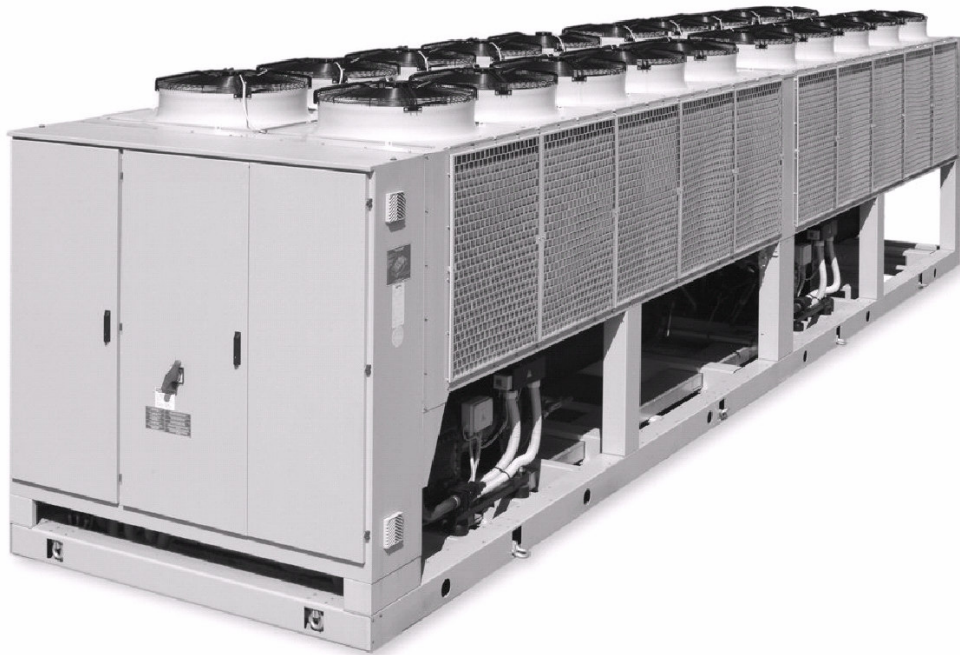




Installation, Operation and Maintenance Manual

D – 510 C – 07/02 E – EN



Air-cooled screw chillers

EWAD 650-C18BJYNN
EWAD 550-C12BJYNN/Q
EWAD 650-C21BJYNN/A
EWAD 600-C10BJYNN/Z

50Hz – Refrigerant: R-134a

Introduction

General description

Each unit is completely assembled, wired, evacuated, charged, tested, and ready for installation. The main components are air-cooled condensers with integral sub-cooler sections, accessible semi-hermetic single-screw compressors, shell-and-tube evaporators, shell-and-tube water heat recovery condensers (optional), oil separators, complete refrigerant piping and electrical panel (including control and power sections). Liquid line components are shut-off valves, charging valves, filter-dryers, sight-glass/moisture indicators, electronic expansion valves, liquid receivers (only with total heat recovery option). Other features are compressor heaters, evaporator heater for low ambient water freeze protection, automatic pump-down during circuit shutdown and fully integrated microprocessor control system.

The chiller uses R134a refrigerant and operates at positive pressures.

Purpose of the manual

The manual allows the installer and the operator to perform correctly all the required operations for unit installation and maintenance without causing any damage to the chiller or injuries to qualified personnel.

Nomenclature

Machine type

ERA: Air-cooled condensing unit
EWW: Water cooled packaged water chiller
EWL: Remote condenser water chiller
EWA: Air-cooled chiller, cooling only
EWY: Air-cooled chiller, heatpump
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-410A

Capacity class in kW (cooling)

Always 3-digit code

Cap < 50 kW: not round: example: 37 kW => **037**
50 < Cap < 999 kW: round 0/5: 536 kW => **535**
Cap > 999 kW use C-symbol (C=100): example: 2578 kW => **C26**

Model series

first character : letter A, B,...: major modification
second character : letter A,B,... : minor modification DENV
letter J-W... : minor modification New Series

Voltage

V1: ~ / 220 - 240 V / 50 Hz
V3: 1~ / 230 V / 50 Hz
T1: 3~ / 230 V / 50 Hz
W1: 3N~ / 400 V / 50 Hz
Y1: 3~ / 380-415 V / 50 Hz
YN: 3~ / 400 V / 50 Hz

Hydraulic module/Heat recovery version/Pump & electrical options (Consult Selection software)

N: No Hydraulic components
M: Modular
A-V: Combination of specific options

Option code (Consult Selection software)

****: 4 digits

Option regarding efficiency version, sound version

/H: High ambient version
/A: High efficiency version
/Q: Extra low noise version
/Z: High efficiency and Extra low noise version

EWA D 600 BJ YN N **** /Z

WARNING

This manual provides information about the features and standard procedure for the complete series.

All units are delivered from the factory complete with wiring diagrams and dimensional drawings including size and weight for each model.

WIRING DIAGRAMS AND DIMENSIONAL DRAWINGS MUST BE CONSIDERED ESSENTIAL DOCUMENTS OF THIS MANUAL

In case of any discrepancy between this manual and the equipment's document please refer to the wiring diagram and dimensional drawings.

Installation

Receiving and handling

The unit should be inspected immediately after receipt for possible damage.

All items on the bill of lading should be carefully checked to ensure a complete shipment. The unit should be carefully checked and shipping damages should be reported to the carrier. The unit serial plate should be checked before unloading the unit to ensure that it agrees with the power supply available. Physical damage to the unit after acceptance is not DAIKIN's responsibility.

Responsibilities

DAIKIN declines all present and future responsibilities referred to injuries to people and damages to things and to the unit, caused by operator's negligence, failure to respect installation/maintenance data from this manual, failure to respect the current regulations regarding the safety of both the equipment and qualified personnel in charge of the installation and the maintenance.

Servicing and maintenance personnel

Experienced personnel with specific training in refrigeration must carry out servicing and maintenance of the unit. Regular checking of safety devices should be carried out, but routine maintenance should be carried out in line with the recommendation list in the main section.

The simple design of the refrigeration circuit minimises potential problems during normal unit operation.

Safety

The unit must be suitably clamped to the ground.

It is necessary to follow these cautions and warnings.

- Lift the unit only using the proper tools that are able to support the weight of the unit fixed in the base frame on the yellow holes.
- No admittance to unauthorised or unqualified personnel should be allowed.
- No operation on the electrical components is allowed without having switched off the power supply.
- No operation on the electrical components is allowed without using insulated platforms; no water or moisture should be present.
- All operations on the refrigerant circuit and pressurised components are to be performed by qualified personnel only.
- Replacing the compressor or adding oil may only be performed by qualified personnel.
- Sharp edges and coil surface are potential injury hazards. Avoid contact with them.
- Disconnect all electrical power supply to the unit while servicing the condenser fan motors. Failure to observe this rule may cause bodily injuries.
- Avoid contamination with foreign bodies in the water piping when connecting the unit to the water system.
- Fit a mechanical filter to the piping connected to the evaporator inlet.
- The unit is equipped with safety relief valves installed on both high and low pressure side of the refrigerant circuit.

Warning

Check the instructions for use before operating the unit.

Installation and maintenance must be performed only by qualified personnel with the required knowledge about chillers, local codes and regulations. Unit installation must be avoided in areas that could be considered dangerous for maintenance operations.

Transport

For transport in containers, the optional container kit is available on request, for preventing damage and to facilitate the sliding of the chiller into the container during push-in and pull-out operations.

The kit includes:

- base frame bracing plus two lifting rings fixed on it;
- wood planks fixed below the unit base frame.

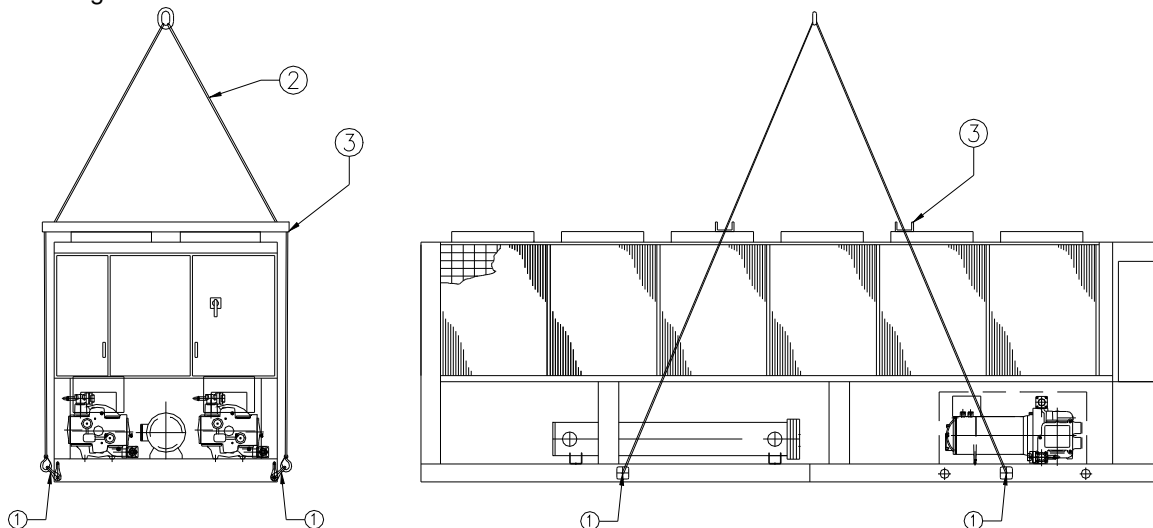
The additional lifting rings are on the same side of the control panel, therefore the chiller has to be loaded into the container with the control panel on the container doors' side.

Handling and lifting

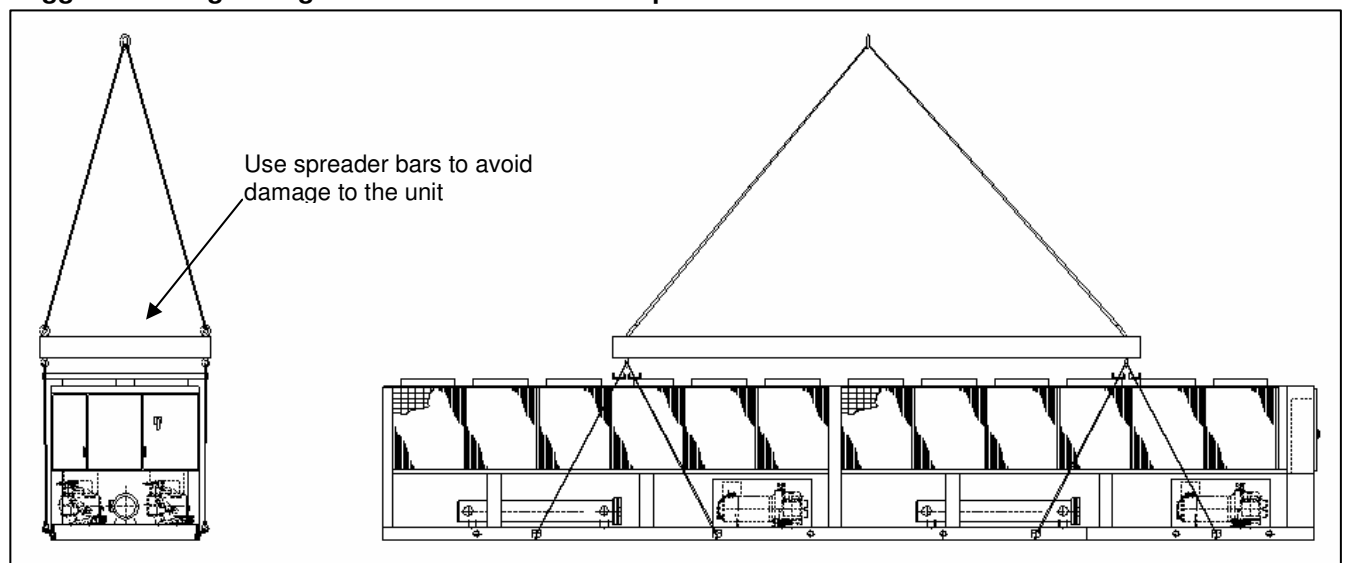
Care should be taken to avoid rough handling or shocks due to the unit being dropped. Do not push or pull the unit from anything else than the base, and block the pushing vehicle away from the unit to prevent damage to the sheet metal cabinet and end frame.

Never allow any part of the unit to fall during unloading or moving as this may result in serious damage.

To lift the unit, suitable holes are provided in the unit base, and spreader bars and cables should be used to prevent damage to the condenser coils or to the cabinet.



Suggested lifting arrangement for units with 2 compressors



Suggested lifting arrangement for units with 3 & 4 compressors

DAIKIN

Location

These units are produced for outdoor installation on roof floors or below ground level on the condition that the condenser air flow is not obstructed. The unit should be positioned on a solid foundation and perfectly leveled; in case of installation on roofs or floors, it may be advisable to arrange the use of suitable weight distribution beams. When the unit is 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. When the unit is positioned in an area that is easily accessible by persons or animals, it is advisable to fit guards for the condenser coil and, when necessary, guards for the evaporator area.

To obtain the best performance in the installation location, make sure the following requirements are met:

- Avoid a short airflow re-circulation.
- Ensure that obstacles do not obstruct proper airflow.
- To reduce noise and vibration, a stiff floor is required.
- Avoid a dusty environment in order to keep the condenser clean.
- Chiller water must be quite clean; oil traces and rust particles must be removed. Fit a water filter on the water inlet pipes.

Space requirements

Since these units are air-cooled, it is important to ensure sufficient airflow across the condenser coils.

Two conditions must be avoided to achieve best performance: warm air re-circulation and coil starvation.

Both these conditions cause an increase in the condensing pressure, which reduces unit efficiency and capacity.

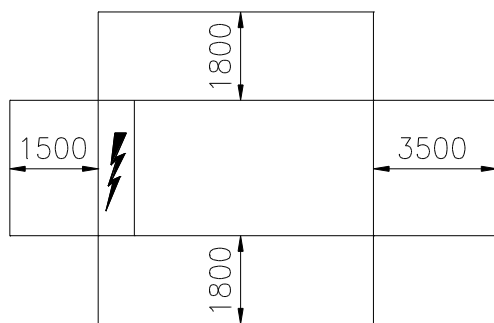
Each side of the unit must be accessible after installation for periodic service. Figure 3 shows the minimum clearance requirements.

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

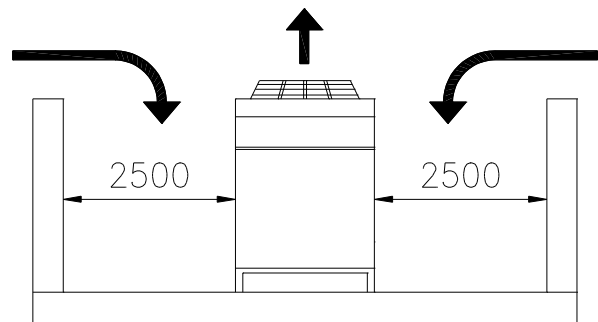
If the unit is positioned in a location surrounded by walls or obstacles of the same height as the unit, the unit should be at least 2500 mm from any obstacle (figure 4). If the obstacles are higher than the unit, the unit should be at least 3000 mm from the obstacles (figure 5). Units installed closer than the minimum recommended distance to walls or other vertical risers may experience a combination of coil starvation and warm air re-circulation, thus causing reduced unit capacity and efficiency.

When two or more units are positioned side by side it is recommended that the condenser coils of each unit be at least at 3600 mm apart (figure 6).

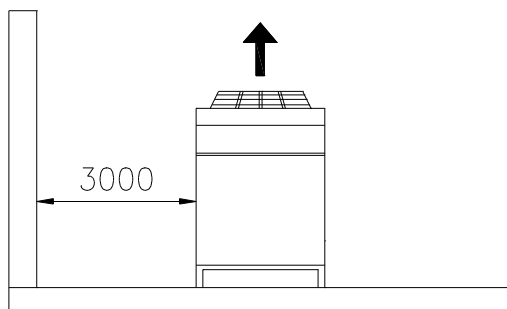
For different installation solutions, consult DAIKIN technicians.



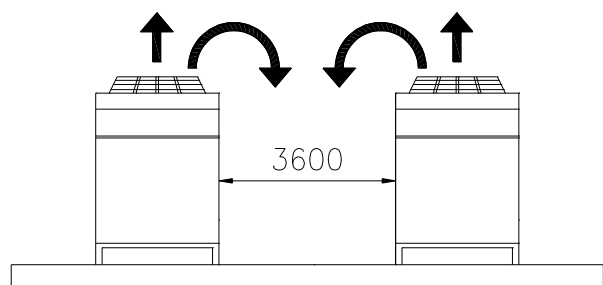
Picture 3



Picture 4



Picture 5



Picture 6

Acoustic protection

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

Water piping

Due to the variety of piping practices, it is advisable to follow the recommendations of local authorities. They can supply the installer with the proper building and safety codes required for a safe and proper installation.

Basically, the piping should be designed with a minimum number of bends and changes in elevation to keep system cost down and performance up. It should contain:

1. Vibration eliminators to reduce vibration and noise transmission to the building.
2. Shutoff valves to isolate the unit from the piping system during unit servicing.
3. Manual or automatic air vent valves at the higher points of the system. Drains at the lower points of the system. The evaporator and heat recovery condensers should not be the highest point in the piping system.
4. Devices to maintain adequate system water pressure (e.g. expansion tank or regulating valve).
5. Water temperature and pressure indicators located at the unit to aid in unit servicing.
6. A strainer or devices to remove foreign matter from the water before it enters the pump. The strainer should be placed far enough upstream to prevent cavitations at the pump inlet (consult pump manufacturer for recommendations). The use of a strainer will prolong pump life and help maintain high system performance levels.
7. A strainer should be placed in the supply water line just prior to the inlet of the evaporator and heat recovery condensers. This will aid in preventing foreign material from entering and decreasing the performance of the heat exchangers.
8. The shell-and-tube evaporator has a thermostat and an electric heater to prevent freeze-up down to -28°C. Any water piping to the unit must be protected to prevent freezing.
9. The shell-and-tube heat recovery condensers must be empty of water during the winter season, unless you fill the water circuit with ethylene glycol.
10. If the unit is used as a replacement chiller on a previously existing piping system, the system should be thoroughly flushed prior to unit installation and then regular chilled water analysis and chemical water treatment is recommended immediately at equipment start-up.
11. In the event glycol is added to the water system, as an afterthought for freeze protection, recognize that the refrigerant suction pressure will be lower, cooling performance less, and water side pressure drop greater. System safety devices such as freeze protection and low pressure protection must be reset.

Prior to insulating the piping and filling the system, a preliminary leak check should be made.

Evaporator/Heat Recovery condenser freeze protection

All evaporators are equipped with a thermostatically controlled electric heater that provides freeze protection down to -28°C. However, this should not be the only method of freeze protection. Unless the evaporator and heat recovery condensers are flushed and drained as is described below in note 4, two or more of the remaining three recommendations must be followed as part of the system design:

1. Continuous circulation of water through the piping and the heat exchanger.
2. Filling of glycol solution in the chilled water circuit.
3. Additional insulation and heating of the exposed piping.
4. Draining and flushing the chiller vessel with air during winter season.

It is the responsibility of the installing contractor and/or on-site maintenance personnel to ensure that this additional protection is provided. Routine checks should be made to ensure adequate freeze protection is maintained.

Failure to do so may result in damage to unit components. Freeze damage is not considered a warranty failure.

Flow switch

A water flow switch must be mounted in either the entering or leaving water line to insure adequate water flow through the evaporator before starting the unit. This will safeguard against slugging the compressors on start-up. It serves to shut down the unit in the event that water flow is interrupted to protect against evaporator freeze-up. Whenever the unit is equipped with the heat recovery condensers a water flow switch must be mounted in either the entering or leaving water line to ensure adequate water flow before switching the unit in "Heat recovery mode". It prevents the unit from shutting down due to high condensing pressure.

A flow switch is available from DAIKIN; this is a "paddle" type switch which may be adapted to any pipe size from 5" (127 mm) to 8" (203 mm) nominal.

Certain minimum flow rates are required to close the switch (Table 1).

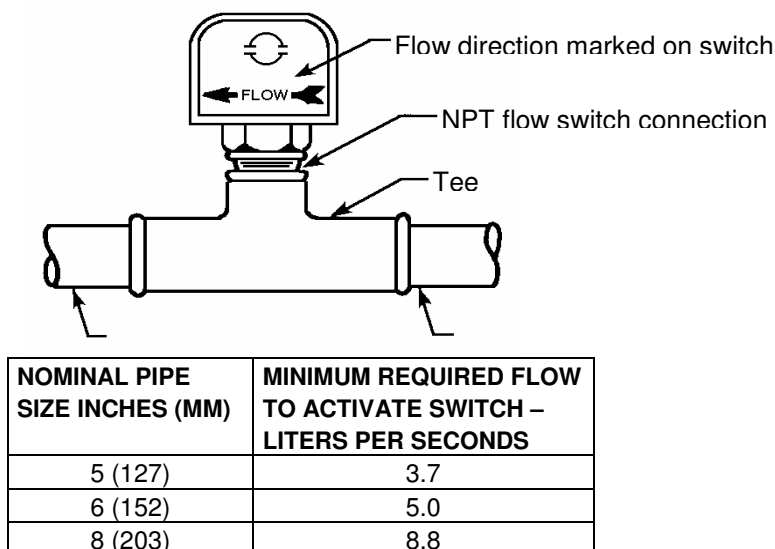


Table 1

Table 2 – Operating limits – EWAD-BJYNN - EWAD-BJYNN/Q

Unit version		BJYNN	EWAD-BJYNN with Option OPRN	EWAD-BJYNN with Option OPLN	BJYNN/Q
Max ambient temperature	°C	+44	+40	+40	+40 (1)
Min ambient temperature	°C	+10 (2)	+10 (2)	+10 (2)	-10 (3)
Max leaving evaporator water temperature	°C	+9	+9	+9	+9
Min leaving evap. water temp. (without glycol)	°C	+4	+4	+4	+4
Min leaving evap. water temp. (with glycol)	°C	-8	-8	-8	-8
Max evaporator ΔT	°C	8	8	8	8
Min evaporator ΔT	°C	4	4	4	4

Notes:

- (1) When the air temperature is higher than +32°C fan speed control device (OPFS) (standard on BJYNN/Q units) sets up speed rotation increasing cooling capacity and sound pressure level.
- (2) When the air temperature is lower than +10°C you need the fan speed control device (OPFS). It allows the unit to operate with air temperature down to -10°C. Low ambient operation (OPLA) allows to reach -18°C.
- (3) Fan speed control device (OPFS) is standard furnished on the BJYNN/Q units.

Table 3 – Operating limits – EWAD-BJYNN/A - EWAD-BJYNN/Z

Unit version		BJYNN/A	EWAD-BJYNN/A with Option OPLN	EWAD-BJYNN/A with Option OPRN	BJYNN/Z
Max ambient temperature	°C	+48	+44	+44	+40
Min ambient temperature	°C	+10 (2)	+10 (2)	+10 (2)	-10 (3)
Max leaving evaporator water temperature	°C	+9	+9	+9	+9
Min leaving evap. water temp. (without glycol)	°C	+4	+4	+4	+4
Min leaving evap. water temp. (with glycol)	°C	-8	-8	-8	-8
Max evaporator ΔT	°C	8	8	8	8
Min evaporator ΔT	°C	4	4	4	4

Notes:

- (2) When the air temperature is lower than +10°C you need the fan speed control device (OPFS). It allows the unit to operate with air temperature down to -10°C. Low ambient operation (OPLA) allows to reach -18°C.
- (3) Fan speed control device (OPFS) is standard furnished on the BJYNN/Z units.

Physical data EWAD-BJYNN R-134a

Unit size		650	700	750	850	900
Cooling capacity (1)	kW	640	700	761	817	886
Power input (1)	kW	217	233	253	270	282
COP		2,94	3,01	3,01	3,03	3,15
Screw compressors	N°	2	2	2	2	2
Refrigerant circuits	N°	2	2	2	2	2
Refrigerant charge R-134a	kg	97	104	114	124	124
Oil charge	kg	40	40	40	40	40
Min % of capacity reduction	%	12,5	12,5	12,5	12,5	12,5

Condenser fans

No. of fans / nominal power fan	kW	9/1,7	10/1,7	11/1,7	12/1,7	12/1,7
Fan speed	rpm	860	860	860	860	860
Diameter	mm	800	800	800	800	800
Total air flow	m ³ /s	47,5	52,8	58,1	63,3	64,5

Evaporator

Evaporators / water volume	N°/l	1/254	1/254	1/246	1/246	1/246
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	168,3	168,3	168,3	168,3	168,3

Condenser coil

Coil type	Lanced fins – internally spiral wound tubes					
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Weight and dimensions

Standard unit shipping weight	kg	4910	4990	5256	5480	5580
Standard unit operating weight	kg	5130	5200	5520	5734	5834
Unit length	mm	5310	5310	6210	6210	6210
Unit width	mm	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520

Unit size		Note (2)	950	C10	C11	C12	C13
Cooling capacity (1)	kW		988	1057	1109	1166	1226
Power input (1)	kW		334	345	369	386	404
COP			2,96	3,06	3,01	3,02	3,04
Screw compressors	N°		3	3	3	3	3
Refrigerant circuits	N°		3	3	3	3	3
Refrigerant charge R-134a	kg		144	160	164	180	186
Oil charge	kg		60	60	60	60	60
Min % of capacity reduction	%		8,3	8,3	8,3	8,3	8,3

Condenser fans

No. of fans / nominal power fan	kW		14/1,7	16/1,7	16/1,7	18/1,7	18/1,7
Fan speed	rpm		860	860	860	860	860
Diameter	mm		800	800	800	800	800
Total air flow	m ³ /s		73,9	86,0	84,5	89,7	95,0

Evaporator

Evaporators / water volume	N°/l		1/415	1/415	1/402	1/402	1/402
Max operating pressure	bar		10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm		219,1	219,1	219,1	219,1	219,1

Condenser coil

Coil type	Lanced fins – internally spiral wound tubes						
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Weight and dimensions

Standard unit shipping weight	kg		7550	7830	7830	8420	8420
Standard unit operating weight	kg		7970	8250	8250	8830	8830
Unit length	mm		7400	8270	8270	9200	9200
Unit width	mm		2230	2230	2230	2230	2230
Unit height	mm		2520	2520	2520	2520	2520

- Notes:** (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp. Power input is for compressor only.
 (2) For cooling capacity in the middle of 886kW and 988kW, select EWAD-BJYNN/A unit.

Physical data EWAD-BJYNN R-134a

Unit size		C14	Note (2)	C15	C16	C18
Cooling capacity (1)	kW	1322		1520	1641	1772
Power input (1)	kW	421		503	539	564
COP		3,14		3,02	3,05	3,15
Screw compressors	N°	3		4	4	4
Refrigerant circuits	N°	3		4	4	4
Refrigerant charge R-134a	kg	186		236	256	256
Oil charge	kg	60		80	80	80
Min % of capacity reduction	%	8,3		6,25	6,25	6,25
Condenser fans						
No. of fans / nominal power fan	kW	18/1,7		22/1,7	24/1,7	24/1,7
Fan speed	rpm	860		860	860	860
Diameter	mm	800		800	800	800
Total air flow	m³/s	96,7		116,1	126,7	129
Evaporator						
Evaporators / water volume	N°/l	1/402		2/254+246	2/246+246	2/246+246
Max operating pressure	bar	10,5		10,5	10,5	10,5
Water connection diameter	mm	219,1		168,3	168,3	168,3
Condenser coil						
Coil type		Lanced fins – internally spiral wound tubes				
Weight and dimensions						
Standard unit shipping weight	kg	8570		9552	10632	10832
Standard unit operating weight	kg	8980		10024	11140	11340
Unit length	mm	9200		11000	11900	11900
Unit width	mm	2230		2230	2230	2230
Unit height	mm	2520		2520	2520	2520

- Notes:** (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp.
Power input is for compressor only.
(2) For cooling capacity in the middle of 1322kW and 1520kW, select EWAD-BJYNN/A unit.

Electrical data EWAD-BJYNN R-134a

Unit size		650	700	750	850
Standard voltage (1)		400 V – 3f – 50 Hz			
Nominal unit current (2)	A	414	436	471	502
Max compressor current (3)	A	435	460	501	542
Fans current	A	36	40	44	48
Max unit current (3)	A	471	500	545	590
Max unit inrush current (4)	A	814	834	838	867
Max unit current for wires sizing (5)	A	530	582	625	668

Unit size		900	950	C10	C11	C12
Standard voltage (1)		400 V – 3f – 50 Hz				
Nominal unit current (2)	A	497	632	658	688	726
Max compressor current (3)	A	548	664	687	730	773
Fans current	A	48	56	64	64	72
Max unit current (3)	A	596	720	751	794	845
Max unit inrush current (4)	A	867	998	1022	1022	1055
Max unit current for wires sizing (5)	A	668	821	877	916	963

Unit size		C13	C14	C15	C16	C18
Standard voltage (1)		400 V – 3ph – 50 Hz				
Nominal unit current (2)	A	756	744	938	1004	994
Max compressor current (3)	A	816	820	1002	1084	1096
Fans current	A	72	72	88	96	96
Max unit current (3)	A	888	892	1090	1180	1192
Max unit inrush current (4)	A	1079	1079	1284	1292	1292
Max unit current for wires sizing (5)	A	1002	1002	1250	1336	1336

- Notes:** (1) Allowed voltage tolerance $\pm 10\%$. Voltage unbalance between phases must be within $\pm 3\%$.
(2) Nominal current is based on: 12/7 °C entering/leaving evaporator water temperature and 35°C ambient temp.
(3) Maximum current is based on: 14/9 °C entering/leaving evaporator water temperature and 44°C ambient temp.
(4) Inrush current of biggest compressor + 75 % of nominal absorbed current of the other compressor + fans current.
(5) Compressor FLA + fans current.

Physical data EWAD-BJYNN with option OPRN R-134a

Unit size		650	700	750	850	900
Cooling capacity (1)	kW	606	670	730	784	868
Power input (1)	kW	235	250	269	289	305
COP		2,58	2,68	2,71	2,71	2,84
Screw compressors	N°	2	2	2	2	2
Refrigerant circuits	N°	2	2	2	2	2
Refrigerant charge R-134a	kg	97	104	114	124	128
Oil charge	kg	40	40	40	40	40
Min % of capacity reduction	%	12,5	12,5	12,5	12,5	12,5
Condenser fans						
No. of fans / nominal power fan	kW	9/1	10/1	11/1	12/1	12/1
Fan speed	rpm	680	680	680	680	680
Diameter	mm	800	800	800	800	800
Total air flow	m³/s	36,4	40,5	44,5	48,6	48,6
Evaporator						
Evaporators / water volume	N°/l	1/254	1/254	1/246	1/246	1/246
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	168,3	168,3	168,3	168,3	168,3
Condenser coil						
Coil type	Lanced fins – internally spiral wound tubes					
Weight and dimensions						
Standard unit shipping weight	kg	4910	4990	5256	5480	5580
Standard unit operating weight	kg	5130	5200	5520	5734	5834
Unit length	mm	5310	5310	6210	6210	6210
Unit width	mm	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520

Unit size		Note (2)	950	C10	C11	C12	C13
Cooling capacity (1)	kW		945	1016	1062	1116	1175
Power input (1)	kW		360	371	395	414	432
COP			2,63	2,74	2,69	2,70	2,72
Screw compressors	N°		3	3	3	3	3
Refrigerant circuits	N°		3	3	3	3	3
Refrigerant charge R-134a	kg		149	160	160	180	186
Oil charge	kg		60	60	60	60	60
Min % of capacity reduction	%		8,3%	8,3%	8,3%	8,3%	8,3
Condenser fans							
No. of fans / nominal power fan	kW		14/1	16/1	16/1	18/1	18/1
Fan speed	rpm		680	680	680	680	680
Diameter	mm		800	800	800	800	800
Total air flow	m³/s		56,7	66,0	64,8	68,8	72,9
Evaporator							
Evaporators / water volume	N°/l		1/415	1/415	1/402	1/402	1/402
Max operating pressure	bar		10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm		219,1	219,1	219,1	219,1	219,1
Condenser coil							
Coil type		Lanced fins – internally spiral wound tubes					
Weight and dimensions							
Standard unit shipping weight	kg		7550	7830	7830	8420	8420
Standard unit operating weight	kg		7970	8250	8250	8830	8830
Unit length	mm		7400	8270	8270	9200	9200
Unit width	mm		2230	2230	2230	2230	2230
Unit height	mm		2520	2520	2520	2520	2520

- Notes:** (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp. Power input is for compressor only.
(2) For cooling capacity in the middle of 868kW and 945kW, select EWAD-BJYNN/A unit.

Physical data EWAD-BJYNN with option OPRN R-134a

Unit size		C14	Note (2)	C15	C16	C18
Cooling capacity (1)	kW	1296		1457	1553	1735
Power input (1)	kW	456		546	573	610
COP		2,84		2,67	2,71	2,84
Screw compressors	N°	3		4	4	4
Refrigerant circuits	N°	3		4	4	4
Refrigerant charge R-134a	kg	186		228	248	248
Oil charge	kg	60		80	80	80
Min % of capacity reduction	%	8,3		6,25	6,25	6,25
Condenser fans						
No. of fans / nominal power fan	kW	18/1		22/1	24/1	24/1
Fan speed	rpm	680		680	680	680
Diameter	mm	800		800	800	800
Total air flow	m³/s	73,6		89,0	97,1	98,0
Evaporator						
Evaporators / water volume	N°/l	1/402		2/254+246	2/246+246	2/246+246
Max operating pressure	bar	10,5		10,5	10,5	10,5
Water connection diameter	mm	219,1		168,3	168,3	168,3
Condenser coil						
Coil type		Lanced fins – internally spiral wound tubes				
Weight and dimensions						
Standard unit shipping weight	kg	8570		9552	10632	10832
Standard unit operating weight	kg	8980		10024	11140	11340
Unit length	mm	9200		11000	11900	11900
Unit width	mm	2230		2230	2230	2230
Unit height	mm	2520		2520	2520	2520

- Notes:** (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp.
Power input is for compressor only.
(2) For cooling capacity in the middle of 1296kW and 1457kW, select EWAD-BJYNN/A unit.

Electrical data EWAD-BJYNN with option OPRN R-134a

Unit size		650	700	750	850
Standard voltage (1)		400 V – 3f – 50 Hz			
Nominal unit current (2)	A	416	438	474	510
Max compressor current (3)	A	443	470	504	538
Fans current	A	18	20	22	24
Max unit current (3)	A	461	490	526	562
Max unit inrush current (4)	A	797	815	817	846
Max unit current for wires sizing (5)	A	512	562	603	644

Unit size		900	950	C10	C11	C12
Standard voltage (1)		400 V – 3f – 50 Hz				
Nominal unit current (2)	A	508	638	662	701	733
Max compressor current (3)	A	549	678	705	739	773
Fans current	A	24	28	32	32	34
Max unit current (3)	A	573	706	737	771	807
Max unit inrush current (4)	A	846	971	992	992	1021
Max unit current for wires sizing (5)	A	644	793	845	884	925

Unit size		C13	C14	C15	C16	C18
Standard voltage (1)		400 V – 3f – 50 Hz				
Nominal unit current (2)	A	765	760	948	1020	1016
Max compressor current (3)	A	807	821	1008	1076	1097
Fans current	A	36	36	44	48	48
Max unit current (3)	A	843	857	1052	1124	1145
Max unit inrush current (4)	A	1050	1050	1249	1253	1253
Max unit current for wires sizing (5)	A	966	966	1206	1288	1288

- Notes:** (1) Allowed voltage tolerance $\pm 10\%$. Voltage unbalance between phases must be within $\pm 3\%$.
(2) Nominal current is based on: 12/7 °C entering/leaving evaporator water temperature and 35°C ambient temp.
(3) Maximum current is based on: 14/9 °C entering/leaving evaporator water temperature and 40°C ambient temp.
(4) Inrush current of biggest compressor + 75 % of nominal absorbed current of the other compressor + fans current.
(5) Compressor FLA + fans current.

Physical data EWAD-BJYNN with option OPLN R-134a

Unit size		650	700	750	850	900
Cooling capacity (1)	kW	606	670	730	784	868
Power input (1)	kW	235	250	269	289	305
COP		2,58	2,68	2,71	2,71	2,84
Screw compressors	N°	2	2	2	2	2
Refrigerant circuits	N°	2	2	2	2	2
Refrigerant charge R-134a	kg	97	104	114	124	128
Oil charge	kg	40	40	40	40	40
Min % of capacity reduction	%	12,5	12,5	12,5	12,5	12,5
Condenser fans						
No. of fans / nominal power fan	kW	9/1	10/1	11/1	12/1	12/1
Fan speed	rpm	680	680	680	680	680
Diameter	mm	800	800	800	800	800
Total air flow	m³/s	36,4	40,5	44,5	48,6	48,6
Evaporator						
Evaporators / water volume	N°/l	1/254	1/254	1/246	1/246	1/246
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	168,3	168,3	168,3	168,3	168,3
Condenser coil						
Coil type		Lanced fins – internally spiral wound tubes				
Weight and dimensions						
Standard unit shipping weight	kg	5150	5230	5496	5720	5820
Standard unit operating weight	kg	5370	5440	5760	5974	6074
Unit length	mm	5310	5310	6210	6210	6210
Unit width	mm	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520

Unit size		Note (2)	950	C10	C11	C12	C13
Cooling capacity (1)	kW		945	1016	1062	1116	1175
Power input (1)	kW		360	371	395	414	432
COP			2,63	2,74	2,69	2,70	2,72
Screw compressors	N°		3	3	3	3	3
Refrigerant circuits	N°		3	3	3	3	3
Refrigerant charge R-134a	kg		149	160	160	180	186
Oil charge	kg		60	60	60	60	60
Min % of capacity reduction	%		8,3	8,3	8,3	8,3	8,3
Condenser fans							
No. of fans / nominal power fan	kW		14/1	16/1	16/1	18/1	18/1
Fan speed	rpm		680	680	680	680	680
Diameter	mm		800	800	800	800	800
Total air flow	m³/s		56,7	66,0	64,8	68,8	72,9
Evaporator							
Evaporators / water volume	N°/l		1/415	1/415	1/402	1/402	1/402
Max operating pressure	bar		10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm		219,1	219,1	219,1	219,1	219,1
Condenser coil							
Coil type		Lanced fins – internally spiral wound tubes					
Weight and dimensions							
Standard unit shipping weight	kg		7910	8190	8190	8780	8930
Standard unit operating weight	kg		8330	8610	8610	9190	9340
Unit length	mm		7400	8270	8270	9200	9200
Unit width	mm		2230	2230	2230	2230	2230
Unit height	mm		2520	2520	2520	2520	2520

Notes: (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp. Power input is for compressor only.

(2) For cooling capacity in the middle of 868kW and 945kW, select EWAD-BJYNN/A unit.

Physical data EWAD-BJYNN with option OPLN R-134a

Unit size		C14	Note (2)	C15	C16	C18
Cooling capacity (1)	kW	1296		1457	1553	1735
Power input (1)	kW	456		546	573	610
COP		2,84		2,67	2,71	2,84
Screw compressors	N°	3		4	4	4
Refrigerant circuits	N°	3		4	4	4
Refrigerant charge R-134a	kg	186		228	248	248
Oil charge	kg	60		80	80	80
Min % of capacity reduction	%	8,3		6,25	6,25	6,25
Condenser fans						
No. of fans / nominal power fan	kW	18/1		22/1	24/1	24/1
Fan speed	rpm	680		680	680	680
Diameter	mm	800		800	800	800
Total air flow	m³/s	73,6		89,0	97,1	98,0
Evaporator						
Evaporators / water volume	N°/l	1/402		2/254+246	2/246+246	2/246+246
Max operating pressure	bar	10,5		10,5	10,5	10,5
Water connection diameter	mm	219,1		168,3	168,3	168,3
Condenser coil						
Coil type		Lanced fins – internally spiral wound tubes				
Weight and dimensions						
Standard unit shipping weight	kg	9080		10032	11112	11312
Standard unit operating weight	kg	9490		10504	11620	11820
Unit length	mm	9200		11000	11900	11900
Unit width	mm	2230		2230	2230	2230
Unit height	mm	2520		2520	2520	2520

- Notes:** (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp.
Power input is for compressor only.
(2) For cooling capacity in the middle of 1296kW and 1457kW, select EWAD-BJYNN/A unit.

Electrical data EWAD-BJYNN with option OPLN H134a

Unit size		650	700	750	850
Standard voltage (1)		400 V – 3f – 50 Hz			
Nominal unit current (2)	A	416	438	474	510
Max compressor current (3)	A	443	470	504	538
Fans current	A	18	20	22	24
Max unit current (3)	A	461	490	526	562
Max unit inrush current (4)	A	797	815	817	846
Max unit current for wires sizing (5)	A	512	562	603	644

Unit size		900	950	C10	C11	C12
Standard voltage (1)		400 V – 3f – 50 Hz				
Nominal unit current (2)	A	508	638	662	701	733
Max compressor current (3)	A	549	678	705	739	773
Fans current	A	24	28	32	32	34
Max unit current (3)	A	573	706	737	771	807
Max unit inrush current (4)	A	846	971	992	992	1021
Max unit current for wires sizing (5)	A	644	793	845	884	925

Unit size		C13	C14	C15	C16	C18
Standard voltage (1)		400 V – 3f – 50 Hz				
Nominal unit current (2)	A	765	760	948	1020	1016
Max compressor current (3)	A	807	821	1008	1076	1097
Fans current	A	36	36	44	48	48
Max unit current (3)	A	843	857	1052	1124	1145
Max unit inrush current (4)	A	1050	1050	1249	1253	1253
Max unit current for wires sizing (5)	A	966	966	1206	1288	1288

- Notes:** (1) Allowed voltage tolerance $\pm 10\%$. Voltage unbalance between phases must be within $\pm 3\%$.
(2) Nominal current is based on: 12/7 °C entering/leaving evaporator water temperature and 35°C ambient temp.
(3) Maximum current is based on: 14/9 °C entering/leaving evaporator water temperature and 40°C ambient temp.
(4) Inrush current of biggest compressor + 75 % of nominal absorbed current of the other compressor + fans current.
(5) Compressor FLA + fans current.

Physical data EWAD-BJYNN/Q R-134a

Unit size		550	600	650	700	750	800
Cooling capacity (1)	kW	539	597	650	709	759	812
Power input (1)	kW	229	246	262	285	307	340
COP		2,35	2,43	2,48	2,48	2,47	2,39
Screw compressors	N°	2	2	2	2	2	3
Refrigerant circuits	N°	2	2	2	2	2	3
Refrigerant charge R-134a	kg	104	114	124	132	140	160
Oil charge	kg	40	40	40	40	40	60
Min % of capacity reduction	%	12,5	12,5	12,5	12,5	12,5	8,3
Condenser fans							
No. of fans / nominal power fan	kW	10/0,3	11/0,3	12/0,3	13/0,3	14/0,3	16/0,3
Fan speed	rpm	500	500	500	500	500	500
Diameter	mm	800	800	800	800	800	800
Total air flow	m³/s	25,6	28,2	30,8	33,3	35,9	42,1
Evaporator							
Evaporators / water volume	N°/l	1/261	1/254	1/254	1/246	1/246	1/424
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	168,3	168,3	168,3	168,3	168,3	219,1
Condenser coil							
Coil type		Lanced fins – internally spiral wound tubes					
Weight and dimensions							
Standard unit shipping weight	kg	5230	5445	5659	5900	6030	8190
Standard unit operating weight	kg	5440	5650	5864	6150	6280	8610
Unit length	mm	5310	6210	6210	7110	7110	8300
Unit width	mm	2230	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520	2520

Unit size		850	900	950	C10	C11	C12
Cooling capacity (1)	kW	869	921	974	1055	1086	1152
Power input (1)	kW	361	377	393	406	438	449
COP		2,41	2,45	2,48	2,60	2,48	2,57
Screw compressors	N°	3	3	3	3	3	3
Refrigerant circuits	N°	3	3	3	3	3	3
Refrigerant charge R-134a	kg	160	180	186	199	202	215
Oil charge	kg	60	60	60	60	60	60
Min % of capacity reduction	%	8,3	8,3	8,3	8,3	8,3	8,3
Condenser fans							
No. of fans / nominal power fan	kW	16/0,3	18/0,3	18/0,3	20/0,3	20/0,3	22/0,3
Fan speed	rpm	500	500	500	500	500	500
Diameter	mm	800	800	800	800	800	800
Total air flow	m³/s	41,0	43,6	46,1	51,3	51,3	56,4
Evaporator							
Evaporators / water volume	N°/l	1/415	1/415	1/415	1/402	1/402	1/402
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	219,1	219,1	219,1	219,1	219,1	219,1
Condenser coil							
Coil type		Lanced fins – internally spiral wound tubes					
Weight and dimensions							
Standard unit shipping weight	kg	8190	8725	8725	9310	9310	9750
Standard unit operating weight	kg	8610	9150	9150	9720	9720	10160
Unit length	mm	8300	9200	9200	10100	10100	11000
Unit width	mm	2230	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520	2520

Note: (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 32°C air ambient temp.
Power input is for compressor only.

Electrical data EWAD-BJYNN/Q R-134a

Unit size		550	600	650	700	750	800
Standard voltage (1)		400 V – 3f – 50 Hz					
Nominal unit current (2)	A	414	439	468	512	556	605
Max compressor current (3)	A	440	473	506	558	610	660
Fans current	A	10	11	12	13	14	16
Max unit current (3)	A	450	484	518	571	624	676
Max unit inrush current (4)	A	796	797	819	820	854	958
Max unit current for wires sizing (5)	A	456	505	554	594	634	685

Unit size		850	900	950	C10	C11	C12
Standard voltage (1)		400 V – 3f – 50 Hz					
Nominal unit current (2)	A	640	666	702	733	791	818
Max compressor current (3)	A	693	726	759	811	863	895
Fans current	A	16	18	18	20	20	22
Max unit current (3)	A	709	744	777	831	883	917
Max unit inrush current (4)	A	958	980	1000	1002	1035	1070
Max unit current for wires sizing (5)	A	733	783	831	872	911	952

- Notes:**
- (1) Allowed voltage tolerance $\pm 10\%$. Voltage unbalance between phases must be within $\pm 3\%$.
 - (2) Nominal current is based on: 12/7 °C entering/leaving evaporator water temperature and 35°C ambient temp.
 - (3) Maximum current is based on: 14/9 °C entering/leaving evaporator water temperature and 40°C ambient temp.
 - (4) Inrush current of biggest compressor + 75 % of nominal absorbed current of the other compressor + fans current.
 - (5) Compressor FLA + fans current.

Physical data EWAD-BJYNN/A R-134a

Unit size		650	700	800	850	900	950
Cooling capacity (1)	kW	667	723	800	855	903	926
Power input (1)	kW	204	217	237	255	268	260
COP		3,27	3,33	3,38	3,36	3,37	3,57
Screw compressors	N°	2	2	2	2	2	2
Refrigerant circuits	N°	2	2	2	2	2	2
Refrigerant charge R-134a	kg	114	124	128	132	132	144
Oil charge	kg	40	40	40	40	40	40
Min % of capacity reduction	%	12,5	12,5	12,5	12,5	12,5	12,5
Condenser fans							
No. of fans / nominal power fan	kW	11/1,7	12/1,7	13/1,7	14/1,7	14/1,7	16/1,7
Fan speed	rpm	860	860	860	860	860	860
Diameter	mm	800	800	800	800	800	800
Total air flow	m³/s	58,1	63,3	68,6	73,9	75,2	86,0
Evaporator							
Evaporators / water volume	N°/l	1/254	1/254	1/246	1/246	1/246	1/244
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	168,3	168,3	168,3	168,3	168,3	168,3
Condenser coil							
Coil type		Lanced fins – internally spiral wound tubes					
Weight and dimensions							
Standard unit shipping weight	kg	5205	5419	5660	5790	5890	6333
Standard unit operating weight	kg	5410	5624	5910	6040	6140	6589
Unit length	mm	6210	6210	7110	7110	7110	8300
Unit width	mm	2230	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520	2520

Unit size		C10	C11	C12	C13	C14	C15	C16
Cooling capacity (1)	kW	974	1038	1094	1177	1222	1282	1354
Power input (1)	kW	267	312	325	343	365	378	396
COP		3,65	3,33	3,37	3,43	3,35	3,40	3,42
Screw compressors	N°	2	3	3	3	3	3	3
Refrigerant circuits	N°	2	3	3	3	3	3	3
Refrigerant charge R-134a	kg	144	180	186	196	194	204	204
Oil charge	kg	40	60	60	60	60	60	60
Min % of capacity reduction	%	12,5	8,3	8,3	8,3	8,3	8,3	8,3
Condenser fans								
No. of fans / nominal power fan	kW	16/1,7	18/1,7	18/1,7	20/1,7	20/1,7	22/1,7	22/1,7
Fan speed	rpm	860	860	860	860	860	860	860
Diameter	mm	800	800	800	800	800	800	800
Total air flow	m³/s	86,0	100,6	95,0	105,6	105,6	116,1	118,3
Evaporator								
Evaporators / water volume	N°/l	1/392	1/415	1/415	1/402	1/402	1/402	1/402
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	219,1	219,1	219,1	219,1	219,1	219,1	219,1
Condenser coil								
Coil type	Lanced fins – internally spiral wound tubes							
Weight and dimensions								
Standard unit shipping weight	kg	6563	8420	8420	8950	8950	9390	9540
Standard unit operating weight	kg	6967	8830	8830	9360	9360	9800	9950
Unit length	mm	8300	9200	9200	10100	10100	11000	11000
Unit width	mm	2230	2230	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520	2520	2520

Note: (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp.
Power input is for compressor only.

Physical data EWAD-BJYNN/A R-134a

Unit size		C17	C18	C19	C20	C21
Cooling capacity (1)	kW	1430	1557	1710	1806	1920
Power input (1)	kW	386	476	510	536	555
COP		3,70	3,27	3,35	3,37	3,46
Screw compressors	N°	3	4	4	4	4
Refrigerant circuits	N°	3	4	4	4	4
Refrigerant charge R-134a	kg	232	256	264	264	264
Oil charge	kg	60	80	80	80	80
Min % of capacity reduction	%	8,3	6,25	6,25	6,25	6,25
Condenser fans						
No. of fans / nominal power fan	kW	26/1,7	26/1,7	28/1,7	28/1,7	28/1,7
Fan speed	rpm	860	860	860	860	860
Diameter	mm	800	800	800	800	800
Total air flow	m³/s	140	137,2	147,8	150,5	150,5
Evaporator						
Evaporators / water volume	N°/l	1/533	2/254+246	2/246+246	2/246+246	2/392+392
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	219,1	168,3	168,3	168,3	219,1
Condenser coil						
Coil type		Lanced fins – internally spiral wound tubes				
Weight and dimensions						
Standard unit shipping weight	kg	10355	10960	11168	11368	12144
Standard unit operating weight	kg	10931	11420	11678	11878	13036
Unit length	mm	12800	12800	13670	13670	13670
Unit width	mm	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520

Note: (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp.
Power input is for compressor only.

Electrical data EWAD-BJYNN/A R-134a

Unit size		650	700	800	850	900
Standard voltage (1)		400 V – 3f – 50 Hz				
Nominal unit current (2)	A	412	434	464	494	485
Max compressor current (3)	A	442	468	511	554	547
Fans current	A	44	48	52	56	56
Max unit current (3)	A	486	516	563	610	603
Max unit inrush current (4)	A	821	842	846	872	872
Max unit current for wires sizing (5)	A	538	590	633	676	676

Unit size		950	C10	C11	C12	C13	C14
Standard voltage (1)		400 V – 3f – 50 Hz					
Nominal unit current (2)	A	480	491	631	651	686	713
Max compressor current (3)	A	532	545	670	696	742	788
Fans current	A	64	64	72	72	80	80
Max unit current (3)	A	596	609	742	768	822	868
Max unit inrush current (4)	A	872	872	1012	1029	1037	1059
Max unit current for wires sizing (5)	A	684	684	837	885	932	971

Unit size		C15	C16	C17	C18	C19	C20	C21
Standard voltage (1)		400 V – 3f – 50 Hz						
Nominal unit current (2)	A	748	722	723	928	988	970	998
Max compressor current (3)	A	834	810	791	1022	1108	1095	1130
Fans current	A	88	88	104	104	112	112	112
Max unit current (3)	A	922	898	895	1126	1220	1207	1242
Max unit inrush current (4)	A	1090	1090	1090	1291	1299	1299	1299
Max unit current for wires sizing (5)	A	1018	1018	1034	1266	1352	1352	1352

- Notes:** (1) Allowed voltage tolerance $\pm 10\%$. Voltage unbalance between phases must be within $\pm 3\%$.
(2) Nominal current is based on: 12/7 °C entering/leaving evaporator water temperature and 35°C ambient temp.
(3) Maximum current is based on: 14/9 °C entering/leaving evaporator water temperature and 48°C ambient temp.
(4) Inrush current of biggest compressor + 75 % of nominal absorbed current of the other compressor + fans current.
(5) Compressor FLA + fans current.

Physical data EWAD-BJYNN/A with option OPRN R-134a

Unit size		650	700	800	850	900	950
Cooling capacity (1)	kW	640	703	769	822	881	907
Power input (1)	kW	216	232	254	271	286	275
COP		2,97	3,02	3,03	3,04	3,08	3,30
Screw compressors	N°	2	2	2	2	2	2
Refrigerant circuits	N°	2	2	2	2	2	2
Refrigerant charge R-134a	kg	114	124	128	132	132	144
Oil charge	kg	40	40	40	40	40	40
Min % of capacity reduction	%	12,5	12,5	12,5	12,5	12,5	12,5
Condenser fans							
No. of fans / nominal power fan	kW	11/1	12/1	13/1	14/1	14/1	16/1
Fan speed	rpm	680	680	680	680	680	680
Diameter	mm	800	800	800	800	800	800
Total air flow	m³/s	44,5	48,6	52,6	56,7	57,2	65,4
Evaporator							
Evaporators / water volume	N°/l	1/254	1/254	1/246	1/246	1/246	1/244
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	168,3	168,3	168,3	168,3	168,3	168,3
Condenser coil							
Coil type		Lanced fins – internally spiral wound tubes					
Weight and dimensions							
Standard unit shipping weight	kg	5205	5419	5660	5790	5890	6333
Standard unit operating weight	kg	5410	5624	5910	6040	6140	6589
Unit length	mm	6210	6210	7110	7110	7110	8300
Unit width	mm	2230	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520	2520

Unit size		C10	C11	C12	C13	C14	C15	C16
Cooling capacity (1)	kW	953	998	1053	1135	1177	1238	1323
Power input (1)	kW	283	332	347	362	389	402	421
COP		3,36	3,00	3,03	3,14	3,03	3,08	3,14
Screw compressors	N°	2	3	3	3	3	3	3
Refrigerant circuits	N°	2	3	3	3	3	3	3
Refrigerant charge R-134a	kg	144	180	186	196	194	204	204
Oil charge	kg	40	60	60	60	60	60	60
Min % of capacity reduction	%	12,5	8,3	8,3	8,3	8,3	8,3	8,3
Condenser fans								
No. of fans / nominal power fan	kW	16/1	18/1	18/1	20/1	20/1	22/1	22/1
Fan speed	rpm	680	680	680	680	680	680	680
Diameter	mm	800	800	800	800	800	800	800
Total air flow	m³/s	65,4	77,1	72,8	80,9	80,9	89,0	89,9
Evaporator								
Evaporators / water volume	N°/l	1/392	1/415	1/415	1/402	1/402	1/402	1/402
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	219,1	219,1	219,1	219,1	219,1	219,1	219,1
Condenser coil								
Coil type		Lanced fins – internally spiral wound tubes						
Weight and dimensions								
Standard unit shipping weight	kg	6563	8420	8420	8950	8950	9390	9540
Standard unit operating weight	kg	6967	8830	8830	9360	9360	9800	9950
Unit length	mm	8300	9200	9200	10100	10100	11000	11000
Unit width	mm	2230	2230	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520	2520	2520

Note: (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35 °C air ambient temp.
Power input is for compressor only.

Physical data EWAD-BJYNN/A with option OPRN R-134a

Unit size		C17	C18	C19	C20	C21
Cooling capacity (1)	kW	1401	1512	1618	1762	1871
Power input (1)	kW	408	501	541	572	594
COP		3,44	3,02	2,99	3,08	3,15
Screw compressors	N°	3	4	4	4	4
Refrigerant circuits	N°	3	4	4	4	4
Refrigerant charge R-134a	kg	232	256	264	264	264
Oil charge	kg	60	80	80	80	80
Min % of capacity reduction	%	8,3	6,25	6,25	6,25	6,25
Condenser fans						
No. of fans / nominal power fan	kW	26/1	26/1	28/1	28/1	28/1
Fan speed	rpm	680	680	680	680	680
Diameter	mm	800	800	800	800	800
Total air flow	m³/s	106,3	105,2	113,3	114,4	114,4
Evaporator						
Evaporators / water volume	N°/l	1/533	2/254+246	2/246+246	2/246+246	2/392+392
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	219,1	168,3	168,3	168,3	219,1
Condenser coil						
Coil type		Lanced fins – internally spiral wound tubes				
Weight and dimensions						
Standard unit shipping weight	kg	10355	10960	11168	11368	12144
Standard unit operating weight	kg	10931	11420	11678	11878	13036
Unit length	mm	12800	12800	13670	13670	13670
Unit width	mm	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520

Note: (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp.
Power input is for compressor only.

Electrical data EWAD-BJYNN/A with option OPRN R-134a

Unit size		650	700	800	850	900
Standard voltage (1)		400 V – 3f – 50 Hz				
Nominal unit current (2)	A	403	428	459	490	484
Max compressor current (3)	A	443	470	510	550	547
Fans current	A	22	24	26	28	28
Max unit current (3)	A	465	494	536	578	575
Max unit inrush current (4)	A	796	815	817	843	843
Max unit current for wires sizing (5)	A	516	566	607	648	648

Unit size		950	C10	C11	C12	C13	C14
Standard voltage (1)		400 V – 3f – 50 Hz					
Nominal unit current (2)	A	472	484	614	633	669	705
Max compressor current (3)	A	528	543	678	705	745	785
Fans current	A	32	32	36	36	40	40
Max unit current (3)	A	560	575	714	741	785	825
Max unit inrush current (4)	A	843	843	971	988	992	1015
Max unit current for wires sizing (5)	A	652	652	801	849	892	931

Unit size		C15	C16	C17	C18	C19	C20	C21
Standard voltage (1)		400 V – 3ph – 50 Hz						
Nominal unit current (2)	A	729	716	704	918	980	967	1000
Max compressor current (3)	A	825	807	783	1020	1100	1094	1116
Fans current	A	44	44	52	52	56	56	56
Max unit current (3)	A	869	851	835	1072	1156	1150	1172
Max unit inrush current (4)	A	1043	1043	1043	1234	1238	1238	1238
Max unit current for wires sizing (5)	A	974	974	982	1214	1296	1296	1296

- Notes:** (1) Allowed voltage tolerance $\pm 10\%$. Voltage unbalance between phases must be within $\pm 3\%$.
(2) Nominal current is based on: 12/7 °C entering/leaving evaporator water temperature and 35°C ambient temp.
(3) Maximum current is based on: 14/9 °C entering/leaving evaporator water temperature and 44°C ambient temp.
(4) Inrush current of biggest compressor + 75 % of nominal absorbed current of the other compressor + fans current.
(5) Compressor FLA + fans current.

Physical data EWAD-BJYNN/A with option OPLN R-134a

Unit size		650	700	800	850	900	950
Cooling capacity (1)	kW	640	703	769	822	881	907
Power input (1)	kW	216	232	254	271	286	275
COP		2,97	3,02	3,03	3,04	3,08	3,30
Screw compressors	N°	2	2	2	2	2	2
Refrigerant circuits	N°	2	2	2	2	2	2
Refrigerant charge R-134a	kg	114	124	128	132	132	144
Oil charge	kg	40	40	40	40	40	40
Min % of capacity reduction	%	12,5	12,5	12,5	12,5	12,5	12,5
Condenser fans							
No. of fans / nominal power fan	kW	11/1	12/1	13/1	14/1	14/1	16/1
Fan speed	rpm	680	680	680	680	680	680
Diameter	mm	800	800	800	800	800	800
Total air flow	m³/s	44,5	48,6	52,6	56,7	57,2	65,4
Evaporator							
Evaporators / water volume	N°/l	1/254	1/254	1/246	1/246	1/246	1/244
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	168,3	168,3	168,3	168,3	168,3	168,3
Condenser coil							
Coil type		Lanced fins – internally spiral wound tubes					
Weight and dimensions							
Standard unit shipping weight	kg	5445	5659	5900	6030	6130	6573
Standard unit operating weight	kg	5650	5864	6150	6280	6380	6829
Unit length	mm	6210	6210	7110	7110	7110	8300
Unit width	mm	2230	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520	2520

Unit size		C10	C11	C12	C13	C14	C15	C16
Cooling capacity (1)	kW	953	998	1053	1135	1177	1238	1323
Power input (1)	kW	283	332	347	362	389	402	421
COP		3,36	3,00	3,03	3,14	3,03	3,08	3,14
Screw compressors	N°	2	3	3	3	3	3	3
Refrigerant circuits	N°	2	3	3	3	3	3	3
Refrigerant charge R-134a	kg	144	180	186	196	194	204	204
Oil charge	kg	40	60	60	60	60	60	60
Min % of capacity reduction	%	12,5	8,3	8,3	8,3	8,3	8,3	8,3
Condenser fans								
No. of fans / nominal power fan	kW	16/1	18/1	18/1	20/1	20/1	22/1	22/1
Fan speed	rpm	680	680	680	680	680	680	680
Diameter	mm	800	800	800	800	800	800	800
Total air flow	m³/s	65,4	77,1	72,8	80,9	80,9	89,0	89,9
Evaporator								
Evaporators / water volume	N°/l	1/392	1/415	1/415	1/402	1/402	1/402	1/402
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	219,1	219,1	219,1	219,1	219,1	219,1	219,1
Condenser coil								
Coil type		Lanced fins – internally spiral wound tubes						
Weight and dimensions								
Standard unit shipping weight	kg	6803	8780	8780	9310	9310	9750	9900
Standard unit operating weight	kg	7207	9190	9190	9720	9720	10160	10310
Unit length	mm	8300	9200	9200	10100	10100	11000	11000
Unit width	mm	2230	2230	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520	2520	2520

Note: (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35 °C air ambient temp.
Power input is for compressor only.

Physical data EWAD-BJYNN/A with option OPLN R-134a

Unit size		C17	C18	C19	C20	C21
Cooling capacity (1)	kW	1401	1512	1618	1762	1871
Power input (1)	kW	408	501	541	572	594
COP		3,44	3,02	2,99	3,08	3,15
Screw compressors	N°	3	4	4	4	4
Refrigerant circuits	N°	3	4	4	4	4
Refrigerant charge R-134a	kg	232	256	264	264	264
Oil charge	kg	60	80	80	80	80
Min % of capacity reduction	%	8,3	6,25	6,25	6,25	6,25
Condenser fans						
No. of fans / nominal power fan	kW	26/1	26/1	28/1	28/1	28/1
Fan speed	rpm	680	680	680	680	680
Diameter	mm	800	800	800	800	800
Total air flow	m³/s	106,3	105,2	113,3	114,4	114,4
Evaporator						
Evaporators / water volume	N°/l	1/533	2/254+246	2/246+246	2/246+246	2/392+392
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	219,1	168,3	168,3	168,3	219,1
Condenser coil						
Coil type		Lanced fins – internally spiral wound tubes				
Weight and dimensions						
Standard unit shipping weight	kg	10715	11440	11648	11848	12624
Standard unit operating weight	kg	11291	11900	12158	12358	13516
Unit length	mm	12800	12800	13670	13670	13670
Unit width	mm	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520

Note: (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp.
Power input is for compressor only.

Electrical data EWAD-BJYNN/A with option OPLN R-134a

Unit size		650	700	800	850	900		
Standard voltage (1)		400 V – 3f – 50 Hz						
Nominal unit current (2)	A	403	428	459	490	484		
Max compressor current (3)	A	443	470	510	550	547		
Fans current	A	22	24	26	28	28		
Max unit current (3)	A	465	494	536	578	575		
Max unit inrush current (4)	A	796	815	817	843	843		
Max unit current for wires sizing (5)	A	516	566	607	648	648		
Unit size		950	C10	C11	C12	C13	C14	
Standard voltage (1)		400 V – 3f – 50 Hz						
Nominal unit current (2)	A	472	484	614	633	669	705	
Max compressor current (3)	A	528	543	678	705	745	785	
Fans current	A	32	32	36	36	40	40	
Max unit current (3)	A	560	575	714	741	785	825	
Max unit inrush current (4)	A	843	843	971	988	992	1015	
Max unit current for wires sizing (5)	A	652	652	801	849	892	931	
Unit size		C15	C16	C17	C18	C19	C20	C21
Standard voltage (1)		400 V – 3ph – 50 Hz						
Nominal unit current (2)	A	729	716	704	918	980	967	1000
Max compressor current (3)	A	825	807	783	1020	1100	1094	1116
Fans current	A	44	44	52	52	56	56	56
Max unit current (3)	A	869	851	835	1072	1156	1150	1172
Max unit inrush current (4)	A	1043	1043	1043	1234	1238	1238	1238
Max unit current for wires sizing (5)	A	974	974	982	1214	1296	1296	1296

- Notes:** (1) Allowed voltage tolerance $\pm 10\%$. Voltage unbalance between phases must be within $\pm 3\%$.
(2) Nominal current is based on: 12/7 °C entering/leaving evaporator water temperature and 35°C ambient temp.
(3) Maximum current is based on: 14/9 °C entering/leaving evaporator water temperature and 44°C ambient temp.
(4) Inrush current of biggest compressor + 75 % of nominal absorbed current of the other compressor + fans current.
(5) Compressor FLA + fans current.

Physical data EWAD-BJYNN/Z R-134a

Unit size		600	650	700	850	900	950	C10
Cooling capacity (1)	kW	569	631	668	840	914	953	1013
Power input (1)	kW	216	237	264	323	336	361	361
COP		2,64	2,66	2,53	2,61	2,72	2,64	2,80
Screw compressors	No.	2	2	2	3	3	3	3
Refrigerant circuits	No.	2	2	2	3	3	3	3
Refrigerant charge R-134a	kg	124	128	132	186	196	194	204
Oil charge	kg	40	40	40	60	60	60	60
Min % of capacity reduction	%	12,5	12,5	12,5	8,3	8,3	8,3	8,3

Condenser fans

No. of fans / nominal power fan	kW	12/0,3	13/0,3	14/0,3	18/0,3	20/0,3	20/0,3	22/0,3
Fan speed	rpm	500	500	500	500	500	500	500
Diameter	mm	800	800	800	800	800	800	800
Total air flow	m ³ /s	30,8	33,3	35,9	46,1	51,3	51,3	56,4

Evaporator

Evaporators / water volume	No./l	1/254	1/246	1/246	1/415	1/402	1/402	1/402
Max operating pressure	bar	10,5	10,5	10,5	10,5	10,5	10,5	10,5
Water connection diameter	mm	168,3	168,3	168,3	219,1	219,1	219,1	219,1

Condenser coil

Coil type	Lanced fins – internally spiral wound tubes							
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Weight and dimensions

Standard unit shipping weight	kg	5659	5900	6030	8725	9310	9310	9750
Standard unit operating weight	kg	5864	6150	6280	9150	9720	9720	10160
Unit length	mm	6210	7110	7110	9200	10100	10100	11000
Unit width	mm	2230	2230	2230	2230	2230	2230	2230
Unit height	mm	2520	2520	2520	2520	2520	2520	2520

Note: (1) Cooling capacity and power input are based on 12/7 °C entering/leaving water temp. and 35°C air ambient temp.
Power input is for compressor only.

Electrical data EWAD-BJYNN/Z R-134a

Unit size		600	650	700	850	900	950	C10
Standard voltage (1)		400 V – 3ph – 50 Hz						
Nominal unit current (2)	A	392	420	444	585	604	636	652
Max compressor current (3)	A	416	447	474	618	640	678	705
Fans current	A	12	13	14	18	20	20	22
Max unit current (3)	A	428	460	488	636	660	698	727
Max unit inrush current (4)	A	790	791	812	943	945	965	986
Max unit current for wires sizing (5)	A	458	507	556	687	737	785	835

- Notes: (1) Allowed voltage tolerance $\pm 10\%$. Voltage unbalance between phases must be within $\pm 3\%$.
(2) Nominal current is based on: 12/7 °C entering/leaving evaporator water temperature and 35°C ambient temp.
(3) Maximum current is based on: 14/9 °C entering/leaving evaporator water temperature and 40°C ambient temp.
(4) Inrush current of biggest compressor + 75 % of nominal absorbed current of the other compressor + fans current.
(5) Compressor FLA + fans current.

Sound pressure level EWAD-BJYNN and EWAD-BJYNN/A

EWAD-BJYNN	EWAD-BJYNN/A	Sound pressure level at 1 m from the unit in free field (ref. 2×10^{-5})								
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
650	650	77,0	77,5	79,0	75,0	74,5	72,0	63,0	54,5	79,0
700	700	77,0	77,5	79,0	75,0	74,5	72,0	63,0	54,5	79,0
750	800	77,5	78,0	79,5	75,5	75,0	72,5	63,5	55,0	79,5
850	850	77,5	78,0	79,5	75,5	75,0	72,5	63,5	55,0	79,5
900	900	78,0	78,5	80,0	76,0	75,5	73,0	64,0	55,5	80,0
-	950	77,5	78,0	79,5	75,5	75,0	72,5	63,5	55,0	79,5
-	C10	77,5	78,0	79,5	75,5	75,0	72,5	63,5	55,0	79,5
950	C11	77,0	77,5	79,0	75,0	74,5	72,0	63,0	54,5	79,0
C10	C12	77,0	77,5	79,0	75,0	74,5	72,0	63,0	54,5	79,0
C11	C13	77,5	78,0	79,5	75,5	75,0	72,5	63,5	55,0	79,5
C12	C14	77,5	78,0	79,5	75,5	75,0	72,5	63,5	55,0	79,5
C13	C15	77,5	78,0	79,5	75,5	75,0	72,5	63,5	55,0	79,5
C14	C16	78,0	78,5	80,0	76,0	75,5	73,0	64,0	55,5	80,0
-	C17	78,0	78,5	80,0	76,0	75,5	73,0	64,0	55,5	80,0
C15	C18	77,5	78,0	79,5	75,5	75,0	72,5	63,5	55,0	79,5
C16	C19	77,5	78,0	79,5	75,5	75,0	72,5	63,5	55,0	79,5
C18	C20	78,0	78,5	80,0	76,0	75,5	73,0	64,0	55,5	80,0
	C21	78,0	78,5	80,0	76,0	75,5	73,0	64,0	55,5	80,0

Notes: Average sound pressure level rated in accordance to ISO 3744, at free field semispherical conditions.
Sound pressure levels are referred to units furnished without water pump and/or high lift fans.

Sound pressure level EWAD-BJYNN + option OPRN and EWAD-BJYNN/A + option OPRN

EWAD-BJYNN + option OPRN	EWAD-BJYNN/A + option OPRN	Sound pressure level at 1 m from the unit in free field (ref. 2×10^{-5})								
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
650	650	74,0	70,5	73,5	70,0	69,0	66,5	58,0	50,5	73,5
700	700	74,0	71,0	74,0	70,5	69,0	67,0	58,0	50,5	74,0
750	800	74,5	71,5	74,5	71,0	69,5	67,5	58,5	51,0	74,5
850	850	75,0	72,0	75,0	71,5	70,0	68,0	59,0	52,0	75,0
900	900	76,0	73,0	76,5	72,5	71,0	69,0	60,0	52,5	76,0
-	950	76,0	73,0	76,5	72,5	71,0	69,0	60,0	52,5	76,0
-	C10	76,0	73,0	76,5	72,5	71,0	69,0	60,0	52,5	76,0
950	C11	74,5	71,5	74,0	71,0	69,5	67,5	58,5	51,0	74,5
C10	C12	74,5	71,5	74,0	71,0	69,5	67,5	58,5	51,0	74,5
C11	C13	75,0	72,0	75,0	71,5	70,0	68,0	59,0	51,5	75,0
C12	C14	75,5	72,0	75,0	71,5	70,5	68,0	59,5	52,0	75,0
C13	C15	76,0	72,5	75,5	72,0	71,0	68,5	60,0	52,5	75,5
C14	C16	76,5	73,5	77,0	73,0	71,5	69,5	60,5	53,0	76,5
-	C17	76,5	73,5	77,0	73,0	71,5	69,5	60,5	53,0	76,5
C15	C18	75,5	72,5	75,5	72,0	70,5	68,5	59,5	52,0	75,5
C16	C19	76,0	73,0	76,5	72,5	71,0	69,0	60,0	52,5	76,0
C18	C20	76,5	73,5	77,0	73,0	71,5	69,5	60,5	53,0	76,5
	C21	76,5	73,5	77,0	73,0	71,5	69,5	60,5	53,0	76,5

Notes: Average sound pressure level rated in accordance to ISO 3744, at free field semispherical conditions.
Sound pressure levels are referred to units furnished without water pump and/or high lift fans.

Sound pressure level EWAD-BJYNN + option OPLN and EWAD-BJYNN/A + option OPLN

EWAD-BJYNN + option OPLN	EWAD-BJYNN/A + option OPLN	Sound pressure level at 1 m from the unit in free field (ref. 2×10^{-5})								
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
650	650	75,0	72,5	72,0	69,5	66,5	61,5	54,5	46,5	71,5
700	700	75,0	73,0	72,0	69,5	66,5	62,0	54,5	46,5	71,5
750	800	75,0	73,0	72,5	69,5	66,5	62,0	54,5	46,5	71,5
850	850	75,0	73,0	72,5	70,0	66,5	62,0	55,0	47,0	71,5
900	900	76,0	74,0	73,0	70,5	67,5	63,0	55,5	47,5	72,5
-	950	76,0	74,0	73,0	70,5	67,5	63,0	55,5	47,5	72,5
-	C10	76,0	74,0	73,0	70,5	67,5	63,0	55,5	47,5	72,5
950	C11	75,0	73,0	72,5	69,5	66,5	62,0	54,5	46,5	71,5
C10	C12	75,0	73,0	72,5	69,5	66,5	62,0	54,5	46,5	71,5
C11	C13	75,0	73,0	72,5	70,0	66,5	62,0	55,0	47,0	71,5
C12	C14	75,0	73,0	72,5	70,0	66,5	62,0	55,0	47,0	71,5
C13	C15	75,5	73,0	72,5	70,0	67,0	62,0	55,0	47,0	72,0
C14	C16	76,5	74,5	73,5	71,0	68,0	63,5	56,0	48,0	73,0
-	C17	76,5	74,5	73,5	71,0	68,0	63,5	56,0	48,0	73,0
C15	C18	75,5	73,0	72,5	70,0	67,0	62,0	55,0	47,0	72,0
C16	C19	75,5	73,5	72,5	70,0	67,0	62,5	55,0	47,0	72,0
C18	C20	76,5	74,5	73,5	71,0	68,0	63,5	56,0	48,0	73,0
	C21	76,5	74,5	73,5	71,0	68,0	63,5	56,0	48,0	73,0

Notes: Average sound pressure level rated in accordance to ISO 3744, at free field semispherical conditions.
Sound pressure levels are referred to units furnished without water pump and/or high lift fans.

Sound pressure level EWAD-BJYNN/Q and EWAD-BJYNN/Z

EWAD-BJYNN/Q	EWAD-BJYNN/Z	Sound pressure level at 1 m from the unit in free field (ref. 2×10^{-5})								
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
550	600	61,5	63,5	66,0	64,5	57,5	54,0	50,0	42,5	65,0
600	650	61,5	64,0	66,0	64,5	58,0	54,5	50,0	43,0	65,0
650	700	62,0	64,0	66,0	65,0	58,0	54,5	50,5	43,0	65,0
700	-	62,5	64,5	66,5	65,5	58,5	55,0	50,5	43,5	65,5
750	-	62,5	65,0	67,0	65,5	59,0	55,5	51,0	44,0	66,0
800	850	62,0	64,0	66,5	65,0	58,0	54,5	50,5	43,0	65,5
850	900	62,0	64,0	66,5	65,0	58,0	54,5	50,5	43,0	65,5
900	950	62,0	64,5	66,5	65,0	58,5	55,0	50,5	43,5	65,5
950	C10	62,0	64,5	66,5	65,0	58,5	55,0	50,5	43,5	65,5
C10	-	62,5	64,5	67,0	65,5	59,0	55,5	51,0	44,0	66,0
C11	-	63,0	65,0	67,0	66,0	59,0	55,5	51,0	44,0	66,0
C12	-	63,0	65,5	67,5	66,0	59,5	56,0	51,5	44,5	66,5

Notes: Average sound pressure level rated in accordance to ISO 3744, at free field semispherical conditions.
The data for EWAD-BJYNN/Q and EWAD-BJYNN/Z units are referred to 32 °C air ambient temperature.
Sound pressure levels are referred to units furnished without water pump and/or high lift fans.

Relief Valves

As a safety precaution and to meet code requirements, each chiller is equipped with pressure relief valves located on the condenser coil, evaporator, heat recovery condenser (if supplied) and liquid receiver, for the purpose of releasing excessive refrigerant pressure (caused by equipment malfunctioning, fire etc.) to the atmosphere.

Oil Heater

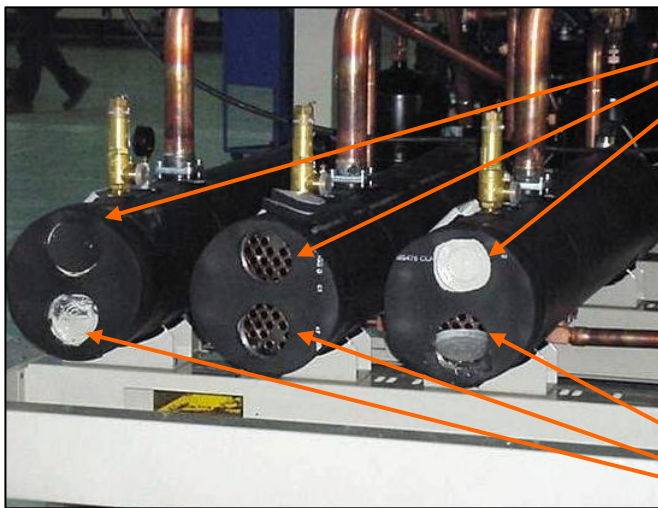
The oil separator is equipped with an immersion electric heater that is installed in a tube and can be removed without disturbing the oil or opening the refrigerant circuit.

Evaporator water flow and pressure drop

Adjust the chilled water flow through the evaporator. The flow rates must remain between the minimum and maximum values. Flow rates below the minimum values shown will result in laminar flow that will reduce efficiency, cause erratic operation of the electronic expansion valve and could cause low temperature cut-out. On the other hand flow rates exceeding the maximum values shown may cause erosion, vibration and possible breakage of evaporator water connections and tubes. Measure the chilled water pressure drop across the evaporator at field installed pressure taps. It is important not to include any pressure drop due to valves or strainers in the measurement. Variable chilled water flow through the evaporator while the compressors are operating is not recommended. Set points are valid for a constant flow and a variable temperature.

Heat Recovery Condenser water flow and pressure drop

Heat recovery condensers are supplied without the connection headers for both inlet and outlet water sides. These headers, including the well pockets for microprocessor control sensors, must be provided locally by the installer. Adjust the hot water flow through the heat recovery condenser. The flow rates must remain between the minimum and maximum values. Flow rates below the minimum values shown will result in laminar flow that will reduce efficiency, cause erratic operation of the unit and could cause high pressure cut-out. On the other hand, flow rates exceeding the maximum values shown can cause erosion on the condenser water connections and tubes. Measure the hot water pressure drop across the condenser at field installed pressure taps. It is important not to include in the measurement any pressure drop due to valves or strainers. Variable hot water flow through the condenser while the compressors are operating is not recommended. Set points are valid for a constant flow and a variable temperature.



Leaving Connections

Installer must provide the Headers between the heat recovery condenser to have only one supply water connection and one return water connection

Entering Connections

Heat Recovery Condensers

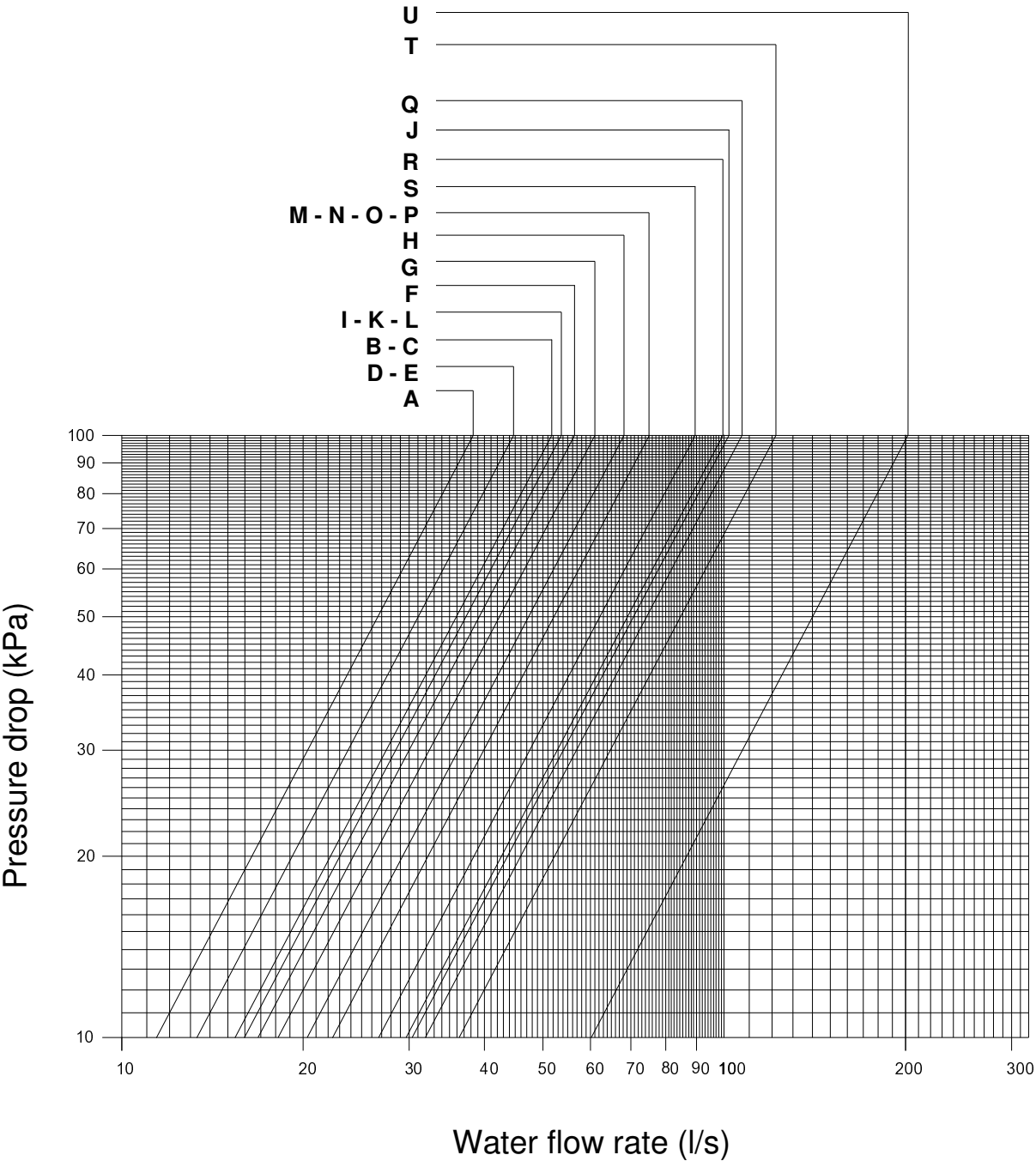
Table for matching unit size

Unit size	BJYNN	BJYNN/A	BJYNN/Q	BJYNN/Z
A	-	-	550	600
B	650	650	600	650
C	700	700	650	700
D	750	800	700	-
E	850	850	750	-
F	-	-	800	850
G	900	900	-	-
H	-	950	-	-
I	-	-	850	950
J	-	C10	-	C10
K	950	C11	900	-
L	C10	C12	950	-
M	C11	C13	C10	-
N	C12	C14	C11	-
O	C13	C15	C12	-
P	C14	C16	-	-
Q	-	C17	-	-
R	C15	C18	-	-
S	C16	C19	-	-
T	C18	C20	-	-
U	-	C21	-	-

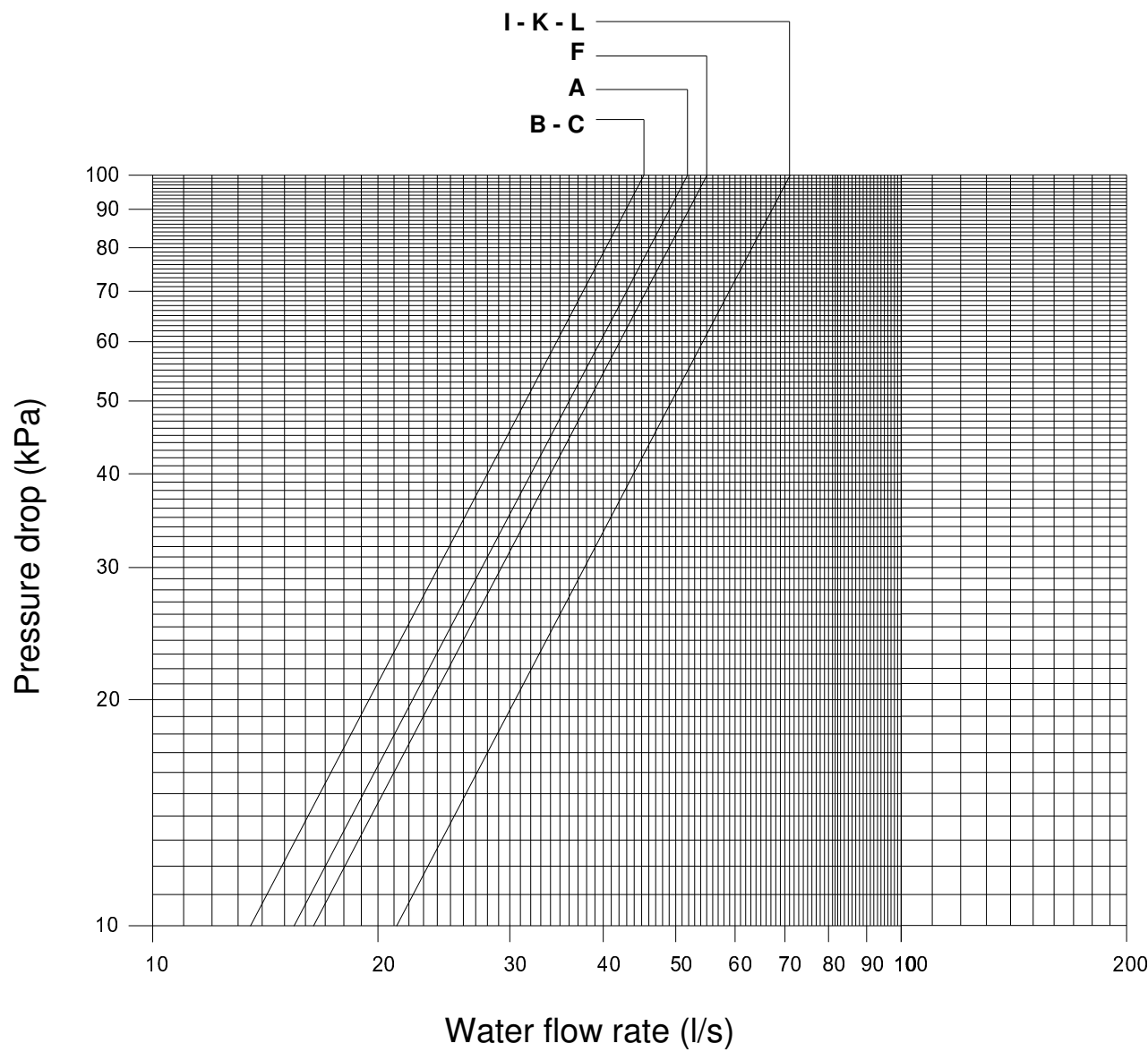
Note:

Unit size matching system used for evaporator pressure drop curves and pressure drop curves for partial and total heat recovery.

Evaporator pressure drop
EWAD-BJYNN - EWAD-BJYNN/Q
EWAD-BJYNN/A



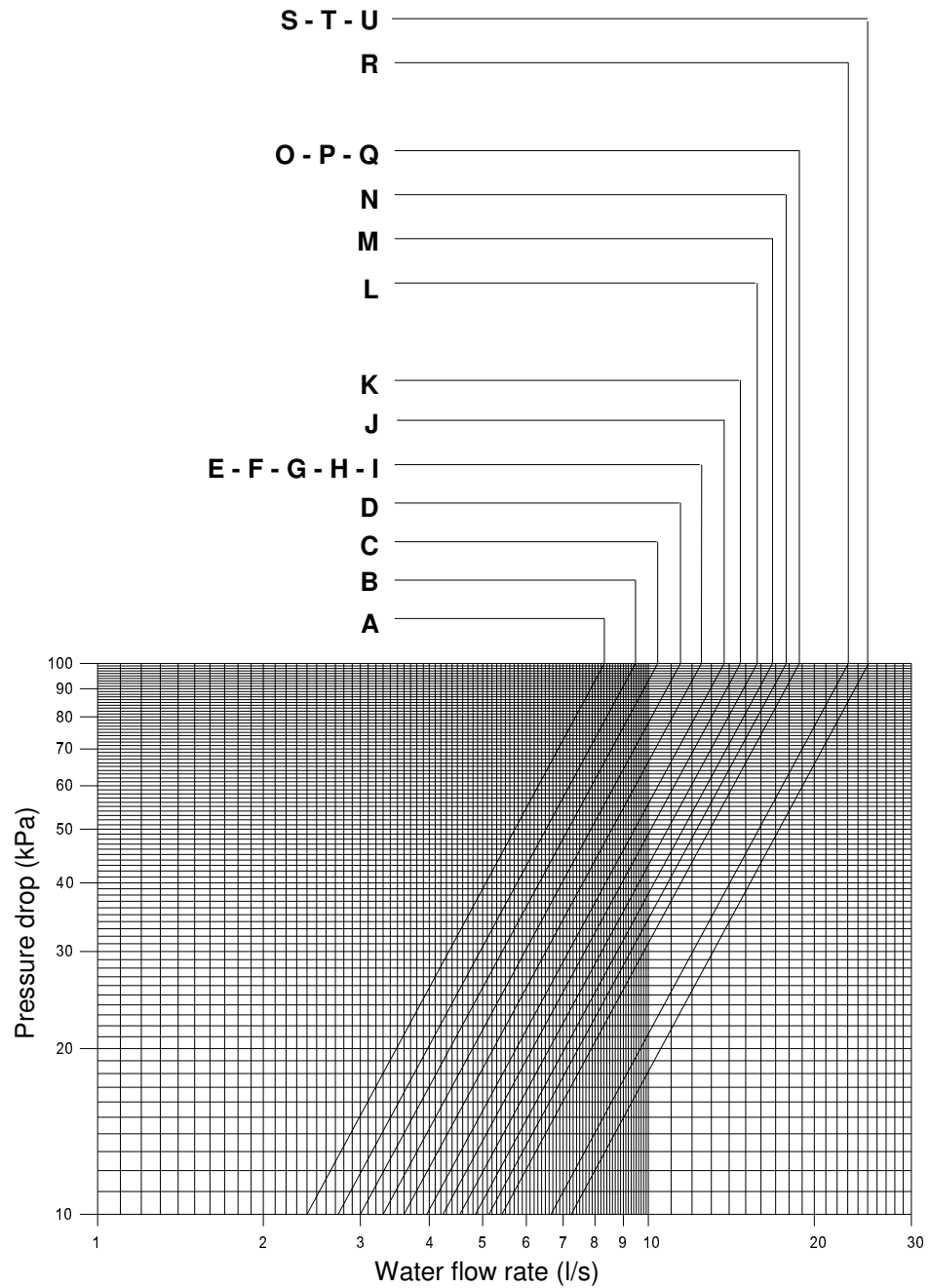
Evaporator pressure drop
EWAD-BJYNN/Z



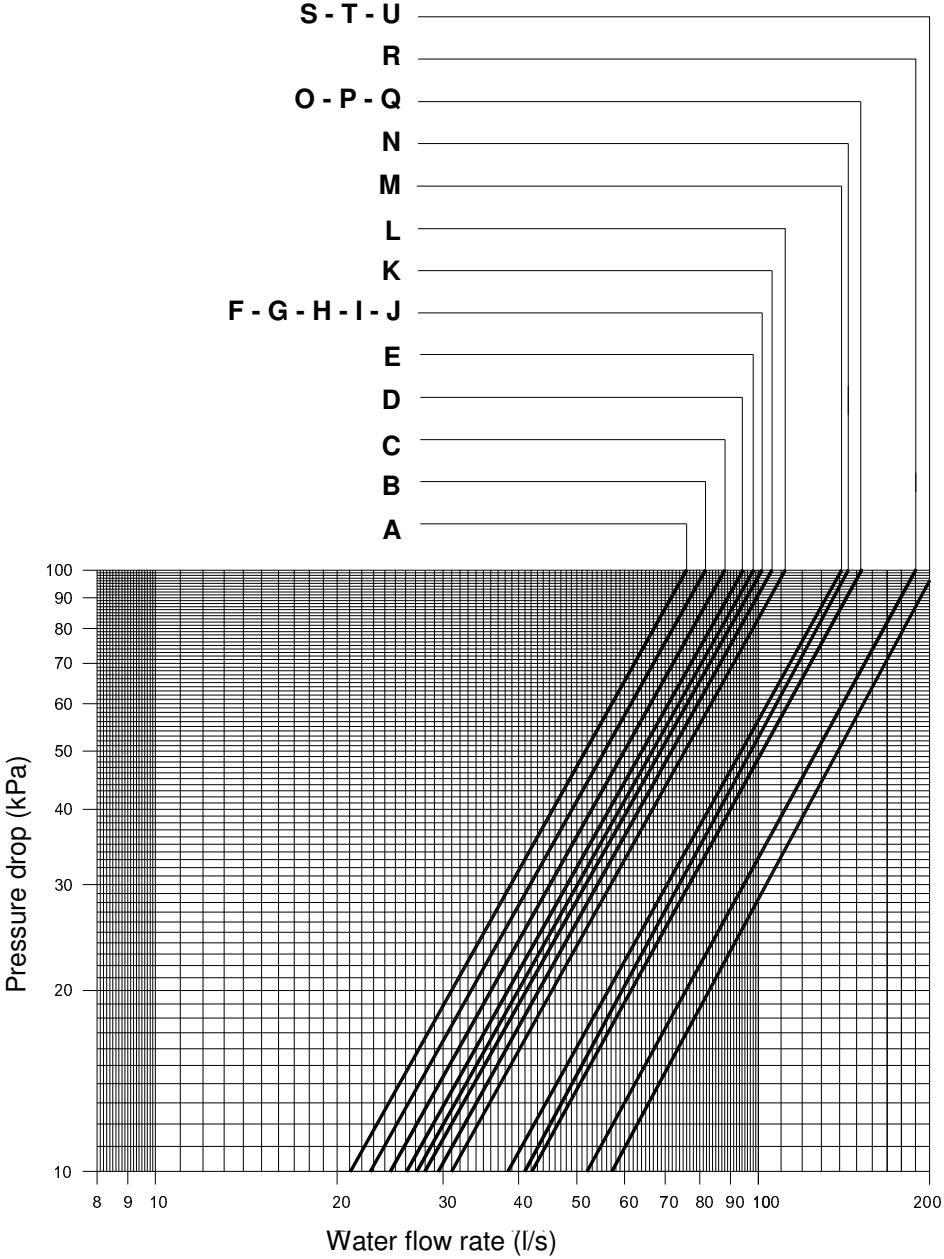
Pressure drop across partial heat recovery exchanger (plate exchanger)

EWAD-BJYNN - EWAD-BJYNN/Q

EWAD-BJYNN/A - EWAD-BJYNN/Z



Pressure drop across total heat recovery exchanger
EWAD-BJYNN - EWAD-BJYNN/Q
EWAD-BJYNN/A - EWAD-BJYNN/Z



System Pre-start Checklist

	Yes	No	N/A
Chilled water			
Piping complete			
Water system filled and vented			
Pump installed, (rotation checked), strainers cleaned			
Controls (3-way valves, face and bypass dampers, by-pass valves, etc.) operative			
Water system operated and flow adjusted to meet unit design requirements			
Heat recovery Condensers			
Piping and headers complete			
Water system filled and vented			
Temperature sensors installed in the water well pockets			
Pump installed, (rotation checked), strainers cleaned			
Controls (3-way valves, face and bypass dampers, by-pass valves, etc.) operative			
Water system operated and flow adjusted to meet unit design requirements			
Electrical			
Power leads connected to starter			
All interlock wiring to the control panel complete and in accordance with specification			
Pump starter and interlock wired			
Wiring complies with local codes			
Miscellaneous			
Thermometer wells, thermometers, gauges, control wells, controls, etc., installed			
A minimum 60% of system capacity is available for tests and control adjustments			

Note: This check list must be completed and sent to the local DAIKIN service center two weeks prior to start-up.

Operation

Operator Responsibilities

It is important that the operator become familiar with the equipment and the system before attempting to operate the chiller. In addition to reading this manual, the operator should study the operating manual for the control panel (latest edition) and the electrical wiring diagram furnished with the unit before starting, operating, or shutting it down.

During the initial start up of the chiller, the DAIKIN technician will be available to answer any questions and advise procedures for a correct operation.

It is recommended that the operator maintain a separate operation log for each chiller unit. In addition, a separate maintenance log, specific for periodic maintenance and service activities, should be kept in place.

If the operator encounters abnormal or unusual operating conditions, it is recommended that a DAIKIN service technician be consulted.

Refrigeration Cycle

The low-pressure refrigerant gas from the evaporator enters the screw compressor through the motor, thus cooling motor windings. The compressor compresses the refrigerant from low to high pressure and during this process oil is injected into the screw chamber for cooling, lubrication and sealing purposes. As a result of the injection of oil, a mixture of oil and refrigerant reaches the high efficiency oil separator where both elements are separated by the combined action of centrifugal force and low velocity,

As the gas leaves from the top of the oil separator, the oil flows down the receiver walls and is forced, by the effect of the differential pressure between suction and discharge sides, back into the compressor injection port.

After leaving the oil separator, the high pressure and hot gas goes through the "four-way valve" and, depending on the unit operation mode, enters either the air-cooled coil condenser (cooling mode) or the heat recovery water condenser (heat recovery mode).

In either heat exchanger, the hot gas is cooled by the ambient air in the first case or by the water in the second case, changing from gas to liquid phase.

Before leaving the condensing section, the liquid refrigerant is led into the sub-cooler where it is cooled below its saturation temperature, thus compensating for the pressure drop along the liquid line and improving the capacity of the evaporator.

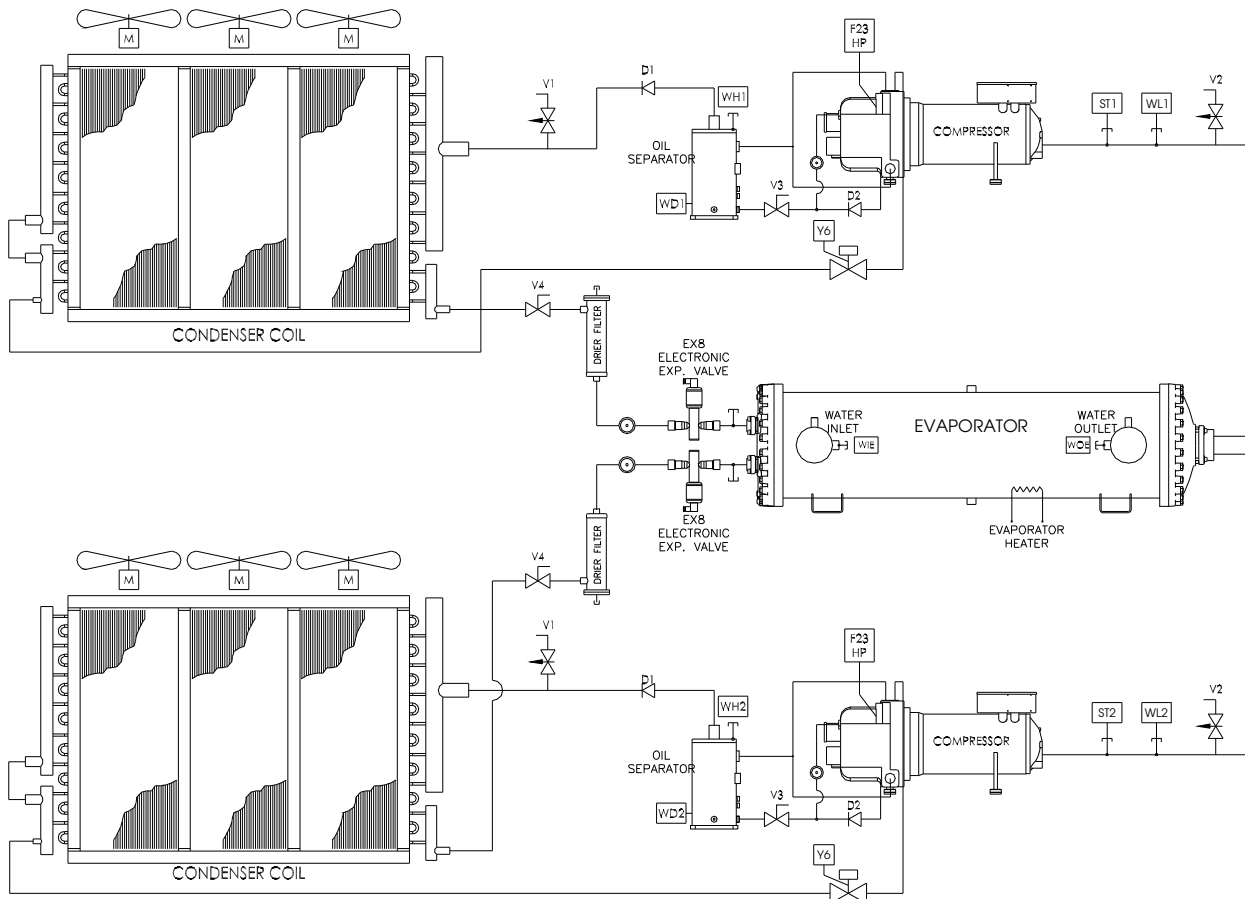
After leaving the sub-cooler, the liquid refrigerant enters the liquid receiver, where the exceeding charge is accumulated during the “cooling mode” in order to compensate for the different volume (refrigerant side) between the coil condenser and the heat recovery condenser. The liquid refrigerant goes through the filter dryer, where any existing particles of humidity are removed, and then through the expansion valve.

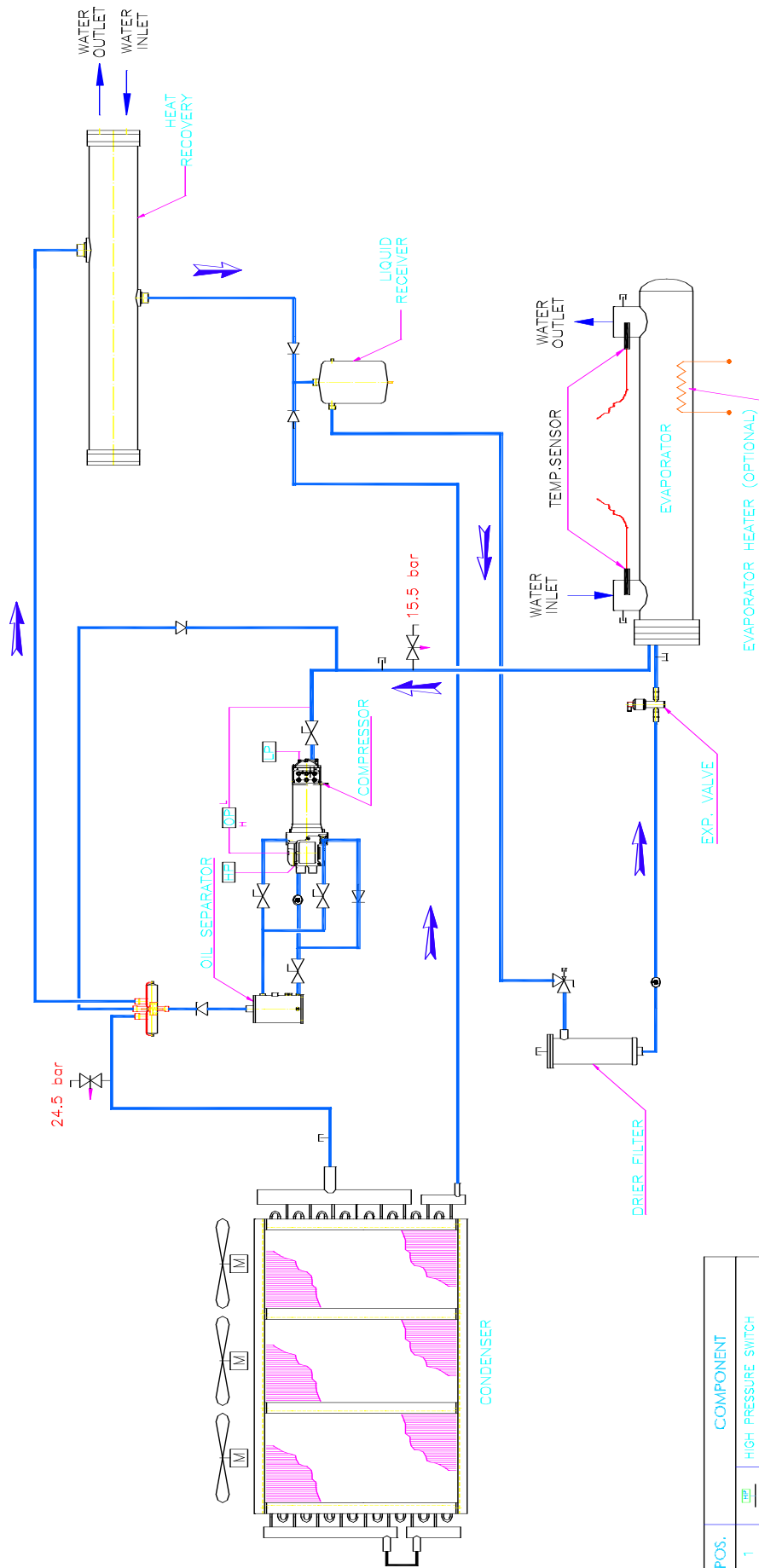
At that point, there will be a mixture of low-pressure liquid and gas refrigerant which enters the evaporator and takes the heat load from the chilled water, thus completing the process and allowing a new cycle to start.

Refrigerant circuit

EWAD-BJYNN - EWAD-BJYNN/Q

EWAD-BJYNN/A - EWAD-BJYNN/Z





Refrigerant circuit EWAD-BJYNN – EWAD-BJYNN/Q EWAD-BJYNN/A – EWAD-BJYNN/Z with Heat Recovery Option

POS.	COMPONENT
1	HIGH PRESSURE SWITCH
2	OIL DIFF. PRESS. SWITCH
3	LOW PRESSURE SWITCH
4	CHECK VALVE
5	SAFETY VALVE
6	2 WAY ANGLE VALVE WITH GAS CHARGE PORT
7	SLIGHT GLASS
8	EXPANSION VALVE
9	2 WAY SHUT-OFF VALVE
10	OIL INJECTION SOLENOID VALVE
11	1/4" SAE FLARE VALVE

Controller

The controller can be used to modify the setpoints of the unit and to check control parameters. A display shows the machine's operating status, programming values and setpoints (e.g. temperatures and pressures of fluids such as water and refrigerant). This control device maximizes the DAIKIN chiller energy efficiency and reliability. It uses sophisticated software with predictive logic to select the most energy-efficient combination of compressor, electronic expansion valve and condenser fan to keep stable operating conditions and maximize energy efficiency. The compressors are automatically used on a rotation basis to ensure even operating hours. The controller protects critical components in response to external signals received from the system field sensors measuring: motor temperatures, refrigerant gas and oil pressures, correct phase sequence and phase failure.

Control section - main features:

- Management of the compressor capacity slide and the electronic expansion valve in accordance with the distributed multiprocessor logic system
- Chillers enabled to work in partial failure condition thanks to the distributed multiprocessor logic system
- Full operational routines for following conditions:
 - High ambient temperature
 - High thermal load
 - High evaporator inlet water temperature (start-up)
- Display of evaporator inlet/outlet water temperature
- Display of both condensing and evaporating temperatures and pressures, and both suction and discharge superheat temperatures for each circuit
- Regulation of cooled water outlet temperature. Temperature tolerance $\pm 0,1\text{ }^{\circ}\text{C}$
- Compressors and evaporator pump hour counters
- Display of status of safety devices
- Equalization of the number of running sessions and working hours of the different compressors
- Excellent management of compressors load
- Management of cooling tower fans according to condensing pressure
- Automatic re-start in case of power supply interruption (adjustable)
- Soft load
- Return temperature reset
- Reset according to air outside temperature value
- Setpoint Reset
- Demand limit or Current limit
- Speedtrol control (optional)

Safety - each refrigerant circuit

High pressure (pressure switch)

Low pressure (pressure switch)

Compressor overload

Condenser fan magneto-thermal protection

High discharge temperature on the compressor

Phase monitor

Star / Delta transition failure

Low delta (differential) pressure between suction and discharge

Low pressure ratio

High oil pressure drop

Low oil pressure



Safety - system

Phase monitor

Freeze protection

One evaporator flow input to controller (stops the unit)

Remote on/off input.

Regulation type

Proportional + integral + derivative regulation with feed-back input taken from the temperature sensor at the evaporator water outlet.

Condensation

The condensation control can be based on temperature or on pressure. The fans can be managed according to ON/OFF mode or with a 0/10 V modulating signal.

Controller terminal

The controller terminal has following features:

- 4-line by 20-character backlit liquid crystal display
- Key-pad consisting of 15 keys using a "clear language presentation"
- Memory to protect the data
- General faults alarm LED
- 4-level password access to modify settings
- Service report displaying all running hours and general conditions
- Memorized alarm history to facilitate fault analysis.

Tele-maintenance and supervisory system

The controller can be monitored locally or via modem using the supervisory program.

The supervision system is the best solution:

- To centralize all the information in just one local and/or remote PC
- To check all the parameters for each unit connected
- Temperature – pressure data logging
- Printouts of alarms, parameters and graphs
- To control several plants, located in different geographical areas, from a central station
- To manage the Service centers

The supervisory system allows:

- Displaying all working conditions for each controller
- Displaying their graphics
- Displaying and printing current alarms
- Connection between local and remote computer via telephone line (Modem)
- Switching units ON / OFF
- Changing setpoint.

Remote control

Compatibility with supervisory systems is becoming increasingly important in the HVAC industry. The unit controller allows easy interfacing with BMS (Building Management Systems), the external world that may be:

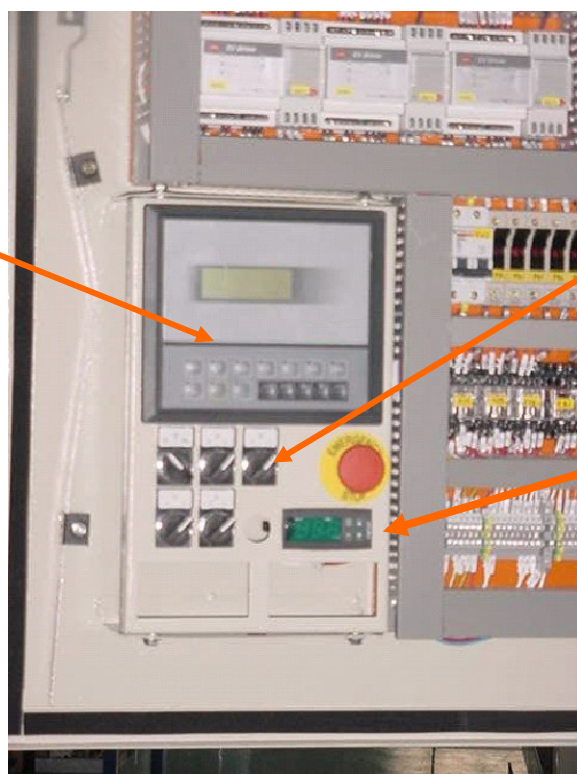
- fully compatible with Siemens, Johnson;
- any MODBUS compatible system (Satchwell, Honeywell);
- BacNet point to point, ECHELON FTT10 (available on request).

Heat Recovery Microprocessor Control

All the units equipped with heat recovery water condensers have an additional “microprocessor control” to manage the heat recovery function of the unit.

The microprocessor is installed inside the main control box, below the key pad. (see the picture below)

**Key Pad
Chiller Operation**



**HEAT RECOVERY
OPERATION**

**Switch Selector “Q7”
“0” Cooling Mode
“1” Heat Recovery
Mode**

**Heat Recovery
Microprocessor
Control**

Carel type “ IR32”

We use two different models of microprocessor control.

IR32W	units with two heat recovery condensers
IR32Z	units with three or four heat recovery condensers

Both models are equipped with NTC PT100 temperature sensors to control the inlet water temperature of the heat recovery condenser and to measure the hot outlet water temperature.

The temperature sensors are supplied electrically connected to the microprocessor but not fitted in the pipe well pockets; the installation must be done locally by the installer.

The identification of the sensors goes as follows:

“W10” to be installed at the condenser inlet
“W11” to be installed at the condenser outlet

Function

When the heat recovery mode is enabled by the selector switch Q7, if the sensor “W10” reads a water temperature value below the current setpoint, the control will allow the first stage to switch the four-way valve from chiller to heat recovery position.

If the setpoint temperature is not achieved, the microprocessor will activate the rest of control stages that, depending on the number of refrigerant circuits, are available. On the contrary, if the water temperature exceeds the setpoint value, the microprocessor will switch off control stages until the temperature is within the regulation band.

Of course it is mandatory that the heat recovery condenser flow switch is on, otherwise the unit will not enable the heat recovery cycle.

The Microprocessor control is normally set at the factory. To verify or change the setpoints, please refer to the user manual supplied with the unit.

Heat Recovery Operation

The units supplied with heat recovery condensers are equipped with an additional microprocessor (TC10, see electrical wiring diagram) for hot water temperature control, featuring two, three or four control stages depending on the number of heat exchangers installed on the unit (one stage per compressor). For information on how to set this microprocessor see the Specific manual supplied with the unit. The heat recovery mode is available only when

DAIKIN

there is a request for cooling while the system load can be balanced by adjusting the number of compressors running and their load condition.

To run the unit in heat recovery mode follow the points listed below:

- 1) Verify that the installation of the water flow switch was done by the installer and check the electrical connection at M3.426 and M3.427 terminal blocks inside the electrical panel
- 2) Check that the microprocessor sensor is fitted in the pocket well of the water return common header (done by the installer)
- 3) Check the set point of the return water temperature on the display of the microprocessor "TC10" (Carel IR32). Do not exceed the max allowed water temperature (see the operating limits) to avoid the shut-down of the unit on high pressure.
- 4) Switch on the water pump
- 5) Switch "ON" the selector "Q7" that allows the unit to run in heat recovery mode. If the microprocessor TC10 demands hot water, the 4 way-valve in the refrigerant circuit will switch from condenser coil function to heat recovery condenser function (first control stage) and continue to activate additional circuits until the hot water return temperature reaches the set point. In that scenario, the fan motors of the respective condenser coils are switched "OFF". Vice-versa, when the microprocessor is reducing the number of control stages, the 4 way-valve changes the refrigerant circuit from the heat recovery condenser to the condenser coil, while also switching on the respective fan motors.
- 6) In case of lack of water in the heat recovery condenser, the unit is automatically put in cooling mode only.

Standard controls

High pressure control

The high pressure switch will shut-down the compressor when the discharge pressure exceeds the setting point value.

Phase/voltage monitor

The phase/voltage monitor is a device which provides protection against three-phase electrical motor fault conditions such as power failure, phase failure, and phase reversal. Whenever any of these conditions occur, an open contact signal is sent to the microprocessor which then de-energizes all inputs. Once power is restored, contacts close and the microprocessor enables compressors for operation. When three-phase power has been applied, the output relay should close and the "run light" should turn on. If the output relay does not close, perform the following tests:

1. Check the voltages between L1-L2, L1-L3 and L2-L3 (L1, L2, L3 are the three phases). These voltages should be even and within + 10% of the rated three-phase line-to-line voltage.
2. If these voltages are extremely low or widely unbalanced check the power system to determine the cause of the problem.
3. If the voltages are good, using a phase tester, verify that phases are in A, B, C sequence for L1, L2 and L3. Correct rotation is required for compressor operation. If it is necessary to correct the phase sequence, turn off the power supply and interchange any two of the supply power leads wired to the main disconnect switch. This may be necessary as the phase voltage monitor is sensitive to phase reversal. Turn on the power. The output relay should now close after the appropriate delay.

Heat Recovery Microprocessor Set-up

The units supplied with heat recovery condensers are equipped with an additional microprocessor (TC10, see electrical wiring diagram) for hot water temperature control, featuring two, three or four control stages depending on the number of heat exchangers installed on the unit (one stage per compressor). For information on how to set this microprocessor see the specific manual supplied with the unit.

The most important set-up values are given below. Please see the microprocessor manual for further details.

ITEM	Description	Setpoint
St1	Inlet water temperature set point	Max 50
St2		N/A
CO	Operating Mode	1
P1	Differential Set point	2
P2		N/A
C4	Authority	0.5
C5		1
C6		0
C7		3
C8		5
C9		0
C10		0
C11		0
C12		20"
C13		1
C14		0
C15		0
C16		100
C17		5
C18		0
C19		0
C21		30
C22		43
C23		N/A
C24		N/A
P25		8
P26		55
P27		2
P28		20
C29		4
C30		N/A
C31		0
C32		1
C33		0
C50		4
C51		0

System Maintenance

General

To ensure proper operation at peak capacity and to avoid damage to system components, a periodic inspections program should be set up and followed. The information given below is intended as a guide to be used during inspection and must be combined with observation of compressor sound and good electrical practices to ensure trouble-free performance. The sight-glass indicator in the liquid line of every circuit must be checked to verify the glass is full and clear. If the indicator shows a wet condition and/or there are bubbles in the sight-glass, even when the system has a full refrigerant charge, the filter-dryer element must be changed.

Compressor maintenance

The screw compressor does not required frequent maintenance. However, a vibration test is an excellent check for proper mechanical operation. Compressor vibration indicates that maintenance is required as it adversely affects the performance and efficiency of the unit. It is recommended that the compressor be checked with a vibration analyser at or shortly after start-up and again on an annual basis. When performing the test, the load should be maintained as close to the rated load as possible. The vibration analysis provides a fingerprint of the compressor

and, if performed on a routinely basis, can give a warning on impending problems. The compressor is supplied with a cartridge oil filter. It is a good practice to replace this filter anytime the compressor is opened for service.

Electrical control

Warning: Electric shock hazard. Turn off all electrical power supplies before attempting electrical service as described below.

Caution: It is necessary to de-energize the complete electrical panel, including crankcase heater, before doing any servicing inside.

Prior to attempting any service on the control panel, it is advisable to study the wiring diagram and understand the operation system of the water chiller. Electrical components do not require any special maintenance other than a monthly tightening of cable connections.

Warning: The warranty becomes void if the wiring connection to the unit is not in accordance with the specification. A blown fuse or tripped protector indicates that a short, ground or overload condition exists.

Before replacing the fuse or restarting the compressor, the cause of the problem must be found and corrected. It is important to have a qualified electrician service this panel. Unqualified tampering with the controls may cause serious damage to the equipment and makes the warranty void.

Refrigerant sight-glass

The refrigerant sight-glasses should be observed periodically (a weekly observation should be adequate). A clear liquid sight-glass indicates that the system is charged with the correct amount of refrigerant to ensure proper feed through the expansion valve. Bubbling refrigerant in the sight-glass, during stable running conditions, indicates that the system may be short of refrigerant charge. Refrigerant gas flashing in the sight-glass might also indicate an excessive pressure drop in the liquid line, possibly due to a clogged filter-dryer or a restriction elsewhere in the liquid line. If sub-cooling is low add refrigerant to make the sight-glass clear. If sub-cooling is normal and flashing is visible in the sight-glass, replace the filter-dryer. The moisture condition of the refrigerant is indicated by the changing color of the element inside the sight-glass. If the sight-glass does not indicate a dry condition after about 3 hours of operation, the unit should be pumped down and the filter-dryers changed.

The following table is a guide to determinate the dry or wet condition of the system:

COLOUR	MEANS
Green (Sky Blue)	Dry
Yellow (Pink)	Wet

Filter-dryers

A replacement of the filter-dryer is recommended during scheduled service maintenance of the unit when, even if sub-cooling temperature is normal, bubbles can be seen in the sight-glass. The filter-dryer should also be changed if the colour of the moisture indicator in the sight-glass shows excessive humidity content. During the first few months of operation, it might be necessary to replace the filter dryer if bubbles appear in the liquid line as explained before. Any residual particles from the unit working process, compressor and miscellaneous components are carried over by the refrigerant into the liquid line and retained by the filter-drier.

To change the filter drier, close the manual liquid line shutoff valve and pump the unit down by opening the switches Q1, Q2 (ON/OFF switches of compressors) in "off" position.

Move the ON/OFF unit switch Q0 to the "off" position.

Close the suction line valve. Remove and replace the filter-drier. Evacuate the liquid line through the manual shutoff valve to remove non-condensable that may have entered during filter replacement.

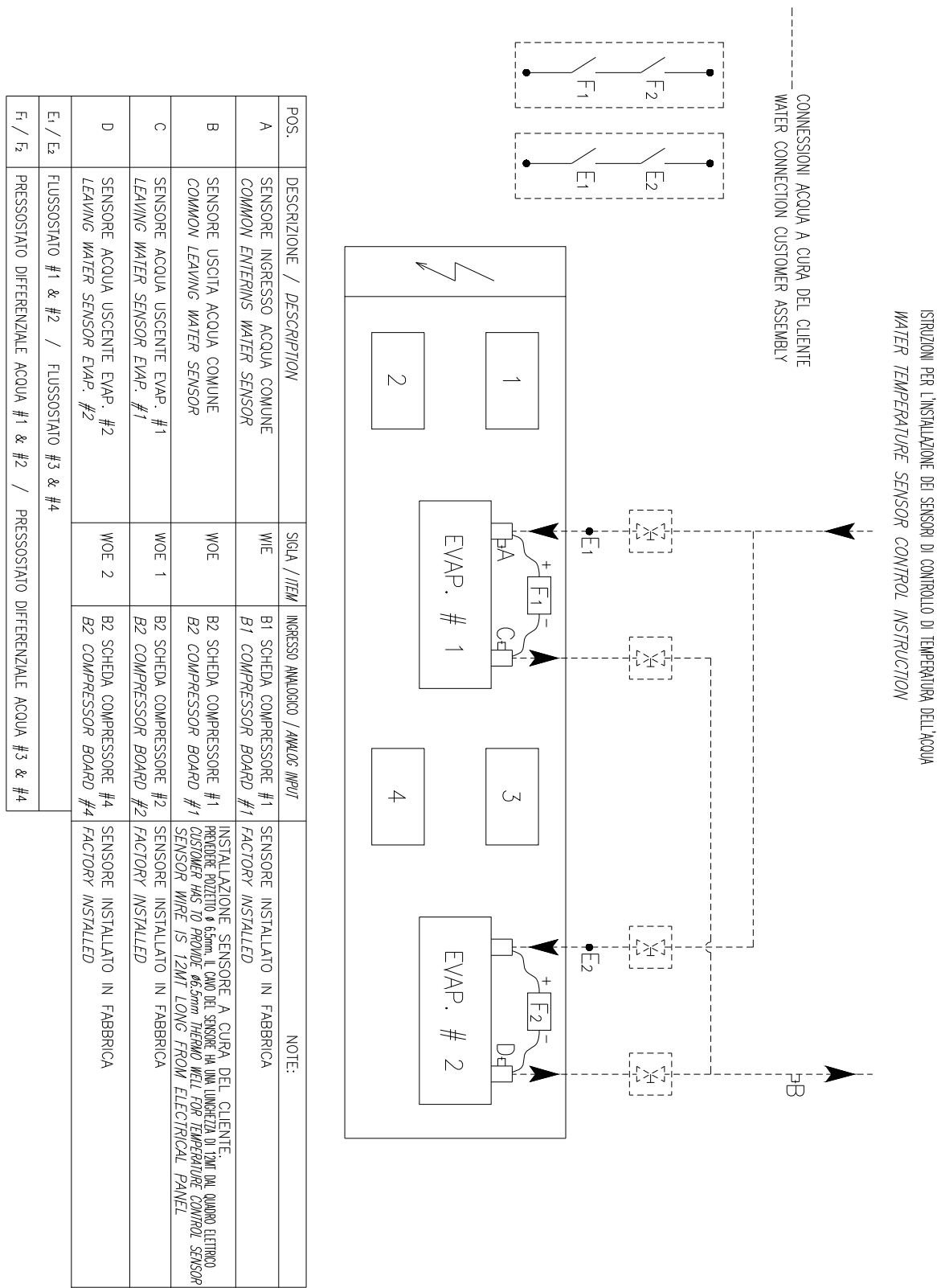
Open the suction line valve; open the liquid line manual shutoff valve. A leak check is recommended before putting the unit in operation.

Electronic expansion valve

The air-cooled chiller is equipped with the most advanced electronic expansion valve, thus achieving precise control of refrigerant mass flow. As today's systems require improved energy efficiency, tighter temperature control, and wider range of operating conditions, and incorporate features like remote monitoring and diagnostics, the application of electronic expansion valves becomes mandatory. The electronic expansion valve has features that make it unique: short opening and closing time, high accuracy, positive shut-off function that eliminates the need for an additional solenoid valve, highly linear flow capacity, continuous modulation of mass flow without stress in the refrigerant circuit and corrosion-resistant stainless steel body.

Evaporator

The units are supplied with optimized counter-flow evaporator, single refrigerant pass. It is direct expansion type (2 evaporators for units with 4 compressors), with refrigerant inside the tubes and water outside (shell side), carbon steel tube sheets, and straight copper tubes, that are spirally wound internally for higher efficiency, expanded on the tube plates. The external shell is linked to an electrical heater that prevents freezing at ambient temperatures as low as -28°C and is energized by a thermostat and covered with a closed cell insulation material. Each evaporator has 2, 3 or 4 refrigerant circuits, one for each compressor. Each evaporator is manufactured in accordance with PED standards. Normally, no service work is required on the evaporator.



Heat Recovery Condensers

Condensers are easy-to-clean shell and through-tube type. Standard configuration is 2 passes. The unit has completely assembled independent exchangers, one per circuit. Each heat recovery condenser has integrally-finned high-efficiency seamless copper tubes, roll-expanded into heavy carbon steel tube sheets. Water heads are removable and include vent and drain plugs. The condensers are equipped with spring-loaded relief valves.

The condenser is designed to comply with PED standards. Waterside working pressure is designed as 10.5 bar. Standard configuration on water connection side is 2 passes.

The installer must provide both inlet and outlet water connection headers for all heat recovery condensers installed on the unit, and provide the flow switch as well. All the heat recovery condensers must be connected together in parallel. A temperature sensor, supplied with the unit, must be installed on the inlet water pipe for control of the heat recovery cycle.

Condenser coil fans

The condenser fans are helical type with wing-profile blades for a better performance. The direct coupling to the electrical motor helps reduce vibrations during operation. The three-phase motors are supplied with IP54 protection as standard (Insulation class F); they are protected against overloading and short circuits by circuit breakers located inside the electrical control panel.

Air-cooled condenser (Condensing coil)

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

No maintenance is normally required except for occasional removal of dirt and debris from the outside surface of the fins. DAIKIN recommends the use of foaming coil cleaners available at air conditioning supply outlets. Use caution when selecting such cleaners as some may contain potentially harmful chemical. Care should be taken not to damage the fins during cleaning.

Lubricating oils

In addition to lubricating the bearing and other moving parts, the oil has the equally important task of sealing the clearances between the rotors and other potential leakage paths, thus improving pumping efficiency; the oil also helps dissipate the heat of compression. The amount of oil injected is therefore well in excess of that required for lubrication alone. To reduce the oil circulation in the refrigerant circuit, the oil separator is installed on the compressor discharge line.

Lubricating oil approved by DAIKIN is mentioned on the compressor label.

The oil pressure transducer monitors the oil injection pressure in the compressor. If the oil pressure value is below the setpoint for microprocessor control, the compressor stops.

The oil pressure is generated by the discharge pressure; therefore this must maintain a minimum value, which will increase as the suction pressure increases, so that the required pressure difference is maintained.

Crankcase and oil separator heaters

The function of the Oil separator heaters is to prevent oil dilution with refrigerant during compressor shutdown, which would cause foaming and consequent reduction in lubricating oil flow to the moving parts. Electric heaters are energized every time the compressors shuts-down.

Warning: Make sure that the heaters have been energized at least 12 hours prior to the start-up.

Refrigerant

Refrigerant charging

These air-cooled screw chillers have been factory-charged with a full operating charge of refrigerant; however, there might be times when the unit must be recharged at the jobsite. Follow these recommendations when charging in the field. Refer to the unit operating charge found in the table of physical data, pages 9 through 15, according to the version of the unit, either chiller or heat recovery. The optimum charge is the charge that allows the unit to run with no flashing in the liquid line at any operating conditions. When the liquid line temperature does not drop with the addition of 2,0-4,0 kg of charge and the discharge pressure goes up by 20-35 kPa then the sub-cooler is nearly full and proper charge has been reached. Unit can be charged at any steady load condition, at any outdoor ambient temperature. Unit must be allowed to run for 5 minutes or longer so that the condenser fan

staging is stabilized at normal operating discharge pressure. For best results charge the unit with 2 or more condenser fans operating per refrigerant circuit.

In case moisture is detected in the moisture indicator, the system must be evacuated to eliminate the cause of trouble. After the problem has been solved, the system must be dried by making an almost perfect vacuum. For this purpose, a displacement vacuum pump should be used.

When the system has been opened for extensive repairs, such as an overhaul, the following evacuation procedure is advised:

1. Evacuate the refrigerant system by means of a vacuum pump until the value 200 Pa (1,5 mm Hg) is reached.
2. Break the vacuum with nitrogen until the atmospheric pressure is reached.
3. Repeat operations 1 and 2 for two times.
4. Evacuate the refrigerant system until the value of 66,5 Pa is reached.

The dry nitrogen, used to break the vacuum, will absorb any moisture and air left in the system, and they will be almost completely removed after three evacuations. If burnt oil or sludge are found in the refrigerant circuit (caused by the compressor motor burn-out), it will be necessary to carefully clean the system, before attempting the vacuum operation, by using the filter dryer clean-out method, which basically involves the use of special filter dryers including a suitable desiccant in both the liquid and suction lines.

Excessive refrigerant losses can also cause leak of oil from the system. Check the oil level during operation and ensure that oil is visible in the top sight-glass of the oil separator.

1. If the unit is slightly undercharged, it will show bubbles in the sight-glass. Recharge the unit.
2. If the unit is moderately undercharged, it will, most likely, trip on freeze protection. Recharge the unit as described in the charging procedure below.

Procedure to charge a moderately undercharged unit

1. If a unit is low on refrigerant, you must first determine the cause before attempting to recharge the unit. Locate and repair any refrigerant leak. Evidence of oil is a good indicator of leakage; however, oil might not be visible in all cases. Liquid leak detector fluids work well to show bubbles in medium size leaks but electronic leak detector may be needed to locate small leaks.
2. Add the charge to the system through the valve on the evaporator inlet pipe, between the expansion valve and the evaporator head. Follow the procedure described in "Refrigerant charging".
3. The charge can be added at any load condition.

Charging the refrigerant

1. Connect the refrigerant bottle with a filling pipe to the filling valve on the evaporator head. Before firmly tightening the refrigerant bottle valve, open it and force the air out of the filling pipe. Tighten the charging valve connection and fill the refrigerant.
2. When the refrigerant stops flowing into the system, start the compressor and complete the refrigerant charge.
3. If you do not know how much refrigerant has to be added, shut off the bottle valve every 5 minutes and continue to charge the refrigerant until the sight glass is clear and free of bubbles.

Note: Do not discharge the refrigerant into the atmosphere. To recover it, use empty, clean and dry bottles. The liquid refrigerant recovery can be made through the valve provided on the condenser coil sub-cooler outlet. To facilitate the recovery of refrigerant, put the bottle inside a container full of ice; avoid excessive filling of the bottle (70÷80% max).

Preventive maintenance schedule

Operation Ref. No.	TYPE OF OPERATION	SCHEDULE			
		Weekly	Monthly	Six-Monthly	Yearly
1	Reading and recording of suction pressure	X			
2	Reading and recording of discharge pressure	X			
3	Reading and recording of supply voltage	X			
4	Reading and recording of current intensity	X			
5	Check the circuit for refrigerant charge and possible moisture by observing the liquid sight glass	X			
6	Check the suction temperature and the superheating		X		
7	Check setting and operation of safety devices		X		
8	Check setting and proper operation of control devices			X	
9	Inspect the condenser for possible scaling or damages				X

Start-up and shut-down

Start-up

- Verify that all shut-off valves are open.
- Prior to starting the unit, open the water circulation pump(s) and regulate the flow through the evaporator and through the heat recovery condensers (if supplied) in accordance with the working conditions of the unit. If no flow meter is available in the water system, it is recommended to adjust the water flow, as a first step, by establishing the corresponding differential pressure drop across the heat exchangers as specified in the pressure drop diagram. The final set up will be done, when the unit is running, by adjusting the water flow to reach the water "ΔT" at full load.
- Verify that both evaporator inlet and outlet water temperature sensors indicate the same temperature as the local thermometers, or the discrepancy does not exceed 0,1 °C.
- Verify that the inlet water temperature sensor of the heat recovery condenser (if supplied) has been installed in a well pocket on the common pipe and indicates the same temperature as the local thermometer, or the discrepancy does not exceed 0,1 °C.
- Verify that the flow switch(es) is(are) connected to the electrical panel at the terminal blocks M3.8 – M3.23 for the evaporator and M3.426 – M3.427 for heat recovery condensers (if supplied).
- Check the electrical power connection to the electrical panel and put all the switches in "OFF" position. Switch "ON" the main switch isolator "Q10" and the selector "Q12". In this way the electric heaters of the compressors and the oil separators are energized.
- Check if the software installed on the microprocessor corresponds to the unit type and make sure that the setpoints are correct. See the controller operating manual for instructions
- Turn the selector switch Q0 to "Local" position. For normal unit operation, if the unit is controlled remotely, switch Q0 to "remote" position.
- Push the "on/off" button on the keypad and wait for the green light.
- Before turning the Q1 selector to ON position, check that the Q10 and Q12 have been switched ON at least 12 hours before. The controller, if there is a cooling load demand, will start the corresponding compressor. Repeat the sequence for Q2, Q3, Q4 selectors depending on the number of compressors installed.

Operational Shut-down

- Push the "On/Off" button on the keypad, or use remote switch, to de-energize the unit. The green light will turn off and all the compressors will carry out their pump-down cycle and then stop.
- Switch off the water pumps

Seasonal Shut-down

- Turn the Q1 selector to Off position. The compressor will carry out its pump-down cycle and then stop.
- Repeat the sequence for all the selectors Q2, (Q3 and Q4) to stop all the other compressors.
- Switch the "Q0" selector from "Local" to off position.

- Push the “On/Off” button on the keypad to de-energize the unit, green light becomes off.
- Open the circuit breaker Q12 to stop the auxiliary circuit.
- Open the main switch Q10 to disconnect the power supply to the unit. In this condition the oil electric heater is off. When you restart the unit, before switching on the compressors, wait for at least 12 hours to warm up the oil.
- Close the shut-off valves of the refrigerant circuits.
- Switch off the water pumps
- Empty the water heat exchangers or fill them with glycol for freeze protection.

Maintenance Shut-down

- Turn the Q1 selector to Off position. The compressor will carry out its pump-down cycle and then stop.
- Repeat the sequence for all the selectors Q2, (Q3 and Q4) to stop all the other compressors.
- Switch the “Q0” selector from “Local” to off position.
- Push the “On/Off” button on the keypad to de-energize the unit, green light become off.
- Open the circuit breaker Q12 to stop the auxiliary circuit.
- Open the main switch Q10 to disconnect the power supply to the unit. In this condition the oil electric heater is off. When you restart the unit, before switching on the compressors, wait for at least 12 hours to warm up the oil.
- Close the shut-off valves of the refrigerant circuits.
- Switch off the water pumps
- Service the unit in accordance with the program

Procedure to return materials under warranty

Material may not be returned except with permission from DAIKIN Service department. A "Returned Goods" tag will be included with the returned material to expedite handling at our factory. Return of the parts does not constitute an order for replacement. Therefore, a purchase order must be entered through our nearest Sales Representative. The order should include part name, part number, model number and serial number of the unit involved. After DAIKIN inspection of the returned part, if the failure is due to faulty material or workmanship, credit will be issued on the customer's purchase order. All defective parts shall be returned to DAIKIN factory, transportation charges prepaid.

Service & replacement parts

Always report the model number, acknowledgement number and the unit serial number stamped on the nameplate, whenever ordering maintenance service or replacement parts.

When ordering replacement parts, state the installing date of the machine and the date of the failure. For an exact definition of the replacement part requested, please mention the respective code number or, should this not be possible, attach a description of the part being requested.

Troubleshooting chart

PROBLEM	POSSIBLE CAUSES	POSSIBLE CORRECTIVE STEPS
Compressor will not run	<ol style="list-style-type: none"> 1. Main power switch open. 2. Unit system switch open. 3. Circuit switch in pump-down position. 4. Evaporator flow switch not closed. 5. Circuit breakers open. 6. Fuse blown or circuit breakers tripped. 7. Unit phase voltage monitor not satisfied. 8. Compressor overload tripped. 9. Defective compressor contactor or contactor coil. 10. System shut down by safety devices. 11. No cooling required. 12. Motor electrical trouble. 13. Loose wiring. 	<ol style="list-style-type: none"> 1. Close switch. 2. Check unit status on Control Panel. Close switch. 3. Check circuit status on Control Panel. Close switch. 4. Check unit status on Control Panel. Close switch. 5. Close circuit breakers. 6. Check electrical circuits and motor windings for shorts or grounds. Investigate the possibility of overload. Check for loose or corroded connections. Reset breakers or replace fuses after fault is corrected. 7. Check unit power wiring to unit for correct phasing. Check voltage. 8. Overloads are reset manually. Reset overload button. Clear alarm on Microprocessor. 9. Check wiring. Repair or replace contactor. 10. Determine type and cause of shutdown and correct problem before attempting to restart. 11. Check control settings. Wait until unit calls for cooling. 12. See 6, 7, 8 above. 13. Check circuits for voltage at required points. Tighten all power wiring terminals.
Compressor Overload Relay Tripped or Circuit Breaker Tripped or Fuses Blown	<ol style="list-style-type: none"> 1. Low voltage during high load condition. 2. Loose power wiring. 3. Power line fault causing unbalanced voltage. 4. Defective or grounded wiring in the motor. 5. High discharge pressure. 	<ol style="list-style-type: none"> 1. Check supply voltage for excessive voltage drop. 2. Check and tighten all connections. 3. Check supply voltage. 4. Check motor and replace if defective. 5. See corrective steps for high discharge pressure.
Compressor noisy or vibrating	<ol style="list-style-type: none"> 1. Compressor internal problem. 2. Oil injection not adequate. 	<ol style="list-style-type: none"> 1. Contact DAIKIN. 2. Contact DAIKIN.
Compressor will not load or unload	<ol style="list-style-type: none"> 1. Defective capacity control. 2. Unloader mechanism defective. 3. Control solenoids defective. 	<ol style="list-style-type: none"> 1. See Capacity control section. 2. Replace. 3. Replace.

Troubleshooting chart

PROBLEM	POSSIBLE CAUSES	POSSIBLE CORRECTIVE STEPS
High discharge pressure.	<ol style="list-style-type: none"> 1. Discharge shutoff valve partially closed. 2. Non condensable in the system. 3. Fans not running. 4. Fan control out of adjustment. 5. Heat recovery condensers dirty. 6. System overcharged with refrigerant. 7. Dirty condenser coil. 8. Air re-circulation from outlet into unit coils. 9. Air restriction in the unit. 	<ol style="list-style-type: none"> 1. Open shutoff valve. 2. Purge the non condensable from the condenser coil after shutdown. 3. Check fan fuses and electrical circuits. 4. Check that unit set-up in Microprocessor matches the unit model number. Check Microprocessor condenser pressure sensor for proper operation. 5. Clean the condenser tubes by mechanical or chemical tools 6. Check for excessive sub-cooling. Remove the excess charge. 7. Clean the condenser coil. 8. Remove the cause of re-circulation. 9. Remove obstructions near unit.
Low discharge pressure	<ol style="list-style-type: none"> 1. Wind effect at low ambient temperature. 2. Condenser fan control not correct. 3. Low suction pressure. 4. Compressor operating unloaded. 	<ol style="list-style-type: none"> 1. Protect unit against excessive wind into vertical coils. 2. Check that unit set-up in Microprocessor matches the unit model number. 3. See Corrective steps for low suction pressure. 4. See Corrective steps for failure to load.
Low suction pressure	<ol style="list-style-type: none"> 1. Inadequate refrigerant charge quantity. 2. Evaporator dirty. 3. Clogged liquid line filter-drier. 4. Expansion valve malfunctioning. 5. Insufficient water flow to evaporator. 6. Water temperature leaving evaporator is too low. 7. Evaporator head ring gasket slippage. 	<ol style="list-style-type: none"> 1. Check liquid line sight-glass. Check unit for leaks. 2. Carry out chemical cleaning. 3. Replace. 4. Check expansion valve superheat and valve opening position. Replace the valve only if certain that the valve is not working. 5. Check water pressure drop across the evaporator and adjust the flow. 6. Adjust water temperature to higher value. 7. Low suction pressure and low superheat both present may indicate an internal problem. Consult factory.
High suction pressure	<ol style="list-style-type: none"> 1. Excessive load - high water temperature. 2. Compressor unloaders open. 3. Superheat is too low. 	<ol style="list-style-type: none"> 1. Reduce load or add additional equipment. 2. See Corrective Steps below for failure of compressor to load. 3. Check superheat on Microprocessor display. Check suction line sensor installation and the sensor itself.
Unit doesn't switch in Heat Recovery operation Mode	<ol style="list-style-type: none"> 1. "Q7" selector switch doesn't work. 2. No Heating load required. 3. Flow switch not operating. 4. 4-way solenoid valve not working. 5. "W10" sensor element not fixed in the well pocket. 6. "W10" sensor element gives wrong signal. 7. "TC10" Microprocessor control doesn't work. 	<ol style="list-style-type: none"> 1. Replace the selector switch 2. Add additional equipment. 3. Check water pump. 4. Check the solenoid valve and if the 4-way valve is blocked. Replace the wrong components. 5. Fix the element in the well pocket properly. 6. Replace the element. 7. Check the supply connections or replace them.

Air-cooled screw chillers

EWAD 650-C18BJYNN
EWAD 550-C12BJYNN/Q
EWAD 650-C21BJYNN/A
EWAD 600-C10BJYNN/Z



Daikin units comply with the European regulations that guarantee the safety of the product.



Daikin Europe N.V. is participating in the EUROVENT Certification Programme. Products are as listed in the EUROVENT Directory of Certified Products.

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