.5
	dpwc	kPa	63	60	56	53	50	46	66	63	59	56	52	49
13	CC	kW	178	169	159	149	138	126	203	193	182	170	157	144
	PI	kW	34	37	40.3	44.2	48.6	53.6	39.4	42.8	46.7	51.2	56.4	62.3
	qwe	l/s	8.6	8.1	7.7	7.2	6.6	6.1	9.8	9.3	8.7	8.1	7.6	6.9
	dpwe	kPa	48	43	38	33	28	24	50	45	40	35	30	25
	HC	kW	211	205	199	192	186	179	241	234	227	220	213	205
	qwc	l/s	10.2	9.9	9.6	9.3	9.0	8.7	11.6	11.3	11.0	10.6	10.3	10.0
	dpwc	kPa	70	66	62	58	55	51	73	69	65	61	57	54
15	CC	kW	189	179	169	158	147	134	215	204	193	180	167	153
	PI	kW	34.6	37.5	40.9	44.7	49	54	40.1	43.5	47.4	51.9	57	62.9
	qwe	l/s	9.1	8.6	8.1	7.6	7.1	6.4	10.4	9.8	9.3	8.7	8.0	7.3
	dpwe	kPa	54	48	43	38	32	27	56	51	45	40	34	28
	HC	kW	222	215	209	202	195	187	253	246	238	231	223	214
	qwc	l/s	10.7	10.4	10.1	9.8	9.5	9.1	12.2	11.9	11.5	11.2	10.8	10.4
	dpwc	kPa	78	73	69	64	60	56	81	77	72	68	63	59

EWHQ G-SS

			210						240					
Twe		**Twc**	**30**	**35**	**40**	**45**	**50**	**55**	**30**	**35**	**40**	**45**	**50**	**55**
5	CC	kW	179	170	160	150	140	129	206	195	184	171	158	144
	PI	kW	41.5	45.4	50	55.3	61.3	68.2	48.4	52.7	57.6	63.3	69.9	77.6
	qwe	l/s	8.6	8.1	7.7	7.2	6.7	6.2	9.8	9.3	8.8	8.2	7.6	6.9
	dpwe	kPa	32	29	26	23	20	17	30	27	24	21	18	15
	HC	kW	219	214	209	205	200	196	253	247	241	234	228	221
	qwc	l/s	10.5	10.3	10.1	9.9	9.7	9.5	12.1	11.8	11.5	11.2	10.9	10.6
	dpwc	kPa	51	48	46	44	42	41	30	29	27	26	24	23
7	CC	kW	191	181	171	160	149	138	219	208	196	183	169	154
	PI	kW	42.1	46	50.5	55.7	61.8	68.7	49.1	53.3	58.2	63.9	70.4	78
	qwe	l/s	9.1	8.7	8.2	7.7	7.1	6.6	10.5	9.9	9.4	8.8	8.1	7.4
	dpwe	kPa	36.8	33.2	29.6	26.0	22.5	19.2	34.2	30.7	27.3	23.8	20.3	16.9
	HC	kW	232	226	220	215	210	206	267	260	253	246	239	231
	qwc	l/s	11	11	11	10	10	10	13	13	12	12	12	11
	dpwc	kPa	57	54	51	49	47	45	34	32	30	28	27	25
9	CC	kW	203	193	182	171	159	147	233	221	208	195	180	164
	PI	kW	42.7	46.6	51.1	56.3	62.3	69.1	49.7	53.9	58.8	64.4	70.9	78.4
	qwe	l/s	9.7	9.2	8.7	8.2	7.6	7.0	11.2	10.6	10.0	9.3	8.6	7.9
	dpwe	kPa	42	38	34	30	26	22	39	35	31	27	23	19
	HC	kW	244	238	232	226	221	215	282	274	266	258	250	242
	qwc	l/s	11.7	11.5	11.2	10.9	10.7	10.4	13.5	13.1	12.8	12.4	12.0	11.6
	dpwc	kPa	63	60	57	54	52	49	37	35	33	31	29	27
11	CC	kW	215	205	194	182	170	157	248	235	222	207	192	175
	PI	kW	43.5	47.3	51.8	57	62.9	69.7	50.4	54.6	59.4	65	71.5	78.9
	qwe	l/s	10.4	9.8	9.3	8.7	8.1	7.5	11.9	11.3	10.6	9.9	9.2	8.4
	dpwe	kPa	47	43	38	34	29	25	44	40	35	31	26	22
	HC	kW	257	251	244	238	231	225	297	289	280	271	262	253
	qwc	l/s	12.4	12.1	11.8	11.5	11.2	10.9	14.2	13.8	13.4	13.0	12.6	12.2
	dpwc	kPa	70	66	63	60	57	54	42	39	37	35	32	30
13	CC	kW	229	218	206	194	181	167	264	250	236	220	204	187
	PI	kW	44.2	48.1	52.5	57.7	63.6	70.4	51.1	55.2	60	65.6	72	79.4
	qwe	l/s	11.0	10.4	9.9	9.3	8.7	8.0	12.7	12.0	11.3	10.6	9.8	8.9
	dpwe	kPa	53	48	43	38	33	28	50	45	40	35	30	25
	HC	kW	271	264	257	250	243	236	313	304	295	285	275	265
	qwc	l/s	13.0	12.7	12.4	12.1	11.8	11.5	15.0	14.6	14.1	13.7	13.2	12.7
	dpwc	kPa	77	74	70	66	62	59	46	43	41	38	36	33
15	CC	kW	242	231	218	205	192	178	280	265	250	234	217	198
	PI	kW	45.1	48.9	53.3	58.5	64.4	71.1	51.9	56	60.7	66.2	72.5	79.9
	qwe	l/s	11.6	11.1	10.5	9.9	9.2	8.5	13.4	12.8	12.0	11.3	10.4	9.5
	dpwe	kPa	60	54	49	43	38	32	56	51	45	39	34	28
	HC	kW	285	278	270	262	255	247	330	320	310	299	288	277
	qwc	l/s	13.7	13.4	13.0	12.7	12.3	12.0	15.8	15.3	14.9	14.4	13.9	13.3
	dpwc	kPa	86	81	77	73	69	65	51	48	45	42	39	36

EWHQ G-SS

			270						340					
Twe		**Twc**	**30**	**35**	**40**	**45**	**50**	**55**	**30**	**35**	**40**	**45**	**50**	**55**
5	CC	kW	229	218	206	193	180	166	287	273	258	243	227	209
	PI	kW	53.4	58.3	63.9	70.1	77.2	85	66.5	72.8	79.8	87.9	97	107
	qwe	l/s	10.9	10.4	9.8	9.2	8.6	7.9	13.7	13.1	12.4	11.6	10.8	10.0
	dpwe	kPa	37	34	30	27	23	20	41	37	33	29	25	22
	HC	kW	281	275	269	262	256	250	352	344	337	329	322	315
	qwc	l/s	13.5	13.2	12.9	12.6	12.3	12.0	16.9	16.5	16.2	15.9	15.5	15.2
	dpwc	kPa	37	35	34	32	31	29	62	60	57	55	52	50
7	CC	kW	244	232	219	206	192	177	306	291	275	259	242	223
	PI	kW	54.3	59.1	64.7	70.9	78	85.9	67.6	73.7	80.8	88.9	98	108
	qwe	l/s	11.7	11.1	10.5	9.9	9.2	8.5	14.6	13.9	13.2	12.4	11.6	10.7
	dpwe	kPa	42.3	38.3	34.2	30.2	26.3	22.4	46.5	42.1	37.7	33.4	29.0	24.8
	HC	kW	297	290	283	276	269	262	371	363	354	346	338	330
	qwc	l/s	14	14	14	13	13	13	18	17	17	17	16	16
	dpwc	kPa	41	39	38	36	34	32	69	66	63	60	58	55
9	CC	kW	259	247	233	220	205	189	325	310	294	276	258	239
	PI	kW	55.4	60.1	65.5	71.8	78.8	86.7	68.8	74.8	81.8	89.8	99	109
	qwe	l/s	12.4	11.8	11.2	10.5	9.8	9.1	15.6	14.9	14.1	13.2	12.4	11.4
	dpwe	kPa	48	43	39	34	30	26	53	48	43	38	33	28
	HC	kW	313	305	298	290	283	275	392	382	373	364	355	346
	qwc	l/s	15.0	14.6	14.3	13.9	13.6	13.2	18.8	18.4	18.0	17.5	17.1	16.7
	dpwc	kPa	46	44	42	40	38	36	77	74	70	67	64	61
11	CC	kW	275	262	248	234	218	202	345	329	312	294	275	255
	PI	kW	56.5	61.2	66.5	72.7	79.6	87.5	70.1	76	82.9	90.8	99.8	110
	qwe	l/s	13.2	12.6	11.9	11.2	10.5	9.7	16.6	15.8	15.0	14.1	13.2	12.2
	dpwe	kPa	54	49	44	39	34	29	60	54	49	43	38	32
	HC	kW	330	322	314	305	297	289	413	403	393	383	373	363
	qwc	l/s	15.8	15.4	15.0	14.7	14.3	13.9	19.8	19.4	18.9	18.4	18.0	17.5
	dpwc	kPa	51	49	46	44	41	39	86	82	78	74	70	67
13	CC	kW	292	278	264	248	232	215	366	350	332	313	293	272
	PI	kW	57.8	62.3	67.6	73.6	80.6	88.4	71.5	77.3	84.1	91.9	101	111
	qwe	l/s	14.0	13.4	12.7	11.9	11.1	10.3	17.6	16.8	15.9	15.0	14.1	13.0
	dpwe	kPa	61	55	50	44	39	33	67	61	55	49	43	37
	HC	kW	348	339	330	321	312	303	435	424	413	402	391	380
	qwc	l/s	16.6	16.2	15.8	15.4	15.0	14.6	20.9	20.4	19.9	19.4	18.9	18.4
	dpwc	kPa	57	54	51	48	46	43	95	91	86	82	77	73
15	CC	kW	309	295	280	264	247	229	388	371	352	332	312	289
	PI	kW	59.1	63.6	68.8	74.7	81.6	89.3	73.1	78.7	85.4	93.1	102	112
	qwe	l/s	14.9	14.2	13.4	12.7	11.9	11.0	18.7	17.8	16.9	16.0	15.0	13.9
	dpwe	kPa	69	62	56	50	44	38	76	69	62	55	49	42
	HC	kW	366	356	347	337	327	317	458	446	434	423	411	399
	qwc	l/s	17.5	17.1	16.6	16.2	15.7	15.3	22.0	21.4	20.9	20.4	19.8	19.3
	dpwc	kPa	63	60	57	53	50	47	106	100	95	90	85	80

EWHQ G-SS

			400					
Twe		**Twc**	**30**	**35**	**40**	**45**	**50**	**55**
5	CC	kW	347	330	313	294	275	254
	PI	kW	79.8	87.4	96.1	106	117	130
	qwe	l/s	16.6	15.8	15.0	14.1	13.1	12.1
	dpwe	kPa	42	38	34	30	26	22
	HC	kW	424	416	407	399	391	383
	qwc	l/s	20.4	20.0	19.6	19.3	18.9	18.5
	dpwc	kPa	65	62	60	57	55	53
7	CC	kW	369	352	333	314	293	271
	PI	kW	80.9	88.4	97.1	107	118	131
	qwe	l/s	17.7	16.9	16.0	15.0	14.0	13.0
	dpwe	kPa	47.4	43.0	38.6	34.2	29.8	25.6
	HC	kW	448	438	428	419	410	401
	qwc	l/s	22	21	21	20	20	19
	dpwc	kPa	72	69	66	63	61	58
9	CC	kW	392	374	355	335	313	290
	PI	kW	82.1	89.5	98.1	108	119	132
	qwe	l/s	18.8	18.0	17.0	16.0	15.0	13.9
	dpwe	kPa	54	49	44	39	34	29
	HC	kW	472	461	451	440	430	420
	qwc	l/s	22.7	22.2	21.7	21.3	20.8	20.3
	dpwc	kPa	80	76	73	70	67	64
11	CC	kW	416	398	378	356	333	309
	PI	kW	83.5	90.8	99.3	109	120	133
	qwe	l/s	20.0	19.1	18.1	17.1	16.0	14.8
	dpwe	kPa	61	55	50	44	39	33
	HC	kW	497	485	474	463	451	440
	qwc	l/s	23.9	23.4	22.9	22.3	21.8	21.3
	dpwc	kPa	89	85	81	77	73	70
13	CC	kW	442	422	401	379	355	330
	PI	kW	85	92.1	100	110	121	134
	qwe	l/s	21.2	20.3	19.3	18.2	17.0	15.8
	dpwe	kPa	68	62	56	50	44	38
	HC	kW	523	511	498	486	473	461
	qwc	l/s	25.1	24.6	24.0	23.5	22.9	22.3
	dpwc	kPa	98	94	89	85	81	77
15	CC	kW	468	447	425	402	377	351
	PI	kW	86.7	93.6	102	111	123	135
	qwe	l/s	22.5	21.5	20.5	19.3	18.1	16.9
	dpwe	kPa	77	70	63	57	50	43
	HC	kW	550	537	523	510	497	483
	qwc	l/s	26.4	25.8	25.2	24.6	24.0	23.4
	dpwc	kPa	109	104	99	94	89	84

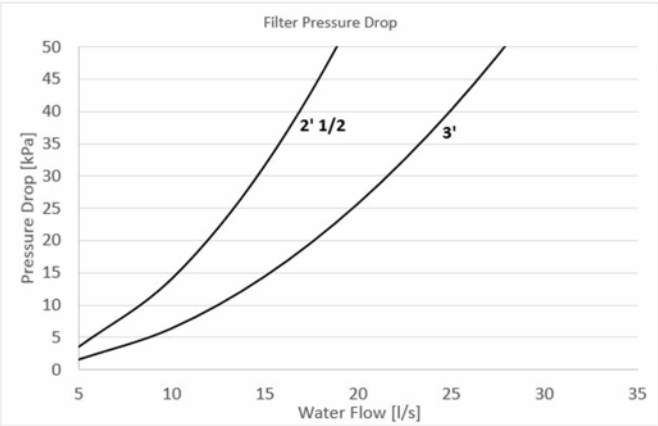
Fluid: Water
Twe: Evaporator leaving water temperature (Δt 5°C); Twc: Condenser leaving water temperature (Δt 5°C);
HC: Heat capacity at condenser; qwc: Fluid flow rate at condenser; dpwc: Fluid pressure drop at condenser
qwc: Fluid flow rate at condenser; dpwc: Fluid pressure drop at condenser
** For working condition where dpw value is "Italic-Red Color" please contac factory*

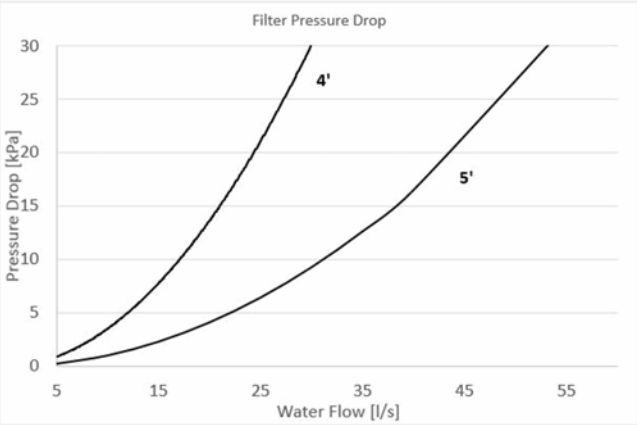
Water filter - Combination matrix

Models			filter		
			2' 1/2	3'	4'
EWWQ090G-SS	EWHQ100G-SS	EWLQ090G-SS	x		
EWWQ100G-SS	EWHQ120G-SS	EWLQ100G-SS	x		
EWWQ120G-SS	EWHQ130G-SS	EWLQ120G-SS	x		
EWWQ130G-SS	EWHQ150G-SS	EWLQ130G-SS	x		
EWWQ150G-SS	EWHQ160G-SS	EWLQ150G-SS	x		
EWWQ170G-SS	EWHQ190G-SS	EWLQ170G-SS	x		
EWWQ190G-SS	EWHQ210G-SS	EWLQ190G-SS	x		
EWWQ210G-SS	EWHQ240G-SS	EWLQ210G-SS	x		
EWWQ240G-SS	EWHQ270G-SS	EWLQ240G-SS		x	
EWWQ300G-SS	EWHQ340G-SS	EWLQ300G-SS		x	
EWWQ360G-SS	EWHQ400G-SS	EWLQ360G-SS			x

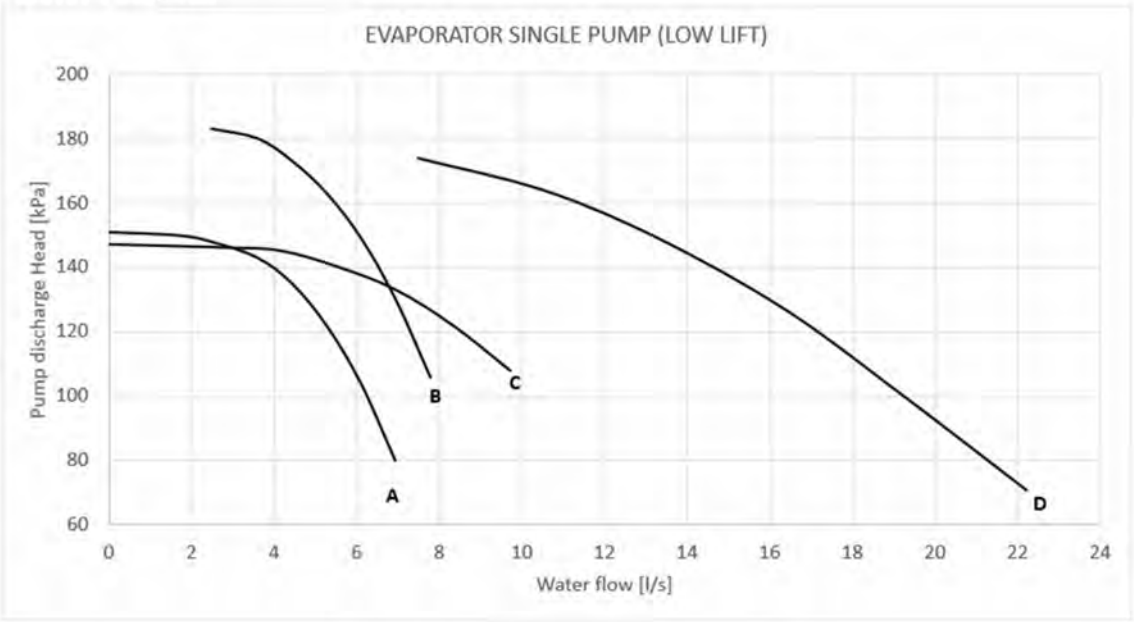
Models		filter		
		3'	4'	5'
EWWQ180L-SS	EWLQ180L-SS	x		
EWWQ205L-SS	EWLQ205L-SS	x		
EWWQ230L-SS	EWLQ230L-SS	x		
EWWQ260L-SS	EWLQ260L-SS	x		
EWWQ290L-SS	EWLQ290L-SS	x		
EWWQ330L-SS	EWLQ330L-SS		x	
EWWQ380L-SS	EWLQ380L-SS		x	
EWWQ430L-SS	EWLQ430L-SS		x	
EWWQ480L-SS	EWLQ480L-SS		x	
EWWQ540L-SS	EWLQ540L-SS		x	
EWWQ600L-SS	EWLQ600L-SS			x
EWWQ660L-SS	EWLQ660L-SS			x
EWWQ720L-SS	EWLQ720L-SS			x

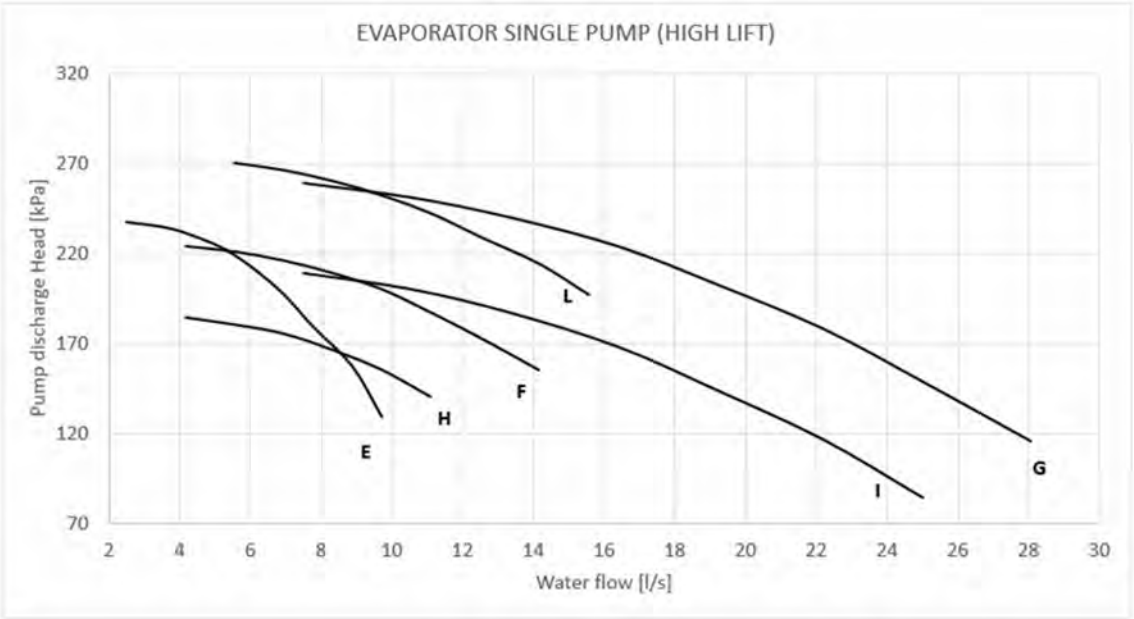
Filter pressure drops





Water Pump Kit





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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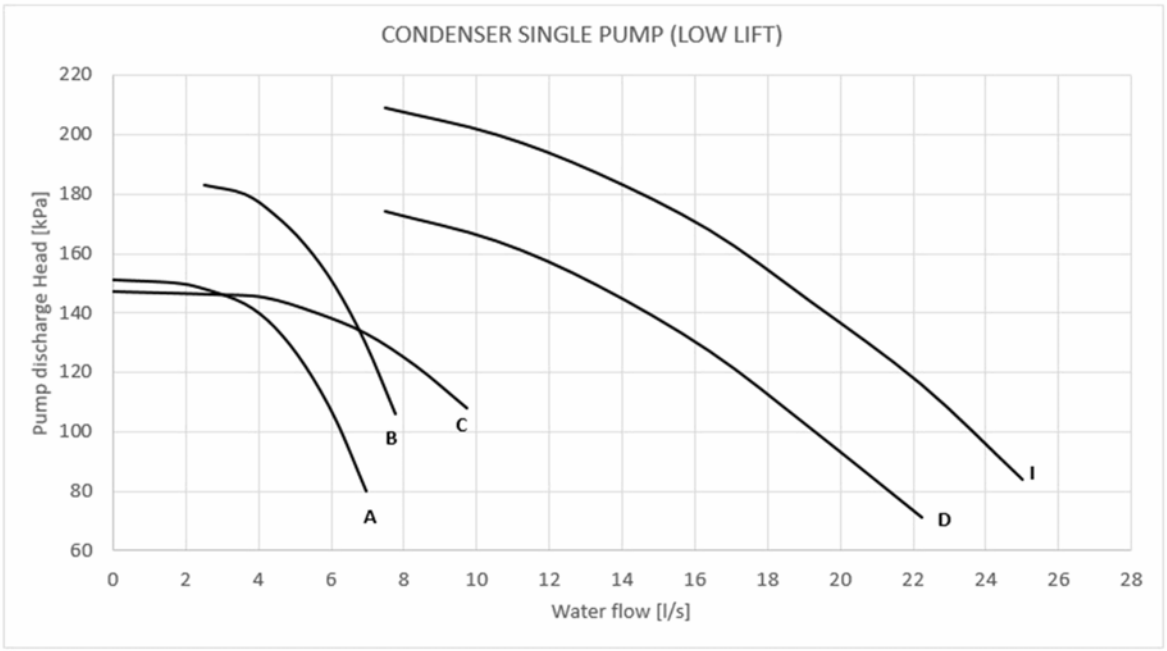
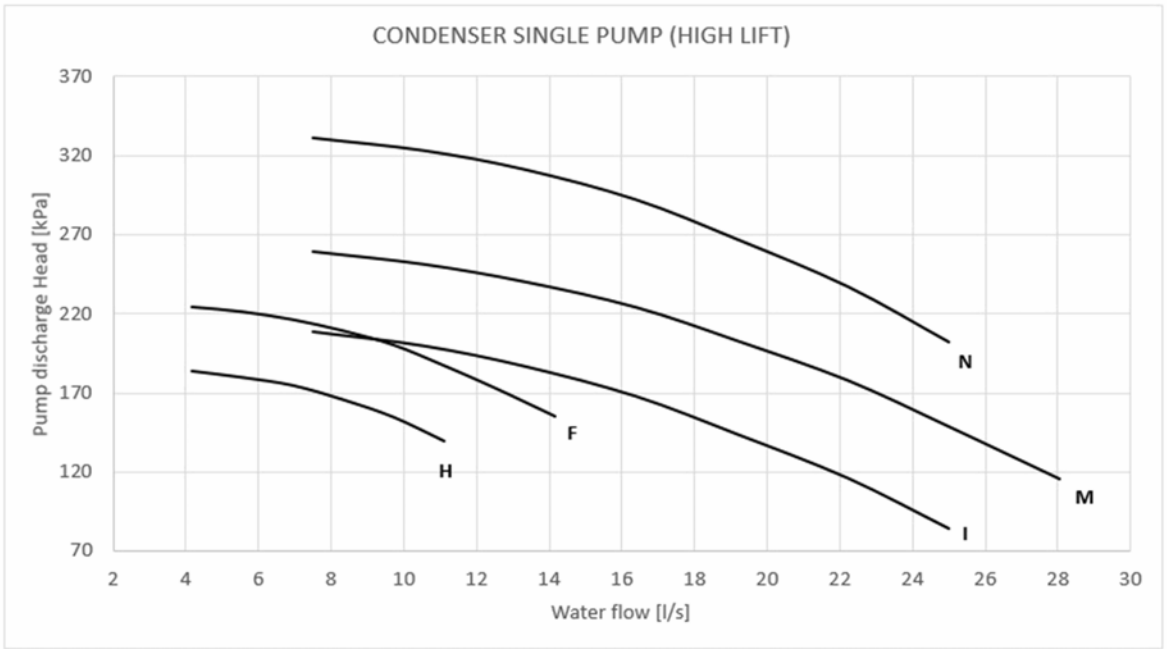




Note
- the above curves are referred to the discharge head of the pump only, not including pressure drops in the unit
- when using mixture of water and glycol please contact the factory as above specification can change
.

Water Pump Kit - Technical Information

	Models			ref	Pump Motor Power [kW]	Pumo Motor Current [A]	Power Supply [V-ph-Hz]	PN	Motor Protection	Insulation [Class]	Working Temperature [°C]
EVAPORATOR SINGLE PUMP (LOW LIFT)	EWWQ090G-SS	EWHQ100G-SS	EWLQ090G-SS	A	1,1	2,38	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ100G-SS	EWHQ120G-SS	EWLQ100G-SS	A	1,1	2,38	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ120G-SS	EWHQ130G-SS	EWLQ120G-SS	A	1,1	2,38	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ130G-SS	EWHQ150G-SS	EWLQ130G-SS	B	1,5	3,18	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ150G-SS	EWHQ160G-SS	EWLQ150G-SS	C	1,5	3,18	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ170G-SS	EWHQ190G-SS	EWLQ170G-SS	C	1,5	3,18	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ190G-SS	EWHQ210G-SS	EWLQ190G-SS	C	1,5	3,18	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ210G-SS	EWHQ240G-SS	EWLQ210G-SS	D	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ240G-SS	EWHQ270G-SS	EWLQ240G-SS	D	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ300G-SS	EWHQ340G-SS	EWLQ300G-SS	D	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ360G-SS	EWHQ400G-SS	EWLQ360G-SS	D	3	6,27	400-3ph-50Hz	16	IP55	F	-25 / 120
EVAPORATOR SINGLE PUMP (HIGH LIFT)	EWWQ090G-SS	EWHQ100G-SS	EWLQ090G-SS	E	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ100G-SS	EWHQ120G-SS	EWLQ100G-SS	E	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ120G-SS	EWHQ130G-SS	EWLQ120G-SS	E	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ130G-SS	EWHQ150G-SS	EWLQ130G-SS	H	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ150G-SS	EWHQ160G-SS	EWLQ150G-SS	H	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ170G-SS	EWHQ190G-SS	EWLQ170G-SS	F	3	6,27	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ190G-SS	EWHQ210G-SS	EWLQ190G-SS	F	3	6,27	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ210G-SS	EWHQ240G-SS	EWLQ210G-SS	L	4	7,62	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ240G-SS	EWHQ270G-SS	EWLQ240G-SS	I	4	7,62	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ300G-SS	EWHQ340G-SS	EWLQ300G-SS	I	4	7,62	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ360G-SS	EWHQ400G-SS	EWLQ360G-SS	G	5,5	10,5	400-3ph-50Hz	16	IP55	F	-25 / 120

	Models		ref	Pump Motor Power [kW]	Pumo Motor Current [A]	Power Supply [V-ph-Hz]	PN	Motor Protection	Insulation [Class]	Working Temperature [°C]
CONDENSER SINGLE PUMP (LOW LIFT)	EWWQ090G-SS	EWHQ100G-SS	A	1,1	2,38	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ100G-SS	EWHQ120G-SS	A	1,1	2,38	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ120G-SS	EWHQ130G-SS	B	1,5	3,18	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ130G-SS	EWHQ150G-SS	C	1,5	3,18	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ150G-SS	EWHQ160G-SS	C	1,5	3,18	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ170G-SS	EWHQ190G-SS	D	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ190G-SS	EWHQ210G-SS	D	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ210G-SS	EWHQ240G-SS	D	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ240G-SS	EWHQ270G-SS	D	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ300G-SS	EWHQ340G-SS	D	3	6,27	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ360G-SS	EWHQ400G-SS	I	4	7,62	400-3ph-50Hz	16	IP55	F	-25 / 120
CONDENSER SINGLE PUMP (HIGH LIFT)	EWWQ090G-SS	EWHQ100G-SS	H	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ100G-SS	EWHQ120G-SS	H	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ120G-SS	EWHQ130G-SS	H	2,2	4,54	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ130G-SS	EWHQ150G-SS	F	3	6,27	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ150G-SS	EWHQ160G-SS	F	3	6,27	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ170G-SS	EWHQ190G-SS	I	4	7,62	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ190G-SS	EWHQ210G-SS	I	4	7,62	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ210G-SS	EWHQ240G-SS	I	4	7,62	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ240G-SS	EWHQ270G-SS	I	4	7,62	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ300G-SS	EWHQ340G-SS	M	5,5	10,5	400-3ph-50Hz	16	IP55	F	-25 / 120
	EWWQ360G-SS	EWHQ400G-SS	N	7,5	14,1	400-3ph-50Hz	16	IP55	F	-25 / 120

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 not equipped as standard with water filter. The filter is selectable as option and mounted externally from the unit.

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.

How to calculate the chiller external available pressure head with Single/Twin pumps kit option (factory supplied)

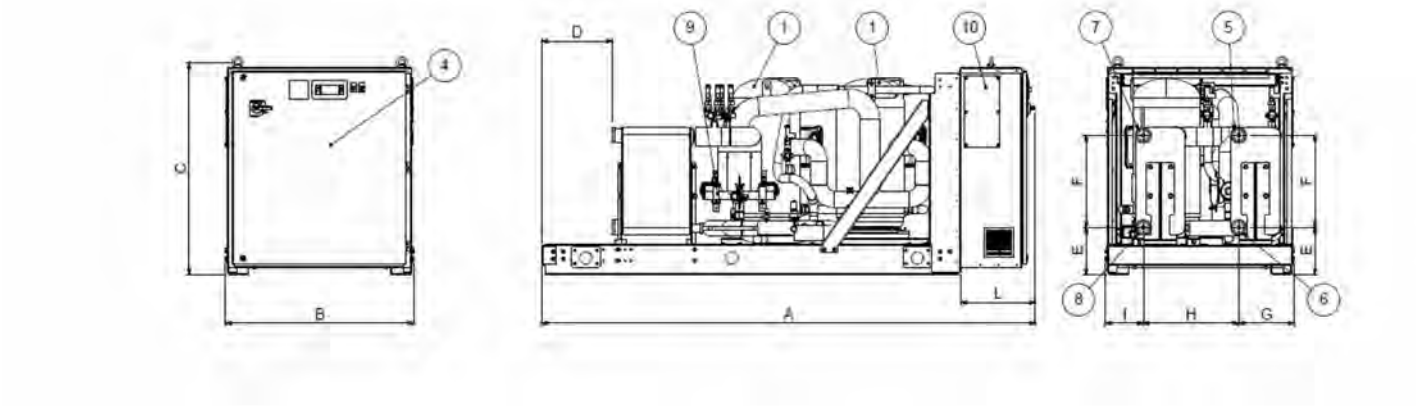
In order to calculate the chiller external available pressure head with Single pumps kit option (factory supplied) the following points have to be considered:

-The pressure drop values showed in CSS (Chiller Selection Software) are referred to chiller's evaporator only.
- This multiscroll series is not equipped as standard with water filter. The filter is selectable as option and mounted externally from the unit.

Chiller external available pressure head = pump discharge head [kPa] – evaporator pressure drop [kPa] –Single/Twin pumps kit pressure drop (including filter) [kPa]

a) Select the pump characteristic from the graph (refer to the Technical information table in order to get the pump curve corresponding to the selected unit) and get the corresponding 'Pump Discharge Head'.
b) Select the chiller with CSS tool at design conditions, you get easily the design water flow rate and the corresponding "evaporator pressure drop" (in CSS tool kPa figures are referred to evaporator only)
c) If the option 115 "Water filter" has been selected, considering the design flow rate and water filter size from the Filter combination matxix, from graph "Filter pressure drops" get the corresponding kPa value.
f) By considering the values at point a, b and c you can easily calculate the chiller external available pressure head as pump discharge head – evaporator pressure drop – filter pressure drop.

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



LEGEND

1:	COMPRESSOR
2:	EVAPORATOR
3:	CONDENSER
4:	ELECTRICAL PANEL
5:	EVAPORATOR WATER INLET CONNECTION (VICTAULIC AS OPTION)
6:	EVAPORATOR WATER OUTLET CONNECTION (VICTAULIC AS OPTION)
7:	CONDENSER WATER INLET CONNECTION (VICTAULIC AS OPTION)
8:	CONDENSER WATER OUTLET CONNECTION (VICTAULIC AS OPTION)
9:	4 WAY VALVE
10:	POWER CONNECTIONS SLOT 150X200
note:	Dimentions without options

	A	B	C	D	E	F	G	H	I	L	M
EWHO100G-SS	2432	928	1066	426	227	470	221	469	238	371	
EWHO120G-SS	2432	928	1066	372	227	470	221	469	238	371	
EWHO130G-SS	2264	928	1066	343	231	450	273	469	185	371	
EWHO150G-SS	2264	928	1066	306	231	450	273	469	185	371	
EWHO160G-SS	2264	928	1066	279	231	450	273	469	185	371	
EWHO190G-SS	2432	928	1066	415	231	450	273	469	185	371	
EWHO210G-SS	2432	928	1066	383	231	450	273	469	185	371	
EWHO240G-SS	2432	928	1066	346	231	450	273	469	185	371	
EWHO270G-SS	2432	928	1066	346	231	450	273	469	185	371	
EWHO340G-SS	2432	928	1186	348	242	597	330	433	165	371	
EWHO400G-SS	2432	928	1186	275	242	597	330	433	165	371	

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 Avoid bumping and/or jolting during loading/unloading unit from the truck and moving it. Do not push or pull the unit from any part other than the basis. Secure the unit inside the truck to prevent it from moving and causing damages. Do not allow any part of the unit to fall during transportation or loading/unloading. Use extreme caution when handling the unit to prevent damage to the control or the refrigerant piping. The unit must be lifted by inserting a hook in each corner, where there are holes for lifting (see the following drawings instruction). During the lifting phase to verify that the ropes and / or the lifting chains do not touch the electrical panel and / or piping. If moving the machine, you had the sleds or skates, push only on the basis of the machine without touching the pipes of copper, steel, compressors and / or the electrical panel.

Location All units are designed for indoor installation. A leveled and sufficiently strong floor is required. If necessary, additional structural members should be provided to transfer the weight of the unit to 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.

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:

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:	+57°C
Maximum R.H.:	95% not condensing

The above recommended information are representative of a general installation. A specific evaluation should be done by the contractor case by case.
For complete information refer to the installation manual.

General The unit 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 unit will be delivered to the job site completely assembled and charged with refrigerant and oil. The installation of the unit 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:
Chiller mode:
- evaporator leaving fluid temperature between ..... °C and ..... °C
- condenser leaving fluid temperature between ..... °C and ..... °C

Heat pump mode:
- evaporator leaving fluid temperature between ..... °C and ..... °C
- condenser leaving fluid temperature between ..... °C and ..... °C

Refrigerant Only HFC 410A can be used.

Performance The unit shall supply the following performances:
- Number : ..... unit(s)
- Cooling capacity for single unit : ..... kW
- Power input for single chiller in cooling mode : ..... kW
- Evaporator heat exchanger entering water temperature in cooling mode : ..... °C
- Evaporator heat exchanger leaving water temperature in cooling mode : ..... °C
- Evaporator heat exchanger water flow : ..... l/s
- Condenser heat exchanger entering water temperature in cooling mode : ..... °C
- Condenser heat exchanger leaving water temperature in cooling mode : ..... °C
- Condenser heat exchanger water flow : ..... l/s

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 The unit shall include as standard: one or two refrigerant circuit, two or four hermetic type rotary scroll compressors (according to the capacity), electronic expansion device (EEXV), refrigerant direct expansion plate to plate heat exchangers, 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, hemispheric 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

Compressors The units shall be equipped with:

• High performance hermetic scroll compressors optimized to work with R410a, with reduced vibration and sound emissions. High efficiency values shall be guaranteed:

-by high volumetric efficiency in the whole range of application, through the continuous contact between the fixed and the orbiting scroll deleting the dead space and the re-expansion of the refrigerant gas;

-by low pressure drops due to the absence of inlet and discharge valves and to the uniform compression cycle;

-reduction of the heat exchange between the gas during suction and discharge due to the separation of gas flows;

•The reduced noise shall be obtained: -for the absence of the inlet and discharge valves

-for the uniform compression cycle

-for the absence of pistons which ensures reduced vibration and pulsation of the refrigerant

• The engine shall be cooled by the suction refrigerant fluid.

• The terminal shall be contained in a casing with protection degree IP 54.

• The compressors shall be provided with crankcase heater to prevent the dilution of refrigerant and oil the during the stops of the unit;

• Shall be present an electronic thermal protection for the three phases complete with sensors on the stator windings to avoid overheating caused by lack of phase, insufficient cooling, mechanical locks, power supply out of tolerance;

•The compressors shall be connected in Tandem on a single refrigerating circuit.

•The compressors shall be fitted on rubber antivibration mounts.

•The compressors shall be provided complete with oil charge.

User side exchanger (PHE) The units shall be equipped with a direct expansion plate to plate type exchanger.

• The exchanger will be made of stainless steel brazed plates closed cell polyurethane insulation material (20-mm thick).

•The evaporator will be manufactured in accordance to PED approval.

•Flow switch must be installed on plant.

•Water filter must be installed on plant.

Source side exchanger (PHE) The units shall be equipped with a plate to plate type exchanger.

• The exchanger will be made of stainless steel brazed plates closed cell polyurethane insulation material (20-mm thick).

•The evaporator will be manufactured in accordance to PED approval.

•Flow switch must be installed on plant.

•Water filter must be installed on plant.

Refrigerant circuit The unit shall have one or two refrigerant circuits according to the capacity.

•The circuits shall include as standard: 4 ways valve, electronic expansion device piloted by unit's microprocessor control, charging valves, high pressure switch, high and low pressure transducers and insulated suction line.

Condensation control The controller automatically unloads the circuit 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.

Hydronic kit options (on request) The hydronic module shall be integrated in the unit chassis without increasing its dimensions and includes the following elements: centrifugal pump with motor protected by a circuit breaker installed in control panel 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 insulated to prevent condensation.

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.

Controller main features Controller shall be guarantee following minimu functions:

• Management of the circuit capacity.
•Chiller enabled to work in partial failure condition (for 2 circuit units).
• Full routine operation at condition of:
- high thermal load
-high evaporator entering water temperature (start-up)
•Display of evaporator entering/leaving water 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.
•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.

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.

For more information email **info@daikinapplied.uk** or visit **www.daikinapplied.uk**

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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