DAIKIN

Applied Systems

Technical Data

Air cooled chiller, standard efficiency, low sound

EEDEN13-409

EWAD-E-SL

TABLE OF CONTENTS

EWAD-E-SL

1 Features

- standard efficiency, low sound levels
- One refrigerant circuit with single screw compressor
- Compact design with brazed plate heat exchanger
- Large operation range (ambient temperature down to -18ºC)
- Water supply down to -15ºC

2 Specifications

2-1 Technical Specifications					EWAD100E-SL	EWAD120E-SL	EWAD130E-SL	EWAD160E-SL	EWAD180E-SL	EWAD210E-SL	EWAD250E-SL	EWAD300E-SL	EWAD350E-SL	EWAD400E-SL
Cooling capacity	Nom.			kW	98 (1)	116 (1)	134 (1)	157 (1)	177 (1)	208 (1)	248 (1)	295 (1)	344 (1)	397 (1)
Capacity control	Method				Stepless									
	Minimum capacity			%	25									
Power input	Cooling	Nom.		kW	39.2 (1)	48.3 (1)	53.4 (1)	60.8 (1)	68.3 (1)	72.8 (1)	85.4 (1)	111.2 (1)	135.0 (1)	152 (1)
EER					2.49 (1)	2.39 (1)	2.50 (1)	2.57 (1)	2.59 (1)	2.86 (1)	2.90 (1)	2.65 (1)	2.55 (1)	2.62 (1)
ESEER					2.92	2.89	2.78	2.92	3.00	3.24	3.41	3.28	3.22	3.33
IPLV					3.32	3.21	3.30	3.46	3.28	3.48	3.86	3.75	3.63	3.76
Casing	Colour				Ivory white									
	Material				Galvanized and painted steel sheet									
Dimensions	Unit	Height		mm	2,273						2,223			
		Width		mm	1,292						2,236			
		Depth		mm	2,165		3,065		3,965		3,070			
Weight	Unit			kg	1,784		1,961		2,186		3,029			
	Operation weight			kg	1,799		1,981		2,216		3,073			
Water heat exchanger	Type				Plate heat exchanger									
	Water volume			l	12	15	17	20	24	30	25	30	36	44
	Nominal water flow	Cooling		l/s	4.7	5.5	6.4	7.5	8.4	10.0	11.9	14.1	16.5	19.0
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	23		22	23	21	20	45		44	42
	Insulation material				Closed cell									
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler									
Fan	Quantity				2		3		4		6			
	Type				Direct propeller									
	Diameter			mm	800									
	Air flow rate	Nom.		l/s	8,373	8,144	12,560	12,216	16,747	16,288	25,120		24,432	
	Speed			rpm	700									
Fan motor	Drive				Direct on line									
	Input	Cooling		W	1,600		2,400		3,100		4,700			
Sound power level	Cooling	Nom.		dBA	89		90			92				93
Sound pressure level	Cooling	Nom.		dBA	71					73				74
Compressor	Type				Semi-hermetic single screw compressor						asymmetric single screw compressor			
	Quantity				1									
	Oil	Charged volume		l	13						16	19		
Operation range	Water side	Cooling	Min.	ºCDB	-15									
			Max.	ºCDB	15									
	Air side	Cooling	Min.	ºCDB	-18									
			Max.	ºCDB	48									
Refrigerant	Type				R-134a									
	Charge			kg	18	21	23	28	30	33	46		56	60
	Circuits	Quantity			1									
Piping connections	Evaporator water inlet/outlet (OD)				3"									
Safety devices	Item	01			High discharge pressure (pressure switch)									
		02			High discharge pressure (pressure transducer)									
		03			Low suction pressure (pressure transducer)									
		04			Compressor motor protection									
		05			High discharge temperature									
		06			Low oil pressure									
		07			Low pressure ratio									
		08			High oil filter pressure drop									
		09			Phase monitor									
		10			Water freeze protection controller									

2 Specifications

2-2 Electrical Specifications				EWAD100E-SL	EWAD120E-SL	EWAD130E-SL	EWAD160E-SL	EWAD180E-SL	EWAD210E-SL	EWAD250E-SL	EWAD300E-SL	EWAD350E-SL	EWAD400E-SL
Compressor	Phase			3~									
	Voltage		V	400									
	Voltage range	Min.	%	-10									
		Max.	%	10									
	Maximum running current		A	80	96	107	121	145		171	224	264	
	Starting method			Wye-delta									
Power supply	Phase			3~									
	Frequency		Hz	50									
	Voltage		V	400									
	Voltage range	Min.	%	-10									
		Max.	%	10									
Unit	Maximum starting current		A	156		203		298		346	426		
	Nominal running current (RLA)	Cooling	A	67	82	91	113	118	124	144	184	223	248
	Maximum running current		A	85	101	115	129	155		187	240	280	
	Max unit current for wires sizing		A	94	111	126	142	171		205	264	308	
Fans	Nominal running current (RLA)		A	5.2		7.8		10.4		15.6			

Notes

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

(2) Sound pressure levels are measured at entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC; full load operation; Standard: ISO3744

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

(4) Max. unit starting current: starting current of biggest compressor + fans current.

(5) Nominal current in cooling mode: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC. Compressor + fans current.

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

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

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

3 Features and advantages

3 - 1 Features and Advantages

Features and advantages

Low operating cost

EWAD~E- is the result of careful design, aimed to optimizing the energy efficiency of the chillers, with the objective of bringing down operating costs and improving installation profitability, effectiveness and economical management.

The EWAD~E- chillers use the new very high efficiency single rotor screw compressor design, large condenser coil surface area for maximum heat transfer and low discharge pressure, advanced technology condenser fans, a plate to plate direct-expansion evaporator with low refrigerant pressure drops.

Low operating sound levels

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

Excellent Serviceability

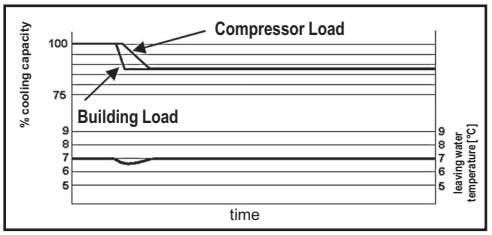
Field serviceability has not been sacrificed to meet design performance objectives. The compressor is equipped with discharge, liquid and suction shut off valves. The compressor and serviceable components such as filter-driers are located on the outside edges of the base allowing ready access. The shaped of the coil allows an easy access for inspection and service. The MicroTech III controller gives detailed information on the causes of an alarm or fault.

Proven Reliability

Full factory testing of every unit with water hook-up 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.

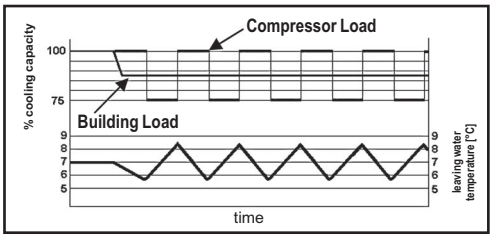
Infinite capacity control

Cooling capacity control is infinitely variable by means of a single screw compressor controlled by microprocessor system. Each unit has infinitely variable capacity control from 100% down to 25%. This modulation allows the compressor capacity to exactly match the building cooling load. Chilled water temperature fluctuation is avoided only with a stepless control.



ELWT fluctuation with stepless capacity control

In the case the compressor with load step control is used, 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. Only a chiller with stepless regulation, is able to follow the system cooling demand at any time and to deliver chilled water at set-point.

FTA_1a-2b_Rev.02_1

3 Features and advantages

3 - 1 Features and Advantages

Superior control logic

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

Code requirements – Safety and observant of laws/directives

All EWAD~E- 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 by Daikin 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

EWAD~E- is available in one Efficiency Version:

S: Standard Efficiency

10 sizes to cover a range from 98 up to 413 kW with an EER up to 2.98 and an ESEER up to 3.34 (data referred to Standard Noise configuration)

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

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

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

	A	B	C	D
Coefficient	0.03 (3%)	0.33 (33%)	0.41 (41%)	0.23 (23%)
Air inlet condenser temperature	35°C	30°C	25°C	20°C

Sound Configuration

EWAD~E- is available in two different Sound level configurations:

S: Standard Noise

Condenser fan rotating at 920 rpm, rubber antivibration under compressor

L: Low Noise

Condenser fan rotating at 715 rpm, rubber antivibration under compressor, compressor sound enclosure.

FTA_1a-2b_Rev.02_2

4 General Characteristics

4 - 1 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 with integrated oil separator
From size EWAD100E-SS to size EWAD 210E-SS and from size EWAD100E-SL to size EWAD210E-SL
The compressor is semi-hermetic, single-screw type with gate-rotors (made of carbon impregnated engineered composite material). The compressor has one slide managed by the unit microprocessor for infinitely modulating the capacity from 100% to 25%. An integrated high efficiency oil separator maximises the oil separation. Standard Start is Wye-delta (Y-Δ) type.

From size EWAD260E-SS to size EWAD 410E-SS and from size EWAD250E-SL to size EWAD400E-SL
The compressor is semi-hermetic, single-screw type with gate-rotor (with the latest high-strength fibre reinforced star material). The compressor has an asymmetric slide regulation managed by the unit controller for infinitely modulating capacity from 100% to 25%. An integrated high efficiency oil separator maximizes the oil separation. Standard Start is Wye-delta (Y-Δ) type.

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

Evaporator
The units are equipped with a direct expansion plate to plate type evaporator. This heat exchanger is made of stainless steel brazed plates and is covered with a 10mm closed cell insulation material. The exchanger is equipped with an heater for protection against freezing down to –28°C.
Each evaporator has 1circuit (one compressor) and is manufactured in accordance to PED approval. The evaporator water outlet connections are 3”.

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

Condenser coil fans
The condenser fans are propeller type with high efficiency design blades to maximize performances. The material of the blades is glass reinforced resin and each fan is protected by a guard. Fan motors are protected by circuit breakers installed inside the electrical panel as a standard. The motors are IP54.

Electronic expansion valve
The unit is equipped with the most advanced electronic expansion valves to achieve precise control of refrigerant mass flow. As today’s system requires improved energy efficiency, tighter temperature control, wider range of operating conditions and incorporate features like remote monitoring and diagnostics, the application of electronic expansion valves becomes mandatory. Electronic expansion valves possess features that make it unique: short opening and closing time, high resolution, positive shut-off function to eliminate use of additional solenoid valve, continuous modulation of mass flow without stress in the refrigerant circuit and corrosion resistance stainless steel body.
Electronic Expansion Valves are typically working with lower ΔP between high and low pressure side, than a thermostatic expansion valve. The electronic expansion valve allows the system to work with low condenser pressure (winter time) without any refrigerant flow problems and with a perfect chilled water leaving temperature control.

GNC_1a-2a-3a-4c-5b-6_Rev.03_1

4 General Characteristics

4 - 1 General characteristics

Refrigerant Circuit

Each unit has 1 refrigerant circuit and includes:

- Compressor with integrated oil separator
- Air Cooled Condenser
- Electronic expansion valve
- Evaporator
- Discharge line shut off valve
- Liquid line shut off valve
- Suction line shut off valve
- Sight glass with moisture indicator
- Filter drier
- Charging valves
- High pressure switch
- High and low pressure transducers

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, fan circuit breaker, fan contactors and control circuit transformer.

MicroTech III controller

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

MicroTech III is able to protect critical components based on external 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 and fans modulation.
- Chillers enabled to work in partial failure condition.
- Full routine operation at condition of:
  - high ambient temperature value
  - high thermal load
  - high evaporator entering water temperature (start-up)
- Display of evaporator entering/leaving water temperature.
- Display of Outdoor Ambient Temperature.
- Display of condensing-evaporating temperature and pressure, suction and discharge superheat for each circuit.
- Leaving water evaporator temperature regulation. Temperature tolerance = 0,1°C.
- Compressor and evaporator pumps hours counter.
- Display of Status Safety Devices.
- Number of starts and compressor working hours.

GNC_1a-2a-3a-4c-5b-6_Rev.03_2

4 General Characteristics

4 - 1 General characteristics

- Optimized management of compressor load.
- Fan management according to condensing pressure.
- Re-start in case of power failure (automatic / manual).
- Soft Load (optimized management of the compressors load during the start-up).
- Start at high evaporator water temperature.
- Return Reset (Set Point Reset based on return water temperature).
- OAT (Outside Ambient temperature) Reset.
- Set point Reset (optional).
- Application and system upgrade with commercial SD cards.
- Ethernet port for remote or local servicing using standard web browsers.
- Two different sets of default parameters could be stored for easy restore.

Safety device / logic for each refrigerant circuit

- High pressure (pressure switch).
- High pressure (transducer).
- Low pressure (transducer).
- Fans circuit breaker.
- 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 leaving water evaporator output probe.

Condensing pressure

Condensing pressure can be controlled in according to the entering air temperature to the condenser coil. The fans can be managed either with steps, or with a 0/10 V modulating signal or with a mixed 0/10V + Steps strategy to cover all possible operational conditions.

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.

GNC_1a-2a-3a-4c-5b-6_Rev.03_3

4 General Characteristics

4 - 1 General characteristics

- 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)
- Ethernet TCP/IP.

Standard accessories (supplied on basic unit)

Wye-Delta Compressors starter (Y-D) – For low inrush current and reduced starting torque.
Double set-point – Dual leaving water temperature set-points.
Fans thermal overload relays – Safety devices against fan motor overloading in addition to the normal protection envisaged by the electrical windings.
Phase monitor – The phase monitor controls that phases sequence is correct and controls phase loss.
10mm evaporator insulation
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.
Electronic expansion valve
Discharge line shut off valves – Installed on the discharge port of the compressor to facilitate maintenance operation.
Suction line shut off valve – Installed on the suction port of the compressor to facilitate maintenance operation.
Outside ambient temperature sensor and reset of leaving water temperature set-point.
Compressor hour run meter.
General fault – Alarm relay.
Set-point reset – 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.
Demand limit – User can limit the load of the unit by 4-20mA signal or by network system
Alarm from external device – 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.
Main switch interlock door
Emergency stop
Fans circuit breakers – Safety device against motor overloading and short circuit
Low pressure side manometers

4 General Characteristics

4 - 1 General characteristics

Options (on request)

Total heat recovery – Provided with plate to plate heat exchangers to produce hot water.

Partial heat recovery – Plate to plate heat exchangers installed between the compressor discharge and the condenser coil, allowing to produce hot water.

Soft starter – 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. This device together with internal motor protection (standard) guarantee the best safety system for compressor motor.

Under/Over Voltage – This device control the voltage value of power supply and stop the chiller if the value exceeds the allowed operating limits.

Energy Meter – This device allows to measure the energy absorbed by the chiller during its life. It is installed inside the control box mounted on a DIN rail and show on a digital display: Line-to-Line Voltage, Phase and Average Current, Active and Reactive Power, Active Energy, Frequency.

Capacitors for power factor correction – To increase the operating power factor of the unit at nominal operating conditions. The capacitors are “dry” self-regenerating type with over pressure disconnectiong safety device insulated with a no toxic dielectric mix with no PCB or PCT.

Current limit – To limit maximum absorbed current of the unit whenever is required

20mm evaporator insulation

Fan speed regulation – To control the fan speed revolution for smooth operating control of the unit. During low ambient temperature operation, this option improves also the sound level of the unit.

With “Fan speed regulation” option, by different microprocessor setting, it is also possible to set the “Fan Silent Mode” configuration. It means that the microprocessor clock switches the fan at low speed according to the client setting (i.e. Night & Day), providing that the ambient temperature/condensing pressure is allowing the speed change.

It allows a perfect condensing control down to –10°C.

Speedtrol – Continuous fan speed modulation on the first fan of each circuit. It allows the unit working with air temperature down to –18°C.

Condenser coil guards

Cu-Cu condensing coils – To give better protection against corrosion by aggressive environments.

Cu-Cu-Sn condensing coils – To give better protection against corrosion in aggressive environments and by salty air.

Alucoat condensing coils – Fins are protected by a special acrylic paint with a high resistance to corrosion.

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

High pressure side manometer.

Kit container

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

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

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

Hydronic Kit (twin water pumps - low or high lifting) – (Not available on sizes EWAD100E-SS / SL and EWAD120E-SS / SL) Hydronic kit consists of: twin direct driven centrifugal pumps, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pumps are protected from freezing with an additional electrical heater.

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).

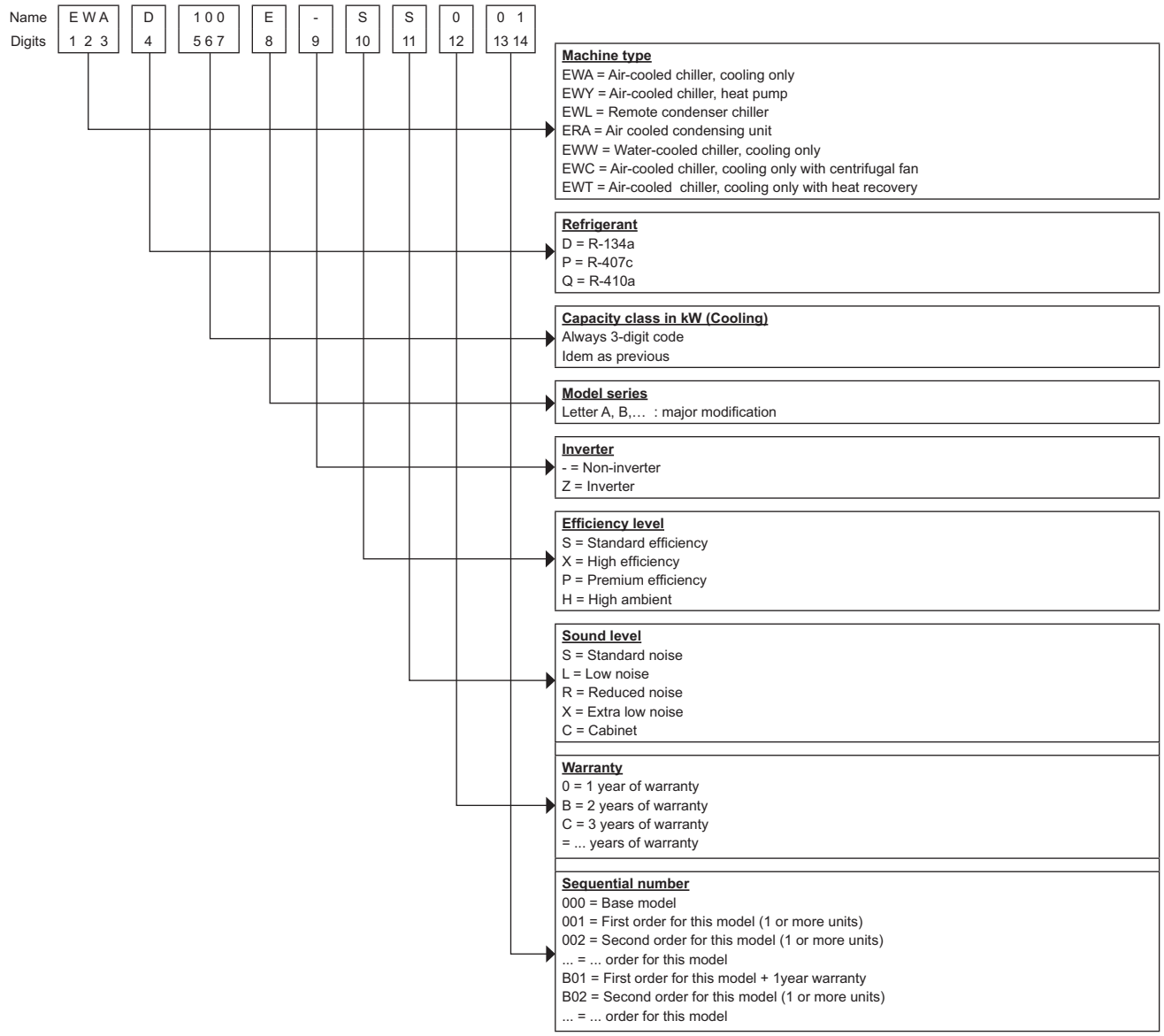
Compressors circuit breakers.

Double pressure relief valve with diverter

GNC_1a-2a-3a-4c-5b-6_Rev.03_5-6

5 Nomenclature

5 - 1 Nomenclature



NMC_1a-2_Rev.01_2

6 Options

6 - 1 Options

Partial Heat Recovery pressure drops

	EWAD~E-SS / SL									
Size EWAD~E-SS	**100**	**120**	**140**	**160**	**180**	**210**	**260**	**310**	**360**	**410**
Size EWAD~E-SL	**100**	**120**	**130**	**160**	**180**	**210**	**250**	**300**	**350**	**400**
Heating Capacity (kW)	44.2	52.9	60.8	70	79	92	109	133	134	134
Water Flow (l/s)	2.11	2.53	2.90	3.37	3.78	4.41	5.22	6.33	6.41	6.39
Heat Recovery Pressure Drops (kPa)	5	6	6	7	7	8	4	5	4	3

NOTES

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

Total Heat Recovery pressure drops

	EWAD~E-SS / SL									
Size EWAD~E-SS	**100**	**120**	**140**	**160**	**180**	**210**	**260**	**310**	**360**	**410**
Size EWAD~E-SL	**100**	**120**	**130**	**160**	**180**	**210**	**250**	**300**	**350**	**400**
Heating Capacity (kW)	110	131	151	175	196	230	273	330	344	343
Water Flow (l/s)	5.24	6.27	7.21	8.36	9.38	10.99	13.02	15.78	16.44	16.39
Heat Recovery Pressure Drops (kPa)	26	29	33	34	36	39	23	27	21	18

NOTES

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

OPT_1-2-3-4a-5-6a-7_Rev.02_1-2

Total and Partial Heat Recovery Pressure Drops

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

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

where:

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

How to use the formula: Example

The unit EWAD100E-SS has been selected for working at the following conditions:
- Total heat recovery leaving water temperature 40/50°C

The heating capacity at these working conditions is: 106 kW
The water flow at these working conditions is: 2.53 l/s

The unit EWAD100E-SS at nominal working conditions has the following data:
- Total heat recovery leaving water temperature 40/45°C
- condenser air inlet: 35°C

The heating capacity at these working conditions is: 110 kW
The water flow at these working conditions is: 5.24 l/s
The pressure drop at these working conditions is: 26 kPa

The pressure drop at the selected working condition will be:

$$PD_2\ (kPa) = 26\ (kPa) \times \left(\frac{2.53\ (l/s)}{5.24\ (l/s)} \right)^{1.80}$$

$$PD_2\ (kPa) = 7\ (kPa)$$

OPT_1-2-3-4a-5-6a-7_Rev.02_3

6 Options

6 - 1 Options

Total heat recovery ratings

EWC/LWC	Model EWAD~E-SS	Model EWAD~E-SL	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	EER Hc
40/45	100	100	92.3	36.6	110	85%	5.52
	120	120	110	44.4	131	85%	5.44
	140	130	128	49.4	151	85%	5.65
	160	160	149	57.1	175	85%	5.67
	180	180	166	65.2	196	85%	5.55
	210	210	197	73.2	230	85%	5.84
	260	250	233	87.6	273	85%	5.77
	310	300	278	110	330	85%	5.51
	360	350	326	132	344	75%	5.06
	410	400	380	148	343	65%	4.88
40/50	100	100	88.0	37.0	106	85%	5.25
	120	120	105	44.8	127	85%	5.18
	140	130	122	49.9	146	85%	5.38
	160	160	142	57.7	170	85%	5.40
	180	180	158	65.9	190	85%	5.29
	210	210	188	74.0	223	85%	5.56
	260	250	222	88.4	264	85%	5.50
	310	300	265	111	320	85%	5.25
	360	350	311	134	334	75%	4.82
	410	400	362	150	332	65%	4.64
45/55	100	100	88.0	37.4	75.3	60%	4.36
	120	120	105	45.3	90.1	60%	4.30
	140	130	122	50.5	104	60%	4.47
	160	160	142	58.3	120	60%	4.49
	180	180	158	66.6	135	60%	4.39
	210	210	188	74.7	158	60%	4.63
	260	250	222	89.3	187	60%	4.58
	310	300	265	113	227	60%	4.37
	360	350	311	135	223	50%	3.96
	410	400	362	151	221	43%	3.86

Partial heat recovery ratings

50/60	100	100	88.0	38.2	44.2	35%	3.47
	120	120	105	46.3	52.9	35%	3.41
	140	130	122	51.5	60.8	35%	3.55
	160	160	142	59.5	70.4	35%	3.57
	180	180	158	67.9	79.1	35%	3.49
	210	210	188	75.4	92.3	35%	3.72
	260	250	222	90.1	109	35%	3.68
	310	300	265	114	133	35%	3.50
	360	350	311	136	134	30%	3.27
	410	400	362	152	134	26%	3.25

NOTES

Cc (cooling capacity)
Pi (unit power input)
Hc (heating heat recovery capacity)
%Hc (percentage heat recovered)
EER Hc (coefficent of performance during heat recovery = (cooling+ heating capacity) / power input))
EWC (Entering water heat recovery condenser)
LWC (Leaving water heat recovery condenser)

Data are referred to:
LWE (Leaving water evaporator) = 7°C
Same evaporator flow as for nominal cooling operation
Condenser Inlet Air Temperature = 35°C
0.0176 m2 °C/kW evaporator fouling factor

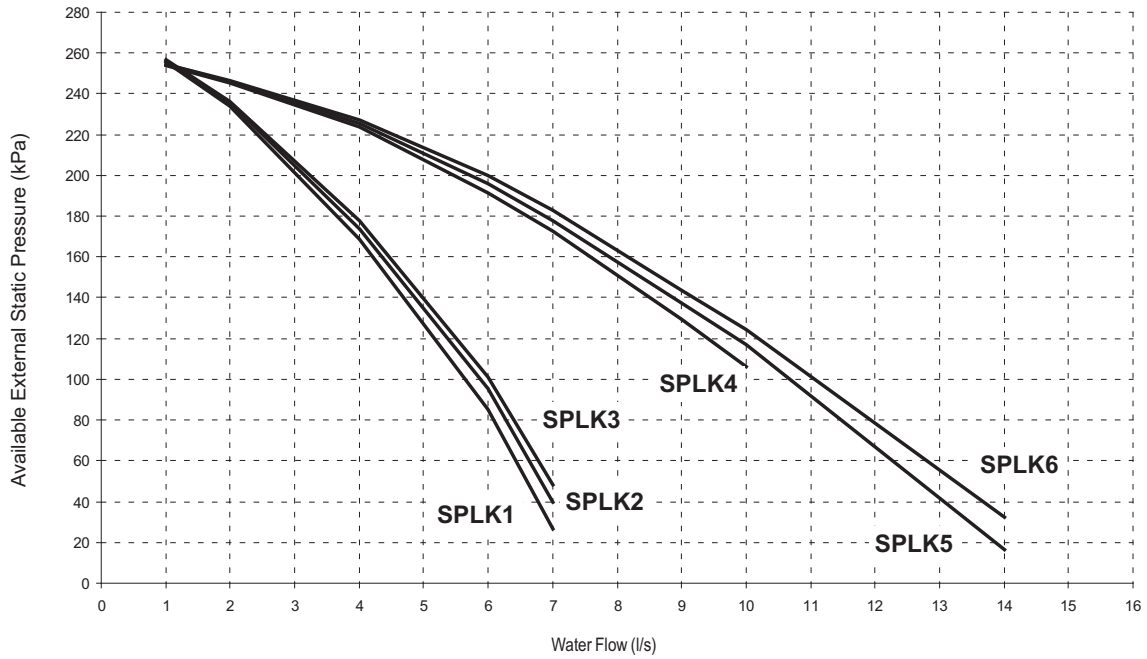
OPT_1-2-3-4a-5-6a-7_Rev.02_4-5

6 Options

6 - 1 Options

EWAD~E-

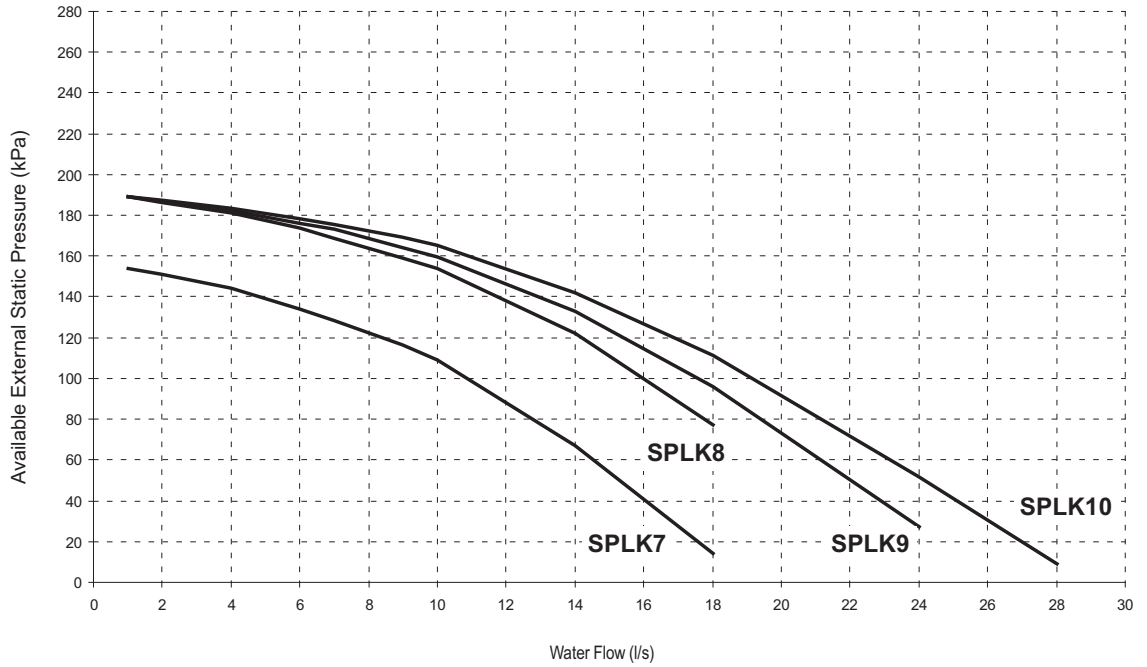
Single Pump (2 poles) - Low Available external static pressure



NOTE

When using mixture of water and glycol please contact the factory as above specification can change

Single Pump (2 poles) - Low Available external static pressure



NOTE

When using mixture of water and glycol please contact the factory as above specification can change

Pump Kit	SPLK1	SPLK2	SPLK3	SPLK4	SPLK5	SPLK6	SPLK7	SPLK8	SPLK9	SPLK10
Size EWAD~E-SS	100	120	140	160	180	210	260	310	360	410
Size EWAD~E-SL	100	120	130	160	180	210	250	300	350	400

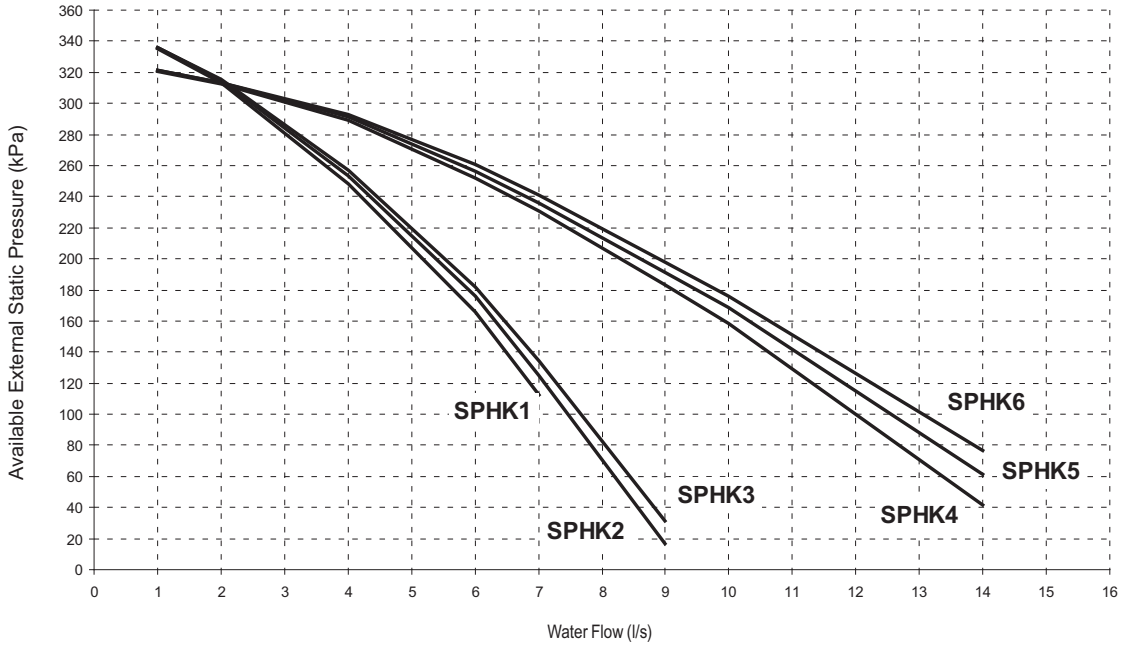
OPT_1-2-3-4a-5-6a-7_Rev.02_6 (1/4)

6 Options

6 - 1 Options

EWAD~E-

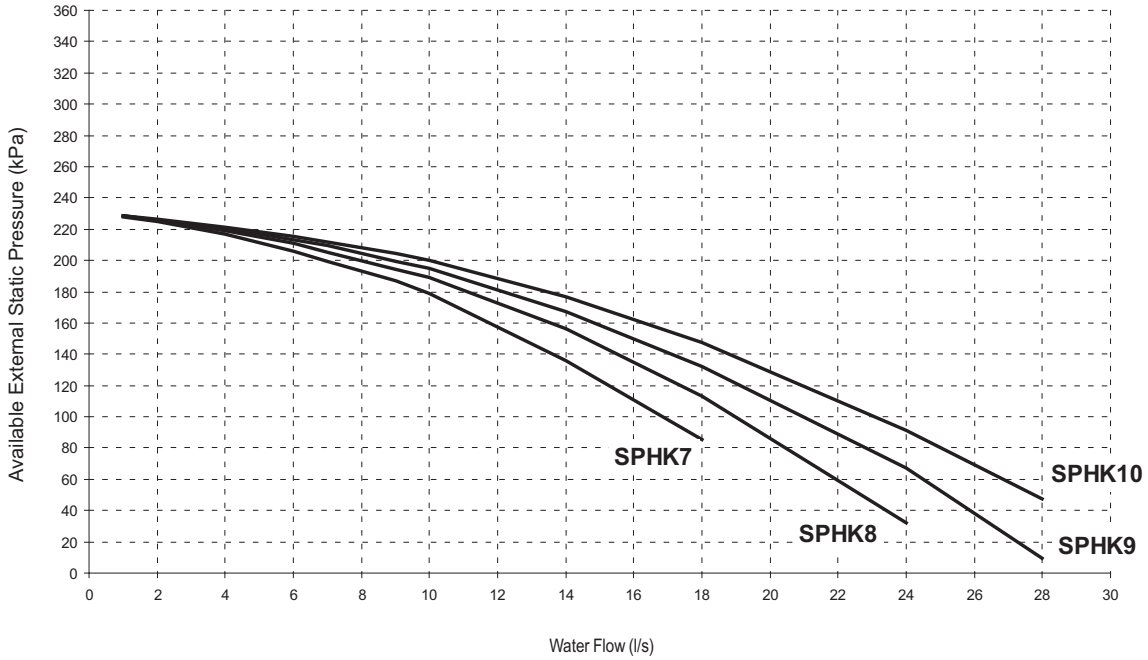
Single Pump (2 poles) - High Available external static pressure



NOTE

When using mixture of water and glycol please contact the factory as above specification can change

Single Pump (2 poles) - High Available external static pressure



NOTE

When using mixture of water and glycol please contact the factory as above specification can change

Pump Kit	SPHK1	SPHK2	SPHK3	SPHK4	SPHK5	SPHK6	SPHK7	SPHK8	SPHK9	SPHK10
Size EWAD~E-SS	100	120	140	160	180	210	260	310	360	410
Size EWAD~E-SL	100	120	130	160	180	210	250	300	350	400

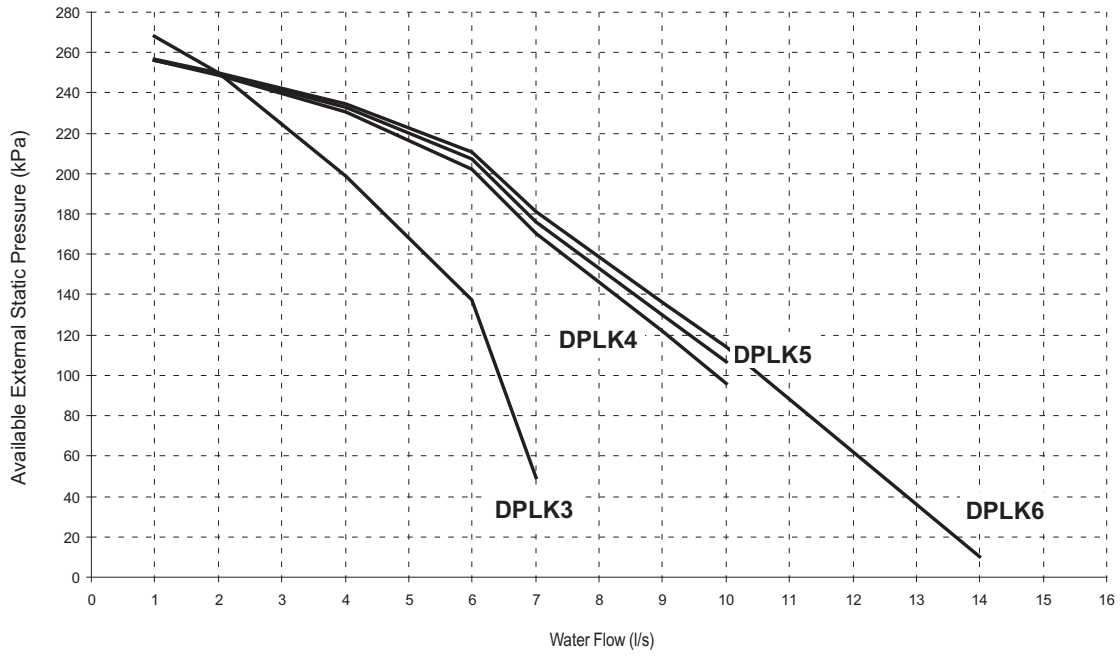
OPT_1-2-3-4a-5-6a-7_Rev.02_6 (2/4)

6 Options

6 - 1 Options

EWAD~E-

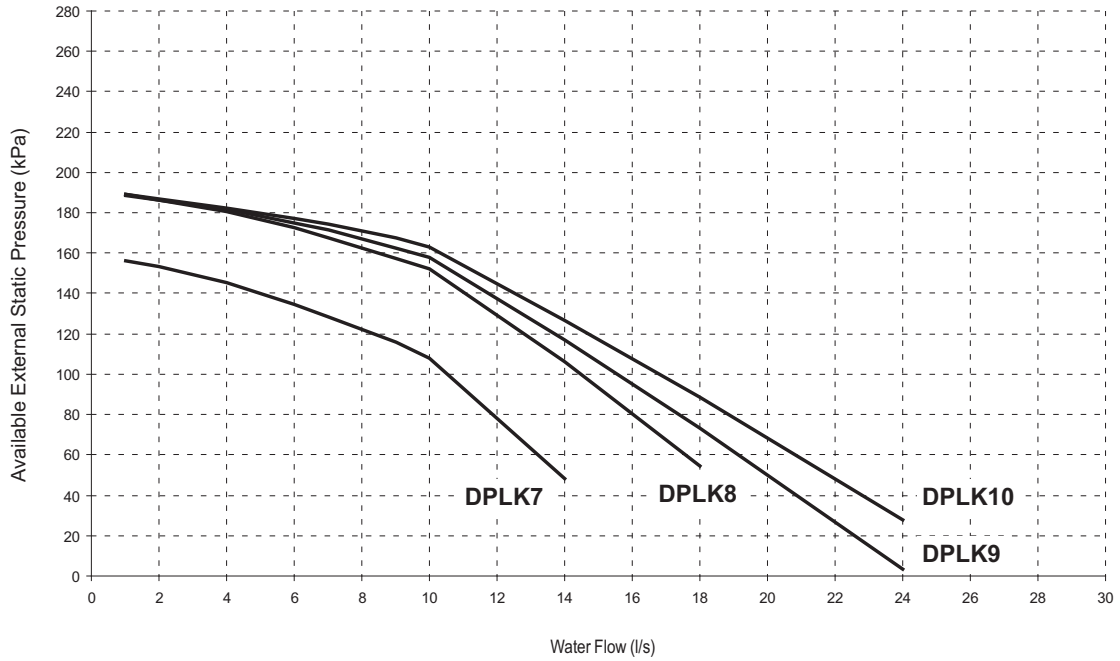
Twin Pump (2 poles) - Low Available external static pressure



NOTE

When using mixture of water and glycol please contact the factory as above specification can change

Twin Pump (2 poles) - Low Available external static pressure



NOTE

When using mixture of water and glycol please contact the factory as above specification can change

Pump Kit	DPLK3	DPLK4	DPLK5	DPLK6	DPLK7	DPLK8	DPLK9	DPLK10
Size EWAD~E-SS	140	160	180	210	260	310	360	410
Size EWAD~E-SL	130	160	180	210	250	300	350	400

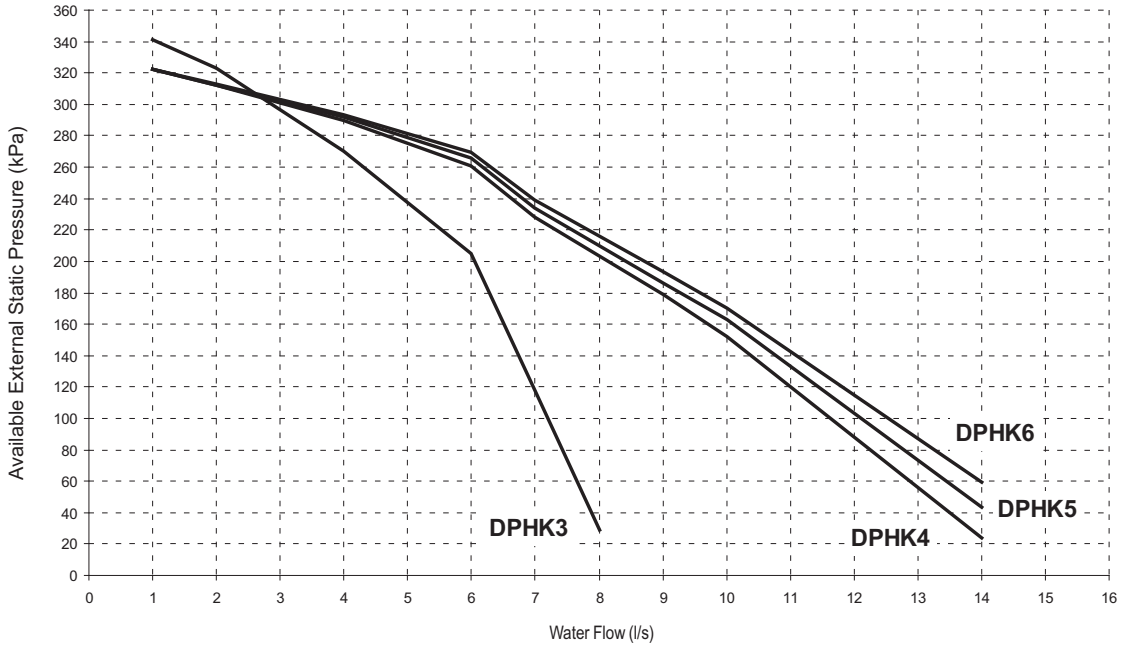
OPT_1-2-3-4a-5-6a-7_Rev.02_6 (3/4)

6 Options

6 - 1 Options

EWAD~E-

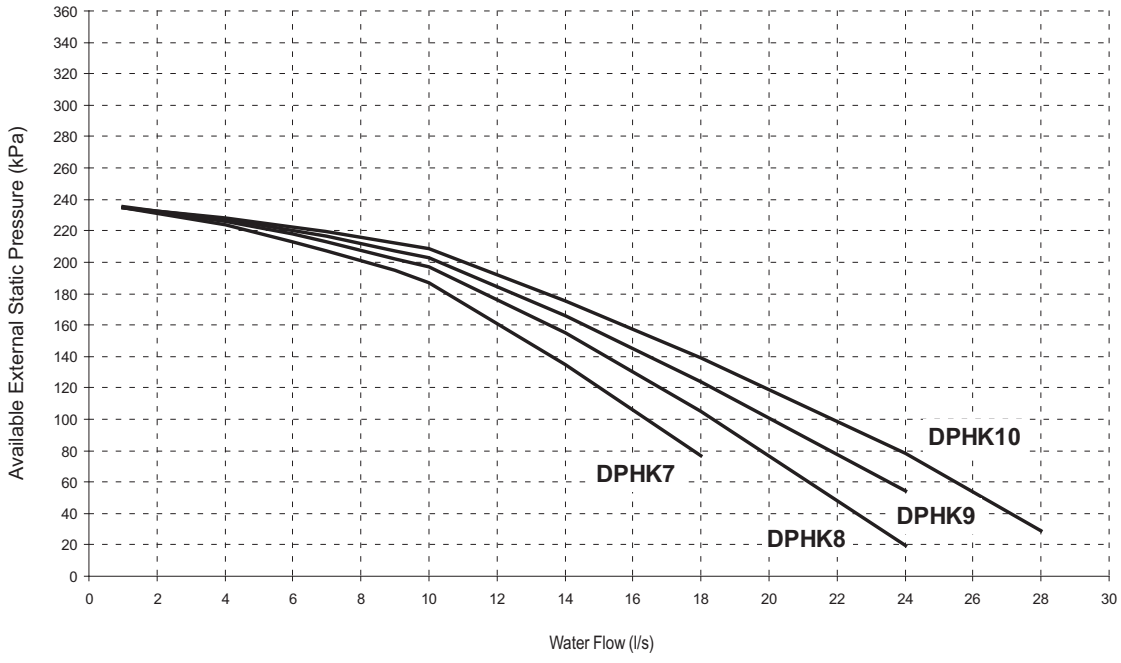
Twin Pump (2 poles) - High Available external static pressure



NOTE

When using mixture of water and glycol please contact the factory as above specification can change

Twin Pump (2 poles) - High Available external static pressure



NOTE

When using mixture of water and glycol please contact the factory as above specification can change

Pump Kit	DPHK3	DPHK4	DPHK5	DPHK6	DPHK7	DPHK8	DPHK9	DPHK10
Size EWAD~E-SS	140	160	180	210	260	310	360	410
Size EWAD~E-SL	130	160	180	210	250	300	350	400

OPT_1-2-3-4a-5-6a-7_Rev.02_6 (4/4)

6 Options

6 - 1 Options

EWAD~E-
Water Pump Kit - Technical Information

		Pump Motor Power (kW)	Pump Motor Current (A)	Power supply (V-ph-Hz)	PN	Motor Protection	Insulation (Class)	Working Temp. (°C)
Single Pump - Low lifting	SPLK 1	1.5	3.4	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPLK 2	1.5	3.4	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPLK 3	1.5	3.4	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPLK 4	2.2	5.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPLK 5	2.2	5.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPLK 6	2.2	5.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPLK 7	3.0	6.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPLK 8	4.0	8.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPLK 9	4.0	8.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPLK10	4.0	8.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
Single Pump - High Lifting	SPHK 1	2.2	5.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPHK 2	2.2	5.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPHK 3	2.2	5.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPHK 4	3.0	6.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPHK 5	3.0	6.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPHK 6	3.0	6.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPHK 7	5.5	10.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPHK 8	5.5	10.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPHK 9	5.5	10.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	SPHK10	5.5	10.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
Twin Pump - low Lifting	DPLK 3	1.5	3.4	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPLK 4	2.2	5.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPLK 5	2.2	5.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPLK 6	2.2	5.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPLK 7	3.0	6.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPLK 8	4.0	8.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPLK 9	4.0	8.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPLK 10	4.0	8.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
Twin Pump - High Lifting	DPHK 3	2.2	5.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPHK 4	3.0	6.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPHK 5	3.0	6.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPHK 6	3.0	6.0	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPHK 7	5.5	10.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPHK 8	5.5	10.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPHK 9	5.5	10.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130
	DPHK 10	5.5	10.1	400V-3ph-50hz	10	IP55	Class F	-10 ÷ 130

NOTE

when using mixture of water and glycol please contact the factory as above specification can change

OPT_1-2-3-4a-5-6a-7_Rev.02_7

7 Capacity tables

7 - 1 Cooling Capacity Tables

EWAD100-180E-SL

Ta: Condenser inlet air temperature; Twout: Evaporator leaving water temperature (Δt 5°C);
CC: Cooling capacity; PI: Power input; qw: Fluid flow rate; dpw: Fluid pressure drop

	Condenser inlet air temperature	Twout																							
		5				7				9				11				13				15			
		CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw
Size	Ta	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa
100	25	102	32.0	4.9	25	107	33.0	5.1	27	113	34.1	5.4	30	119	35.2	5.7	33	125	36.3	6.0	36	132	37.5	6.3	40
	30	97.0	34.9	4.6	23	103	36.0	4.9	25	108	37.1	5.2	28	114	38.2	5.5	31	120	39.4	5.8	34	126	40.6	6.1	37
	35	92.1	38.1	4.4	21	97.6	39.2	4.7	23	103	40.3	4.9	26	109	41.5	5.2	28	115	42.7	5.5	31	120	43.9	5.8	34
	40	86.8	41.5	4.2	19	92.1	42.6	4.4	21	97.5	43.8	4.7	23	103	45.0	4.9	26	109	46.3	5.2	28	114	47.6	5.5	31
	45	81.0	45.1	3.9	16	85.8	45.9	4.1	18	87.7	44.5	4.2	19	89.7	43.4	4.3	20	91.5	42.2	4.4	21	93.0	41.0	4.5	21
	48	70.2	41.5	3.4	13	72.1	40.4	3.4	13	73.6	39.3	3.5	14	75.5	38.5	3.6	15	77.1	37.6	3.7	15	78.5	36.7	3.8	16
120	25	121	39.5	5.8	25	128	40.7	6.1	27	135	42.0	6.4	30	141	43.4	6.8	33	149	44.8	7.1	36	156	46.3	7.5	40
	30	115	43.0	5.5	23	122	44.4	5.8	25	129	45.8	6.2	28	135	47.2	6.5	31	142	48.7	6.8	33	149	50.2	7.2	37
	35	109	46.9	5.2	21	116	48.3	5.5	23	122	49.8	5.9	25	129	51.3	6.2	28	135	52.8	6.5	31	142	54.4	6.8	34
	40	103	51.1	4.9	19	109	52.6	5.2	21	115	54.1	5.5	23	122	55.6	5.8	25	126	55.7	6.1	27	129	54.4	6.2	28
	45	91.9	52.4	4.4	15	94.0	50.7	4.5	16	96.4	49.4	4.6	17	98.3	48.0	4.7	17	101	47.1	4.8	18	102	45.5	4.9	18
	48	77.1	46.4	3.7	11	78.8	45.0	3.8	12	80.8	44.0	3.9	12	82.5	43.0	4.0	13	83.9	41.9	4.0	13	85.9	41.3	4.1	14
130	25	139	43.8	6.6	24	147	45.0	7.0	26	155	46.3	7.4	29	163	47.7	7.8	32	171	49.1	8.2	35	180	50.6	8.6	38
	30	133	47.7	6.3	22	140	49.0	6.7	24	148	50.4	7.1	27	156	51.8	7.5	29	164	53.3	7.9	32	173	54.9	8.3	35
	35	126	51.9	6.0	20	134	53.4	6.4	22	141	54.9	6.8	25	149	56.4	7.2	27	157	57.9	7.5	30	165	59.6	7.9	33
	40	119	56.7	5.7	18	126	58.2	6.0	20	134	59.8	6.4	22	142	61.4	6.8	25	149	63.1	7.2	27	157	64.8	7.6	30
	45	111	62.0	5.3	16	118	63.6	5.7	18	126	65.3	6.0	20	132	65.9	6.3	22	134	63.7	6.4	22	137	62.1	6.6	23
	48	103	63.1	4.9	14	106	61.0	5.1	15	109	59.5	5.2	15	111	57.8	5.3	16	114	56.7	5.5	17	115	54.9	5.5	17
160	25	163	49.7	7.8	25	172	51.2	8.2	27	181	52.8	8.7	30	190	54.4	9.1	33	200	56.0	9.6	36	210	57.8	10.1	39
	30	156	54.3	7.4	23	165	55.9	7.9	25	174	57.5	8.3	28	183	59.1	8.8	30	192	60.9	9.2	33	201	62.7	9.7	36
	35	148	59.2	7.1	21	157	60.8	7.5	23	165	62.6	7.9	25	174	64.3	8.4	28	183	66.1	8.8	31	193	68.0	9.3	33
	40	139	64.5	6.7	18	148	66.2	7.1	21	157	68.0	7.5	23	165	69.9	7.9	25	174	71.8	8.4	28	183	73.7	8.8	31
	45	130	70.2	6.2	16	139	72.0	6.6	18	143	71.2	6.9	20	147	69.5	7.0	20	150	67.8	7.2	21	153	65.9	7.3	22
	48	115	66.5	5.5	13	118	64.8	5.7	14	121	63.0	5.8	14	125	61.8	6.0	15	126	59.9	6.1	16	129	58.5	6.2	16
180	25	185	55.7	8.8	23	195	57.3	9.3	25	205	59.0	9.8	28	216	60.7	10.4	31	227	62.4	10.9	33	238	64.3	11.4	37
	30	176	60.7	8.4	21	187	62.5	8.9	23	197	64.3	9.4	26	207	66.1	9.9	28	217	67.9	10.4	31	228	69.9	10.9	34
	35	167	66.4	8.0	19	177	68.3	8.4	21	187	70.3	8.9	24	196	72.2	9.4	26	206	74.2	9.9	28	216	76.3	10.4	31
	40	155	72.9	7.4	17	164	74.9	7.9	19	174	76.9	8.3	21	184	79.1	8.8	23	193	81.3	9.3	25	202	83.5	9.7	27
	45	141	80.2	6.7	14	150	82.3	7.2	16	159	84.5	7.6	18	168	86.8	8.0	19	175	87.6	8.4	21	178	84.7	8.5	22
	48	132	85.0	6.3	12	137	84.0	6.5	13	140	81.1	6.7	14	144	79.0	6.9	15	147	76.8	7.0	15	151	75.3	7.2	16

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

2 For working conditions where dpw values are in italic, please contact factory.
Für Arbeitsbedingungen mit kursiv gedruckten dpw-Werten, wenden Sie sich bitte an den Hersteller.
Για τις συνθήκες εργασίας όπου οι τιμές dpw είναι σε πλάγια γραφή, παρακαλούμε επικοινωνήστε με το εργοστάσιο.
Para las condiciones de funcionamiento en las que los valores dpw están en cursiva, póngase en contacto con la fábrica.
Pour les conditions de travail lorsque les valeurs dpw sont en italique, veuillez contacter l'usine.
Per le condizioni d'esercizio in cui i valori dpw sono riportati in corsivo, contattare il produttore.
Voor bedrijfsomstandigheden met schuingedrukte dpw-waarden, gelieve contact op te nemen met de fabriek.
Если условия работы соответствуют значениям dpw, указанным курсивом, обратитесь на завод-изготовитель.

SRC_1-2_Rev.01_2_(1-2)

7 Capacity tables

7 - 1 Cooling Capacity Tables

EWAD210-400E-SL

Ta: Condenser inlet air temperature; Twout: Evaporator leaving water temperature (Δt 5°C);
CC: Cooling capacity; PI: Power input; qw: Fluid flow rate; dpw: Fluid pressure drop

Size	Condenser inlet air temperature Ta	Twout																							
		5				7				9				11				13				15			
		CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw
		kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa
210	25	210	58.1	10.0	21	222	59.7	10.6	23	233	61.3	11.2	25	245	63.0	11.7	27	256	64.8	12.3	30	269	66.7	12.9	32
	30	205	64.2	9.8	20	216	65.9	10.4	22	228	67.7	10.9	24	239	69.5	11.5	26	250	71.4	12.0	28	262	73.4	12.6	31
	35	198	71.0	9.4	18	208	72.8	10.0	20	220	74.8	10.5	22	230	76.8	11.0	24	241	78.8	11.6	27	252	80.9	12.1	29
	40	187	78.6	8.9	17	197	80.7	9.4	18	208	82.7	9.9	20	218	84.9	10.5	22	229	87.1	11.0	24	239	89.4	11.5	26
	45	173	87.3	8.2	14	182	89.5	8.7	16	192	91.7	9.2	18	197	90.4	9.5	19	202	88.7	9.7	19	205	86.0	9.8	20
	48	156	87.6	7.5	12	160	85.2	7.7	13	164	82.6	7.8	13	167	80.7	8.0	14	171	78.8	8.2	14	173	76.8	8.3	15
250	25	257	70.2	12.3	48	272	72.4	13.0	53	287	74.6	13.8	59	303	77.0	14.6	65	319	79.5	15.4	71	335	82.2	16.2	78
	30	246	76.2	11.8	44	261	78.4	12.5	49	276	80.7	13.2	55	291	83.1	14.0	60	306	85.6	14.7	66	322	88.2	15.5	73
	35	233	83.2	11.2	40	248	85.4	11.9	45	263	87.7	12.6	50	277	90.1	13.3	55	292	92.6	14.0	61	307	95.2	14.8	67
	40	219	91.4	10.5	36	233	93.5	11.2	40	247	95.8	11.9	45	262	98.1	12.6	50	276	101.0	13.3	55	290	103.0	14.0	60
	45	203	101.0	9.7	31	216	103.0	10.3	35	229	105.0	11.0	39	243	107.0	11.7	44	257	110.0	12.3	48	269	112.0	12.9	53
	48	191	107.0	9.1	28	204	109.0	9.8	32	212	108.0	10.1	34	217	105.0	10.4	36	223	103.0	10.7	37	229	101.0	11.0	39
300	25	309	92.6	14.8	49	326	95.8	15.6	54	344	99.1	16.5	59	362	103.0	17.4	65	380	106.0	18.3	71	399	110.0	19.2	78
	30	295	99.8	14.1	45	312	103.0	14.9	49	328	107.0	15.8	54	346	110.0	16.6	60	363	114.0	17.5	65	381	118.0	18.3	71
	35	278	107.0	13.3	40	295	111.0	14.1	45	311	115.0	14.9	49	327	119.0	15.7	54	344	123.0	16.5	59	361	127.0	17.4	65
	40	260	116.0	12.4	35	275	120.0	13.2	39	291	124.0	14.0	44	307	128.0	14.7	48	322	132.0	15.5	53	338	137.0	16.3	58
	45	238	125.0	11.4	30	250	127.0	11.9	33	255	125.0	12.2	34	261	124.0	12.5	36	267	122.0	12.8	37	271	119.0	13.0	39
	48	203	116.0	9.7	23	210	115.0	10.0	24	216	114.0	10.4	26	220	111.0	10.6	26	226	108.0	10.8	28	230	106.0	11.1	29
350	25	362	112.0	17.3	49	382	116.0	18.3	54	402	120.0	19.3	59	423	125.0	20.3	65	444	129.0	21.3	71	465	134.0	22.4	77
	30	345	121.0	16.5	45	364	125.0	17.4	49	383	130.0	18.4	54	403	134.0	19.4	59	423	139.0	20.3	65	443	144.0	21.3	71
	35	325	130.0	15.5	40	344	135.0	16.5	44	362	140.0	17.4	49	381	145.0	18.3	54	399	150.0	19.2	59	419	155.0	20.1	64
	40	302	140.0	14.4	35	319	145.0	15.3	39	337	151.0	16.2	43	355	156.0	17.0	47	369	159.0	17.7	51	375	156.0	18.0	52
	45	267	146.0	12.8	28	275	145.0	13.1	30	280	142.0	13.4	31	286	139.0	13.7	32	293	137.0	14.1	34	298	132.0	14.3	35
	48	221	130.0	10.6	20	230	129.0	11.0	22	237	127.0	11.3	23	243	124.0	11.6	24	248	121.0	11.9	25	255	119.0	12.2	26
400	25	408	124.0	19.5	44	429	128.0	20.5	48	450	133.0	21.6	53	472	137.0	22.7	57	494	142.0	23.7	62	516	148.0	24.8	68
	30	395	135.0	18.9	41	415	139.0	19.9	45	435	144.0	20.9	50	456	149.0	21.9	54	476	155.0	22.9	59	497	160.0	23.9	63
	35	377	146.0	18.0	38	397	152.0	19.0	42	416	157.0	19.9	46	435	162.0	20.9	50	455	168.0	21.8	54	472	173.0	22.7	58
	40	354	159.0	16.9	34	366	161.0	17.5	36	372	159.0	17.8	37	378	157.0	18.1	38	385	155.0	18.5	40	392	152.0	18.8	41
	45	281	141.0	13.4	22	289	140.0	13.8	24	295	137.0	14.1	25	299	133.0	14.3	25	306	131.0	14.7	26	311	129.0	15.0	27
	48	234	125.0	11.2	16	243	125.0	11.6	17	248	122.0	11.9	18	253	119.0	12.1	19	257	116.0	12.3	19	264	114.0	12.7	20

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

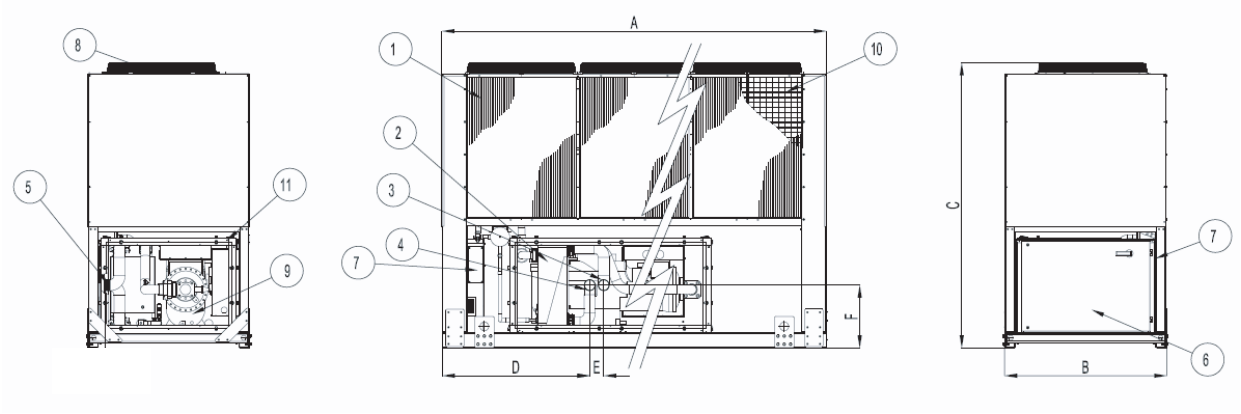
2 For working conditions where dpw values are in italic, please contact factory.
Für Arbeitsbedingungen mit kursiv gedruckten dpw-Werten, wenden Sie sich bitte an den Hersteller.
Για τις συνθήκες εργασίας όπου οι τιμές dpw είναι σε πλάγια γραφή, παρακαλούμε επικοινωνήστε με το εργοστάσιο.
Para las condiciones de funcionamiento en las que los valores dpw están en cursiva, póngase en contacto con la fábrica.
Pour les conditions de travail lorsque les valeurs dpw sont en italique, veuillez contacter l'usine.
Per le condizioni d'esercizio in cui i valori dpw sono riportati in corsivo, contattare il produttore.
Voor bedrijfsomstandigheden met schuingedrukte dpw-waarden, gelieve contact op te nemen met de fabriek.
Если условия работы соответствуют значениям dpw, указанным курсивом, обратитесь на завод-изготовитель.

SRC_1-2_Rev.01_2_(2-2)

8 Dimensional drawings

8 - 1 Dimensional Drawings

EWAD100-210E-SS
EWAD100-210E-SL



Size		Dimensions						
E-SS	E-SL	A	B	C	D	E	F	Fans
100	100	2165	1292	2273	1175	112	501	2
120	120	2165	1292	2273	1175	112	501	2
140	130	3065	1292	2273	1175	112	501	3
160	160	3065	1292	2273	1175	112	501	3
180	180	3965	1292	2273	1175	112	501	4
210	210	3965	1292	2273	1175	112	501	4

LEGEND

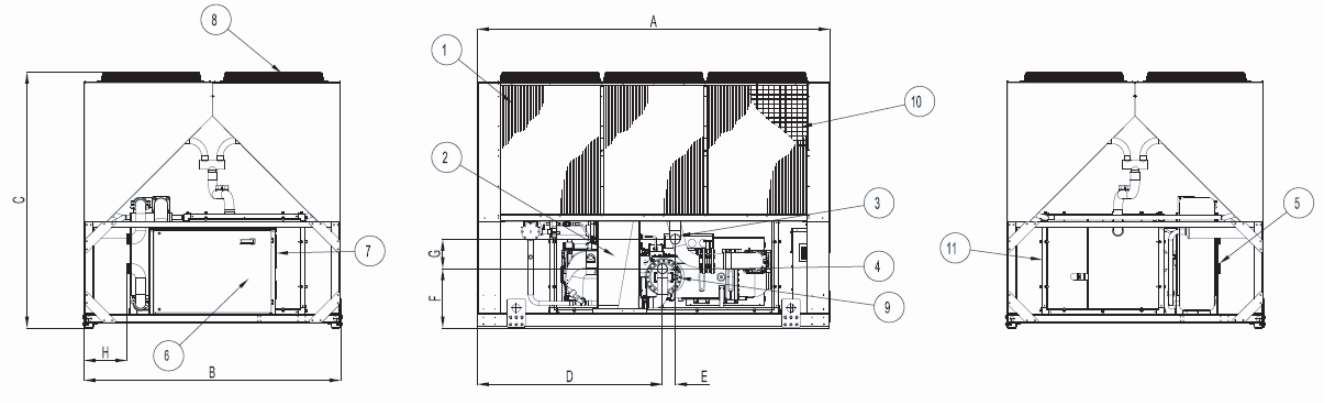
1 Air heat exchanger (condenser)
2 Water heat exchanger (evaporator)
3 Evaporator water inlet
4 Evaporator water outlet
5 Evaporator connections
6 Electrical control panel
7 Slot for power and control connection
8 Fan
9 Compressor
10 Coil protection guards (optional)
11 Compressor sound enclosure (optional)

DMN_1c-2b_Rev.03_1

8 Dimensional drawings

8 - 1 Dimensional Drawings

EWAD260-410E-SS
EWAD250-400E-SL



Size		Dimensions								
E-SS	E-SL	A	B	C	D	E	F	G	H	Fans
260	250	3070	2236	2223	1612	112	515	257	376	6
310	300	3070	2236	2223	1612	112	515	257	376	6
360	350	3070	2236	2223	1612	112	515	257	376	6
410	400	3070	2236	2223	1612	112	515	257	376	6

LEGEND

1 Air heat exchanger (condenser)
2 Water heat exchanger (evaporator)
3 Evaporator water inlet
4 Evaporator water outlet
5 Evaporator connections
6 Electrical control panel
7 Slot for power and control connection
8 Fan
9 Compressor
10 Coil protection guards (optional)
11 Compressor sound enclosure (optional)

DMN_1c-2b_Rev.03_2

9 Sound data

9 - 1 Sound Level Data

Noise Level

EWAD~E-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)
100	75.5	70.8	68.9	75.3	64.3	61.7	53.0	47.3	**73.5**	**91.5**
120	75.5	70.8	68.9	75.3	64.3	61.7	53.0	47.3	**73.5**	**91.5**
140	75.7	71.0	69.1	75.5	64.5	61.9	53.2	47.5	**73.7**	**92.3**
160	75.7	71.0	69.1	75.5	64.5	61.9	53.2	47.5	**73.7**	**92.3**
180	75.9	71.2	69.3	75.7	64.7	62.1	53.4	47.7	**73.9**	**93.0**
210	77.1	72.4	70.5	76.9	65.9	63.3	54.6	48.9	**75.1**	**94.2**
260	77.0	72.3	70.4	76.8	65.8	63.2	54.5	48.8	**75.0**	**94.2**
310	77.3	72.6	70.7	77.1	66.1	63.5	54.8	49.1	**75.3**	**94.5**
360	77.3	72.6	70.7	77.1	66.1	63.5	54.8	49.1	**75.3**	**94.5**
410	78.0	73.3	71.4	77.8	66.8	64.2	55.5	49.8	**76.0**	**95.2**

EWAD~E-SL

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)
100	73.0	68.3	66.4	72.8	61.8	59.2	50.5	44.8	**71.0**	**89.0**
120	73.0	68.3	66.4	72.8	61.8	59.2	50.5	44.8	**71.0**	**89.0**
130	73.2	68.5	66.6	73.0	62.0	59.4	50.7	45.0	**71.2**	**89.8**
160	73.2	68.5	66.6	73.0	62.0	59.4	50.7	45.0	**71.2**	**89.8**
180	73.4	68.7	66.8	73.2	62.2	59.6	50.9	45.2	**71.4**	**90.5**
210	74.6	69.9	68.0	74.4	63.4	60.8	52.1	46.4	**72.6**	**91.7**
250	74.5	69.8	67.9	74.3	63.3	60.7	52.0	46.3	**72.5**	**91.7**
300	74.8	70.1	68.2	74.6	63.6	61.0	52.3	46.6	**72.8**	**92.0**
350	74.8	70.1	68.2	74.6	63.6	61.0	52.3	46.6	**72.8**	**92.0**
400	75.5	70.8	68.9	75.3	64.3	61.7	53.0	47.3	**73.5**	**92.7**

NOTES

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

NSL_1-2a_Rev.01_1

9 Sound data

9 - 1 Sound Level Data

Sound pressure level correction factors for different distances

EWAD~E-SS and EWAD~E-SL

Unit size		Distance						
EWAD~E-SS	EWAD~E-SL	1m	5m	10m	15m	20m	25m	50m
100	100	- 0.0	- 8.8	- 13.9	- 17.1	- 19.4	- 21.2	- 27.0
120	120	- 0.0	- 8.8	- 13.9	- 17.1	- 19.4	- 21.2	- 27.0
140	130	- 0.0	- 8.5	- 13.5	- 16.6	- 18.9	- 20.7	- 26.5
160	160	- 0.0	- 8.5	- 13.5	- 16.6	- 18.9	- 20.7	- 26.5
180	180	- 0.0	- 8.2	- 13.1	- 16.2	- 18.4	- 20.3	- 26.0
210	210	- 0.0	- 8.2	- 13.1	- 16.2	- 18.4	- 20.3	- 26.0
260	250	- 0.0	- 8.1	- 13.0	- 16.1	- 18.4	- 20.2	- 25.9
310	300	- 0.0	- 8.1	- 13.0	- 16.1	- 18.4	- 20.2	- 25.9
360	350	- 0.0	- 8.1	- 13.0	- 16.1	- 18.4	- 20.2	- 25.9
410	400	- 0.0	- 8.1	- 13.0	- 16.1	- 18.4	- 20.2	- 25.9

NSL_1-2a_Rev.01_2

10 Installation

10 - 1 Installation Method

Installation notes

Warning

Installation and maintenance of the unit must to be performed only by qualified personnel who have knowledge with local codes and regulations, and experience with this type of equipment. The unit must be installed to allow all the maintenance operations.

Handling

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

Location

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

Space requirements

The units are air-cooled, then it is important to respect the minimum distances which guarantee the best ventilation of the condenser coils. Limitations of space reducing the air flow could cause significant reductions in cooling capacity and an increase in electricity consumption.

To determinate unit placement, careful consideration must be given to assure a sufficient air flow across the condenser heat transfer surface. Two conditions must be avoided to achieve the best performance: warm air recirculation and coil starvation. Both these conditions cause an increase of condensing pressures that result in reductions in unit efficiency and capacity.

Moreover the unique microprocessor has the ability to analyse the operating environment of the air cooled chiller and to optimize its performance staying on-line during abnormal conditions.

Each side of the unit must be accessible after installation for periodic service. Fig.1 and 2 show you minimum recommended clearance requirements.

Vertical condenser air discharge must be unobstructed because the unit would have its capacity and efficiency significantly reduced.

If the units are positioned in places surrounded by walls or obstacles of the same height as the units, the units should be at least 2500 mm from obstacles (fig.3 and 4). In the event the obstacles are higher than the units, the units should be at least 3000 mm from the obstacle (fig.5 and 6). Units installed closer than the minimum recommended distance to a wall or other vertical riser may experience a combination of coil starvation and warm air recirculation, thus causing reduction in unit capacity and efficiency reductions. The microprocessor control is proactive in response "of design condition". In the case of single or compounded influences restricting airflow to the unit, the microprocessor will act to keep the compressor(s) running (at reduced capacity) rather than allowing a shut-off on high discharge pressure.

When two or more units are positioned side by side it is recommended that the condenser coils are at least 3600 mm distance from one another (fig.7 and 8); strong wind could be the cause of air warm recirculation.

For other installation solutions, consult our technicians.

INN_1a-2a-3-4_Rev.01_1

10 Installation

10 - 1 Installation Method

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

Minimum recommended installation clearances.

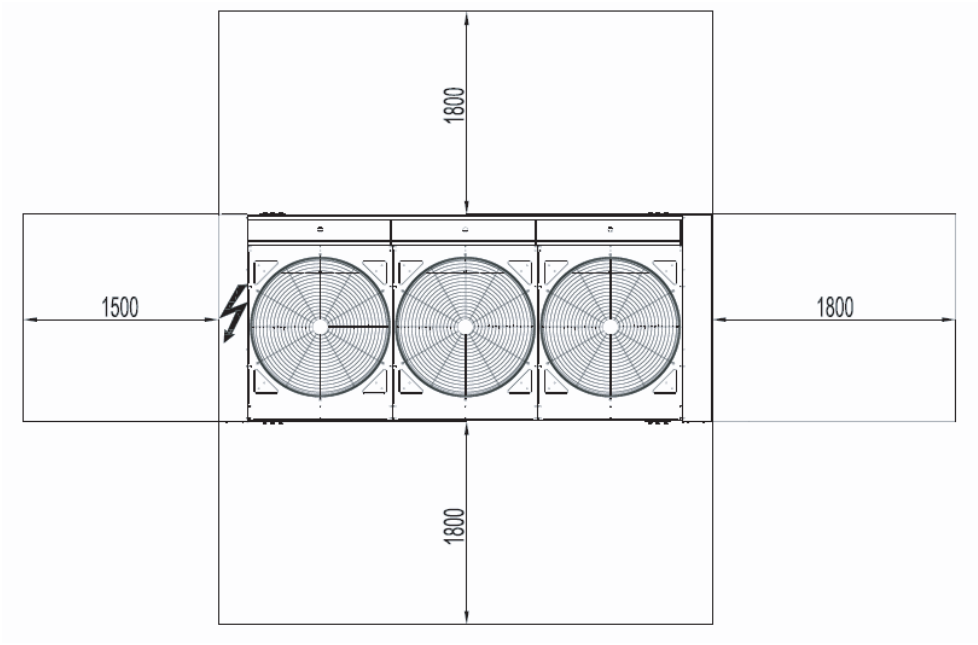


Fig. 1

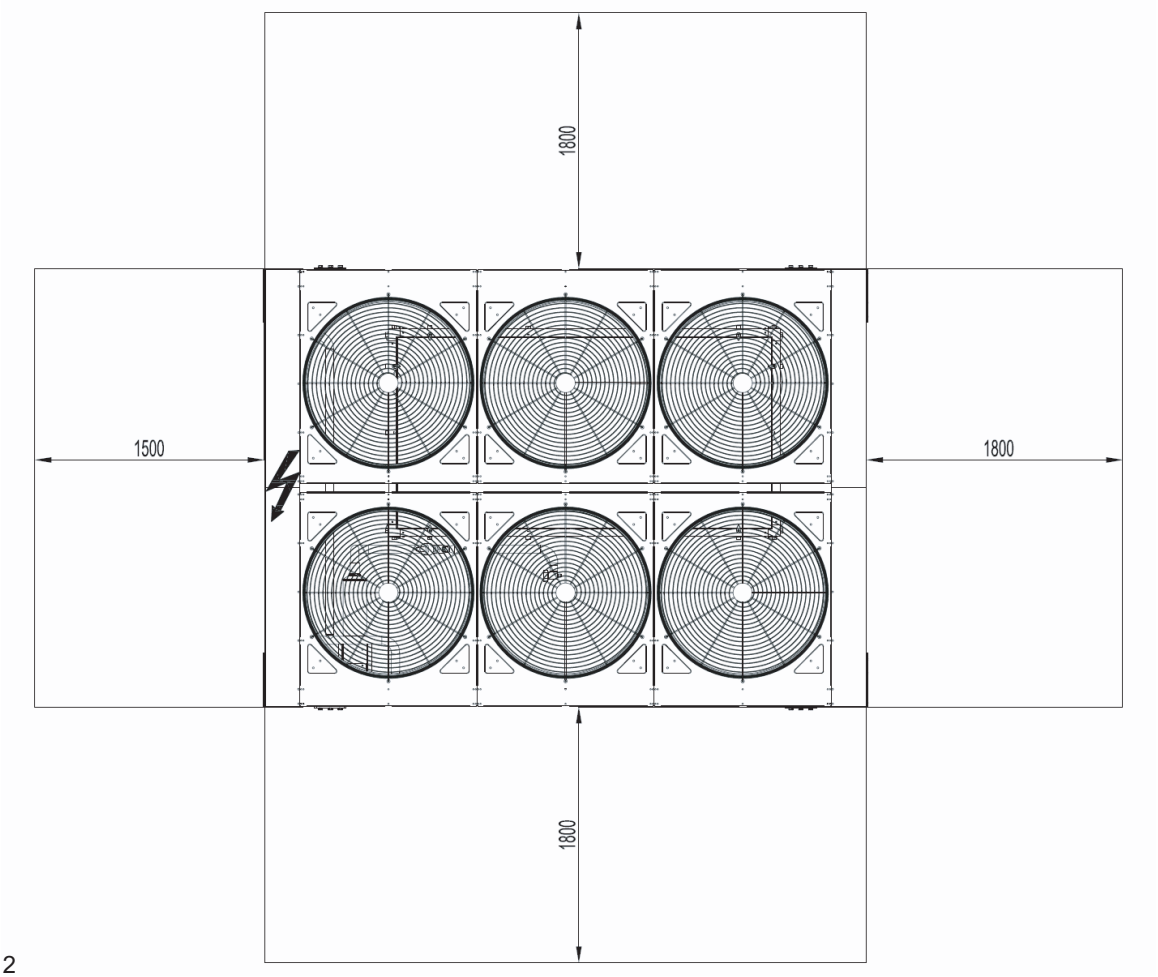


Fig. 2

INN_1a-2a-3-4_Rev.01_2

10 Installation

10 - 1 Installation Method

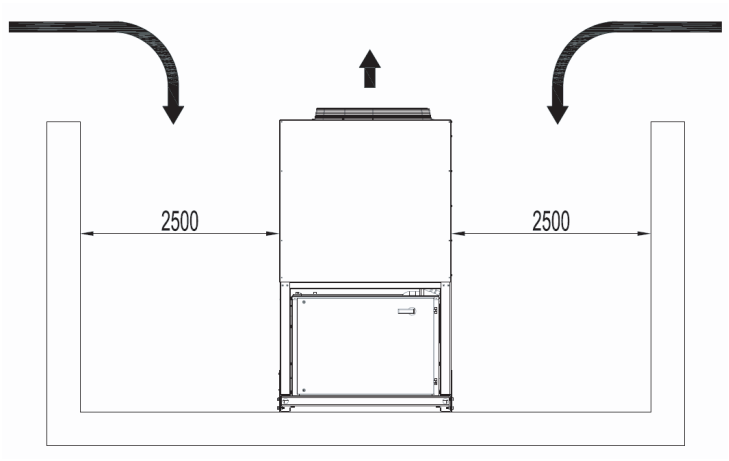


Fig. 3

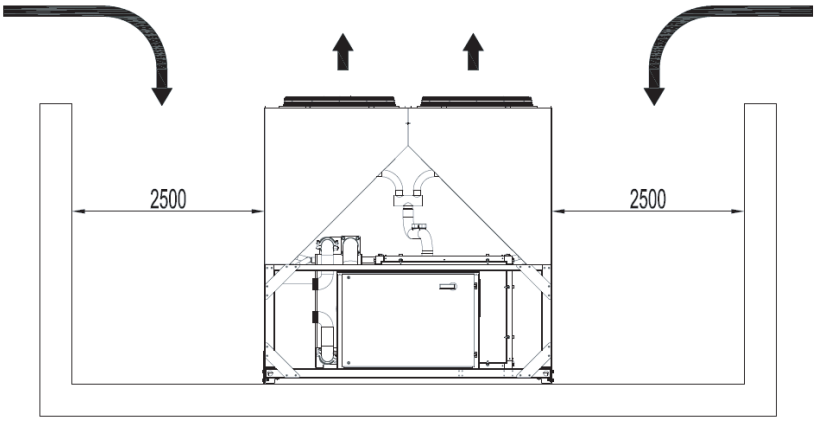


Fig. 4

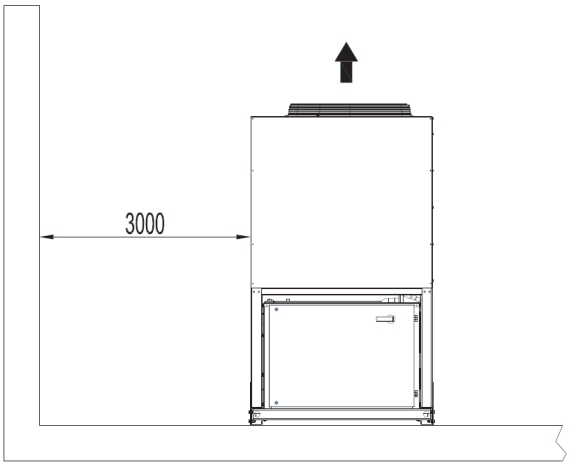


Fig. 5

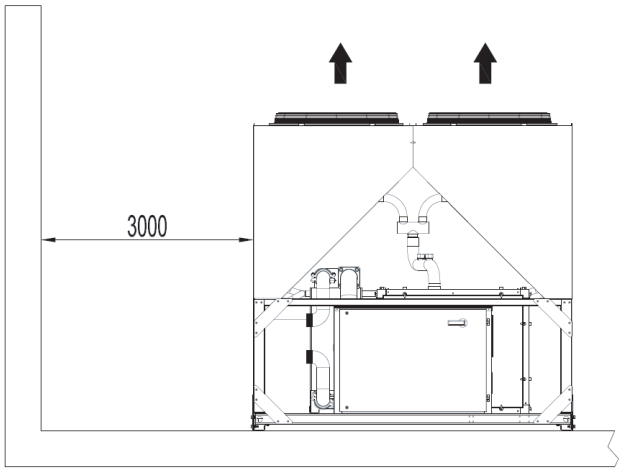


Fig. 6

INN_1a-2a-3-4_Rev.01_3

10 Installation

10 - 1 Installation Method

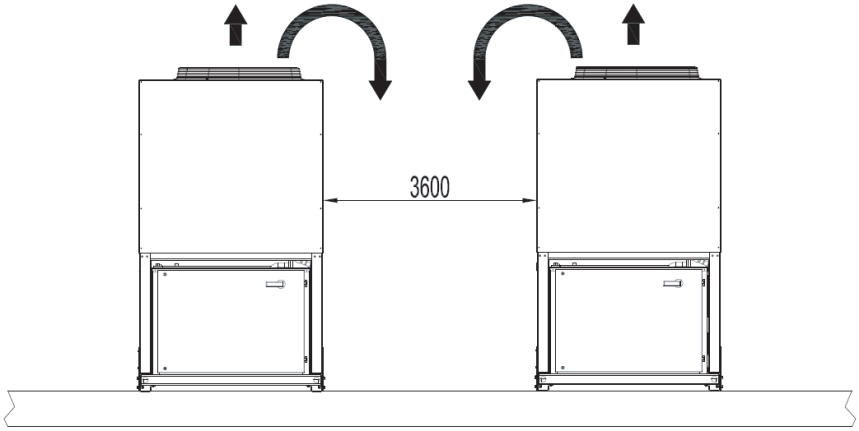


Fig. 7

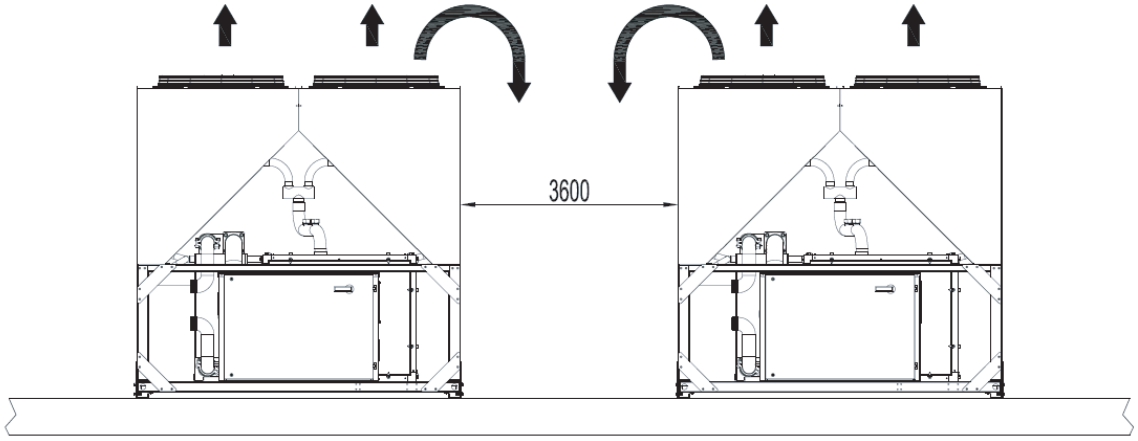


Fig. 8

Acoustic protection

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

Storage

The environment conditions have to be in the following limits:

Minimum ambient temperature:	-20°C
Maximum ambient temperature:	+57°C
Maximum R.H.:	95% not condensing

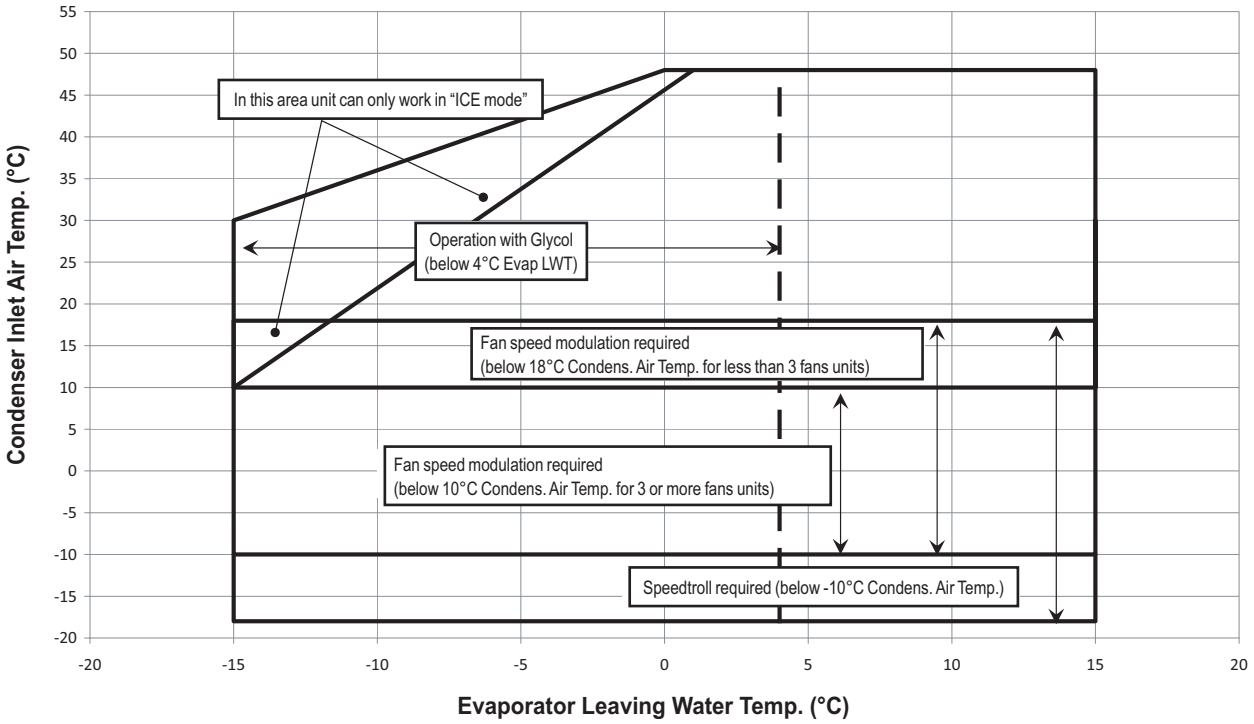
INN_1a-2a-3-4_Rev.01_4

11 Operation range

11 - 1 Operation Range

EWAD~E-

Cooling Mode



OPL_1-2-3-4-5_Rev.00_1

11 Operation range

11 - 1 Operation Range

EWAD~E-

Water heat exchanger - Minimum and maximum water Δt

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

Water heat exchanger - 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

Air heat exchanger - Altitude correction factors

Elevation above sea level (m)	0	300	600	900	1200	1500	1800
Barometric pressure (mbar)	1013	977	942	908	875	843	812
Cooling capacity correction factor	1,000	0,993	0,986	0,979	0,973	0,967	0,960
Power input correction factor	1,000	1,005	1,009	1,015	1,021	1,026	1,031

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

Minimum glycol percentage for low water temperature

EWLT (°C)	2	0	-2	-4	-6	-8	-10	-12	-15
Ethylene glycol (%)	10	20	20	20	30	30	30	40	40
Propylene glycol (%)	10	20	20	30	30	30	40	40	40

- ELWT (Evaporator Leaving Water Temperature (°C)
- Minimum glycol percentage to be used with evaporator leaving water temperature below 4°C to prevent freezing of water circuit.

Minimum glycol percentage for low air ambient temperature

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

- Minimum glycol percentage to prevent freezing of water circuit at indicated air ambient temperature
- 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.

Correction factors for low evaporator leaving water temperature (EWLT < 4°C)

Evaporator Leaving Water Temperature (°C)	2	0	-2	-4	-6	-8	-10	-12	-15
Cooling Capacity	0,842	0,785	0,725	0,670	0,613	0,562	0,510	0,455	0,375
Compressor Power Input	0,950	0,940	0,920	0,890	0,870	0,840	0,798	0,755	0,680

- ELWT (Evaporator Leaving Water Temperature (°C)
- Table referred to Cooling Mode only
- Correction factors have to be applied at working conditions: evaporator leaving water temperature 7°C

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

- Contact factory for water temperature out of operating limits

OPL_1-2-3-4-5_Rev.00_2

11 Operation range

11 - 1 Operation Range

How to use the Correction factors proposed in the previous tables

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

- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.2 and 6)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the 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: **EWAD100E-SS**

Mixture:	Water
Working condition:	ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity:	101 kW (Rated conditions)
- Power input:	38.7 kW (Rated conditions)
- Flow rate (Δt 5°C):	4.83 l/s
- Evaporator pressure drop:	24 kPa

Mixture:	Water + Ethylene Glycol 30% (for a winter air temperature up to -15°C)
Working condition:	ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity:	101 x 0.972 = 98.2 kW
- Power input:	38.7 x 0.986 = 38.2 kW
- Flow rate (Δt 5°C):	4.69 (referred to 98.2 kW) x 1.074 = 5.04 l/s
- Evaporator pressure drop:	26 (referred to 5.04 l/s) x 1.181 = 31 kPa

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

- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.1 and 4.2 and table 6)
- depending from the evaporator leaving water temperature (see table 5)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 5 and Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the 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: **EWAD100E-SS**

Mixture:	Water
Working condition:	ELWT 12/7°C – Condenser inlet air temperature 30°C
- Cooling capacity:	346 kW (Rated conditions)
- Power input:	35.6 kW (Rated conditions)
- Flow rate (Δt 5°C):	5.06 l/s
- Evaporator pressure drop:	26 kPa

Mixture:	Water + Glycol 30% (for a low evaporator leaving temperature of -1/-6°C)
Working condition:	ELWT -1/-6°C – Condenser inlet air temperature 30°C
- Cooling capacity:	106 x 0.613 x 0.972 = 63.2 kW
- Power input:	35.6 x 0.870 x 0.986 = 30.5 kW
- Flow rate (Δt 5°C):	3.02 l/s (referred to 63.2 kW) x 1.074 = 3.24 l/s
- Evaporator pressure drop:	12 kPa (referred to 3.24 l/s) x 1.181 = 14 kPa

OPL_1-2-3-4-5-6_Rev.00_3

11 Operation range

11 - 1 Operation Range

EWAD~E-

Items [1] [5]			Cooling Water			Cooled Water		Heated water [2]				Tendency if out of criteria
			Circulating System		Once Flow			Low temperature		High temperature		
			Circulating water	Supply water [4]	Flowing water	Circulating water [Below 20°C]	Supply water [4]	Circulating water [20°C ~ 60°C]	Supply water [4]	Circulating water [60°C ~ 80°C]	Supply water [4]	
Items to be controlled:	pH	at 25°C	6.5 ~ 8.2	6.0 ~ 8.0	6.0 ~ 8.0	6.0 ~ 8.0	6.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	Corrosion + Scale
	Electrical conductivity	[mS/m] at 25°C	Below 80	Below 30	Below 40	Below 40	Below 30	Below 30	Below 30	Below 30	Below 30	Corrosion + Scale
		(μS/cm) at 25°C	(Below 800)	(Below 300)	(Below 400)	(Below 400)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	Corrosion + Scale
	Chloride ion	[mgCl^-/l]	Below 200	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	Sulfate ion	[mgSO_4^{2-}/l]	Below 200	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	M-alkalinity (pH4.8)	[mg$CaCO_3$/l]	Below 100	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Total hardness	[mg$CaCO_3$/l]	Below 200	Below 70	Below 70	Below 70	Below 70	Below 70	Below 70	Below 70	Below 70	Scale
	Calcium harness	[mg$CaCO_3$/l]	Below 150	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Silca ion	[mgSiO_2/l]	Below 50	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Scale
Items to be referred to	Iron	[mgFe/l]	Below 1.0	Below 0.3	Below 1.0	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Corrosion + Scale
	Copper	[mgCu/l]	Below 0.3	Below 0.1	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 0.1	Below 1.0	Below 0.1	Corrosion
	Sulfite ion	[mgS_2^-/l]	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Corrosion
	Ammonium ion	[mgNH_4^+/l]	Below 1.0	Below 0.1	Below 1.0	Below 1.0	Below 0.1	Below 0.3	Below 0.1	Below 0.1	Below 0.1	Corrosion
	Remaining chloride	[mgCL/l]	Below 0.3	Below 0.3	Below 0.3	Below 0.3	Below 0.3	Below 0.25	Below 0.3	Below 0.1	Below 0.3	Corrosion
	Free carbide	[mgCO_2/l]	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 0.4	Below 4.0	Below 0.4	Below 4.0	Corrosion
	Stability index		6.0 ~ 7.0	---	---	---	---	---	---	---	---	Corrosion + Scale

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

Water content in cooling circuits

The cooled water distribution circuits should have minimum water content to avoid excessive compressors start and stop.
In fact, each time the compressor starts up, an excessive quantity of oil goes from the compressor sump and simultaneously there is a rise in the temperature of the compressor motor's stator due to the inrush current during the start-up.
To prevent damage to the compressors, Daikin has 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 compressors unit
M (liters) = (0.94 x DT(°C) + 5.87) 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_4-5

12 Hydraulic performance

12 - 1 Water Pressure Drop Curve Evaporator

EWAD~E-SS

	100	120	140	160	180	210	260	310	360	410
Cooling Capacity (kW)	101	121	138	163	183	214	256	307	360	413
Water Flow (l/s)	4.83	5.76	6.58	7.77	8.74	10.22	12.22	14.65	17.21	19.74
Pressure Drops (kPa)	24	25	24	24	22	21	48	48	48	45

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

EWAD~E-SL

	100	120	130	160	180	210	250	300	350	400
Cooling Capacity (kW)	97.9	116	134	157	177	209	249	296	345	398
Water Flow (l/s)	4.68	5.54	6.40	7.51	8.47	9.97	11.90	14.15	16.50	19.01
Pressure Drops (kPa)	23	23	23	23	21	20	46	45	44	42

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

EPD_1-2_Rev.00_1

Evaporator pressure drops

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

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

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

The unit EWAD100E-SS has been selected for working at the following conditions:
- evaporator water in/out : 11/6°C
- condenser air inlet: 30°C
The cooling capacity at these working conditions is: 103 kW (Rated conditions)
The water flow at these working conditions is: 4.92 l/s (Rated conditions)

The unit EWAD100E-SS at nominal working conditions has the following data:
- evaporator water in/out : 12/7°C
- condenser air inlet: 35°C
The cooling capacity at these working conditions is: 101 kW
The water flow at these working conditions is: 4.83 l/s
The pressure drop at these working conditions is: 24 kPa

The pressure drop at the selected working condition will be:

$$PD_2\ (kPa) = 24\ (kPa) \times \left(\frac{4.92\ (l/s)}{4.83\ (l/s)} \right)^{1.8}$$

$$PD_2\ (kPa) = 25\ (kPa)$$

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

13 Specification text

13 - 1 Specification Text

Technical Specification for Air Cooled Screw Chiller

GENERAL

The air 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 outside air temperature from …. °C to …. °C with an evaporator leaving fluid temperature between …. °C and ….. °C

REFRIGERANT

Only R-134a will be accepted.

PERFORMANCE

- ✓ Number of air cooled screw chiller: .....
- ✓ Cooling capacity for single air cooled screw chiller: ..... kW
- ✓ Power input for single air cooled screw chiller in cooling mode: ..... kW
- ✓ Plate to plate heat exchanger entering water temperature in cooling mode: ..... °C
- ✓ Plate to plate heat exchanger leaving water temperature in cooling mode: ..... °C
- ✓ Plate to plate heat exchanger water flow: ..... l/s
- ✓ Nominal outside working ambient temperature in cooling mode: ..... °C
- ✓ Operating voltage range should be 400V ±10%, 3ph, 50Hz, voltage unbalance maximum 3%, without neutral conductor and shall only have one power connection point.

UNIT DESCRIPTION

Chiller shall include as standard not less than: one refrigerant circuit, semi-hermetic type rotary single screw compressor, electronic expansion device (EEXV), refrigerant direct expansion plate to plate heat exchanger, air-cooled condenser section, R-134a refrigerant, lubrication system, motor starting components, discharge line shut-off valve, suction line shut-off valve, control system and all components necessary for safe and stable unit operation.
Chiller will be factory assembled on a robust base-frame made of galvanized 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 on the base frame should not exceed 2 mm/s.

SPC_1b-2a-3-4_Rev.02_1

13 Specification text

13 - 1 Specification Text

DIMENSIONS

Unit dimensions shall not exceed following indications:

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

CHILLER COMPONENTS

Compressors

From size EWAD100E-SS to size EWAD 210E-SS and from size EWAD100E-SL to size EWAD210E-SL

- ✓ 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.

From size EWAD260E-SS to size EWAD 410E-SS and from size EWAD250E-SL to size EWAD400E-SL

- ✓ Semi-hermetic, single-screw asymmetric type with one main helical rotor meshing with two diametrical opposed gaterotors. The gaterotors' contact elements shall be constructed of composite material designed for extended life. Electrical motor shall be 2-pole, semi-hermetic, squirrel-cage induction type and cooled by suction gas.
- ✓ 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.
- ✓ The compressor shall be provided with a built in, high efficiency, mesh type oil separator and oil filter
- ✓ 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.
- ✓ Compressor cooling must be done by refrigerant liquid injection. External dedicated heat exchanger and additional piping to carry the oil from the compressor to heat exchanger and viceversa will be not accepted.
- ✓ The compressor shall be direct electrical driven, without gear transmission between the screw and the electrical motor.
- ✓ The compressor casing shall be provided with ports to realize economized refrigerant cycles.
- ✓ Compressor must be protected by temperature sensor for high discharge temperature and electrical motor thermistor for high winding temperature.
- ✓ The compressor shall be equipped with an electric oil 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 chiller will have a microprocessor for the control of compressor slide valve position.
- ✓ The unit capacity control shall be infinitely modulating, from 100% down to 25% for each circuit. The chiller shall be capable of stable operation to a minimum of 25% of full load without hot gas bypass.
- ✓ The system shall control the unit based on the leaving evaporator water temperature that shall be controlled by a PID (Proportional Integral Derivative) logic.
- ✓ Unit control logic shall manage the compressor slides to exactly match plant load request in order to keep constant the set point for delivered chilled water temperature.
- ✓ The microprocessor unit control shall detect conditions that approach protective limits and take self-corrective action prior to an alarm occurring. The system shall automatically reduce chiller capacity when any of the following parameters are outside their normal operating range:
  - o High condenser pressure
  - o Low evaporation refrigerant temperature

SPC_1b-2a-3-4_Rev.02_2

13 Specification text

13 - 1 Specification Text

Evaporator

- ✓ The units shall be equipped with a Direct Expansion plate to plate evaporator with copper tubes rolled into steel tubesheets.
- ✓ The external shell shall be linked with an electrical heater to prevent freezing down to -28°C ambient temperature, controlled by a thermostat and shall be insulated with flexible, closed cell polyurethane insulation material (10 mm thick).
- ✓ The evaporator will have 1 circuit, and shall be single refrigerant pass.
- ✓ The water connections shall be threaded type connections as standard to ensure quick mechanical disconnection between the unit and the hydronic network.
- ✓ Evaporator is manufactured in accordance to PED approval.

Condenser coil

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

Condenser fans

- ✓ The fans used in conjunction with the condenser coils, shall be propeller type with glass reinforced resin blades for higher efficiencies and lower noise. Each fan shall be protected by a fan guard.
- ✓ The air discharge shall be vertical and each fan must be coupled to the electrical motor, supplied as standard to IP54 and capable to work to ambient temperatures of - 20°C to + 65°C.
- ✓ They shall have as a standard a thermally protection by internal thermal motor protection and protected by ciurcuit braker installed inside the electrical panel as a standard.

Refrigerant circuit

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

Condensation control

- ✓ The units will be provided with an automatic control for condensing pressure which ensures the working at low external temperatures down to - °C, to maintain condensing pressure.
- ✓ Compressor automatically unloads when abnormal high condensing pressure is detected to prevent the shutdown of the refrigerant circuit (shutdown of the unit) due to a high-pressure fault.

Low Noise unit options (on request)

- ✓ The unit compressor shall be connected with unit's metal baseframe by rubber antivibration supports to prevent the transmission of vibrations to all metal unit structure and so to control the unit noise.
- ✓ The chiller shall be provided with an acoustically compressor enclosure. This enclosure shall be realized with a light, corrosion resisting aluminium structure and metal panels. The compressor sound-proof enclosure shall be internally fitted with flexible, multi layer, high density materials.

SPC_1b-2a-3-4_Rev.02_3

13 Specification text

13 - 1 Specification Text

Hydronic kit options (on request)

- ✓ The hydronic module shall be integrated in the chiller chassis without increasing its dimensions and include the following elements: centrifugal water pump with three-phase motor equipped with internal over-temperature protection, safety relief valve, filling kit.
- ✓ The water piping shall be protected against corrosion and equipped with drain and purge plugs. The customer connections shall be Victaulic connections. The piping shall be fully insulated to prevent condensation (pump insulation using polyurethane foam).
- ✓ A choice of two pump types shall be available on unit with 2 compressors:
  - o in-line single pump low and high lifting
  - o in-line twin pumps low and high lifting

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 will be Wye-Delta type (Y-Δ).
- ✓ 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:

  - leaving water temperature reset by controlling the water temperature Δt, by a remote 4-20mA 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-start 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

Chiller must be able to communicate to BMS (Building Management System) based on the most common protocols as:

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

SPC_1b-2a-3-4_Rev.02_4

In all of us, a green heart

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"

BARCODE

Daikin products are distributed by:

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