

OWNER'S & INSTALLATION MANUAL

Split Mini Chiller

Thank you very much for purchasing our air conditioner,
please read this installation&owner's manual carefully before using your air conditioner.

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The following symbols are used in this publication and inside the unit:



User



Important



Danger moving blades



Installer



Prohibition




Danger high temperatures



Assistance



Danger voltage

 These units have been designed to chill and/or heat water and must be used in applications compatible with their performance characteristics; these appliances are designed for residential or similar applications.

Incorrect installation, regulation and maintenance or improper use absolve the manufacturer from all liability, whether contractual or otherwise, for damage to people, animals or things. Only those applications specifically indicated in this list are permitted.

Read this manual carefully. All work must be carried out by qualified personnel in conformity with legislation in force in the country concerned.

The guarantee is invalidated if the above instructions are not respected and if the unit is started up for the first time without the presence of personnel authorised by the Company (where speci-


fied in the supply contract) who should draw up a “start-up” report.

The documentation supplied with the unit must be consigned to the owner who should keep it carefully for future consultation in the event of maintenance or service.

All repair or maintenance work must be carried out by the Company's Technical Service or qualified personnel following the instructions in this manual. The air-conditioner must under no circumstances be modified or tampered with as this may create situations of risk. Failure to observe this condition absolves the manufacturer of all liability for resulting damage.

FUNDAMENTAL SAFETY RULES

When operating equipment involving the use of electricity and water, a number of fundamental safety rules must be observed, namely:

 This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Do not touch the unit with bare feet or with wet or damp parts of the body

Do not carry out cleaning operations without first disconnecting the system from the electricity supply.


Do not modify safety or regulation devices without authorisation and instructions from the manufacturer.


Do not pull, detach or twist the electrical cables coming from the unit, even when disconnected from the mains electricity supply.

Do not open doors or panels providing access to the internal parts of the unit without first ensuring that the mains switch is in the off position.


Do not introduce pointed objects through the air intake and outlet grills.

Do not dispose of, abandon or leave within reach of children packaging materials (cardboard, staples, plastic bags, etc.) as they may represent a hazard.

 The chiller appliances are supplied without the main switch. The power supply to the unit must be disconnected using a suitable main switch that must be supplied and installed by the installer.

 Respect safety distances between the unit and other equipment or structures. Guarantee adequate space for access to the unit for maintenance and/or service operations;

Power supply: the cross section of the electrical cables must be adequate for the power of the unit and the power supply voltage must correspond with the value indicated on the respective units. All units must be earthed in conformity with legislation in force in the country concerned.

 Hydraulic connections should be carried out as indicated in the instructions to guarantee correct operation of the unit. Empty the water circuit or add glycol if the unit is not used during the winter. Handle the unit with the utmost care to avoid damage.

These air cooled reverse-cycle chillers with axial-flow fans operate with refrigerant fluid and are suitable for outdoor installation. The units conform to the essential requisites of 2004/108/EC

They are factory tested and on site installation is limited to water and electrical connections.

STRUCTURE

Panels and base are made from galvanised steel plate painted with epoxy powder to ensure total resistance to atmospheric agents. Condensate collection pan as standard.

COMPRESSORS

Digital scroll compressor with crankcase heater and thermal cut-out .

EVAPORATOR

AISI 316 stainless steel plate type evaporator complete with electric heater and differential pressure switch.

Casing lined with anti-condensate closed cell neoprene cladding.

PUMPS

The units feature a pump with the moving parts in contact with the water made from corrosion resistant materials, extra wear ring on the impeller, built-in capacitor for high starting torque and automatic venting of impeller chamber.

PUMP ASSEMBLY

Pump assembly with expansion tank, auto-water replenishing assembly, pump.

CONDENSING COILS

Made from copper tubes and high surface area aluminium fins. Condensing coil protection grills as standard.

FANS

Axial-flow fans. Six-pole electric motor with built-in thermal cut-out. Housed in aerodynamic tubes with accident prevention grill. Device for operation with low outside air temperatures: continuous fan rotation speed control via condensing temperatures transducer.

POWER AND CONTROL ELECTRICAL PANEL

Power and control electrical panel constructed in accordance with IEC 204-1/EN60335-2-40, complete with compressor contactor. Control via "HSW7" control panel.

EMERGENCY STOP PUSHBUTTONS

In case system crisis is occur (e.g: Compressor out of control), press the emergency etop pushbuttons at once, and turn it clockwise, until crisis is removed.

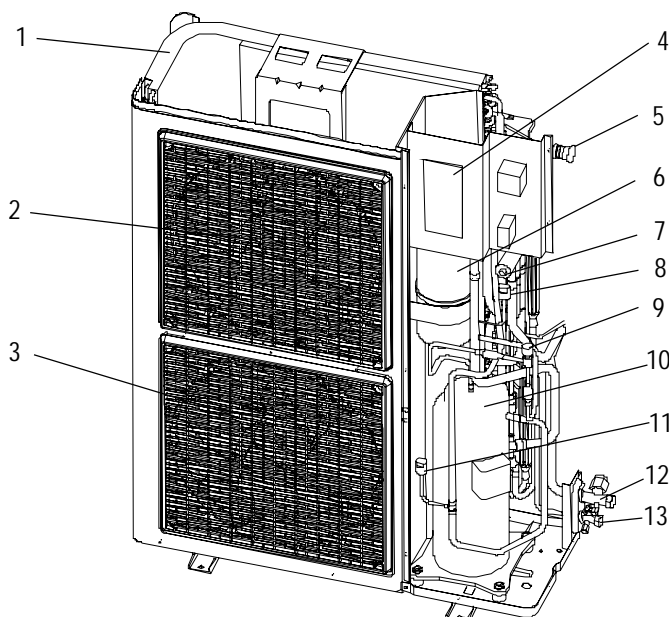
OPTIONAL ACCESSORIES

- Removable metal mesh filter.
- Remote keyboard kit.

The above accessories are optional. Consult the relative documentation for assembly instructions and technical data.

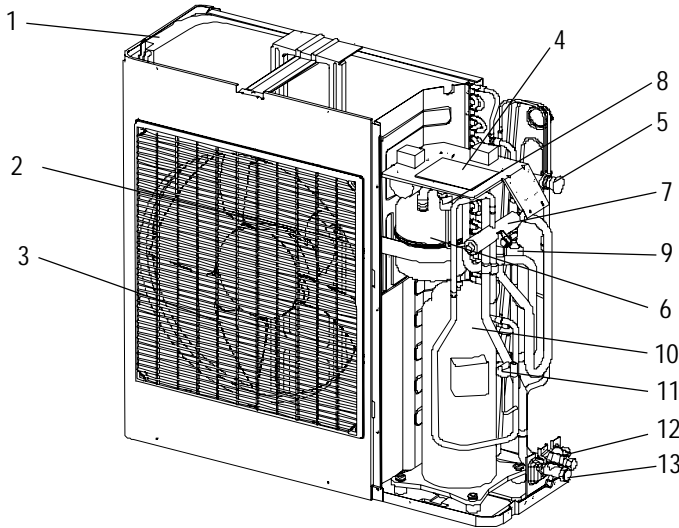
OUT UNIT

Model 12 14 16kw



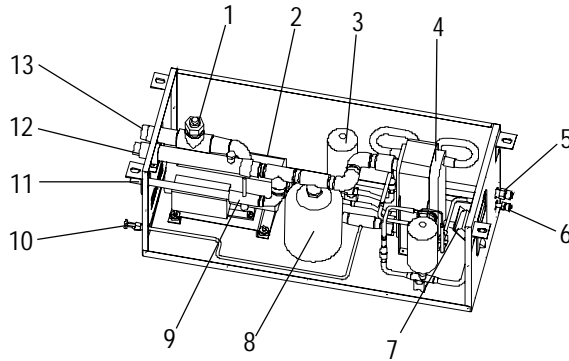
- 1 Condenser
- 2 Motor
- 3 Axial-flow fan
- 4 Electrical panel
- 5 Emergency Stop Pushbuttons
- 6 Liquid receiver
- 7 4-way valve
- 8 Low pressure switch
- 9 Solenoid valve
- 10 Compressor
- 11 High pressure switch
- 12 Gas side
- 13 Liquid side

Model 10kw



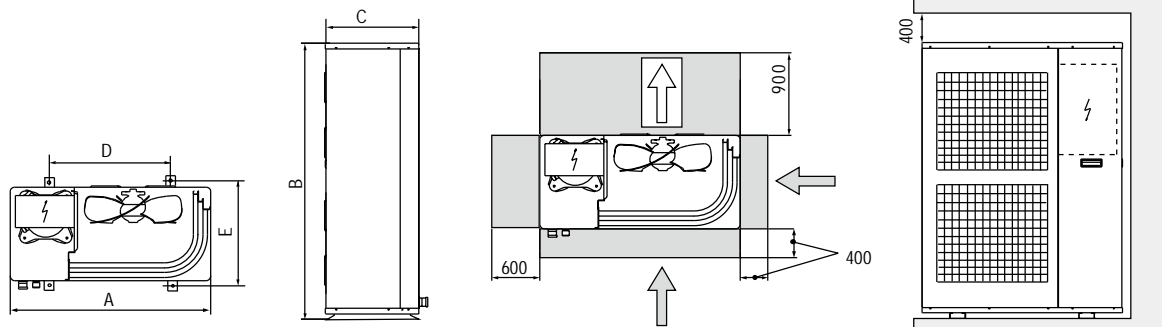
- 1 Condenser
- 2 Motor
- 3 Axial-flow fan
- 4 Electrical panel
- 5 Emergency Stop Pushbuttons
- 6 Accumulator
- 7 4-way valve
- 8 Low pressure switch
- 9 Solenoid valve
- 10 Compressor
- 11 High pressure switch
- 12 Liquid side
- 13 Gas side

Water pump container



- 1 Flow switch
- 2 Pump
- 3 Liquid receiver
- 4 Plate heat exchanger
- 5 Gas side
- 6 Liquid side
- 7 Electrical panel
- 8 Expansion tank
- 9 Auto-water replenishing
- 10 Water discharge
- 11 Auto-water pipe
- 12 Water inlet
- 13 Water outlet

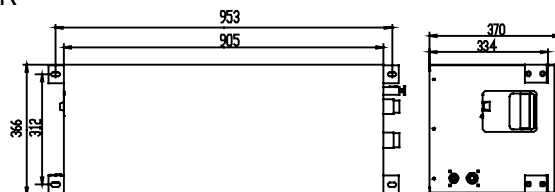
OUT UNIT



mm

Dimension	10KW	12KW	14KW	16KW
A	990	940	940	940
B	966	1250	1250	1250
C	340	340	340	340
D	624	600	600	600
E	366	376	376	376

WATER PUMP CONTAINER



CHOICE OF INSTALLATION SITE

Before installing the unit, agree with the customer the site where it will be installed, taking the following points into consideration:

- check that the fixing points are adequate to support the weight of the unit;
- pay scrupulous respect to safety distances between the unit and other equipment or structures to ensure that air entering the unit and discharged by the fans is free to circulate.

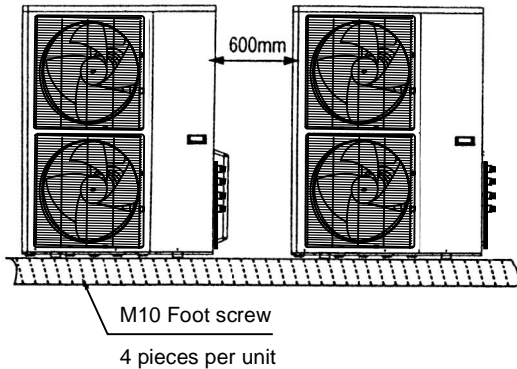
POSITIONING

Before handling the unit, check the capacity of the lifting equipment used, respecting the instructions on the packaging. To move the unit in the horizontal, make appropriate use of a lift truck or similar, bearing in mind the weight distribution of the unit. To lift the unit, insert tubes long enough to allow positioning of the lifting slings and safety pins in the feet on the unit.

To avoid the slings damaging the unit, place protection between the slings and the unit. Position the unit in the site indicated by the customer. Place either a layer of rubber (min. thickness 10 mm) or vibration damper feet (optional) between the base and support surface. Fix the unit, making sure it is level and that there is easy access to hydraulic and electrical components. If the site of installation is exposed to strong winds, fix the unit adequately to the support surface using tie rods if necessary. If a heat pump unit is being installed, make sure the condensate is drained using the drain hose supplied as standard. Prevent leaves, branches or snow from accumulating around the unit. These could reduce the efficiency of the unit.

OUTDOOR UNIT INSTALLATION

- At least 600mm distance should be left between outdoor units:



REFRIGERANT PIPING

1. Refrigerant piping connection is on the right side of outdoor unit.
2. The piping connects to refrigerant piping connection.
3. Install the refrigerant piping towards left, right or back.
4. Refer to system identifiers in valve installation board for corresponding connections of indoor units.
5. Valve installation board in outdoor unit is shown on the right.

Sizes of refrigerant piping ($\phi 9.5 + \phi 19$)

Connection: refer to connection of refrigerant piping

Length and height drop permitted of refrigerant piping

			Permitted value
Maximum length of piping (L)			10m
Maximum height drop	Height drop between water pump and outdoor unit H	Outdoor unit (up)	5m
		Outdoor unit (down)	5m

Remove dirt or water in the piping

- Make sure there is no any dirt or water in the piping before connecting it to the outdoor unit.
- Please clean the piping with high-pressure nitrogen rather than refrigerant of outdoor unit.

Vacuuming with vacuum pump

- Please vacuum with vacuum pump.
- Vacuuming should be done from the gas side.

Open all valves

Refrigerant volume to be added

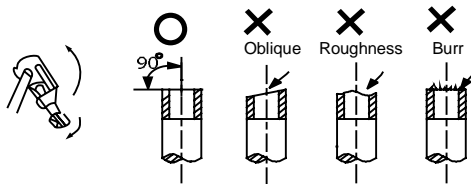
Calculate the volume according to the diameter and the length of the liquid side piping between outdoor unit and water pump container. The type of refrigerant is R410A. This unit has been charged refrigerant for 5m spiping, please refer to the table under “Expel the air” for the added volume.

The connection of refrigerant piping

Expel the air

1 Flaring

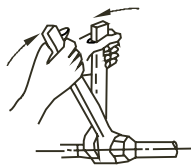
- Cut a pipe with a pipe cutter.



- Insert a flare nut into a pipe and flare the pipe.

2 Fasten the nut

- Put the connecting tubing at the proper position, wrench the nuts with hands then fasten it with a wrench.



CAUTION

Too large torque will harm the bellmouthing and too small will cause leakage.

Pipe gauge	Tightening torque	Flare dimension A (mm)		Flare shape
		min	max	
Ø6.4	15~16 N.m (153~163 kgf.cm)	8.3	8.7	
Ø9.5	25~26 N.m (255~265 kgf.cm)	12.0	12.4	
Ø12.7	35~36 N.m (357~367 kgf.cm)	15.4	15.8	
Ø15.9	45~47 N.m (459~480 kgf.cm)	18.6	19.1	
Ø19.1	65~67 N.m (663~684 kgf.cm)	22.9	23.3	

Expel the air (use A5mm hexagonal wrench)

Piping on liquid side	Method	Refrigerant volume to be added
<5m	Use refrigerant in outdoor unit	—
≥5m	Use vacuum pump or refrigerant container	60g/m X (length of piping -5m)

1. Refer to the relative contents.
2. Add refrigerant according to the table above.
If moving the air conditioner to another place, please do vacuuming with vacuum pump or refrigerant container.

Operate the stop valves

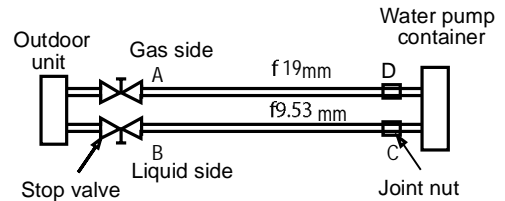
- Open the valve rod until it reaches the limiter. Do not open it any further.
- Fasten the stop valve with wrench or such tools.
- The torque is shown below:

Liquid side (f9.5):1180N-cm(120kgf.cm)

Gas side (f19.1):3540N-cm(360kgf.cm)

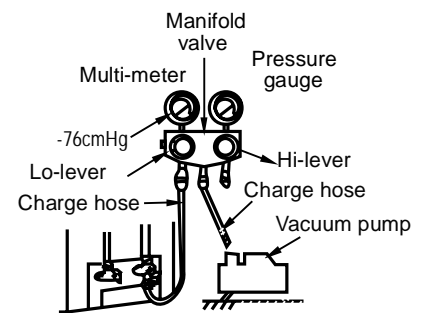
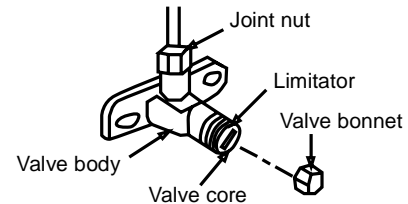
■ Expel the air with refrigerant in outdoor unit: connect the wiring between water pump container and outdoor unit, refer to the example below:

1. Totally fasten the joint nut of stop valve B and nut C and D.
2. Loosen the joint nut of stop valve A a little.
3. For 3~5m s piping, turn the valve rod of B anticlockwise to 45° for about 6~7seconds. After the air is expelled from A, fasten the joint nut of stop valve A. (Refer to former page for the torque)
4. Totally open the valve rods of stop valve A and B.
5. Totally fasten the valve bonnet.



■ Expel the air with vacuum pump (following procedures are for all the Lo-stop valve)
(Please refer to manual to the operation of manifold valve)

1. Connect the charging hose of the manifold valve with the charging inlet of the Lo-stop valve. (All the Hi-stop valves should be closed)
2. Connect the connection of charge hose with vacuum pump.
3. Totally open the Lo-lever of the manifold valve.
4. Turn on the vacuum pump. First loosen the joint nut of Lo-stop valve a little to check whether the air comes in (the noise of vacuum pump changes and the indicator of multi-meter turns to be above 0). Then fasten the joint nut.
5. After vacuuming, close the Lo-lever of manifold valve and turn off vacuum pump. When doing vacuuming for more than 15 minutes, please confirm that the indicator of multi-meter points to $-1.0 \times 10^5 \text{ Pa}$ (-76 cmHg)
6. Totally open the Hi-stop valve and Lo-stop valve.
7. Remove the charge hose from the charging inlet of Lo-stop valve.
8. Fasten the valve bonnets on Hi-stop valve, Lo-stop valve and on the charging inlet of Lo-stop valve.



■ Expel air with refrigerant container

1. Connect the charge hose of refrigerant container with charging inlet of Lo-stop valve.
2. Fasten the joint nuts C, D and the joint nut of stop valve A.
3. Loosen the joint nut of stop valve B a little.
4. Open the valve of refrigerant container, after the refrigerant air is expelled from joint nut on Hi-stop valve side for 10~15 seconds, fasten the joint nut of stop valve B.
5. Remove the charge hose from the connection of Lo-stop valve and push the air valve core with a screw driver to discharge the refrigerant from piping until there is no noise. Then put back the air valve core at once in case the air goes into the system.
6. Remove the valve bonnet and totally open the stop valve B on high-pressure side and the valve rod on low-pressure side of the outdoor unit, then fasten the valve bonnet.
7. Make sure to fasten the valve bonnets of both Hi-stop valve and Lo-stop valve.

INSTALLATION INSTRUCTIONS FOR WATER PUMP

■ Installation location

Please keep away from the following places:

- Such places where the temperature is high, and outdoor.
- There is combustible gas leakage.
- There is much salty ingredients.
- There is caustic gas such sulfide in the air. (The copper tubes and welding parts will be rusted and damaged, causing refrigerant to leak.)
- There is mineral oil, cooking oil or gasoline. (This may cause damage to plastic parts, looseness of components and leakage.
- A place that is too weak to bear the weight of water pump container.
- There is equipment that produces electromagnetic wave. (It will disturb the controlling system of air conditioner.)
- The appliance must be installed 2,3m above floor.

■ Install the refrigerant piping

CAUTION:

Check whether the height drop between water pump container and outdoor unit, the length of refrigerant piping, and the quantity of the bends meet the following requirements:

The Max. Height drop — 5m (if longer than 5m, outdoor unit should be above the water pump container.)

The length of refrigerant piping — Shorter than 10m

The quantity of bends — Fewer than 15

- Do not let air, dust, moisture or other impurities fall in the piping system during installation.
- Fix the outdoor unit and water pump container before installing the refrigerant piping.
- The refrigerant piping should not be installed until you check that the H-stop valve and Lo-stop valve or outdoor unit have been closed.

■ The procedures for connecting pipe

- 1) Connect the water inlets and water outlets of water pump container and indoor unit with soft connection and charge water into the pipe to check whether there is leakage. Then connect the outdoor unit piping. Bend the piping carefully and do not damage them.
- 2) The stop valve of the outdoor unit should be closed absolutely (as original state). Every time you connect it, remove the nut of stop valve then connect the flaring pipe immediately (with 5 minutes). Before connecting, use refrigerant to expel the air in the pipe.
- 3) Connect the Hi-stop valve and Lo-stop valve in outdoor unit to water pump container with piping. Make sure that the connection both outdoor unit and water pump container should be corresponding.
- 4) The flexible pipe should be used on water pump side.

Notice for flexible pipe:

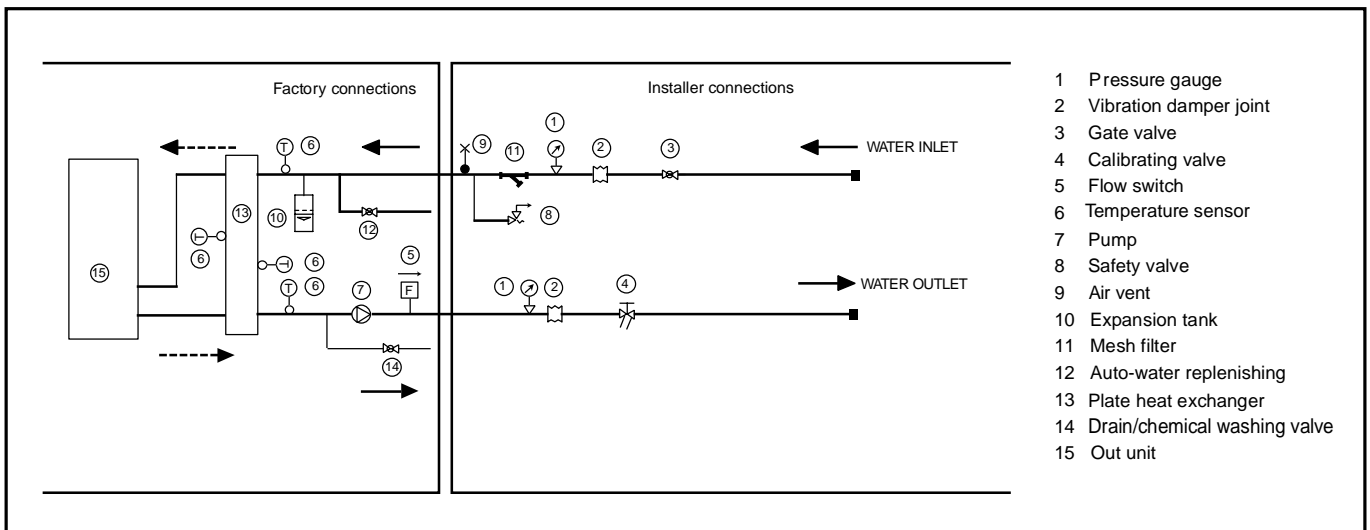
- The bending angle should not exceed 90° .
 - The bending part is preferably in the middle of the pipe, the bigger the bending radius, the better it is.
 - Do not bend the pipe more than 3 times.
- 5) Bending the connecting pipe of thin wall.
 - Cut out a desired concave at the bending part of the insulating pipe.
 - To avoid distortion or damage, please bend the pipe at its biggest radius.
 - Use bender to get a pipe with small radius.

Note: Make sure to use insulation material for the copper tube which you purchase by yourself.

The choice and installation of components is the responsibility of the installer who should follow good working practice and current legislation. Before connecting the pipes, make sure they do not contain stones, sand, rust, dross or other foreign bodies which might damage the unit. Construction of a bypass is recommended to enable the pipes to be washed through without having to disconnect the unit (see drain valves). The connection piping should be supported in such a way as to avoid it weighing on the unit. It is recommended that the following devices are installed in the water circuit of the evaporator.

A hydraulic safety valve shall be mounted in water system, which should open constantly.

1. Two pressure gauges with a suitable scale (inlet and outlet).
2. Two vibration damper joints (inlet and outlet).
3. Two gate valves (normal in inlet and calibrating in outlet).
4. A flow switch (inlet).
5. Two thermometers (inlet and outlet).
6. An inlet filter as close as possible to the evaporator and positioned to allow easy access for routine maintenance.
7. An energy-saving water tank.
8. Additional pump.



⚠ The chillers must be provided with a filling/top-up system connected to the return line and a drain cock in the lowest part of the installation. Installations containing anti-freeze or covered by specific legislation must be fitted with hydraulic disconnectors.

⚠ The manufacturer is not liable for obstruction, breakage or noise resulting from the failure to install filters or vibration dampers. Particular types of water used for filling or topping up must be treated with appropriate treatment systems. For reference values, see the table.

PH	6-8
Electrical conductivity	less than 200 mV/cm (25 °C)
Chlorine ions	less than 50 ppm
Sulphuric acid ions	less than 50 ppm
Total iron	less than 0.3 ppm
Alkalinity M	less than 50 ppm
Total hardness	less than 50 ppm
Sulphur ions	none
Ammonia ions	none
Silicon ions	less than 30 ppm

FILLING THE INSTALLATION

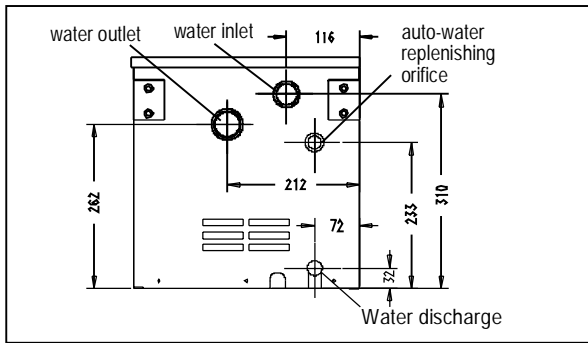
- Before filling, check that the installation drain cock is closed.
- Open all installation and terminal air vents.
- Open the gate valves.
- Begin filling, slowly opening the water filling cock outside the unit
- When water begins to leak out of the terminal air vent valves, close them and continue filling until the pressure gauge indicates a pressure of 1.5 bars.

EMPTYING THE INSTALLATION

- Before emptying, place the mains switch in the "off" position
- Make sure the installation fill/top-up water cock is closed
- Open the drain cock outside the unit and all the installation and terminal air vent valves.

SIZE AND POSITION OF CONNECTIONS

Model	10	12	14	16
Water inlet/outlet (Ø)	R5/4"	R5/4"	R5/4"	R5/4"
Auto-water replenishing(Ø)	R1/2"	R1/2"	R1/2"	R1/2"
Security discharge(Ø)	G1/2"	G1/2"	G1/2"	G1/2"
Mesh filter (Ø)	R5/4"	R5/4"	R5/4"	R5/4"
Air vent (Ø)	G3/8"	G3/8"	G3/8"	G3/8"



! The installation must be filled to a pressure of between 1 and 2 bars. It is recommended that this operation be repeated after the unit has been operating for a number of hours. The pressure of the installation should be checked regularly and if it drops below 1 bar, the water content should be topped-up. Check the hydraulic tightness of joints.

! If the fluid in the circuit contains anti-freeze, it should not be allowed to drain freely as it is pollutant. It should be collected for possible reuse. When draining after heat pump operation, take care as the water may be hot (up to 50°).

ELECTRICAL CONNECTIONS



The split mini chillers leave the factory already wired, and require the installation of an omnipolar thermal overload switch, a lockable mains disconnecting switch for the connection to the mains power supply, and the connection of the flow switch to the corresponding terminals. All the above operations must be carried out by qualified personnel in compliance with the legislation in force.

For all electrical work, refer to the electrical wiring diagrams in this manual. You are also recommended to check:

- that the characteristics of the mains electricity supply are adequate for the absorptions indicated in the electrical characteristics table below, also bearing in mind the possible use of other equipment at the same time.

! Power to the unit must be turned on only after installation work (hydraulic and electrical) has been completed.

All electrical connections must be carried out by qualified personnel in accordance with legislation in force in the country concerned.

Respect instructions for connecting phase, neutral and earth conductors. The power line should be fitted upstream with a suitable device to protect against short-circuits and leakage to earth, isolating the installation from other equipment.

! The devices on the unit must be lockable. An efficient earth connection is obligatory. Failure to earth the appliance absolves the manufacturer of all liability for damage. In the case of three phase units, ensure the phases are connected correctly.

! Voltage must be within a tolerance of $\pm 10\%$ of the rated power supply voltage for the unit (for three phase units, the unbalance between the phases must not exceed 3%). If these parameters are not respected, contact the electricity supply company. For electrical connections, use double insulation cable in conformity with current legislation in the country concerned.

An omnipolar thermal overload switch and a lockable mains disconnecting switch, in compliance with the CEI-EN standards (contact opening of at least 3mm), with adequate switching and residual current protection capacity based on the electrical data table shown below, must be installed as near as possible to the appliance.

! The appliance shall be installed in accordance with national wiring regulations.

! The power cord type designation is H07RN-F.

! An all-pole disconnection device which has at least 3mm separation distance in all pole and a residual current device(RCD)with the rating of above 10mA shall be incorporated in the fixed wiring according to the national rule.

⊖ Do not use water pipes to earth the unit.

ELECTRICAL DATA

Mod. KW	Electrical power supply (V-Ph-Hz)	Rated values (1)										FUSES	
		Compressors			Fan/fans		Pump		Total		Max. values (2)		Glass 5x20mm 250V FUSE1
		F.L.I. (kW)	F.L.A. (A)	L.R.A. (A)	F.L.I. (kW)	F.L.A. (A)	F.L.I. (kW)	F.L.A. (A)	F.L.I. (kW)	F.L.A. (A)	F.L.I. (kW)	F.L.A. (A)	
10	220-240~ 50	5.0	23.2	147	0.3	1.4	0.5	2.2	5.8	26.8	7.54	34.8	10A
12	220-240~ 50	5.0	23.2	147	0.37	1.6	0.5	2.2	5.8	27	7.63	35.1	10A
14	380-415 3N~ 50	5.75	9.8	82.4	0.37	1.6	0.5	2.2	6.62	13.6	8.6	17.7	10A
16	380-415 3N~ 50	5.75	9.8	82.4	0.37	1.6	0.5	2.2	6.62	13.6	8.6	17.7	10A

F.L.I. power input

F.L.A. current input

L.R.A. compressor start-up current

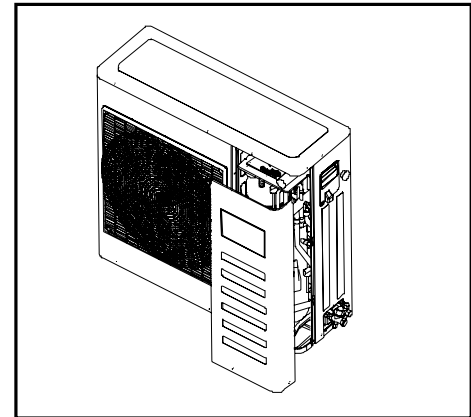
(1) Outside air temperature 35°C -Water temperature at evaporator 12/7°C.

(2) Values refer to the lower rated voltage (50 Hz). These values should be used to dimension protection switches and power cable

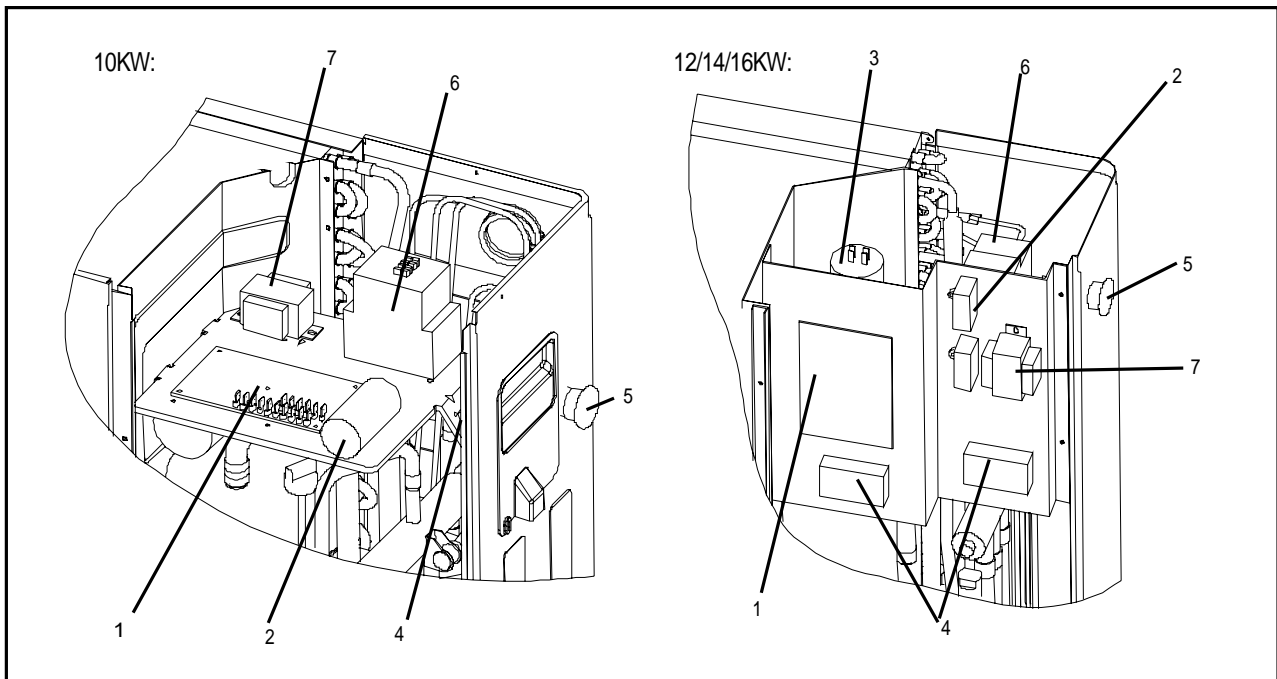
ELECTRICAL PANEL

The electrical panel is located inside the unit at the top of the technical compartment where the various components of the refrigerant circuit are also to be found.

To access the electrical panel, remove the front panel of the unit by undoing the screws.



ELECTRICAL PANEL LAYOUT

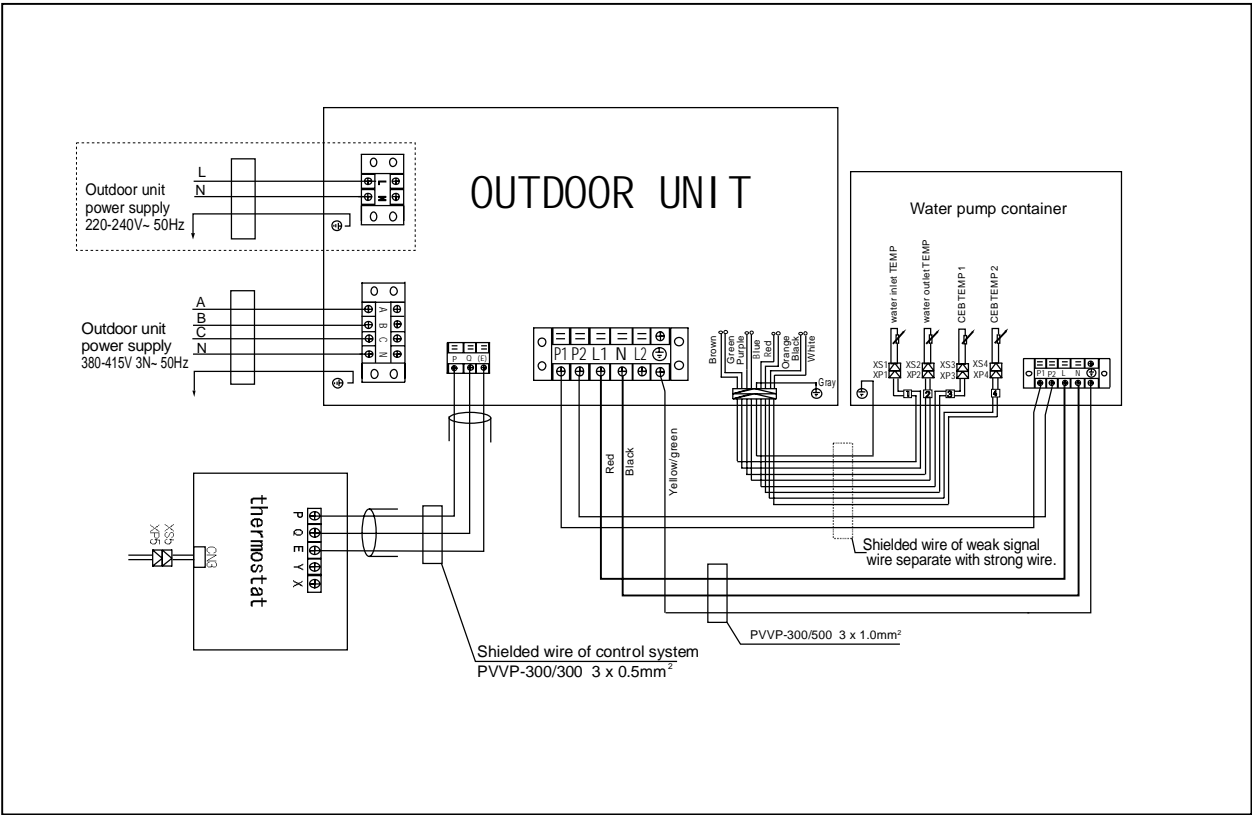


1. Power control board
2. Fan capacitor
3. Compressor capacitor

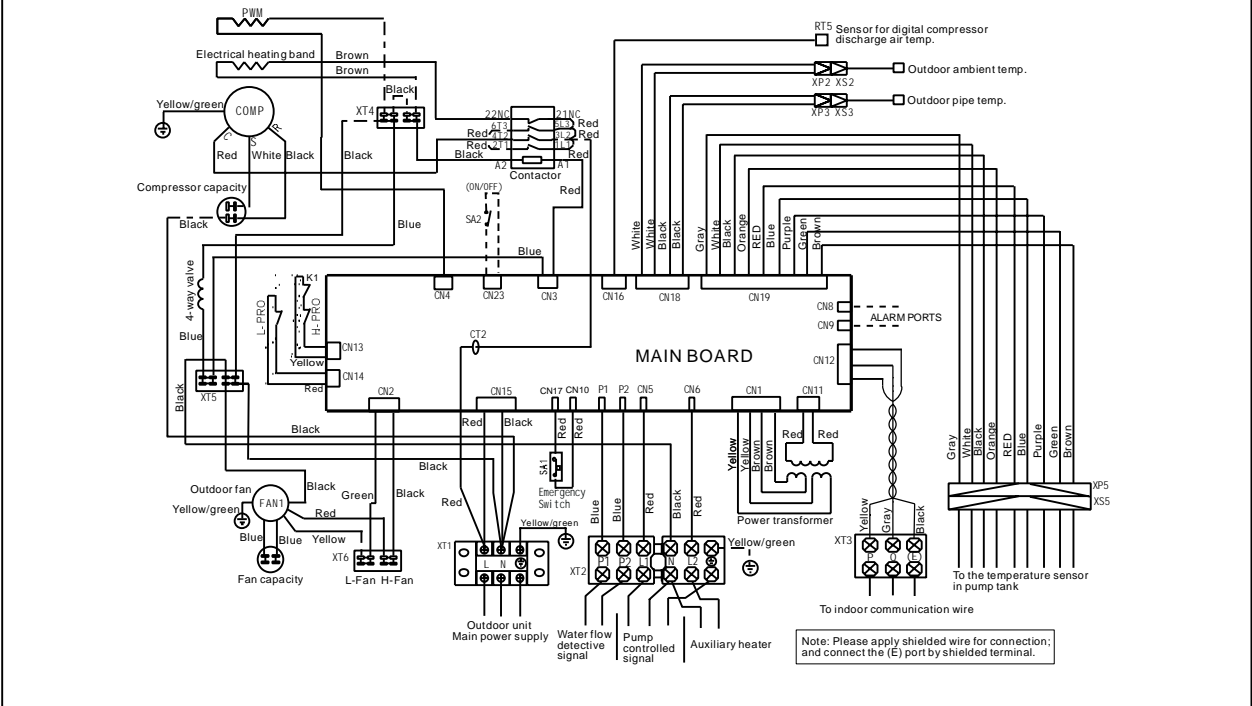
4. Terminal board
5. Emergency switch
6. Compressor contactor

7. Transformer

WIRING

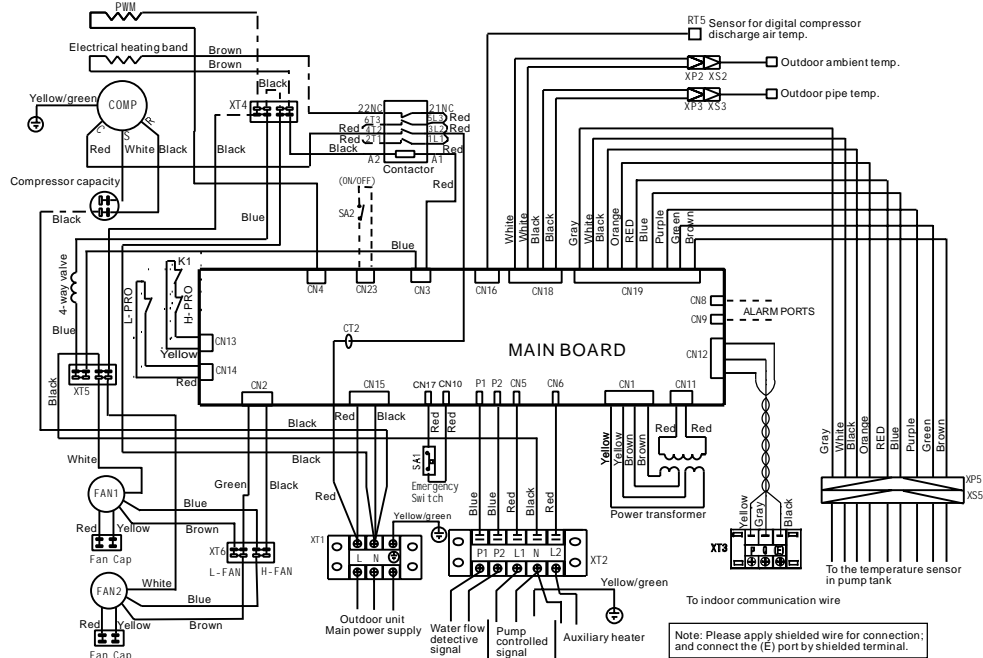


OUTDOOR WIRING DIAGRAM 10KW



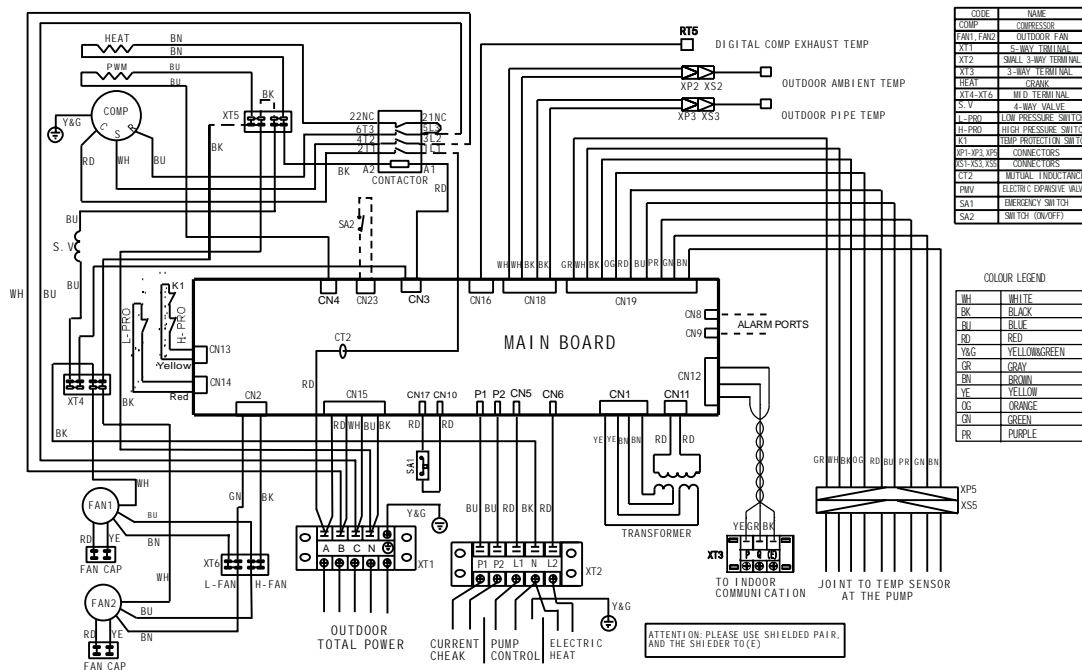
OUTDOOR WIRING DIAGRAM

12KW



OUTDOOR WIRING DIAGRAM

14/16KW



OUTDOOR UNIT WIRING SPECIFICATIONS

Model	Name	Qty	Specifications (for reference)	Notes (purchased by customers)
10/12kW	Overall power cord	1	RVV-300/500 3 x 6.0 mm ²	For outdoor unit
14/16kW	Overall power cord	1	RVV-450/750 5 x 4.0 mm ²	For outdoor unit
10/12/14/16 kW	Water-flow controlling wire	1	AWG24(7-core shielded wire)	Between outdoor unit and water pump container
	Temp. Sensor signal wire (shielded wire)	1	RVV-300/500 3 x 1.0 mm ²	Between outdoor unit and auxiliary heater
	Water pump power cord	1	RVV-300/500 3 x 1.0 mm ²	Between outdoor unit and water pump container
	Auxiliary heater controlling wire	1	RVV-300/500 3 x 1.0 mm ²	Between outdoor unit and auxiliary heater
	Controlling wire for central&wire controller	1	RVVP-300/300 2X0.5mm ² (2-core shielded wire)	Between outdoor unit and central&wire controller shorter than 120m.

GENERAL TECHNICAL DATA



Model		10	12	14	16
Cooling capacity (1)	KW	10.5	12.0	14.0	15.0
Heating capacity(2)	KW	13.0	14.0	16.0	17.0
Compressor	n°	1	1	1	1
Minimum water flow	m ³ /h	0.90	1.03	1.2	1.29
Rated water flow	m ³ /h	1.80	2.06	2.4	2.58
Residual head	kPa	160	150	132	124
Maximum allowable pressure PS _L ^H	MPa	4.2 2.5	4.2 2.5	4.2 2.5	4.2 2.5
Power source		220-240V~ 50Hz		380-415V 3N~ 50Hz	
Rated input	kW	6.15	6.2	6.4	6.6
Rated current	A	29.2	29.4	12.4	12.5
Peak current	A	147	147	82.4	82.4
Electrical index of protection	IP	X4			
Fans	n°	1	2	2	2
Max. air flow	m ³ /h	4500	5800	5600	5600
Noise level (3)	dB(A)	57	60	60	60
R410A refrigerant charge	kg	2.7	3.6	4.1	4.4
Net weight	kg	109	122	123	126
Max. water pressure	bar	6.0			
Max. water-in pressure	bar	5.0			
Min. water-in pressure	bar	0.5			
Pump rated input	W	400	400	450	450
Pump rated current	A	1.83	1.83	2.06	2.06

- (1) condenser air in 35°C.evaporator water in/out 12/7°C.
- (2) at 1m in open field fan side (sound pressure).
- (3) the maximum and minimum operating pressure values refer to the activation of the pressure switches the two types of oil are equivalents.

		Model 10KW								Model 12KW								Model 14KW					
Ta .	Tw	5	6	7	8	9	10	Ta .	Tw	5	6	7	8	9	10	Ta .	Tw	5	6	7	8	9	10
25	Pf	10.9	11.2	11.5	11.8	12.1	12.4	25	Pf	12.4	12.7	13.0	13.3	13.6	13.9	25	Pf	14.8	15.1	15.4	15.7	16.1	16.4
	Pa	3.3	3.3	3.4	3.4	3.4	3.5		Pa	3.5	3.5	3.5	3.6	3.6	3.6		Pa	3.6	3.6	3.6	3.7	3.7	3.7
	Pat	4.1	4.1	4.2	4.2	4.2	4.3		Pat	4.1	4.1	4.1	4.2	4.2	4.2		Pat	4.1	4.1	4.1	4.2	4.2	4.2
	Qev	1.9	1.9	2.0	2.0	2.1	2.2		Qev	2.2	2.2	2.3	2.3	2.3	2.4		Qev	2.6	2.6	2.7	2.7	2.8	2.8
	ΔPev	47.3	47.6	50.0	50.3	54.0	57.0		ΔPev	46.6	47.8	49.6	51.8	54.6	60.0		ΔPev	49.3	50.0	51.7	53.0	56.1	57.8
30	Pf	10.4	10.8	11.1	11.5	11.8	12.1	30	Pf	11.9	12.2	12.5	12.8	13.1	13.4	30	Pf	14.1	14.4	14.7	15.0	15.3	15.6
	Pa	2.9	2.9	3.0	3.1	3.1	3.1		Pa	3.8	3.8	3.8	3.9	3.9	3.9		Pa	4.1	4.1	4.1	4.2	4.2	4.2
	Pat	3.4	3.4	3.5	3.6	3.6	3.6		Pat	4.4	4.4	4.4	4.5	4.5	4.5		Pat	4.6	4.6	4.7	4.7	4.7	4.7
	Qev	1.8	1.8	1.9	2.0	2.0	2.0		Qev	2.0	2.1	2.1	2.2	2.2	2.3		Qev	2.4	2.5	2.5	2.6	2.6	2.7
	ΔPev	44.7	45.6	47.7	49.8	50.4	50.9		ΔPev	37.0	37.1	40.6	43.2	46.1	48.0		ΔPev	43.9	47.9	48.3	49.1	50.2	52.7
35	Pf	9.9	10.2	10.5	10.7	11.0	11.3	35	Pf	11.4	11.7	12.0	12.3	12.6	12.9	35	Pf	13.4	13.7	14.0	14.3	14.6	14.9
	Pa	3.3	3.3	3.4	3.4	3.5	3.5		Pa	4.2	4.2	4.2	4.3	4.3	4.3		Pa	4.6	4.6	4.6	4.7	4.7	4.7
	Pat	3.8	3.8	3.9	3.9	4.0	4.0		Pat	4.8	4.8	4.8	4.9	4.9	4.9		Pat	5.1	5.1	5.1	5.2	5.2	5.2
	Qev	1.7	1.7	1.8	1.9	1.9	2.0		Qev	2.0	2.0	2.1	2.1	2.2	2.2		Qev	2.3	2.4	2.4	2.5	2.5	2.5
	ΔPev	40.5	41.3	45.0	48.0	48.6	51.0		ΔPev	33.8	37.1	40.6	43.2	46.1	48.0		ΔPev	40.8	43.5	44.2	46.9	47.8	48.3
40	Pf	9.4	9.7	10.0	10.3	10.6	11.0	40	Pf	10.9	11.2	11.5	11.8	12.1	12.4	40	Pf	12.5	12.8	13.1	13.4	13.7	14.0
	Pa	3.6	3.6	3.7	3.7	3.8	3.8		Pa	4.5	4.5	4.5	4.6	4.6	4.6		Pa	5.1	5.1	5.1	5.2	5.2	5.2
	Pat	4.1	4.1	4.2	4.2	4.3	4.3		Pat	5.1	5.1	5.1	5.2	5.2	5.2		Pat	5.6	5.6	5.6	5.7	5.7	5.7
	Qev	1.6	1.6	1.7	1.7	1.8	1.8		Qev	1.9	2.0	2.0	2.0	2.1	2.1		Qev	2.2	2.2	2.3	2.3	2.4	2.4
	ΔPev	36.0	36.6	40.8	41.4	45.5	45.8		ΔPev	32.3	35.0	36.3	38.4	41.0	45.1		ΔPev	33.3	34.5	36.7	39.8	43.7	44.9
43	Pf	9.0	9.3	9.5	9.8	10.0	10.3	43	Pf	10.5	10.8	11.1	11.4	11.7	12.0	43	Pf	12.0	12.3	12.6	12.9	13.2	13.5
	Pa	3.8	3.8	3.9	3.9	4.0	4.0		Pa	4.7	4.7	4.7	4.8	4.8	4.8		Pa	5.5	5.5	5.5	5.6	5.6	5.6
	Pat	4.3	4.3	4.4	4.4	4.5	4.5		Pat	5.3	5.3	5.3	5.4	5.4	5.4		Pat	6.0	6.0	6.0	6.1	6.1	6.1
	Qev	1.5	1.6	1.6	1.7	1.7	1.8		Qev	1.8	1.9	1.9	2.0	2.0	2.0		Qev	2.1	2.1	2.2	2.2	2.3	2.3
	ΔPev	31.5	35.7	36.6	40.5	41.3	46.5		ΔPev	28.0	30.1	33.8	37.4	38.6	40.5		ΔPev	30.6	32.5	35.2	36.2	39.1	40.5

		Model 16KW					
Ta .	Tw	5	6	7	8	9	10
25	Pf	15.5	15.7	16.0	16.3	16.5	16.8
	Pa	3.9	3.9	3.9	4.0	4.0	4.0
	Pat	4.7	4.7	4.7	4.8	4.8	4.8
	Qev	2.7	2.7	2.8	2.8	2.9	2.9
	ΔPev	54.9	57.6	59.4	62.1	65.2	67.7
30	Pf	14.9	15.2	15.5	15.8	16.1	16.4
	Pa	4.4	4.4	4.4	4.5	4.5	4.5
	Pat	5.2	5.2	5.2	5.4	5.4	5.4
	Qev	2.6	2.6	2.7	2.7	2.8	2.8
	ΔPev	51.0	52.9	50.9	54.7	59.9	63.0
35	Pf	14.4	14.7	15.0	15.3	15.6	15.9
	Pa	4.9	4.9	4.9	5.0	5.0	5.0
	Pat	5.7	5.7	5.7	5.8	5.8	5.8
	Qev	2.6	2.6	2.7	2.7	2.8	2.8
	ΔPev	50.8	53.1	55.8	58.1	61.2	63.2
40	Pf	13.9	14.2	14.5	14.8	15.1	15.2
	Pa	5.3	5.3	5.3	5.4	5.4	5.4
	Pat	6.1	6.1	6.1	6.2	6.2	6.2
	Qev	2.5	2.5	2.6	2.6	2.7	2.7
	ΔPev	46.8	49.1	51.5	53.1	55.8	59.4
43	Pf	13.5	13.8	14.1	14.4	14.7	14.8
	Pa	5.7	5.7	5.7	5.8	5.8	5.8
	Pat	6.5	6.5	6.5	6.6	6.6	6.6
	Qev	2.4	2.4	2.5	2.5	2.6	2.6
	ΔPev	41.4	44.3	47.0	49.1	51.5	59.4

Ta : outside air temperature (°C)
 Pa : compressor power input (kW)
 ΔPec : evaporator pressure drop (kPa)
 Tw : evaporator water outlet temperature (°C)
 Pat : total power input (kW)
 - conditions outside of operating limits
 Pf : cooling capacity (kW)
 Qev : water flow (m³/h)

Ta . U.R.87%	Model 10					Ta . U.R.87%	Model 12					Ta . U.R.87%	Model 14				
	Tw	35	40	45	50		Tw	35	40	45	50		Tw	35	40	45	50
-5	Pt	8.3	8.3	8.3		-5	Pt	11.0	10.9	10.8	-	-5	Pt	10.4	10.5	10.6	-
	Pa	3.6	3.9	4.2			Pa	3.7	4.0	4.3	-		Pa	4.0	4.4	4.9	-
	Pat	4.4	4.7	5.0			Pat	4.5	4.8	5.1	-		Pat	4.8	5.2	5.7	-
	Qc	1.5	1.5	1.5			Qc	1.7	1.7	1.7	-		Qc	1.9	1.9	1.9	-
	ΔPc	29.4	28.4	27.0			ΔPc	41.6	41.0	40.3	-		ΔPc	25.8	27.2	27.0	-
0	Pt	9.4	9.4	9.4	9.2	0	Pt	12.2	12.1	12.0	11.9	0	Pt	13.1	13.0	13.0	12.9
	Pa	3.7	4.0	4.3	4.5		Pa	3.8	4.1	4.4	4.6		Pa	4.0	4.4	4.9	5.4
	Pat	4.5	4.8	5.1	5.3		Pat	4.6	4.9	5.2	5.4		Pat	4.8	5.2	5.7	6.1
	Qc	1.8	1.8	1.8	1.8		Qc	2.0	2.0	2.0	2.0		Qc	2.3	2.3	2.3	2.3
	ΔPc	27.5	25.6	24.8	23.2		ΔPc	33.0	32.6	32.1	31.8		ΔPc	21.1	21.1	21.0	20.9
7	Pt	13.2	13.1	13.0	12.9	7	Pt	14.2	14.1	14.0	13.9	7	Pt	16.2	16.1	16.0	15.9
	Pa	3.8	4.1	4.4	4.7		Pa	3.9	4.2	4.5	4.8		Pa	4.1	4.5	5.0	5.5
	Pat	4.6	4.9	5.2	5.5		Pat	4.7	5.0	5.3	5.6		Pat	4.9	5.3	5.8	6.3
	Qc	2.2	2.2	2.2	2.2		Qc	2.4	2.4	2.4	2.4		Qc	2.8	2.8	2.8	2.8
	ΔPc	37.2	35.8	34.5	33.1		ΔPc	44.0	43.6	43.1	42.8		ΔPc	31.2	31.1	31.0	31.0
10	Pt	12.3	12.2	12.1	12.0	10	Pt	15.2	15.1	15.0	14.9	10	Pt	17.6	17.5	17.4	17.4
	Pa	3.9	4.2	4.5	4.8		Pa	4.0	4.3	4.6	4.9		Pa	4.2	4.6	5.1	5.6
	Pat	4.7	5.0	5.3	5.1		Pat	4.8	5.1	5.4	5.7		Pat	5.0	5.4	5.9	6.4
	Qc	2.3	2.3	2.3	2.3		Qc	2.5	2.5	2.5	2.5		Qc	3.1	3.1	3.1	3.1
	ΔPc	40.5	40.0	39.2	38.8		ΔPc	38.0	37.6	37.2	37.0		ΔPc	36.4	36.2	36.0	35.9
15	Pt	13.8	13.7	13.6	13.5	15	Pt	16.7	16.6	16.5	16.4	15	Pt	19.8	19.7	19.6	19.4
	Pa	4.0	4.3	4.6	4.9		Pa	4.1	4.4	4.7	5.0		Pa	4.3	4.7	5.2	5.7
	Pat	4.8	5.1	5.4	5.7		Pat	4.9	5.2	5.5	5.8		Pat	5.1	5.5	6.0	6.5
	Qc	2.4	2.4	2.3	2.3		Qc	2.8	2.8	2.8	2.8		Qc	3.5	3.5	3.5	3.5
	ΔPc	45.8	45.1	43.6	42.9		ΔPc	45.0	44.8	44.6	44.2		ΔPc	45.4	45.2	45.0	44.9

Ta . U.R.87%	Model 16				
Tw	35	40	45	50	

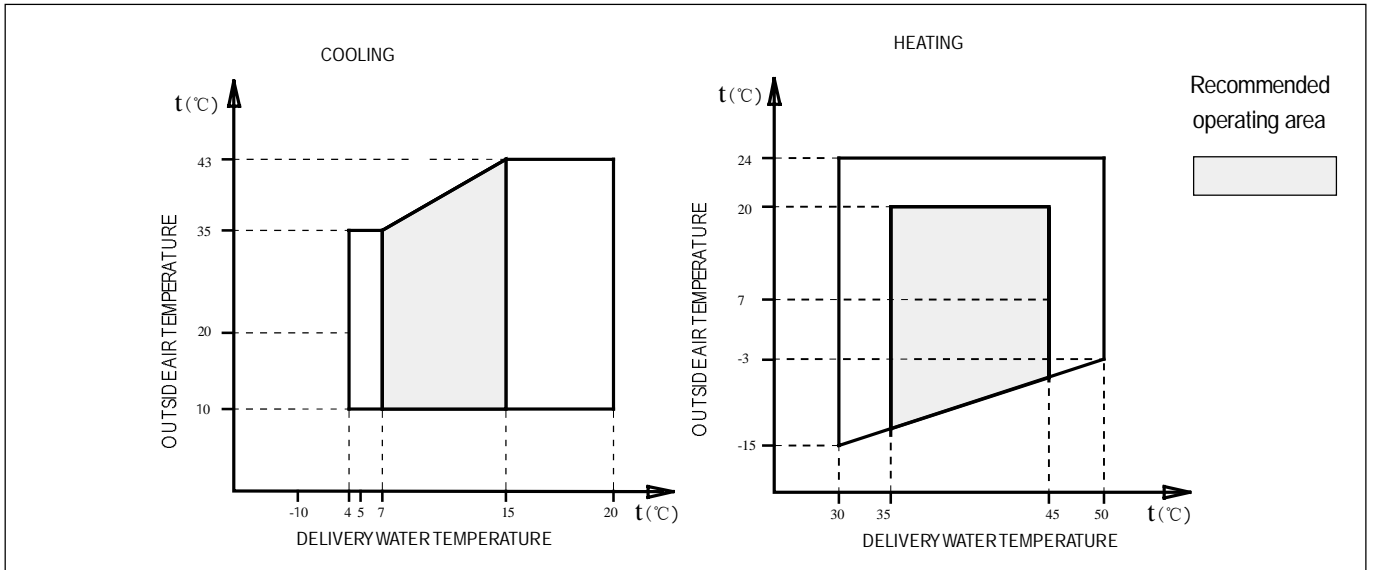
-5	Pt	11.5	11.4	11.3	-
	Pa	4.1	4.5	5.0	-
	Pat	4.9	5.3	5.8	-
	Qc	2.0	2.0	2.0	-
	ΔPc	25.0	25.0	24.8	-
0	Pt	14.2	14.1	14.0	13.9
	Pa	4.2	4.6	5.1	5.6
	Pat	5.0	5.4	5.9	6.4
	Qc	2.4	2.4	2.4	2.4
	ΔPc	20.2	20.1	20	19.9
7	Pt	17.2	17.1	17.0	16.9
	Pa	4.3	4.7	5.2	5.7
	Pat	5.1	5.5	6.0	6.5
	Qc	2.9	2.9	2.9	2.9
	ΔPc	30.2	30.1	30	30
10	Pt	18.7	18.6	18.5	18.4
	Pa	4.4	4.8	5.3	5.8
	Pat	5.2	5.6	6.1	6.6
	Qc	3.2	3.2	3.2	3.2
	ΔPc	35.4	35.2	35	34.8
15	Pt	21.0	20.9	20.8	20.7
	Pa	4.5	4.9	5.4	5.9
	Pat	5.3	5.7	6.2	6.7
	Qc	3.6	3.6	3.6	3.6
	ΔPc	46.2	45.6	45.0	44.4

- Ta: outside air temperature (°C)
- Pa: compressor power input (kW)
- ΔPc: evaporator pressure drop (kPa)
- Tw: evaporator water outlet temperature (°C)
- Pat: total power input (kW)
- conditions outside of operating limits
- Pt: heating capacity (kW)
- Qc: water flow (m³/h)

Air conditioner operating conditions
 For proper performance, run the air conditioner under the following temperature conditions

Cooling operation	Outdoor temperature: 10°C~43°C
	Indoor temperature: /
Heating operation (cooling only type without)	Outdoor temperature: 4°C~24°C (-15°C~24°C, When charge enough antifreeze)
	Indoor temperature: /
Water temperature	Cooling: 4~20°C
	Heating: 30~50°C

If air conditioner is used beyond the above conditions, safely protection features may come into operation



Thermal head min. - max.	12-16
Water circuit pressure (bars)	2-4
Max. storage temperature	65

ETHYLENE GLYCOL SOLUTIONS

Water and ethylene glycol solutions used as a thermal vector in the place of water reduce the performance of the unit. Multiply the performance figures by the values given in the following table.

Freezing point (°C)						
	0	-5	-10	-15	-20	-25
Percentage of ethylene glycol in weight						
	0	12%	20%	28%	35%	40%
cPf	1	0.98	0.97	0.965	0.96	0.955
cQ	1	1.02	1.04	1.075	1.11	1.14
cdp	1	1.07	1.11	1.18	1.22	1.24

- cPf: correction factor refrigerating capacity
- cQ: correction factor flow rate
- cdp: correction factor pressure drop

! During winter leaving the unit unused, please drain water out completely from unit if no antifreeze were charged into pipeline, or keep power on(at standby) and ensure that water is contained inside of unit. When ambient temperature lower 5°C, running cooling mode must be charged antifreeze. Refer to upper parameters for the charged volume.

FOULING FACTORS

The performance data given refer to conditions with clean evaporator plates (fouling factor=1). For different fouling factors, multiply the figures in the performance tables by the coefficient given in the following table.

Fouling factors (m ² °C/W)	Evaporator		
	f1	fk1	fx1
4.4 x 10 ⁻⁵	-	-	-
0.86 x 10 ⁻⁴	0.96	0.99	0.99
1.72 x 10 ⁻⁴	0.93	0.98	0.98

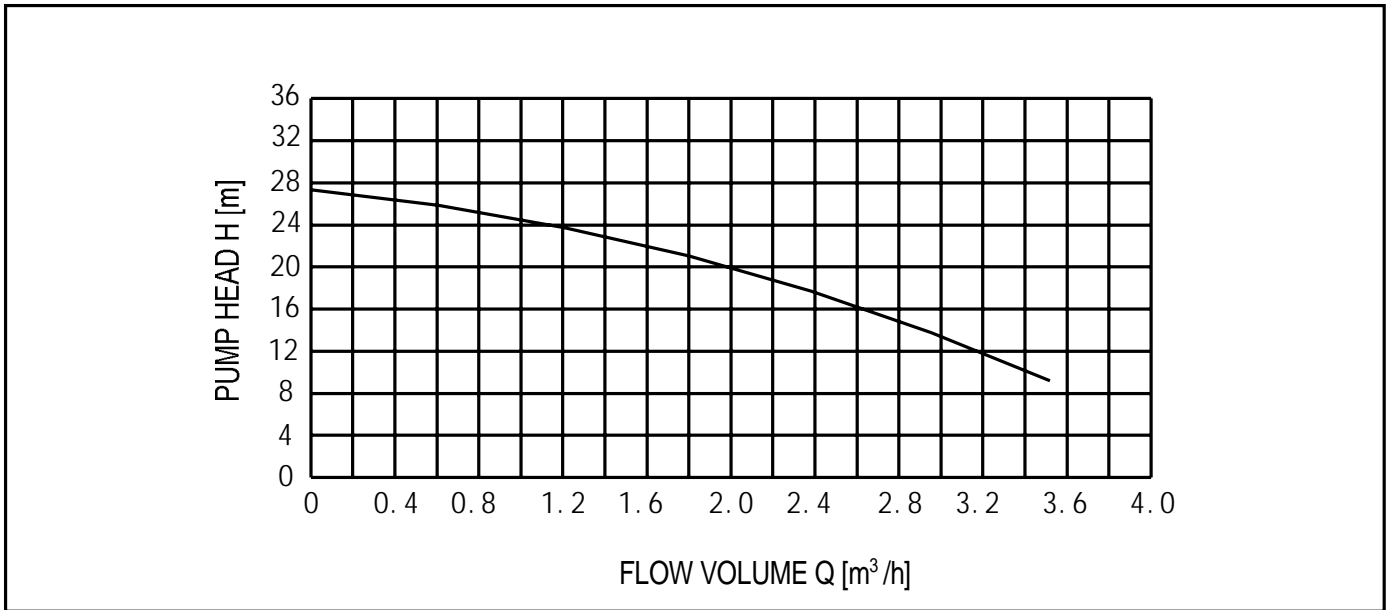
- f1 capacity correction factor
- fk1 compressor power input correction factor
- fx1 total power input correction factor

Minimum water volume

Model (kW)	10	12	14	16
Minimum wate volume L	43	50	60	68

If the total water volume in the system is less than the value in the table above, the additional water tank is necessary in order to avoid the compressor On and Off frequently. The minimum size of the water tank is calculated as:
 Size of additional water tank(L) = Minimum water volume(L) - Actual water volume(L)

USEFUL PUMP HEAD CURVES (*)



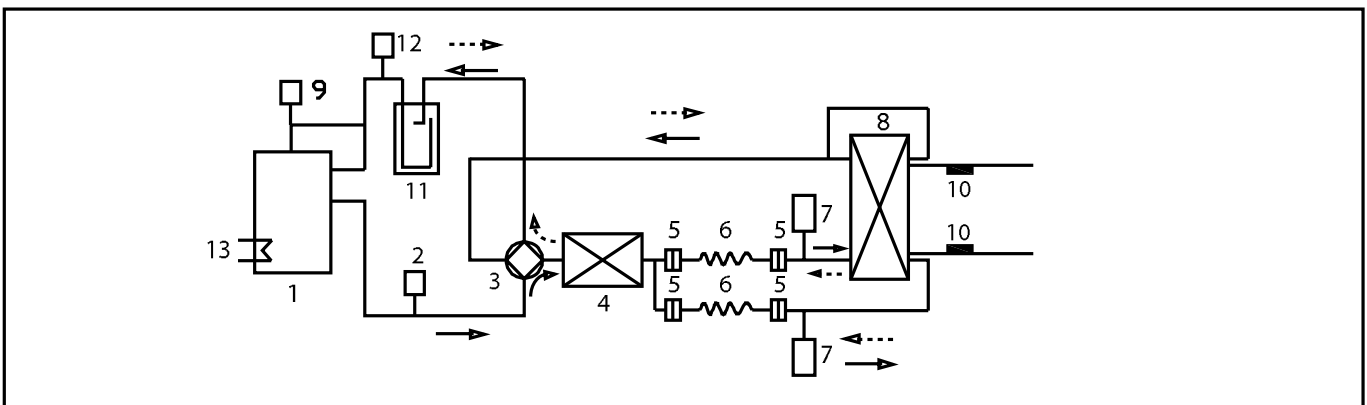
(*) To obtain the useful head of the installation, subtract the pressure drop of the plate heat exchanger.

HEAT EXCHANGER PRESSURE DROP (WATER SIDE)

Model	Water flow	m³/h	0.8	1.0	1.2	1.4	1.6	1.8	2.0	
		l/sec	0.222	0.278	0.333	0.389	0.444	0.500	0.556	
10	Pressure drop	kPa	26	29	33	37	42	46	50	
Model	Water flow	m³/h	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6
		l/sec	0.333	0.389	0.444	0.500	0.556	0.611	0.667	0.722
12	Pressure drop	kPa	35	39	44	47	50	53	58	
14		kPa	28	31	36	40	43	46	50	54
16		kPa	26	29	32	37	41	45	49	52

Note: the values highlighted refer to the rated flow

REFRIGERANT CIRCUIT



1 compressor	5 filter	9 PWM valve	13 crank heater
2 high pressure switch	6 capillary	10 water temperature sensor	
3 4-way valve	7 liquid receiver	11 liquid receiver	
4 condenser	8 plate heat exchanger	12 low pressure switch	

MALFUNCTION CODE

Code	malfunction	Code	Malfunction
E0	water test malfunction	P0	current system protection
E1	sequence malfunction	P1	High pressure protection
E2	In-outdoor unit communication checking channel is abnormal	P2	Low pressure protection
E3	backwater temperature sensor checking channel is abnormal	P3	air-out temperature protection
E4	outdoor environment temperature sensor checking channel is abnormal	P4	inlet temperature protection
E5	outlet water temperature sensor checking channel is abnormal	P5	condenser system high temperature protection
E6	condenser temperature sensor checking channel is abnormal	P6	antifreezer (bushing) low temperature protection
E7	antifreezer temperature sensor 1 checking channel is abnormal	Pb	antifreezer system protection
E8	antifreezer temperature sensor 2 checking channel is abnormal	P8	inlet temperature protection (three times in one hour and need recharge) thermostat display P4
E9	neixe compressor air-out (thermostat display E4)		

TROUBLES CAUSE AND SOLUTION

Troubles	Causes	Solution
Water pump does not work	1. exceed the voltage range 2. Water flow abnormal	Check wiring and circuit Test weather water system is blocked, clean the filter and add water
Water pump works while compressor not	1. Open-circuit of compressor connector 2. Open-circuit of compressor wiring	Check the power supply
Temp. of chilled or hot water abnormal	1. Improper adjustment to water valve 2. Overload	Adjust water valve increase the capacity
Automatic stop	1. Heating in summer 2. Cooling in winter	Change the mode to cooling Change the mode to heating

Following cases are not failure:

When the water Temp. is lower than 3°C, water pump will start automatically even though you do not turn on the unit. The fan and water pump will keep running for about 2 minutes after turning off the unit.(this is to remove the cool/heat remained to protect the heat-exchanger from freezing.)

SHUTTING DOWN FOR LONG PERIODS

If it is previewed not to use the machine for long periods

After deactivating the chiller:

- Make sure the remote switch SA1 is in the "OFF" position, or alternatively disconnect the unit from the power supply.
- Make sure the remote keyboard (if present) is set to "OFF".
- Position QF and QS on OFF
- Deactivate the indoor terminal units by placing the switch of each unit in the "OFF" position.

- Close the water valves.



If there is a possibility that the outside temperature may drop below zero, there is the risk of freezing. The water circuit MUST BE EMPTIED AND SHUT OFF POWER (when draining after heat pump operation take care as the water may be hot) or antifreeze must be added in the proportion recommended by the manufacturer.

ROUTINE MAINTENANCE

A

Never perform any cleaning operations before having disconnected the unit from the mains power supply. If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.

Regular maintenance is fundamental to maintain the efficiency of the unit both in terms of operation and energy consumption. The Technical Assistance Service maintenance plan must be observed, with an annual service which includes the following operations and checks:

- Filling of the water circuit
- Presence of air bubbles in the water circuit
- Efficiency of safety devices
- Power supply voltage

- Power input
 - Tightness of electrical and hydraulic connections
 - Condition of the compressor contactor
 - Efficiency of the plate heat exchanger heater
 - Checking of operating pressure, superheating and sub-cooling
 - Efficiency of compressor heater
 - Cleaning of finned coil (*)
 - Cleaning of fan grills
 - Cleaning of condensate drain pan (if installed).
- (*) for "Heat pump" appliances, the checks are to be performed quarterly.

For units installed near the sea, the intervals between maintenance should be halved.

EXTRAORDINARY MAINTENANCE

A

Never perform any cleaning operations before having disconnected the unit from the mains power supply.

CHEMICAL WASHING

You are recommended to chemically wash the plate heat exchanger after every 3 years of operation. For instructions on how to carry out this operation, contact De'Longhi Spa.

REFRIGERANT GAS CONTENT

The chillers are filled R410a refrigerant gas and tested in the factory. In normal conditions, there should be no need for the Technical Assistance Service to intervene to check the refrigerant gas. However, over time, small leaks may develop at the joints leading to loss of refrigerant and draining of the circuit, causing the unit to function poorly. In this case, the leaks of refrigerant must be identified and repaired and the refrigerant circuit refilled. Proceed as follows:

- Empty and dry the entire refrigerant circuit using a vacuum pump connected to the low and high pressure tap until the vacuumometer reads about 10 Pa. Wait a couple of minutes and check that this value does not rise to more than 200 Pa
- Connect the refrigerant gas cylinder or a filling cylinder to the low pressure line pressure gauge connection.
- Fill with the quantity of refrigerant gas indicated on the

rating plate of the unit..

- Always check the superheating and subcooling values. In the nominal operating conditions for the appliance, these should be between 5 and 10°C and between 4 and 8°C respectively.
- After a couple of hours of operation, check that the liquid indicator indicates circuit dry (dry-green)



In the event of partial leaks, the circuit must be completely emptied before being refilled

The R410a refrigerant must only be filled in the liquid state.

Operating conditions other than nominal conditions may produce considerably different values. Seal testing or identification of leaks must only be carried out using R410a refrigerant gas, checking with a suitable leak detector.



The refrigerant circuit must not be filled with a refrigerant other than that indicated on page 14. The use of a different refrigerant may cause serious damage to the compressor.

Oxygen, acetylene or other inflammable or poisonous gases must never be used in the refrigerant circuit as they may cause explosion or poisoning.

Oils other than those indicated on pages 14 must not be used. The use of different oils may cause serious damage to the compressor.

DISPOSAL

A

Do not dispose this product as unsorted municipal waste. Collection of such waste separately for special treatment is necessary. Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities.

Contact your local government for information regarding the collection systems available.

If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being.



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