DAIKIN

Applied Systems

Technical Data

Water cooled chiller, standard efficiency

EEDEN13-421

EWWQ-B-SS

TABLE OF CONTENTS

EWWQ-B-SS

1 Features

- All models are PED pressure vessel approved
- 1 or 2 stepless single-screw compressors
- 1 or 2 truly independent refrigerant circuits
- Shell and tube heat exchanger
- Optimised for use with R-410A
- Standard electronic expansion valve
- Compact design
- Partial heat recovery available
- MicroTech III controller

2 Specifications

2-1 Technical Specifications					EWWQ380B-SS	EWWQ460B-SS	EWWQ560B-SS	EWWQ640B-SS	EWWQ730B-SS	EWWQ800B-SS	EWWQ860B-SS	EWWQ870B-SS	EWWQ960B-SS	EWWQC10B-SS
Cooling capacity	Nom.			kW	379 (1)	462 (1)	560 (1)	635 (1)	724 (1)	793 (1)	859 (1)	868 (1)	956 (1)	1,003 (1)
Capacity control	Method				Stepless									
	Minimum capacity			%	12.5					25.0	12.5	25.0		12.5
Power input	Cooling	Nom.		kW	89.2 (1)	109 (1)	133 (1)	150 (1)	170 (1)	179 (1)	207 (1)	199 (1)	218 (1)	247 (1)
EER					4.24 (1)		4.21 (1)	4.22 (1)	4.25 (1)	4.42 (1)	4.15 (1)	4.36 (1)	4.38 (1)	4.07 (1)
ESEER					4.61	4.59	4.67		4.62	4.95	4.52	4.91	4.90	4.42
IPLV					5.56	5.62	5.63		5.32	5.58	5.15	5.75	5.92	5.07
Casing	Colour				Ivory white									
	Material				Galvanized and painted steel sheet									
Dimensions	Unit	Height		mm	1,849		2,001		1,848	2,158	1,848	2,158		1,848
		Width		mm	1,140		1,276		1,314	1,350	1,314	1,350		1,314
		Depth		mm	3,373		3,454		3,535	5,020	2,001	5,020		2,001
Weight	Unit			kg	1,933	1,967	2,283	2,332	2,407	3,921	2,427	3,949	3,988	2,457
	Operation weight			kg	2,135	2,169	2,543	2,628	2,777	4,422	2,795	4,463	4,496	2,812
Water heat exchanger - evaporator	Type				Single pass shell and tube									
	Water volume			l	124	118	176	170	274	344	266	344	325	251
	Water flow rate	Nom.		l/s	18.1	22.1	26.8	30.4	34.7	38.0	41.1	41.6	45.8	48.0
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	48	63	44	47	54	53	49	62	58	56
	Insulation material				Closed cell foam elastomer									
Water heat exchanger - condenser	Type				Single pass shell and tube									
	Water flow rate	Nom.		l/s	22.4	27.4	33.2	37.7	43.1	23.3	51.3	23.3	28.2	60.1
	Nominal water pressure drop	Cooling		kPa	59	63	67	65	16	64	20	64	67	26
	Nominal water pressure drop 2	Cooling		kPa	-					64	-	66	67	-
	Insulation material				Expanded elastomer									
	Model	Quantity			1					2	1	2		1
Sound power level	Cooling	Nom.		dBA	100	101	102			105	102	105		103
Sound pressure level	Cooling	Nom.		dBA	82	83	84		83	84	85			86
Compressor	Type				Semi-hermetic single screw compressor									
	Quantity				1					2	1	2		1
	Oil	Charged volume		l	16					32	16	32		16
Operation range	Evaporator	Cooling	Min.	°CDB	-4									
			Max.	°CDB	10									
	Condenser	Cooling	Min.	°CDB	25									
			Max.	°CDB	45									
Refrigerant	Type				R-410A									
	Circuits	Quantity			1					2	1	2		1
Refrigerant circuit	Charge			kg	80		90		80		90		85	100
Refrigerant circuit 2	Charge			kg	-					80	-	90	85	100
Piping connections	Evaporator water inlet/outlet			mm	152.4		203.2							
	Condenser water inlet/outlet			inch	5		6		5					
Safety devices	Item	01			High pressure switch									
		02			Low pressure switch									
		03			Emergency stop									
		04			High discharge temperature on the compressor									
		05			Phase monitor									
		06			Low pressure ratio									
		07			High oil pressure drop									
		08			Low oil pressure									

2-2 Technical Specifications			EWWQC11B-SS	EWWQC12B-SS	EWWQC13B-SS	EWWQC14B-SS	EWWQC15B-SS	EWWQC16B-SS	EWWQC17B-SS	EWWQC19B-SS	EWWQC20B-SS
Cooling capacity	Nom.	kW	1,050 (1)	1,181 (1)	1,251 (1)	1,320 (1)	1,452 (1)	1,595 (1)	1,754 (1)	1,896 (1)	2,055 (1)
Capacity control	Method		Stepless								
	Minimum capacity	%	25.0								

2 Specifications

2-2 Technical Specifications					EWWQC1 1B-SS	EWWQC1 2B-SS	EWWQC1 3B-SS	EWWQC1 4B-SS	EWWQC1 5B-SS	EWWQC1 6B-SS	EWWQC1 7B-SS	EWWQC1 9B-SS	EWWQC2 0B-SS
Power input	Cooling	Nom.		kW	243 (1)	268 (1)	285 (1)	303 (1)	337 (1)	373 (1)	407 (1)	441 (1)	477 (1)
EER					4.32 (1)	4.41 (1)	4.38 (1)	4.35 (1)	4.31 (1)	4.28 (1)	4.31 (1)	4.30 (1)	4.31 (1)
ESEER					4.86	4.96		4.89	4.81	4.76	4.61	4.63	4.54
IPLV					5.90	5.93		5.85	5.46	5.44	5.34	5.38	5.33
Casing	Colour				Ivory white								
	Material				Galvanized and painted steel sheet								
Dimensions	Unit	Height		mm	2,378	2,455			2,495				
		Width		mm	1,350								
		Depth		mm	4,894	5,070			4,892			4,865	
Weight	Unit			kg	4,344	4,529	4,536	4,607	4,988	4,999	5,053	5,204	5,289
	Operation weight			kg	4,780	5,186	5,200	5,280	5,602	5,615	5,670	5,881	5,970
Water heat exchanger - evaporator	Type				Single pass shell and tube								
	Water volume			l	325	538			505		495	539	527
	Water flow rate	Nom.		l/s	50.3	56.5	59.9	63.2	69.5	76.5	84.1	91.0	98.7
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	69	45	49	54	59	69	88	97	120
	Insulation material				Closed cell foam elastomer								
Water heat exchanger - condenser	Type				Single pass shell and tube								
	Water flow rate	Nom.		l/s	28.2	34.7	34.8	38.9	43.0	43.4	52.0	52.3	60.9
	Nominal water pressure drop	Cooling		kPa	67	73		69	16		17		15
	Nominal water pressure drop 2	Cooling		kPa	69	73	69		16	19	17	14	15
	Insulation material				Expanded elastomer								
	Model	Quantity			2								
Sound power level	Cooling	Nom.		dBA	105		107		106		107		108
Sound pressure level	Cooling	Nom.		dBA	86	87			86	87		88	
Compressor	Type				Semi-hermetic single screw compressor								
	Quantity				2								
	Oil	Charged volume		l	32								
Operation range	Evaporator	Cooling	Min.	°CDB	-4								
			Max.	°CDB	10								
	Condenser	Cooling	Min.	°CDB	25								
			Max.	°CDB	45								
Refrigerant	Type				R-410A								
	Circuits	Quantity			2								
Refrigerant circuit	Charge			kg	90	100			130				
Refrigerant circuit 2	Charge			kg	90	100			130				
Piping connections	Evaporator water inlet/outlet			mm	203.2	254							
	Condenser water inlet/outlet			inch	6				5				
Safety devices	Item	01			High pressure switch								
		02			Low pressure switch								
		03			Emergency stop								
		04			High discharge temperature on the compressor								
		05			Phase monitor								
		06			Low pressure ratio								
		07			High oil pressure drop								
		08			Low oil pressure								

2-3 Electrical Specifications				EWWQ3 80B-SS	EWWQ4 60B-SS	EWWQ5 60B-SS	EWWQ6 40B-SS	EWWQ7 30B-SS	EWWQ8 00B-SS	EWWQ8 60B-SS	EWWQ8 70B-SS	EWWQ9 60B-SS	EWWQC 10B-SS
Compressor	Phase			3~									
	Voltage		V	400									
	Voltage range	Min.	%	-10									
		Max.	%	10									
	Maximum running current		A	189	225	274	310	325	189	388	189	225	458
	Starting method			Wye-delta									
Compressor 2	Maximum running current		A	-					189	-	225		-

2 Specifications

2-3 Electrical Specifications				EWWQ380B-SS	EWWQ460B-SS	EWWQ560B-SS	EWWQ640B-SS	EWWQ730B-SS	EWWQ800B-SS	EWWQ860B-SS	EWWQ870B-SS	EWWQ960B-SS	EWWQC10B-SS
Power supply	Phase			3~									
	Frequency		Hz	50									
	Voltage		V	400									
	Voltage range	Min.	%	-10									
		Max.	%	10									
Unit	Maximum starting current		A	455				656	610	656	638		656
	Nominal running current (RLA)	Cooling	A	147	172	207	232	269	294	323	319	344	378
	Maximum running current		A	179	214	260	294	325	358	381	393	428	445
	Max unit current for wires sizing		A	197	235	286	324	357	416	419	432	470	489

Notes

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

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

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

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

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

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

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

(8) Maximum current for wires sizing: compressor full load ampere x 1.1

2-4 Electrical Specifications				EWWQC11B-SS	EWWQC12B-SS	EWWQC13B-SS	EWWQC14B-SS	EWWQC15B-SS	EWWQC16B-SS	EWWQC17B-SS	EWWQC19B-SS	EWWQC20B-SS
Compressor	Phase			3~								
	Voltage		V	400								
	Voltage range	Min.	%	-10								
		Max.	%	10								
	Maximum running current		A	225	274		310	325		388		458
	Starting method			Wye-delta								
Compressor 2	Maximum running current		A	274		310		325	388		458	
Power supply	Phase			3~								
	Frequency		Hz	50								
	Voltage		V	400								
	Voltage range	Min.	%	-10								
		Max.	%	10								
Unit	Maximum starting current		A	638	676	705		933	984		1,035	
	Nominal running current (RLA)	Cooling	A	379	414	439	464	538	592	646	701	756
	Maximum running current		A	474	522	556	589	650	706	764	824	886
	Max unit current for wires sizing		A	522	574	611	648	715	778	840	906	975

Notes

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

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

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3 Features and advantages

3 - 1 Features and Advantages

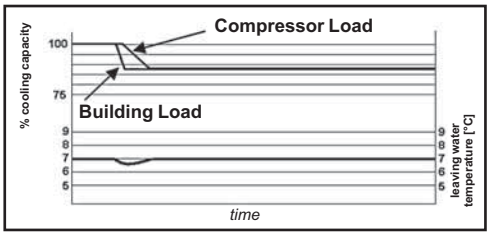
The EWWQ~B- water cooled chillers, featuring 1 or 2 single screw compressors, are manufactured to satisfy the requirements of the consultants and the end user. Units are designed to minimise energy costs while maximising the refrigeration capacities. Daikin's chiller design experience, combined with outstanding features makes the EWWQ~B- chiller unmatched in the industry.

Seasonal quietness

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

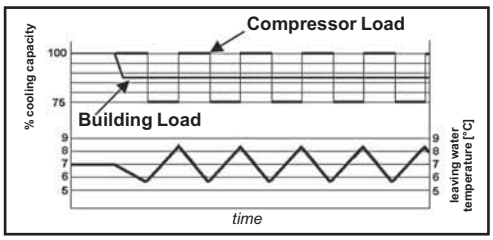
Infinitely capacity control

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



ELWT fluctuation with stepless capacity control

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



ELWT fluctuation with steps capacity control (4 steps)

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

Unmatched serviceability

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

Outstanding reliability features

- Zero clearance fit between the gaterotor/s and main screw rotor virtually eliminates leakage between the high and low-pressure sides during compression. Special gaterotor material made from an advanced composite, temperature stable material makes a zero clearance design possible.
- The chiller is equipped with the most advanced means of refrigerant flow control available. An electronic expansion valve coupled with the MicroTech III controller's control logic provides excellent operating efficiencies both at full and part load operation.
- Infinite unloading matches compressor capacity to load.

FTA_1-2_Rev.00_1

3 Features and advantages

3 - 1 Features and Advantages

- Full factory testing of the unit with water hookups helps provide a trouble-free start-up. Extensive quality control checks during testing means that each equipment protection and operating control is properly adjusted and operates correctly before it leaves the factory.
- The rugged design of the single-screw compressor allows it to be tolerant of liquid slugging. Screw chiller will start and operate under conditions that would often destroy other compressors.
- Very low loading enhances the bearing and compressor reliability. Balanced forces result in the elimination of the high loads inherent in twin-screw compressors.
- Integral to the basic design of the single-screw compressor, the main screw rotor shaft and the gaterotor shaft/s cross at right angles in the compressor. The result is ample space to locate heavy duty bearings and increase compressor reliability since no limitations are placed on bearing design as found in twin-screw compressors.

Code requirements – Safety and observant of laws/directives

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

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

Certifications

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

Versions

EWWQ~B- is available in two different Efficiency Versions:

S: Standard Efficiency
19 sizes, covering a cooling capacity range from 380 up to 2050 kW, EER up to 4.64 and ESEER up to 5.64.

X: High Efficiency
17 sizes, covering a cooling capacity range from 422 up to 2152 kW, EER up to 5.09 and ESEER up to 6.28.

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 water inlet condenser temperature.

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

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

Sound configuration

EWWQ~B- is available in standard sound level configuration:

S: Standard Noise

FTA_1-2_Rev.00_2

4 General Characteristics

4 - 1 General characteristics

General characteristics

Cabinet and structure

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

Screw compressors

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

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

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

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

Ecological R-410A refrigerant

The compressors have been designed to operate with R-410A, ecological refrigerant with zero ODP (Ozone Depletion Potential) and very low GWP (Global Warming Potential) that means low TEWI (Total Equivalent Warming Impact).

Evaporator

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

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

Condensers

The units are equipped with Direct Expansion shell & tube condensers, with copper tubes rolled into steel tubesheets. The unit has independent condensers, one per circuit. is manufactured in accordance to PED approval. The condenser water outlet connections are provided with Victaulic Kit (as standard).

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

Electronic expansion valve

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

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

Refrigerant Circuit

Each unit has independent refrigerant circuits and each one includes:

- Single screw compressor with external cyclonic oil separator

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4 General Characteristics

4 - 1 General characteristics

- (Common) Evaporator
- Condenser
- Oil pressure transducer
- High and low pressure switches
- Moisture liquid indicator
- High efficiency oil separator
- Replaceable core filter-drier
- Electronic expansion valve

Electrical control panel

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

Power Section

The power section includes compressors fuses and control circuit transformer.

MicroTech III controller

The MicroTech III controller is installed as standard; it can be used to modify unit set-points and check control parameters. A built-in display shows chiller operating status plus temperatures and pressures of water, refrigerant, programmable values, set-points. A sophisticated software with predictive logic, selects the most energy efficient combination of compressors and EEXV to keep stable operating conditions to maximise chiller energy efficiency and reliability.

MicroTech III is able to protect critical components based on external signs from its system (such as motor temperatures, refrigerant gas and oil pressures, correct phase sequence, pressure switches and evaporator). The input coming from the high pressure switch cuts all digital output from the controller in less than 50ms, this is an additional security for the equipment.

Fast program cycle (200ms) for a precise monitoring of the system. Floating point calculations supported for increased accuracy in P/T conversions.

Control section - main features

- Management of the compressor stepless capacity.
- Chiller enabled to work in partial failure condition.
- Full routine operation at condition of:
  - high ambient temperature value
  - high thermal load
  - high evaporator entering water temperature (start-up)
- Display of evaporator entering/leaving water temperatures.
- Display of condensing-evaporating temperatures and pressures, suction and discharge superheat for each circuit.
- Leaving water evaporator temperature regulation. Temperature tolerance = 0 .1°C.
- Compressor and evaporator pumps hour counters.
- Display of Status Safety Devices.
- Number of starts and compressor working hours.
- Optimized management of compressor load.
- Re-start in case of power failure (automatic / manual).
- Soft Load (optimized management of the compressor load during the start-up).
- Start at high evaporator water temperature.
- Return Reset (Set Point Reset based on return water temperature).
- Set point Reset (optional).
- Application and system upgrade with commercial SD cards.
- Ethernet port for remote or local servicing using standard web browsers.
- Two different sets of default parameters could be stored for easy restore.

GNC_1-2-3-4-5_Rev.00_2

4 General Characteristics

4 - 1 General characteristics

Safety device / logic for each refrigerant circuit

- High pressure (pressure switch).
- High pressure (transducer).
- Low pressure (transducer).
- High compressor discharge temperature.
- High motor winding temperature.
- Phase Monitor.
- Low pressure ratio.
- High oil pressure drop
- Low oil pressure.
- No pressure change at start.

System security

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

Regulation type

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

MicroTech III

MicroTech III built-in terminal has the following features.

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

Supervising systems (on request)

MicroTech III remote control

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

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

Chiller Sequencing

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

GNC_1-2-3-4-5_Rev.00_3

4 General Characteristics

4 - 1 General characteristics

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

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

Standard accessories (supplied on basic unit)
Wye-Delta Compressor starter (Y-Δ) - For low inrush current and reduced starting torque.
Double set-point - Dual leaving water temperature set-points.
Phase monitor - The phase monitor controls that phases sequence is correct and controls phase loss.
Evaporator Victaulic Kit - Hydraulic joint with gasket for an easy and quick water connection.
Evaporator Water side design pressure 10 bar
Condenser Water side design pressure 16 bar
Electronic Expansion Valve
High Pressure Side Manometers
Hour Run meter - Digital compressors hour run meter
General fault contactor - Alarm relay.
Set-point reset, demand limit and alarm from external device - The leaving water temperature set-point can be overwritten with the following options: 4-20mA from external source (by user); outside ambient temperature; evaporator water temperature Δt. Moreover the device allow the user to limit the load of the unit by 4-20mA signal or by network system and the microprocessor is able to receive an alarm signal from an external device (pump etc… - user can decide if this alarm signal will stop the unit or not).
Double pressure relief valve with diverter (standard on high pressure side, available as option on low pressure side)

Options (on request)
Partial heat recovery - enabled through a shell & tube exchanger sited between the compressor and the condenser, completely dedicated to the heat recovery. These allow hot water to be produced up to a maximum temperature of 58°C.
Soft start - Electronic starting device to reduce the mechanical stress during compressor start-up
Brine version - Allows the unit to operate down to -8°C leaving liquid temperature (antifreeze required).
Compressor thermal overload relays - Safety devices against compressor motor overloading in addition to the normal protection envisaged by the electrical windings.
Under/Over Voltage - This device control the voltage value of power supply and stop the chiller if the value exceeds the allowed operating limits.
Energy Meter - This device allows to measure the energy absorbed by the chiller during its life. It is installed inside the control box mounted on a DIN rail and show on a digital display: Line-to-Line Voltage, Phase and Average Current, Active and Reactive Power, Active Energy, Frequency
Condenser power factor correction - Installed on the electrical control panel to ensure it conforms to the plant rules. (Daikin advices maximum 0.9).
Current limit / display - this option allows monitoring the chiller absorbed current with possibility to set a limit value. This option excludes the Demand Limit.
Compressors circuit breakers
20mm Evaporator/ Condenser Insulation
Condenser Victaulic Kit

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

4 General Characteristics

4 - 1 General characteristics

Condenser / evaporator double flange kit

Cu-Ni 90-10 exchangers - to work with sea water the heat exchangers are fitted with Cu-Ni tubes and special protection inside the end covers.

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).

Discharge line shut-off valves - installed on the discharge port of the compressor to facilitate maintenance operations.

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

Container kit

Rubber type antivibration mounts - Supplied separately, these are positioned under the base of the unit during installation to reduce vibrations.

Sound Proof System - Made of sheet metal and internally insulated, the cabinet is “integral kind” (around the whole chiller, not only around the compressors) to reach the best performance in noise reduction.

Witness test - Every unit is always tested at the test bench prior to the shipment. On request, a second test can be carried out, at customer’s presence, in accordance with the procedures indicated on the test form. (not available for units with glycol mixtures).

Acoustic test – On request, a test can be carried out at customer’s presence (not available for units with glycol mixtures)

GNC_1-2-3-4-5_Rev.00_5

5 Nomenclature

5 - 1 Nomenclature

Name	E W W	Q	3 8 0	B	-	S	S	0	0 1
Digits	1 2 3	4	5 6 7	8	9	10	11	12	13 14

Machine type
EWA = Air-cooled chiller, cooling only
EWY = Air-cooled chiller, heat pump
EWL = Remote condenser chiller
ERA = Air cooled condensing unit
EWW = Water-cooled chiller, cooling only
EWC = Air-cooled chiller, cooling only with centrifugal fan
EWT = Air-cooled chiller, cooling only with heat recovery

Refrigerant
D = R-134a
P = R-407c
Q = R-410

Capacity class in kW (Cooling)
Always 3-digit code
Idem as previous

Model series
Letter A, B,… : major modification

Inverter
- = Non-inverter
Z = Inverter

Efficiency level
S = Standard efficiency
X = High efficiency
P = Premium efficiency (N.A for this range)

Sound level
S = Standard noise
L = Low noise (N.A for this range)
R = Reduced noise (N.A for this range)
X = Extra low noise (N.A for this range)
C = Cabinet (N.A for this range)

Warranty
0 = 1 year of warranty
B = 2 years of warranty
C = 3 years of warranty
... = ... years of warranty

Sequential number
000 = Base model
001 = First order for this model (1 or more units)
002 = Second order for this model (1 or more units)
... = ... order for this model
B01 = First order for this model + 1 year warranty
B02 = Second order for this model (1 or more units)
... = ... order for this model

NMC_Rev.00

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWWQ380-860B-SS

Twe: Evaporator leaving water temperature (Δt 5°C); Twc: Condenser leaving water temperature (Δt 5°C)
qwe: Fluid flow rate at evaporator; dpwe: Fluid pressure drop at evaporator
HC: Heat capacity at condenser; qwc: Fluid flow rate at condenser; dpwc: Fluid pressure drop at condenser

	Condenser inlet air temperature	Twout																						
		5							6							7								
		CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc		
Size	Ta	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa		
380	30	380	79.6	18.2	49	457	22	57	391	79.9	18.7	51	468	22.5	60	402	80.3	19.3	54	480	23.1	62		
	35	357	88.5	17.1	43	443	21.4	54	368	88.9	17.6	46	454	21.9	57	379	89.2	18.1	48	466	22.4	59		
	38	342	94.1	16.3	40	434	20.9	52	352	94.5	16.9	43	445	21.5	55	363	94.8	17.4	45	456	22	57		
	40	331	98	15.8	38	428	20.6	51	342	98.3	16.4	40	438	21.2	53	353	98.7	16.9	43	449	21.7	56		
	42	321	102	15.3	36	421	20.3	50	331	102	15.8	38	432	20.9	52	342	103	16.4	40	442	21.4	54		
	45	304	108	14.6	33	411	19.9	47	315	108	15	35	421	20.4	50	325	109	15.6	37	432	20.9	52		
460	30	463	97.2	22.2	63	558	26.8	61	476	97.7	22.8	67	571	27.5	64	490	98.1	23.5	70	585	28.1	67		
	35	435	108	20.8	57	541	26.1	58	449	108	21.5	60	555	26.7	61	462	109	22.1	63	568	27.4	63		
	38	417	115	20	53	530	25.6	56	430	115	20.6	56	543	26.2	58	444	116	21.3	59	557	26.9	61		
	40	405	119	19.4	50	522	25.2	54	418	120	20	53	535	25.8	57	431	120	20.6	56	549	26.5	60		
	42	392	124	18.8	47	514	24.8	53	405	125	19.4	50	527	25.5	55	418	125	20	53	540	26.1	58		
	45	372	132	17.8	43	502	24.3	51	385	132	18.4	45	515	24.9	53	397	133	19	48	528	25.5	56		
560	30	561	118	26.9	44	677	32.6	64	578	119	27.7	47	694	33.4	67	594	120	28.5	49	710	34.2	70		
	35	528	132	25.3	40	657	31.7	61	544	132	26	42	673	32.5	64	560	133	26.8	44	690	33.2	67		
	38	507	140	24.2	37	644	31.1	59	522	141	25	39	660	31.8	62	538	141	25.7	41	676	32.6	65		
	40	492	146	23.5	35	635	30.7	58	507	147	24.3	37	651	31.4	60	523	147	25	39	667	32.2	63		
	42	476	152	22.8	33	626	30.2	56	492	153	23.5	35	641	31	59	507	153	24.3	37	657	31.8	61		
	45	453	161	21.6	30	612	29.6	54	468	162	22.4	32	627	30.3	56	483	162	23.1	34	642	31.1	59		
640	30	636	134	30.4	47	767	36.9	63	655	135	31.3	50	786	37.8	65	673	135	32.3	52	805	38.7	68		
	35	599	149	28.6	42	745	35.9	60	617	150	29.5	44	763	36.8	62	635	150	30.4	47	781	37.7	65		
	38	575	159	27.5	39	730	35.2	58	592	159	28.3	41	748	36.1	60	610	160	29.2	44	766	37	63		
	40	558	165	26.7	37	720	34.8	56	575	166	27.5	39	738	35.6	59	592	166	28.4	41	756	36.5	61		
	42	540	172	25.8	35	709	34.3	55	557	173	26.7	37	727	35.1	57	575	173	27.5	39	745	36	60		
	45	513	183	24.5	32	693	33.5	52	530	183	25.3	34	710	34.4	55	547	184	26.2	36	728	35.2	57		
730	30	720	153	34.5	54	872	42	16	743	154	35.6	57	896	43.1	16	766	155	36.7	60	920	44.3	17		
	35	680	168	32.5	48	847	40.8	15	702	169	33.6	51	870	41.9	16	724	170	34.7	54	893	43.1	16		
	38	655	177	31.3	45	831	40.1	14	676	179	32.3	48	853	41.2	15	698	180	33.4	51	876	42.3	16		
	40	637	184	30.5	43	820	39.6	14	658	185	31.5	46	842	40.7	15	680	186	32.5	48	865	41.8	15		
	42	619	190	29.6	41	809	39.1	14	640	192	30.6	43	831	40.1	14	661	193	31.7	46	853	41.2	15		
	45	379	147	18.1	*17*	525	25.4	6	381	144	18.2	*17*	524	25.4	6	382	141	18.2	*17*	523	25.3	6		
800	30	795	160	38	53	951	22.9 22.9	62 62	820	161	39.2	56	976	23.5 23.5	65 65	845	162	40.5	59	1001	24.1 24.1	68 68		
	35	745	178	35.7	47	919	22.1 22.1	58 58	769	179	36.8	50	943	22.7 22.7	61 61	793	179	38	53	968	23.3 23.3	64 64		
	38	713	189	34.1	44	898	21.7 21.7	56 56	736	190	35.2	46	922	22.2 22.2	58 58	760	190	36.4	49	946	22.8 22.8	61 61		
	40	691	197	33	41	884	21.3 21.3	54 54	714	197	34.2	44	907	21.9 21.9	57 57	737	198	35.3	46	931	22.5 22.5	60 60		
	42	669	204	32	39	869	21.0 21.0	53 53	691	205	33	41	892	21.6 21.6	55 55	713	206	34.2	44	915	22.1 22.1	58 58		
	45	634	217	30.3	35	847	20.5 20.5	50 50	656	217	31.4	38	869	21.0 21.0	53 53	678	218	32.4	40	892	21.6 21.6	55 55		
860	30	855	186	40.9	49	1039	50	19	882	187	42.2	52	1067	51.4	20	909	189	43.5	55	1096	52.7	21		
	35	807	204	38.6	44	1009	48.7	18	833	205	39.9	47	1037	50	19	859	207	41.1	49	1064	51.3	20		
	38	777	214	37.1	41	990	47.8	18	802	216	38.4	44	1017	49.1	19	828	218	39.6	46	1044	50.4	20		
	40	756	222	36.2	39	977	47.1	17	781	224	37.4	42	1003	48.4	18	806	225	38.6	44	1030	49.7	19		
	42	735	229	35.1	37	962	46.5	17	759	231	36.3	40	988	47.8	18	784	233	37.5	42	1015	49	19		
	45	398	161	19	*12*	559	27	6	398	157	19	*12*	555	26.9	6	405	156	19.3	*13*	560	27.1	6		

NOTES - ANMERKUNGEN - Σημειώσεις - NOTAS - REMARQUES - NOTE - OPMERKINGEN - примечания

1 Fluid: Water
Fluid: Wasser
Υγρό: Νερό
Líquido: agua
Liquide: Eau
Fluido: Acqua
Vloeistof: Water
Жидкость: Вода

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6 Capacity tables

6 - 1 Cooling Capacity Tables

EWWQ380-860B-SS

Twe: Evaporator leaving water temperature (Δt 5°C); Twc: Condenser leaving water temperature (Δt 5°C)
qwe: Fluid flow rate at evaporator; dpwe: Fluid pressure drop at evaporator
HC: Heat capacity at condenser; qwc: Fluid flow rate at condenser; dpwc: Fluid pressure drop at condenser

	Condenser inlet air temperature	Twout																						
		8							9							10								
		CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc		
Size	Ta	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa		
380	30																							
	35	390	89.6	18.7	51	477	23	62	401	90	19.2	54	488	23.5	65	412	90.4	19.8	57	500	24.1	67		
	38	374	95.2	17.9	47	467	22.5	60	385	95.6	18.5	50	479	23.1	62	396	96	19.0	53	490	23.6	65		
	40	364	99	17.4	45	460	22.2	58	374	99.4	18.0	48	472	22.8	61	386	99.8	18.5	50	483	23.3	63		
	42	352	103	16.9	43	453	21.9	57	363	103	17.4	45	465	22.4	59	374	104	18.0	48	476	23	62		
	45	335	109	16.1	39	443	21.4	54	346	109	16.6	41	453	21.9	57	357	110	17.1	44	465	22.5	59		
460	30																							
	35	475	109	22.8	67	582	28	66	488	110	23.4	70	595	28.7	69	502	110	24.1	74	609	29.4	72		
	38	457	116	21.9	62	570	27.5	64	470	117	22.6	65	584	28.2	67	483	117	23.2	69	597	28.8	69		
	40	444	121	21.3	59	562	27.1	62	457	121	21.9	62	576	27.8	65	470	122	22.6	66	589	28.4	68		
	42	431	126	20.6	56	554	26.8	61	444	126	21.3	59	567	27.4	63	457	127	21.9	62	581	28.1	66		
	45	410	133	19.7	51	541	26.2	58	423	134	20.3	54	554	26.8	61	436	134	20.9	57	567	27.4	63		
560	30																							
	35	576	134	27.6	47	706	34	70	593	134	28.4	49	723	34.9	73	610	135	29.2	52	741	35.7	76		
	38	554	142	26.5	43	692	33.4	67	570	143	27.3	46	709	34.2	70	587	143	28.1	48	726	35	73		
	40	538	148	25.8	41	683	33	66	554	148	26.6	43	699	33.8	69	571	149	27.4	46	716	34.6	72		
	42	522	154	25	39	673	32.5	64	538	154	25.8	41	689	33.3	67	554	155	26.6	43	705	34.1	70		
	45	498	163	23.8	36	658	31.8	62	513	163	24.6	38	674	32.6	64	529	164	25.4	40	690	33.4	67		
640	30																							
	35	653	151	31.3	49	800	38.6	68	672	152	32.2	52	819	39.5	71	691	152	33.1	55	839	40.4	74		
	38	628	160	30.1	46	785	37.9	65	646	161	31	49	803	38.8	68	665	162	31.9	51	822	39.7	71		
	40	610	167	29.2	44	774	37.4	64	628	168	30.1	46	792	38.2	67	647	168	31	49	811	39.2	70		
	42	592	174	28.4	41	763	36.8	62	610	174	29.2	44	781	37.7	65	628	175	30.1	46	799	38.6	68		
	45	565	184	27	38	746	36.1	60	582	185	27.9	40	763	36.9	62	600	185	28.7	42	781	37.8	65		
730	30																							
	35	747	172	35.8	57	917	44.2	17	770	173	36.9	61	941	45.4	18	793	174	38.1	64	965	46.5	19		
	38	720	181	34.5	54	900	43.4	17	742	182	35.6	57	923	44.5	17	765	183	36.7	60	947	45.7	18		
	40	701	187	33.6	51	888	42.9	16	724	189	34.7	54	911	44	17	746	190	35.8	57	934	45.1	18		
	42	683	194	32.7	49	876	42.3	16	704	195	33.8	52	898	43.4	17	726	196	34.8	55	921	44.5	17		
	45	389	140	18.6	*18*	528	25.5	6	389	137	18.6	*18*	525	25.4	6									
800	30																							
	35	817	180	39.2	56	993	23.9 23.9	67 67	842	181	40.4	59	1018	24.5 24.5	70 70	867	182	41.6	63	1044	25.2 25.2	73 73		
	38	784	191	37.5	52	970	23.4 23.4	64 64	808	192	38.7	55	995	24.0 24.0	67 67	833	193	39.9	58	1020	24.6 24.6	70 70		
	40	760	199	36.4	49	955	23.0 23.0	62 62	784	200	37.6	52	979	23.6 23.6	65 65	808	200	38.8	55	1004	24.2 24.2	68 68		
	42	736	207	35.3	46	939	22.7 22.7	60 60	760	207	36.4	49	963	23.3 23.3	63 63	784	208	37.6	52	987	23.8 23.8	66 66		
	45	700	219	33.5	42	915	22.1 22.1	58 58	723	219	34.6	45	938	22.7 22.7	60 60	746	220	35.8	48	962	23.3 23.3	63 63		
860	30																							
	35	885	209	42.4	52	1092	52.6	21	912	211	43.7	55	1121	54	22	939	212	45	58	1149	55.4	23		
	38	853	220	40.9	49	1071	51.7	20	879	222	42.1	52	1099	53	21	906	223	43	55	1127	54.4	22		
	40	831	227	39.8	47	1057	51	20	857	229	41.1	49	1084	52.3	21	883	231	42.3	52	1112	53.7	22		
	42	809	234	38.7	44	1041	50.3	19	834	236	40	47	1068	51.6	20	859	238	41.2	50	1095	52.9	21		
	45	403	152	19.3	*13*	555	26.9	6	409	151	19.6	*13*	559	27.1	6									

NOTES - ANMERKUNGEN - Σημειώσεις - NOTAS - REMARQUES - NOTE - OPMERKINGEN - примечания

1 Fluid: Water
Fluid: Wasser
Υγρό: Νερό
Líquido: agua
Liquide: Eau
Fluido: Acqua
Vloeistof: Water
Жидкость: Вода

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6 Capacity tables

6 - 1 Cooling Capacity Tables

EWWQ870-C13B-SS

Twe: Evaporator leaving water temperature (Δt 5°C); Twc: Condenser leaving water temperature (Δt 5°C)
qwe: Fluid flow rate at evaporator; dpwe: Fluid pressure drop at evaporator
HC: Heat capacity at condenser; qwc: Fluid flow rate at condenser; dpwc: Fluid pressure drop at condenser

	Condenser inlet air temperature	Twout																						
		5							6							7								
		CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc		
Size	Ta	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa		
870	30	871	177	41.7	63	1043	22.9 27.3	62 63	897	178	43	66	1070	23.5 28.0	65 66	923	179	44.3	70	1097	24.1 28.7	68 69		
	35	817	197	39.1	56	1010	22.1 26.5	58 60	842	198	40.3	59	1036	22.7 27.2	61 63	868	199	41.6	62	1062	23.3 27.9	64 66		
	38	782	210	37.4	52	988	21.7 26.0	56 58	807	210	38.6	55	1013	22.2 26.6	58 60	832	211	39.9	58	1039	22.8 27.3	61 63		
	40	758	218	36.3	49	972	21.3 25.6	54 56	783	219	37.5	52	997	21.9 26.3	57 59	808	220	38.7	55	1023	22.5 26.9	60 62		
	42	734	227	35.1	46	957	21.0 25.2	53 55	758	228	36.3	49	981	21.6 25.9	55 57	783	228	37.5	52	1006	22.1 26.5	58 60		
	45	696	240	33.3	42	933	20.5 24.6	50 52	720	241	34.4	44	957	21.0 25.3	53 55	744	242	35.6	47	981	21.6 25.9	55 57		
960	30	959	195	45.9	58	1148	27.6 27.6	65 65	988	196	47.3	62	1177	28.3 28.3	68 68	1017	197	48.7	65	1207	29.1 29.1	71 71		
	35	900	216	43	52	1111	26.8 26.8	61 61	928	217	44.4	55	1140	27.5 27.5	64 64	956	218	45.8	58	1169	28.2 28.2	67 67		
	38	861	230	41.2	48	1086	26.2 26.2	59 59	889	231	42.5	51	1115	26.9 26.9	61 61	917	232	43.9	54	1143	27.6 27.6	64 64		
	40	835	239	39.9	45	1070	25.8 25.8	57 57	862	240	41.2	48	1097	26.5 26.5	60 60	889	241	42.6	51	1125	27.2 27.2	63 63		
	42	808	249	38.6	43	1052	25.4 25.4	55 55	834	250	39.9	45	1080	26.1 26.1	58 58	862	251	41.2	48	1107	26.7 26.7	61 61		
	45	766	264	36.6	39	1026	24.8 24.8	53 53	792	265	37.9	41	1053	25.5 25.5	56 56	819	266	39.2	44	1080	26.1 26.1	58 58		
C10	30	1001	221	47.9	56	1219	58.7	25	1031	223	49.4	59	1252	60.3	26	1063	226	50.9	62	1285	61.9	27		
	35	943	242	45.1	50	1183	57	23	973	244	46.6	53	1215	58.6	24	1003	247	48	56	1247	60.1	26		
	38	908	255	43.4	47	1160	56	23	937	257	44.8	50	1192	57.5	24	966	260	46.3	53	1223	59	25		
	40	884	263	42.3	45	1145	55.3	22	912	265	43.6	47	1175	56.7	23	941	268	45.1	50	1207	58.3	24		
	42	859	271	41.1	42	1128	54.5	21	865	269	41.4	43	1132	54.7	22	871	266	41.7	44	1135	54.8	22		
	45	400	170	19.1	*11*	569	27.5	6	405	168	19.4	*11*	573	27.7	6	402	164	19.2	*11*	565	27.3	6		
C11	30	1053	217	50.4	69	1264	27.7 33.1	65 67	1083	218	51.9	73	1295	28.4 33.9	68 69	1114	219	53.4	76	1327	29.1 34.7	71 72		
	35	989	241	47.4	62	1225	26.8 32.2	61 63	1020	242	48.8	65	1256	27.5 33.0	64 66	1050	243	50.3	69	1287	28.2 33.8	67 69		
	38	948	256	45.4	57	1199	26.2 31.6	59 61	978	257	46.8	60	1229	26.9 32.4	62 64	1008	258	48.3	64	1260	27.6 33.2	64 67		
	40	920	266	44	54	1181	25.9 31.2	57 59	949	267	45.4	57	1211	26.5 31.9	60 62	979	268	46.9	60	1241	27.2 32.7	63 65		
	42	891	277	42.6	51	1163	25.5 30.7	56 58	919	278	44	54	1192	26.1 31.5	58 61	949	279	45.4	57	1222	26.8 32.3	61 63		
	45	846	294	40.5	46	1135	24.8 30.1	53 56	874	295	41.8	49	1164	25.5 30.8	56 58	903	296	43.2	52	1193	26.1 31.6	58 61		
C12	30	1184	239	56.6	45	1416	34.1 34.1	70 70	1220	240	58.3	47	1452	34.9 34.9	73 73	1255	241	60.1	50	1488	35.8 35.8	77 77		
	35	1111	265	53.1	40	1369	33.0 33.0	66 66	1146	266	54.8	42	1405	33.9 33.9	69 69	1181	268	56.5	45	1442	34.7 34.7	73 73		
	38	1063	282	50.8	37	1339	32.3 32.3	64 64	1097	283	52.5	39	1374	33.1 33.1	67 67	1132	284	54.2	41	1410	34.0 34.0	70 70		
	40	1030	294	49.2	35	1317	31.8 31.8	62 62	1064	295	50.9	37	1352	32.6 32.6	65 65	1098	296	52.5	39	1387	33.5 33.5	68 68		
	42	996	305	47.6	33	1296	31.3 31.3	60 60	1029	307	49.2	35	1330	32.1 32.1	63 63	1063	308	50.9	37	1364	33.0 33.0	66 66		
	45	944	324	45.1	30	1263	30.5 30.5	57 57	977	325	46.7	32	1296	31.3 31.3	60 60	1010	326	48.3	34	1330	32.2 32.2	63 63		
C13	30	1254	254	60	50	1501	34.1 38.1	70 66	1291	255	61.8	52	1539	35.0 39.1	73 69	1329	257	63.6	55	1577	35.9 40.0	77 73		
	35	1178	283	56.3	44	1454	33.1 37.0	66 63	1214	284	58.1	47	1491	33.9 37.9	69 66	1251	285	59.9	49	1528	34.8 38.9	73 69		
	38	1128	301	53.9	41	1423	32.3 36.3	64 61	1164	302	55.7	43	1459	33.2 37.2	67 63	1200	303	57.4	46	1496	34.1 38.1	70 66		
	40	1094	313	52.3	39	1401	31.9 35.8	62 59	1129	314	54	41	1437	32.7 36.7	65 62	1165	316	55.7	44	1473	33.5 37.6	68 65		
	42	1058	326	50.6	37	1378	31.4 35.2	60 57	1094	327	52.3	39	1414	32.2 36.1	63 60	1129	328	54	41	1450	33.0 37.1	66 63		
	45	1004	346	48	33	1344	30.6 34.4	57 55	1038	347	49.6	35	1379	31.4 35.3	60 58	1073	348	51.3	38	1414	32.2 36.2	63 60		

NOTES - ANMERKUNGEN - Σημειώσεις - NOTAS - REMARQUES - NOTE - OPMERKINGEN - примечания

1 Fluid: Water
Fluid: Wasser
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Líquido: agua
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Vloeistof: Water
Жидкость: Вода

SRC_1-2_Rev.01_1_(3-6)

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWWQ870-C13B-SS

Twe: Evaporator leaving water temperature (Δt 5°C); Twc: Condenser leaving water temperature (Δt 5°C)
qwe: Fluid flow rate at evaporator; dpwe: Fluid pressure drop at evaporator
HC: Heat capacity at condenser; qwc: Fluid flow rate at condenser; dpwc: Fluid pressure drop at condenser

	Condenser inlet air temperature	Twout																						
		8							9							10								
		CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc		
Size	Ta	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa		
870	30																							
	35	894	200	42.9	66	1089	23.9 28.6	67 69	921	201	44.2	70	1116	24.5 29.3	70 72	948	202	45.5	73	1144	25.2 30.0	73 75		
	38	858	212	41.1	61	1065	23.4 28.0	64 66	884	213	42.4	65	1092	24.0 28.7	67 69	911	214	43.7	68	1119	24.6 29.4	70 72		
	40	833	221	39.9	58	1049	23.0 27.6	62 64	859	222	41.2	61	1075	23.6 28.3	65 67	885	222	42.5	65	1102	24.2 29.0	68 70		
	42	807	229	38.7	55	1032	22.7 27.2	60 63	833	230	39.9	58	1058	23.3 27.8	63 65	858	231	41.2	61	1084	23.9 28.5	66 68		
	45	768	243	36.8	50	1006	22.1 26.5	58 60	793	244	38	53	1031	22.7 27.2	60 63	818	244	39.2	56	1057	23.3 27.9	63 65		
960	30																							
	35	985	219	47.2	61	1198	28.9 28.9	70 70	1014	220	48.7	65	1228	29.6 29.6	73 73	1044	221	50.1	68	1259	30.3 30.3	76 76		
	38	945	233	45.3	57	1172	28.3 28.3	67 67	974	234	46.7	60	1202	29.0 29.0	70 70	1003	235	48.1	64	1231	29.7 29.7	73 73		
	40	918	242	44	54	1154	27.9 27.9	65 65	946	243	45.4	57	1183	28.6 28.6	68 68	975	244	46.8	60	1212	29.3 29.3	71 71		
	42	889	252	42.6	51	1135	27.4 27.4	64 64	917	253	44	54	1164	28.1 28.1	66 66	946	254	45.4	57	1193	28.8 28.8	69 69		
	45	846	267	40.5	47	1107	26.8 26.8	61 61	873	267	41.8	49	1135	27.4 27.4	64 64	901	268	43.2	52	1163	28.1 28.1	66 66		
C10	30																							
	35	1033	249	49.5	59	1280	61.7	27	1064	252	51	63	1313	63.3	28	1096	254	52.6	66	1347	64.9	29		
	38	996	262	47.7	56	1255	60.6	26	1026	264	49.2	59	1288	62.1	27	1056	267	50.7	62	1321	63.7	28		
	40	970	270	46.5	53	1238	59.8	25	1000	273	47.9	56	1270	61.3	27	1030	275	49.4	59	1303	62.9	28		
	42	867	261	41.5	43	1127	54.4	21	870	258	41.7	44	1126	54.4	21	880	256	42.2	45	1135	54.8	22		
	45	407	162	19.4	*11*	568	27.5	6	411	160	19.7	*11*	570	27.6	6									
C11	30																							
	35	1081	244	51.8	72	1318	28.9 34.6	70 72	1112	245	53.4	76	1350	29.6 35.4	73 75	1143	247	54.9	80	1382	30.4 36.2	76 78		
	38	1038	259	49.8	67	1291	28.3 34.0	67 70	1069	260	51.3	71	1323	29.0 34.8	70 72	1100	262	52.8	75	1354	29.7 35.6	74 76		
	40	1009	270	48.4	64	1272	27.9 33.5	66 68	1039	271	49.9	68	1303	28.6 34.3	69 71	1070	272	51.4	71	1335	29.3 35.1	72 74		
	42	978	280	46.9	60	1253	27.5 33.1	64 66	1008	281	48.4	64	1283	28.2 33.9	67 69	1039	283	49.9	68	1315	28.9 34.7	70 72		
	45	932	297	44.6	55	1223	26.8 32.3	61 63	961	298	46.1	59	1253	27.5 33.1	64 66	991	299	47.5	62	1283	28.2 33.9	67 69		
C12	30																							
	35	1216	269	58.3	47	1477	35.6 35.6	76 76	1252	270	60	50	1514	36.5 36.5	79 79	1289	271	61.8	53	1551	37.4 37.4	83 83		
	38	1168	286	55.9	44	1446	34.9 34.9	73 73	1203	287	57.6	46	1482	35.7 35.7	76 76	1238	288	59.4	49	1518	36.6 36.6	80 80		
	40	1133	297	54.3	42	1423	34.4 34.4	71 71	1169	298	56	44	1460	35.2 35.2	74 74	1204	299	57.7	46	1495	36.1 36.1	78 78		
	42	1098	309	52.5	39	1400	33.8 33.8	69 69	1133	310	54.3	42	1436	34.7 34.7	72 72	1169	311	56	44	1472	35.6 35.6	76 76		
	45	1044	327	49.9	36	1364	33.0 33.0	66 66	1078	328	51.6	38	1399	33.8 33.8	69 69	1084	323	52	38	1401	33.9 33.9	69 69		
C13	30																							
	35	1288	287	61.7	52	1566	35.7 39.8	76 72	1325	288	63.5	55	1605	36.5 40.8	79 75	1364	289	65.4	58	1644	37.4 41.8	83 78		
	38	1237	304	59.2	49	1534	34.9 39.0	73 69	1274	306	61	51	1571	35.8 40.0	76 72	1311	307	62.9	54	1609	36.7 41.0	80 75		
	40	1201	317	57.5	46	1510	34.4 38.5	71 67	1238	318	59.3	49	1548	35.3 39.4	74 70	1275	319	61.1	51	1586	36.2 40.4	78 74		
	42	1164	329	55.8	44	1487	33.9 38.0	69 66	1201	331	57.5	46	1524	34.7 38.9	72 69	1238	332	59.3	49	1561	35.6 39.8	76 72		
	45	1108	349	53.1	40	1451	33.0 37.1	66 63	1144	350	54.8	42	1487	33.9 38.0	69 66	1166	348	55.9	44	1506	33.9 38.9	69 69		

NOTES - ANMERKUNGEN - Σημειώσεις - NOTAS - REMARQUES - NOTE - OPMERKINGEN - примечания

1 Fluid: Water
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Жидкость: Вода

SRC_1-2_Rev.01_1_(4-6)

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWWQC14-C20B-SS

Twe: Evaporator leaving water temperature (Δt 5°C); Twc: Condenser leaving water temperature (Δt 5°C)
qwe: Fluid flow rate at evaporator; dpwe: Fluid pressure drop at evaporator
HC: Heat capacity at condenser; qwc: Fluid flow rate at condenser; dpwc: Fluid pressure drop at condenser

	Condenser inlet air temperature	Twout																						
		5							6							7								
		CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc		
Size	Ta	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa		
C14	30	1323	270	63.3	55	1586	38.2 38.2	66 66	1362	272	65.2	58	1626	39.1 39.1	69 69	1402	273	67.1	61	1666	40.1 40.1	73 73		
	35	1245	301	59.5	49	1538	37.1 37.1	63 63	1282	302	61.3	52	1577	38.0 38.0	66 66	1320	303	63.2	54	1616	38.9 38.9	69 69		
	38	1194	320	57.1	45	1507	36.4 36.4	61 61	1230	321	58.9	48	1544	37.3 37.3	63 63	1268	322	60.7	51	1582	38.2 38.2	66 66		
	40	1158	333	55.4	43	1484	35.8 35.8	59 59	1195	334	57.2	45	1522	36.7 36.7	62 62	1231	335	58.9	48	1560	37.6 37.6	65 65		
	42	1121	346	53.6	40	1461	35.3 35.3	57 57	1158	348	55.4	43	1499	36.2 36.2	60 60	1194	349	57.2	45	1536	37.1 37.1	63 63		
	45	1063	367	50.8	37	1425	34.5 34.5	55 55	1099	369	52.6	39	1462	35.4 35.4	58 58	1136	370	54.4	41	1499	36.3 36.3	60 60		
C15	30	1445	302	69.1	59	1744	42.0 42.0	16 16	1490	304	71.3	62	1792	43.1 43.1	16 16	1536	307	73.6	66	1840	44.3 44.3	17 17		
	35	1364	331	65.2	53	1693	40.8 40.8	15 15	1408	334	67.4	56	1739	41.9 41.9	16 16	1452	337	69.5	59	1786	43.0 43.0	16 16		
	38	1313	350	62.8	49	1661	40.1 40.1	14 14	1356	352	64.9	52	1706	41.2 41.2	15 15	1399	355	67	55	1752	42.3 42.3	16 16		
	40	1278	362	61.1	47	1639	39.6 39.6	14 14	1321	365	63.2	50	1684	40.6 40.6	15 15	1363	368	65.3	53	1729	41.7 41.7	15 15		
	42	1243	376	59.4	45	1617	39.1 39.1	14 14	1284	378	61.5	47	1661	40.1 40.1	14 14	1327	381	63.5	50	1705	41.2 41.2	15 15		
	45	751	287	35.8	*18*	1037	25.1 25.1	6 6	766	285	36.6	*19*	1049	25.4 25.4	6 6	768	279	36.7	*19*	1046	25.3 25.3	6 6		
C16	30	1588	334	76	68	1919	42.4 50.0	16 18	1637	337	78.4	72	1971	43.5 51.3	16 19	1686	340	80.8	76	2023	44.7 52.6	17 20		
	35	1500	366	71.8	61	1864	41.2 48.7	15 17	1548	370	74.1	65	1914	42.3 50.0	16 18	1595	373	76.5	69	1965	43.4 51.3	16 19		
	38	1445	386	69.1	57	1829	40.4 47.8	14 17	1491	390	71.4	61	1878	41.5 49.1	15 18	1538	393	73.7	64	1928	42.7 50.4	16 18		
	40	1407	400	67.3	55	1805	39.9 47.2	14 16	1453	403	69.5	58	1853	41.0 48.5	15 17	1499	406	71.8	61	1902	42.1 49.7	15 18		
	42	1369	413	65.5	52	1779	39.4 46.6	14 16	1413	416	67.6	55	1827	40.5 47.8	14 17	1459	420	69.9	58	1876	41.6 49.1	15 18		
	45	796	305	38	*20*	1100	25.6 27.6	6 6	805	301	38.5	*20*	1106	25.6 27.9	6 6	806	295	38.5	*20*	1100	25.5 27.7	6 6		
C17	30	1746	365	83.6	87	2108	50.7 50.7	16 16	1799	368	86.3	92	2165	52.1 52.1	17 17	1853	372	88.9	97	2222	53.5 53.5	18 18		
	35	1650	400	79	79	2047	49.3 49.3	15 15	1702	404	81.6	83	2103	50.7 50.7	16 16	1754	407	84.1	88	2158	52.0 52.0	17 17		
	38	1589	422	76.1	74	2009	48.5 48.5	15 15	1640	425	78.6	78	2063	49.8 49.8	15 15	1692	429	81.1	83	2118	51.1 51.1	16 16		
	40	1548	436	74.1	70	1981	47.8 47.8	14 14	1598	439	76.6	74	2035	49.1 49.1	15 15	1648	443	79	79	2089	50.4 50.4	16 16		
	42	1506	450	72.1	67	1953	47.2 47.2	14 14	1555	454	74.5	71	2006	48.4 48.4	15 15	1604	457	76.9	75	2059	49.7 49.7	15 15		
	45	920	346	44	27	1265	30.6 30.6	6 6	925	340	44.2	*28*	1263	30.6 30.6	6 6	927	334	44.3	*28*	1260	30.5 30.5	6 6		
C19	30	1887	395	90.4	96	2279	51.0 58.6	16 14	1943	398	93.2	102	2338	52.4 60.1	17 14	2000	402	96	107	2399	53.8 61.6	18 15		
	35	1785	433	85.5	87	2215	49.6 57.1	15 13	1840	437	88.2	92	2274	51.0 58.6	16 14	1896	441	91	97	2333	52.3 60.1	17 14		
	38	1721	456	82.4	81	2175	48.7 56.2	15 13	1775	460	85.1	86	2233	50.1 57.7	16 13	1830	464	87.8	91	2291	51.4 59.1	16 14		
	40	1677	472	80.3	78	2147	48.1 55.5	15 13	1730	476	82.9	82	2204	49.4 57.0	15 13	1784	480	85.6	87	2261	50.7 58.5	16 14		
	42	1516	463	72.6	65	1977	40.6 54.8	11 12	1164	375	55.7	*40*	1537	29.6 44.6	6 8	716	259	34.2	*17*	975	19.0 28.1	3 4		
	45																							
C20	30	2046	427	98.2	119	2470	59.4 59.4	14 14	2106	431	101.2	126	2534	61.0 61.0	15 15	2168	435	104.2	133	2600	62.5 62.5	16 16		
	35	1936	468	92.9	108	2402	57.9 57.9	13 13	1996	473	95.8	114	2465	59.4 59.4	14 14	2055	477	98.7	120	2529	60.9 60.9	15 15		
	38	1867	494	89.5	101	2358	56.9 56.9	13 13	1925	498	92.4	107	2421	58.4 58.4	14 14	1985	502	95.3	113	2484	59.9 59.9	14 14		
	40	1820	510	87.2	96	2328	56.2 56.2	13 13	1877	515	90.1	102	2389	57.7 57.7	13 13	1936	519	93	108	2452	59.2 59.2	14 14		
	42	1772	527	84.9	92	2296	55.5 55.5	12 12	1236	399	59.2	*48*	1634	39.5 39.5	7 7	751	274	35.9	*19*	1024	24.7 24.7	3 3		
	45																							

NOTES - ANMERKUNGEN - Σημειώσεις - NOTAS - REMARQUES - NOTE - OPMERKINGEN - примечания

1 Fluid: Water
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SRC_1-2_Rev.01_1_(5-6)

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWWQC14-C20B-SS

Twe: Evaporator leaving water temperature (Δt 5°C); Twc: Condenser leaving water temperature (Δt 5°C)
qwe: Fluid flow rate at evaporator; dpwe: Fluid pressure drop at evaporator
HC: Heat capacity at condenser; qwc: Fluid flow rate at condenser; dpwc: Fluid pressure drop at condenser

	Condenser inlet air temperature	Twout																						
		8							9							10								
		CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc	CC	PI	qwe	dpwe	HC	qwc	dpwc
Size	Ta	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa	kW	kW	l/s	kPa	kW	l/s	kPa
C14	30																					
	35	1359	305	65.1	57	1655	39.9 39.9	72 72	1398	306	67	60	1696	40.9 40.9	75 75	1439	307	69	64	1737	41.9 41.9	78 78
	38	1306	324	62.5	53	1621	39.1 39.1	69 69	1344	325	64.4	56	1661	40.1 40.1	72 72	1383	326	66.4	59	1701	41.0 41.0	75 75
	40	1269	337	60.8	51	1598	38.6 38.6	67 67	1307	338	62.6	53	1637	39.5 39.5	70 70	1345	339	64.5	56	1676	40.5 40.5	74 74
	42	1231	350	59	48	1574	38.0 38.0	66 66	1268	351	60.8	51	1612	38.9 38.9	69 69	1306	353	62.6	53	1651	39.9 39.9	72 72
	45	1173	371	56.2	44	1537	37.2 37.2	63 63	1210	372	58	47	1574	38.1 38.1	66 66	1247	373	59.8	49	1612	39.0 39.0	69 69
C15	30																					
	35	1497	339	71.8	63	1833	44.2 44.2	17 17	1543	341	74	66	1881	45.3 45.3	18 18	1589	343	76.3	70	1929	46.5 46.5	19 19
	38	1443	358	69.2	59	1798	43.4 43.4	17 17	1488	360	71.4	62	1845	44.5 44.5	17 17	1534	362	73.6	65	1892	45.7 45.7	18 18
	40	1407	370	67.4	56	1774	42.8 42.8	16 16	1451	372	69.5	59	1820	43.9 43.9	17 17	1495	374	71.7	63	1867	45.1 45.1	18 18
	42	1369	383	65.6	53	1750	42.3 42.3	16 16	1412	385	67.7	56	1795	43.4 43.4	17 17	1456	387	69.9	60	1841	44.5 44.5	17 17
	45	769	273	36.8	*19*	1041	25.2 25.2	6 6	782	270	37.4	*19*	1051	25.4 25.4	6 6							
C16	30																					
	35	1644	376	78.8	73	2016	44.6 52.6	17 20	1693	378	81.2	77	2068	45.8 53.9	18 21	1742	381	83.6	81	2119	46.9 55.2	19 22
	38	1586	396	76	68	1978	43.8 51.7	17 19	1634	398	78.4	72	2029	44.9 53.0	17 20	1682	401	80.8	76	2080	46.1 54.3	18 21
	40	1546	409	74.1	65	1952	43.2 51.0	16 19	1593	412	76.4	69	2002	44.4 52.3	17 20	1641	415	78.8	72	2052	45.5 53.6	18 21
	42	1505	423	72.1	62	1925	42.7 50.3	16 18	1551	425	74.4	65	1974	43.8 51.6	17 19	1599	428	76.7	69	2024	44.9 52.9	17 20
	45	806	288	38.5	*20*	1093	25.4 27.5	6 6	818	285	39.1	*21*	1103	25.6 27.7	6 6							
C17	30																					
	35	1808	411	86.8	93	2215	53.4 53.4	18 18	1861	414	89.4	98	2272	54.8 54.8	18 18	1915	418	92.1	104	2329	56.1 56.1	19 19
	38	1744	432	83.7	87	2173	52.4 52.4	17 17	1797	436	86.3	92	2229	53.8 53.8	18 18	1850	439	88.9	97	2286	55.1 55.1	19 19
	40	1700	447	81.6	83	2144	51.7 51.7	17 17	1752	450	84.1	88	2199	53.1 53.1	17 17	1804	454	86.7	93	2255	54.4 54.4	18 18
	42	1655	461	79.4	79	2113	51.0 51.0	16 16	1706	464	81.9	84	2167	52.4 52.4	17 17	1758	468	84.4	89	2222	53.7 53.7	18 18
	45	929	327	44.4	*28*	1255	30.4 30.4	6 6	928	320	44.4	*28*	1248	30.2 30.2	6 6							
C19	30																					
	35	1952	445	93.7	103	2393	53.7 61.6	18 15	2008	448	96.5	108	2453	55.1 63.2	18 16	2065	452	99.3	114	2514	56.5 64.7	19 16
	38	1885	468	90.5	96	2350	52.7 60.6	17 15	1941	472	93.2	102	2409	54.1 62.1	18 15	1997	476	96	107	2469	55.5 63.7	19 16
	40	1732	463	83.1	83	2192	45.9 59.9	13 14	1465	399	70.2	61	1862	35.5 54.4	8 12							
	42																					
	45																					
C20	30																					
	35	2115	481	101.7	127	2593	62.5 62.5	15 15	2177	486	104.8	134	2659	64.1 64.1	16 16	2239	490	107.8	141	2725	65.7 65.7	17 17
	38	2044	507	98.2	119	2547	61.5 61.5	15 15	2104	511	101.2	126	2612	63.0 63.0	16 16	2164	516	104.2	133	2677	64.6 64.6	16 16
	40	1995	524	95.9	114	2516	60.7 60.7	15 15	1552	425	74.5	72	1975	47.7 47.7	10 10							
	42																					
	45																					

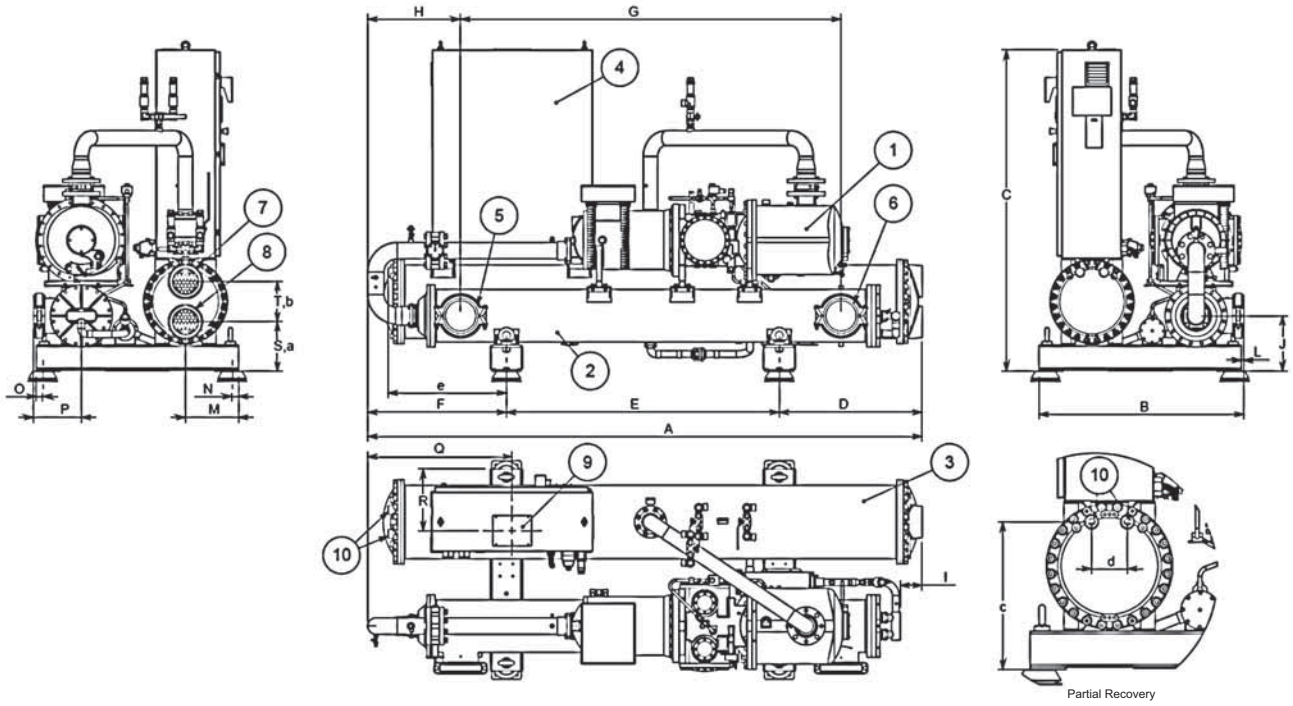
NOTES - ANMERKUNGEN - Σημειώσεις - NOTAS - REMARQUES - NOTE - OPMERKINGEN - примечания

1 Fluid: Water
Fluid: Wasser
Υγρό: Νερό
Líquido: agua
Liquide: Eau
Fluido: Acqua
Vloeistof: Water
Жидкость: Вода

SRC_1-2_Rev.01_1_(6-6)

7 Dimensional drawings

7 - 1 Dimensional Drawings



Models	Dimensions (mm)									
EWWQ~B-SS	A	B	C	D	E	F	G	H	I	J
380	3373	1140	1849	849	1800	724	2430	479	122	323
460	3373	1140	1849	849	1800	724	2430	479	122	323
560	3454	1276	2001	890	1700	864	2370	579	136	342
640	3454	1276	2001	890	1700	864	2370	579	136	342

EWWQ~B-SS	L	M	N	O	P	Q	R	S	T
380	13	305	40	40	294	773	360	254	200
460	13	305	40	40	294	773	360	254	200
560	16	330	56	40	297	900	385	305	252
640	16	330	56	40	297	900	385	305	252

LEGEND

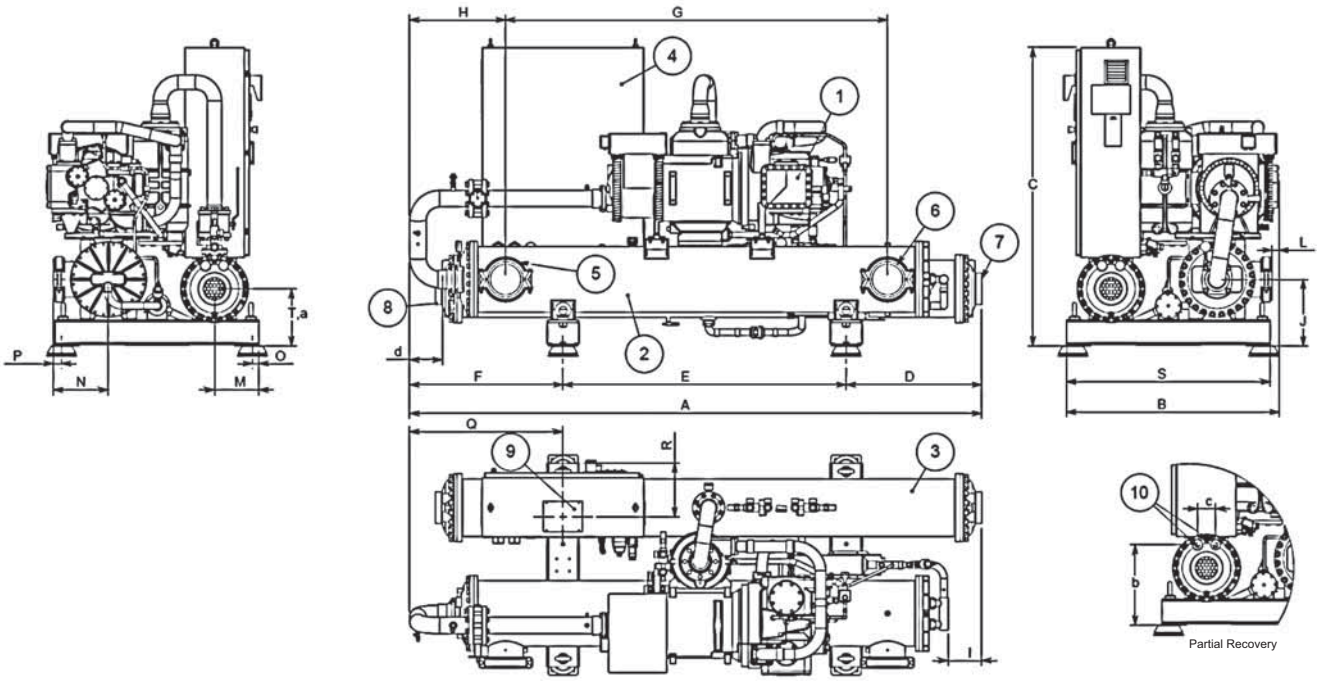
1. Compressor
2. Evaporator
3. Condenser
4. Electrical panel
5. Evaporator water inlet
6. Evaporator water outlet
7. Condenser water inlet
8. Condenser water outlet
9. Power connections slot
10. Partial heat recovery connection (optional)

Models	Partial heat recovery dimensions (mm)				
EWWQ~B-SS	a	b	c	d	e
380	269	138	497	112	688
460	269	138	497	112	688
560	300	210	615	150	737
640	300	210	615	150	737

DMN_1-2-3-4-5-6-7-8_Rev.00_1

7 Dimensional drawings

7 - 1 Dimensional Drawings



Models	Dimensions (mm)									
EWWQ~B-SS	A	B	C	D	E	F	G	H	I	J
730	3535	1314	1848	838	1750	947	2360	592	210	412
860	2001	1314	1848	838	1750	947	2360	592	210	412
C10	2001	1314	1848	838	1750	947	2360	592	210	412

EWWQ~B-SS	L	M	N	O	P	Q	R	S	T
730	44	275	340	40	50	946	330	1260	354
860	44	275	340	40	50	946	330	1260	354
C10	44	275	340	40	50	946	330	1260	305

LEGEND

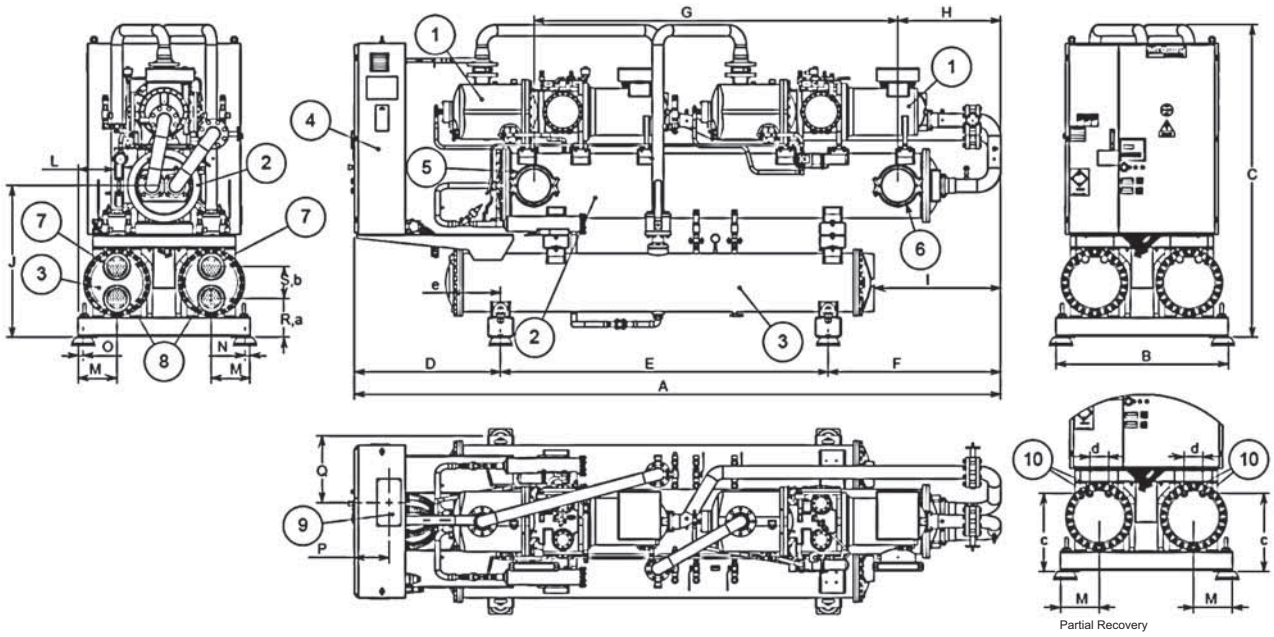
1. Compressor
2. Evaporator
3. Condenser
4. Electrical panel
5. Evaporator water inlet
6. Evaporator water outlet
7. Condenser water inlet
8. Condenser water outlet
9. Power connections slot
10. Partial heat recovery connection (optional)

Models	Partial heat recovery dimensions (mm)			
EWWQ~B-SS	a	b	c	d
730	354	497	112	200
860	354	497	112	200
C10	354	497	112	200

DMN_1-2-3-4-5-6-7-8_Rev.00_2

7 Dimensional drawings

7 - 1 Dimensional Drawings



Models	Dimensions (mm)									
EWWQ~B-SS	A	B	C	D	E	F	G	H	I	J
800	5020	1350	2158	1117	2555	1348	2910	729	958	900
870	5020	1350	2158	1117	2555	1348	2910	729	958	900
960	5020	1350	2158	1117	2555	1348	2910	729	958	900
C11	4894	1350	2378	1127	2555	1211	2910	592	819	1153
C12	5070	1350	2455	1147	2570	1353	2656	805	996	1191
C13	5070	1350	2455	1147	2570	1353	2656	805	996	1191
C14	5070	1350	2455	1147	2570	1353	2656	805	996	1191

EWWQ~B-SS	L	M	N	O	P	Q	R	S
800	337	250	40	40	272	525	254	200
870	337	250	40	40	272	525	254	200
960	337	250	40	40	272	525	254	200
C11	337	305	40	40	272	525	305	252
C12	286	305	40	40	272	525	305	252
C13	286	305	40	40	272	525	305	252
C14	286	305	40	40	272	525	305	252

LEGEND

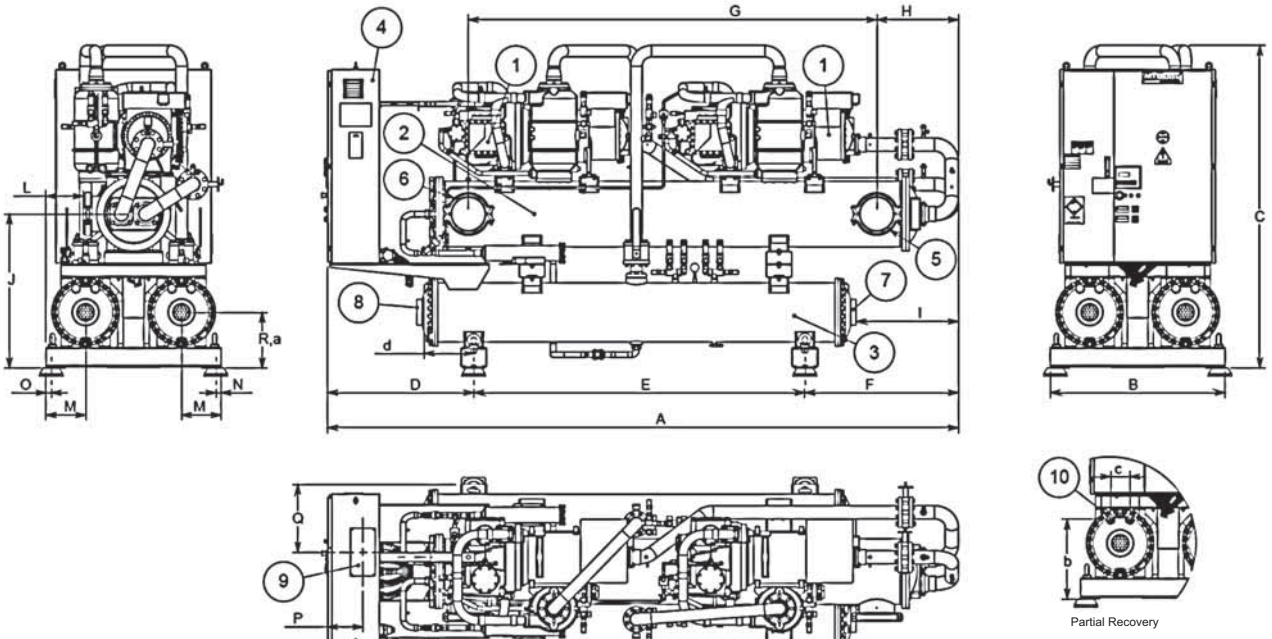
1. Compressor
2. Evaporator
3. Condenser
4. Electrical panel
5. Evaporator water inlet
6. Evaporator water outlet
7. Condenser water inlet
8. Condenser water outlet
9. Power connections slot
10. Partial heat recovery connection (optional)

Models	Partial heat recovery dimensions (mm)				
EWWQ~B-SS	a	b	c	d	e
800	269	138	497	112	380
870	269	138	497	112	380
960	269	138	497	112	380
C11	300	210	615	150	380
C12	300	210	615	150	400
C13	300	210	615	150	400
C14	300	210	615	150	400

DMN_1-2-3-4-5-6-7-8_Rev.00_3

7 Dimensional drawings

7 - 1 Dimensional Drawings



Models	Dimensions (mm)									
EWWQ~B-SS	A	B	C	D	E	F	G	H	I	J
C15	4829	1350	2495	1056	2555	1218	2856	626	824	1191
C16	4829	1350	2495	1056	2555	1218	2856	626	824	1191
C17	4829	1350	2495	1056	2555	1218	2856	626	824	1191
C19	4865	1350	2495	1127	2555	1183	3150	629	789	1191
C20	4865	1350	2495	1127	2555	1183	3150	629	789	1191

EWWQ~B-SS	L	M	N	O	P	Q	R
C15	286	305	40	40	272	525	431
C16	286	305	40	40	272	525	431
C17	286	305	40	40	272	525	431
C19	286	305	40	40	272	525	431
C20	286	305	40	40	272	525	431

LEGEND

1. Compressor
2. Evaporator
3. Condenser
4. Electrical panel
5. Evaporator water inlet
6. Evaporator water outlet
7. Condenser water inlet
8. Condenser water outlet
9. Power connections slot
10. Partial heat recovery connection (optional)

Models	Partial heat recovery dimensions (mm)			
EWWQ~B-SS	a	b	c	d
C15	431	615	150	382
C16	431	615	150	382
C17	431	615	150	382
C19	431	615	150	382
C20	431	615	150	382

DMN_1-2-3-4-5-6-7-8_Rev.00_4

8 Sound data

8 - 1 Sound Level Data

Sound Level

EWWQ~B-SS

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
380	55.1	59.4	71.6	84.1	71.9	72.5	58.5	53.2	**82.2**	**100.2**
460	55.9	60.2	72.4	84.9	72.7	73.3	59.3	54.0	**83.0**	**101.2**
560	56.8	61.1	73.3	85.8	73.6	74.2	60.2	54.9	**83.9**	**102.3**
640	56.8	61.1	73.3	85.8	73.6	74.2	60.2	54.9	**83.9**	**102.3**
730	56.1	60.4	72.6	85.1	72.9	73.5	59.5	54.2	**83.2**	**101.5**
800	56.9	61.2	73.4	85.9	73.7	74.3	60.3	55.0	**84.0**	**104.7**
860	57.8	62.1	74.3	86.8	74.6	75.2	61.2	55.9	**84.9**	**102.3**
870	58.1	62.4	74.6	87.1	74.9	75.5	61.5	56.2	**85.2**	**104.7**
960	58.1	62.4	74.6	87.1	74.9	75.5	61.5	56.2	**85.2**	**105.1**
C10	58.5	62.8	75.0	87.5	75.3	75.9	61.9	56.6	**85.6**	**103.2**
C11	58.9	63.2	75.4	87.9	75.7	76.3	62.3	57.0	**86.0**	**104.7**
C12	59.4	63.7	75.9	88.4	76.2	76.8	62.8	57.5	**86.5**	**105.2**
C13	59.8	64.1	76.3	88.8	76.6	77.2	63.2	57.9	**86.9**	**106.5**
C14	59.8	64.1	76.3	88.8	76.6	77.2	63.2	57.9	**86.9**	**106.5**
C15	59.1	63.4	75.6	88.1	75.9	76.5	62.5	57.2	**86.2**	**105.8**
C16	59.5	63.8	76.0	88.5	76.3	76.9	62.9	57.6	**86.6**	**106.2**
C17	59.9	64.2	76.4	88.9	76.7	77.3	63.3	58.0	**87.0**	**106.6**
C19	60.4	64.7	76.9	89.4	77.2	77.8	63.8	58.5	**87.5**	**107.1**
C20	60.8	65.1	77.3	89.8	77.6	78.2	64.2	58.9	**87.9**	**107.5**

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

EWWQ~B-XS

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
420	55.1	59.4	71.6	84.1	71.9	72.5	58.5	53.2	**82.2**	**100.9**
520	55.9	60.2	72.4	84.9	72.7	73.3	59.3	54.0	**83.0**	**101.7**
640	56.8	61.1	73.3	85.8	73.6	74.2	60.2	54.9	**83.9**	**102.6**
730	56.8	61.1	73.3	85.8	73.6	74.2	60.2	54.9	**83.9**	**102.7**
800	56.1	60.4	72.6	85.1	72.9	73.5	59.5	54.2	**83.2**	**102.0**
970	56.9	61.2	73.4	85.9	73.7	74.3	60.3	55.0	**84.0**	**102.9**
C10	58.5	62.8	75.0	87.5	75.3	75.9	61.9	56.6	**85.6**	**105.2**
C11	57.8	62.1	74.3	86.8	74.6	75.2	61.2	55.9	**84.9**	**103.8**
C12	58.9	63.2	75.4	87.9	75.7	76.3	62.3	57.0	**86.0**	**105.6**
C13	59.4	63.7	75.9	88.4	76.2	76.8	62.8	57.5	**86.5**	**106.1**
C14	59.8	64.1	76.3	88.8	76.6	77.2	63.2	57.9	**86.9**	**106.5**
C15	59.8	64.1	76.3	88.8	76.6	77.2	63.2	57.9	**86.9**	**106.5**
C16	59.1	63.4	75.6	88.1	75.9	76.5	62.5	57.2	**86.2**	**105.8**
C17	59.5	63.8	76.0	88.5	76.3	76.9	62.9	57.6	**86.6**	**106.2**
C19	59.9	64.2	76.4	88.9	76.7	77.3	63.3	58.0	**87.0**	**106.6**
C20	60.4	64.7	76.9	89.4	77.2	77.8	63.8	58.5	**87.5**	**107.1**
C21	60.8	65.1	77.3	89.8	77.6	78.2	64.2	58.9	**87.9**	**107.5**

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

NSL_1-2_Rev.00_1

8 Sound data

8 - 1 Sound Level Data

Sound Level

EWWQ~B-SS

Unit size	Distance					
	1m	5m	10m	15m	20m	25m
380	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
460	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
560	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
640	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
730	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
800	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
860	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
870	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
960	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C10	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
C11	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C12	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C13	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C14	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C15	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C16	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C17	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C19	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C20	0.0	-7.5	-12.2	-15.3	-17.5	-19.3

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

EWWQ~B-XS

Unit size	Distance					
	1m	5m	10m	15m	20m	25m
420	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
520	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
640	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
730	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
800	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
970	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
C10	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C11	0.0	-7.9	-12.7	-15.8	-18.1	-19.8
C12	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C13	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C14	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C15	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C16	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C17	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C19	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C20	0.0	-7.5	-12.2	-15.3	-17.5	-19.3
C21	0.0	-7.5	-12.2	-15.3	-17.5	-19.3

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

NSL_1-2_Rev.00_2

9 Installation

9 - 1 Installation Method

Installation notes

Warning

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

Handling

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

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

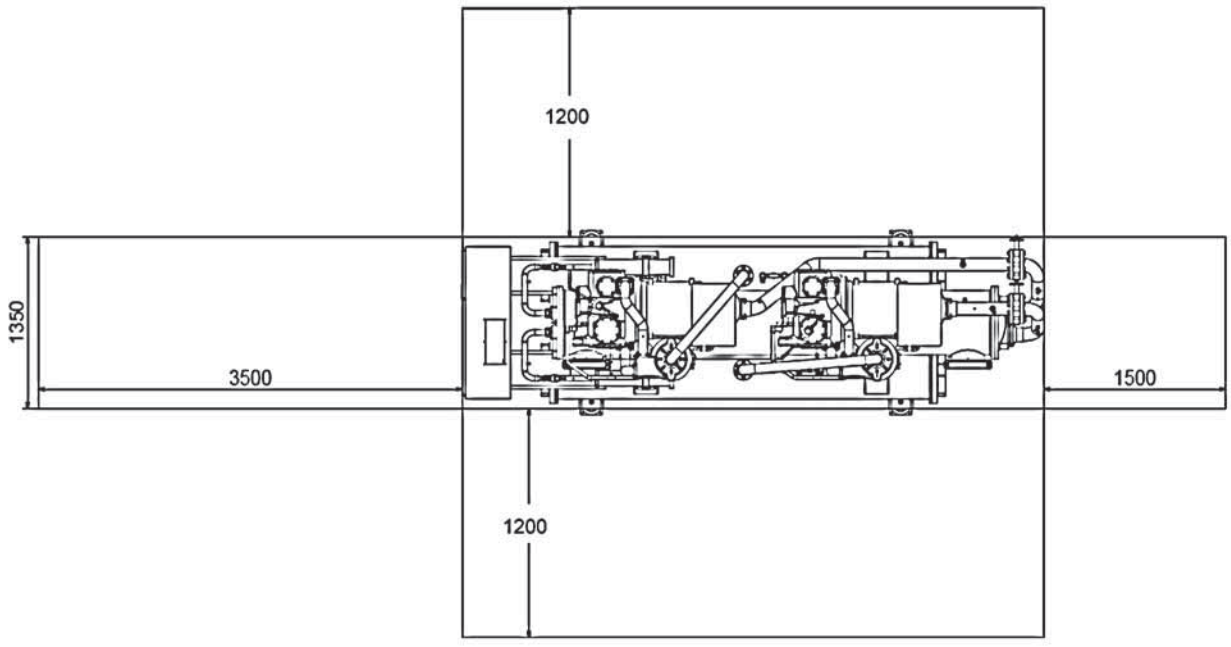
Location

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

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

Minimum space requirements

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

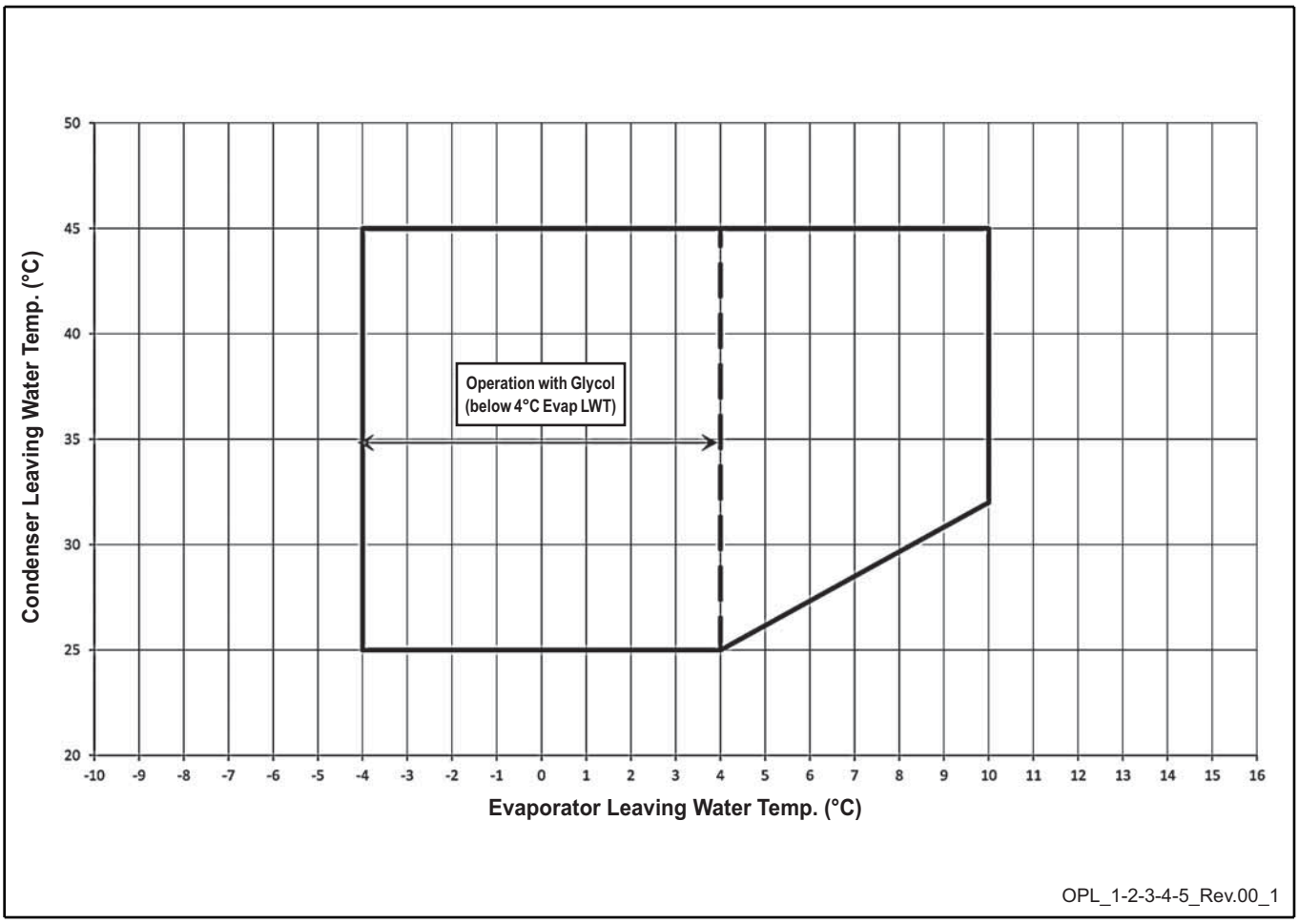


Minimum clearance requirements for machine maintenance

INN_Rev.00_1

10 Operation range

10 - 1 Operation Range



10 Operation range

10 - 1 Operation Range

Table 1 - Evaporator minimum and maximum water Δt

Max evaporator water Δt	°C	6
Min evaporator water Δt	°C	4
Min condenser water Δt	°C	4
Max condenser water Δt	°C	8

Table 2 - Evaporator fouling factors

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

Table 3 - Condenser fouling factors

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

Table 4.1 - Minimum glycol percentage for low water temperature

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

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

Table 4.2 - Minimum glycol percentage for low air temperature

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

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

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

Table 5 - Correction factors for low evaporator leaving water temperature

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

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

Table 6 - Correction factors for water and glycol mixture

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

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10 Operation range

10 - 1 Operation Range

A) Mixture Water and Glycol --- Evaporator leaving water temperature > 4°C
- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.2 and 6)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporatore Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size:	**EWWQ380B-SS**
Mixture:	Water
Working condition:	ELWT 12/7°C – CLWT 30/35°C
- Cooling capacity:	380 kW
- Power input:	84.5 kW
- Flow rate (Δt 5°C):	18.2 l/s
- Evaporator pressure drop:	47 kPa
Mixture:	Water + Ethylene Glycol 30% (for a winter air temperature up to -15°C)
Working condition:	ELWT 12/7°C – CLWT 30/35°C
- Cooling capacity:	380 x 0.972 = 369 kW
- Power input:	84.5 x 0.986 = 83.3 kW
- Flow rate (Δt 5°C):	17.6 (referred to 369 kW) x 1.074 = 18.9 l/s
- Evaporator pressure drop:	44 (referred to 17.6 l/s) x 1.181 = 52kPa

B) Mixture Water and Glycol --- Evaporator leaving water temperature < 4°C
- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.1 and 4.2 and table 6)
- depending from the evaporator leaving water temperature (see table 5)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 5 and Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporatore Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size:	**EWWQ380B-SS**
Mixture:	Water
Standard working condition	ELWT 12/7°C – CLWT 35/40°C
- Cooling capacity:	354 kW
- Power input:	94.2 kW
- Flow rate (Δt 5°C):	16.9 l/s
- Evaporator pressure drop:	41 kPa
Mixture:	Water + Glycol 30% (for a low evaporator leaving temperature of -1/-6°C)
Working condition:	ELWT 2/-3°C – CLWT 35/40°C
- Cooling capacity:	354 x 0.670 x 0.932 = 221 kW
- Power input:	94.2 x 0.890 x 0.969 = 81 kW
- Flow rate (Δt 5°C):	10.56 l/s (referred to 221 kW) x 1.056 = 11.2 l/s
- Evaporator pressure drop:	19 kPa (referred to 11.2 l/s) x 1.496 = 29 kPa

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10 Operation range

10 - 1 Operation Range

Items (1) (5)			Cooling Water			Cooled Water		Heated water (2)				Tendency if out of criteria
			Circulating System		Once Flow			Low temperature		High temperature		
			Circulating water	Supply water (4)	Flowing water	Circulating water [Below 20°C]	Supply water (4)	Circulating water [20°C ~ 60°C]	Supply water (4)	Circulating water [60°C ~ 80°C]	Supply water (4)	
Items to be controlled:	pH	at 25°C	6.5 ~ 8.2	6.0 ~ 8.0	6.0 ~ 8.0	6.0 ~ 8.0	6.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	Corrosion + Scale
	Electrical conductivity	[mS/m] at 25°C	Below 80	Below 30	Below 40	Below 40	Below 30	Below 30	Below 30	Below 30	Below 30	Corrosion + Scale
		(µS/cm) at 25°C	(Below 800)	(Below 300)	(Below 400)	(Below 400)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	Corrosion + Scale
	Chloride ion	[mgCl2-/l]	Below 200	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	Sulfate ion	[mgSO2-4/l]	Below 200	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	M-alkalinity (pH4.8)	[mgCaCO3/l]	Below 100	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Total hardness	[mgCaCO3/l]	Below 200	Below 70	Below 70	Below 70	Below 70	Below 70	Below 70	Below 70	Below 70	Scale
	Calcium harness	[mgCaCO3/l]	Below 150	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Silca ion	[mgSiO2/l]	Below 50	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Scale
Items to be referred to	Iron	[mgFe/l]	Below 1.0	Below 0.3	Below 1.0	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Corrosion + Scale
	Copper	[mgCu/l]	Below 0.3	Below 0.1	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 0.1	Below 1.0	Below 0.1	Corrosion
	Sulfite ion	[mgS2-/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	[mgCO2/l]	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 0.4	Below 4.0	Below 0.4	Below 4.0	Corrosion
	Stability index		6.0 ~ 7.0	---	---	---	---	---	---	---	---	Corrosion + Scale

NOTES

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

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10 Operation range

10 - 1 Operation Range

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

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

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

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

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

where:

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

This formula is valid for:
- standard microprocessor parameters

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

OPL_1-2-3-4-5_Rev.00_5

11 Hydraulic performance

11 - 1 Water Pressure Drop Curve Evaporator

EWWQ~B-SS

	380	460	560	640	730	800	860	870	960	C10	C11	C12	C13	C14	C15	C16	C17	C19	C20
Cooling Capacity (kW)	380	464	562	637	727	796	862	872	960	1007	1055	1185	1255	1325	1460	1584	1748	1888	2050
Water Flow (l/s) - Evaporator	18.2	22.2	26.8	30.4	34.7	38.0	41.2	41.7	45.9	48.1	50.4	56.6	60.0	63.3	69.8	75.7	83.5	90.2	98.0
Evaporator Pressure Drops (kPa)	47	63	43	46	53	52	48	62	57	55	67	43	48	53	58	67	86	95	119
Water Flow (l/s) - Condenser	22.2	27.2	32.9	37.3	42.7	1) 23.1 2) 23.1	50.87	1) 23.4 2) 27.4	1) 27.9 2) 27.9	59.6	1) 27.6 2) 33.6	1) 34.3 2) 34.3	1) 33.4 2) 39.2	1) 38.4 2) 38.4	1) 42.6 2) 42.6	1) 42.7 2) 50.2	1) 51.0 2) 51.0	1) 50.8 2) 59.8	1) 59.8 2) 59.8
Condenser Pressure Drops (kPa)	58	62	66	63	15	1) 62 2) 62	19	1) 62 2) 65	1) 65 2) 65	25	1) 65 2) 67	1) 70 2) 70	1) 70 2) 67	1) 67 2) 67	1) 16 2) 16	1) 16 2) 18	1) 16 2) 16	1) 16 2) 14	1) 14 2) 14

NOTES

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

EWWQ~B-XS

	420	520	640	730	800	970	C10	C11	C12	C13	C14	C15	C16	C17	C19	C20	C21
Cooling Capacity (kW)	422	516	639	725	801	973	1037	1116	1158	1270	1369	1449	1573	1733	1863	2020	2152
Water Flow (l/s) - Evaporator	20.2	24.6	30.5	34.6	38.3	46.5	49.6	53.3	55.3	60.7	65.4	69.2	75.1	82.8	89.0	96.5	102.8
Evaporator Pressure Drops (kPa)	56.8	70.2	73.1	65.5	57.8	54.9	54.9	70.3	64.5	55.9	68.4	76.2	71.3	90.6	92.6	114.7	129.2
Water Flow (l/s) - Condenser	24.2	29.5	36.5	41.4	45.8	55.7	1) 29.5 2) 29.5	64.2	1) 29.6 2) 36.3	1) 36.3 2) 36.3	1) 36.7 2) 41.2	1) 41.2 2) 41.2	1) 44.9 2) 44.9	1) 44.6 2) 54.4	1) 53.3 2) 53.3	1) 53.2 2) 62.6	1) 61.9 2) 61.9
Condenser Pressure Drops (kPa)	50	40	41	46	60	64	1) 39 2) 39	84	1) 35 2) 48	1) 48 2) 48	1) 49 2) 46	1) 46 2) 46	1) 43 2) 43	1) 43 2) 62	1) 60 2) 60	1) 52 2) 79	1) 78 2) 78

NOTES

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

EPD_1-2_Rev.00_1

Evaporator and Condenser Pressure Drops

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

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

where:

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

How to use the formula: Example (evaporator)

The unit EWWQ380B-SS has been selected for working at the following conditions:
- evaporator water in/out: 11/6°C
- condenser water in/out: 30/35°C

The cooling capacity at these working conditions is: 369 kW
The evaporator water flow at these working conditions is: 17.6 l/s

The unit EWWQ380B-SS at nominal working conditions has the following data:
- evaporator water in/out: 12/7°C
- condenser water in/out: 30/35°C

The cooling capacity at these working conditions is: 380 kW
The evaporator water flow at these working conditions is: 18.2 l/s
The evaporator pressure drop at these working conditions is: 47 kPa

The pressure drop at the selected working condition will be:

$$PD_2\ (kPa) = 47\ (kPa) \times \left(\frac{17.6\ (l/s)}{18.2\ (l/s)} \right)^{1.8}$$

$$PD_2\ (kPa) = 44\ (kPa)$$

NOTE - Important

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

EPD_1-2_Rev.00_2

11 Hydraulic performance

11 - 2 Total Heat Recovery Pressure Drop

EWWQ~B-SS

	Heat Recovery Leaving Water Temperature (Δ=5°C)		
	45	50	55
	Hc (kW)	Hc (kW)	Hc (kW)
380	54.2	38.5	23.6
460	66.2	48.0	30.6
560	83.0	60.3	38.5
640	88.9	64.6	41.1
730	119	89.7	61.4
800	114	81.4	49.9
860	146	113	79.9
870	129	93.9	60.2
960	137	99.3	63.0
C10	175	137	101
C11	157	115	74.1
C12	172	122	74.1
C13	185	135	86.6
C14	194	138	83.7
C15	254	191	131
C16	282	214	150
C17	301	227	156
C19	319	241	166
C20	344	258	176

NOTES

- Evaporator Leaving Water Temperature 7°C - ΔT = 5°C
- Condenser Leaving Water Temperature 35°C -ΔT= 5°C

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EWWQ~B-SS

	380	460	560	640	730	800	860	870	960	C10	C11	C12	C13	C14	C15	C16	C17	C19	C20
Heating Capacity (kW)	54.2	66.2	83.0	89	119	114	146	129	137	175	157	172	185.3	194	254.4	282	301	318.7	344.4
Water Flow (l/s)	2.59	3.16	3.97	4.25	5.70	5.46	6.95	6.18	6.56	8.34	7.52	8.23	8.85	9.27	12.2	13.5	14.4	15.2	16.5
Heat Recovery Pressure Drops (kPa)	34	45	32	34	39	38	35	45	41	40	49	32	35	39	42	49	62	69	86

NOTE

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

EWWQ~B-XS

	420	520	640	730	800	970	C10	C11	C12	C13	C14	C15	C16	C17	C19	C20	C21
Heating Capacity (kW)	54.4	65.5	77.4	93.6	106	125	132	152	149	163	175	183	203	228	253	276	302
Water Flow (l/s)	2.60	3.13	3.70	4.47	5.08	5.99	6.28	7.28	7.11	7.80	8.38	8.72	9.71	10.9	12.1	13.2	14.4
Heat Recovery Pressure Drops (kPa)	41	51	53	47	42	40	40	51	47	41	50	55	52	66	67	84	94

NOTE

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

OPT_1-2-3-4_Rev.00_3

11 Hydraulic performance

11 - 2 Total Heat Recovery Pressure Drop

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

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

where:

11

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

How to use the formula: Example

The unit EWWQ380B-SS has been selected for working at the following conditions:
- evaporator water in/out: 12/7°C
- condenser water in/out: 30/35°C
- Partial heat recovery leaving water temperature 45/50°C

The heating capacity at these working conditions is: 38.5 Kw
The water flow at these working conditions is: 1.84 l/s

The unit EWWQ380B-SS at nominal working conditions has the following data:
- evaporator water in/out: 12/7°C
- condenser water in/out: 30/35°C
- Partial heat recovery leaving water temperature 40/45°C

The heating capacity at these working conditions is: 54.2 kW
The water flow at these working conditions is: 2.59 l/s
The pressure drop at these working conditions is: 34 kPa

The pressure drop at the selected working condition will be:

$$PD_2\ (kPa) = \mathbf{34}\ (kPa) \times \left(\frac{\mathbf{1.84}\ (l/s)}{\mathbf{2.59}\ (l/s)} \right)^{1.80}$$

$$PD_2\ (kPa) = \mathbf{18}\ (kPa)$$

OPT_1-2-3-4_Rev.00_4

12 Specification text

12 - 1 Specification Text

Technical Specification for Water Cooled Screw Chiller

GENERAL

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

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

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

Chiller will be delivered to the job site completely assembled and charged with right refrigerant and oil quantity.

Comply with the manufacturer instructions for rigging and handling equipment.

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

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

REFRIGERANT

Only R-410A will be accepted.

PERFORMANCE

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

UNIT DESCRIPTION

Chiller shall include as standard: 1 or 2 independent refrigerant circuits, semi-hermetic rotary single screw compressors, electronic expansion device (EEXV), refrigerant direct expansion shell & tube heat exchangers, R-410A refrigerant, lubrication system, motor starting components, control system and all components necessary for safe and stable unit operation.

Chiller will be factory assembled on a robust base-frame made of zinc coated steel, protected by an epoxy paint.

NOISE LEVEL AND VIBRATIONS

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

DIMENSIONS

Unit dimensions shall not exceed following indications

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

SPC_1-2-3_Rev.00_1

12 Specification text

12 - 1 Specification Text

CHILLER COMPONENTS

Compressors

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

Cooling capacity control system

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

Evaporator

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

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12 Specification text

12 - 1 Specification Text

Condensers

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

Refrigerant circuit

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

Control panel

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

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

Optional High Level Communications Interface

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

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

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

Daikin Europe N.V. participates in the Eurovent Certification programme for Air conditioners (AC), Liquid Chilling Packages (LCP) and Fan coil units (FCU). Check ongoing validity of certificate online: www.eurovent-certification.com or using: www.certiflash.com"

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