INSTALLATION-OPERATING-SERVICE MANUAL

Water chillers and air/water heat pumps with centrifugal fans

r HFC R-410A

BRA FF
BRN FF

0011÷0061

INDICE

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

U **User**

I **Installer**

A **Assistance**

Important

Prohibition

Danger voltage

Danger moving blades

Danger high temperatures

Eurovent certification program.

The manufacturer reserves the right to modify the data in this manual without warning.

ENVIRONMENTAL INFORMATION: This equipment contains fluorinated greenhouse gases covered by the Kyoto Protocol. It should only be serviced or dismantled by professional trained personnel. R410A GWP=1975

GENERAL WARNINGS

U I A

⚠ **These appliances** 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 specified 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.

When the items are consigned by the carrier, check that the packaging and the unit are undamaged. If damage or missing components are noted, indicate this on the delivery note. A formal complaint should be sent via fax or registered post to the After Sales Department within eight days from the date of receipt of the items.

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

U I A

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

⛔ **The unit must not be used** by children or by unfit persons without suitable supervision.

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 BRA/N FF 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.

⚠ **Terminals 10, 11, 12 and 13** may be live even after the unit has been disconnected. Check for voltage at these terminals before proceeding.

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. .

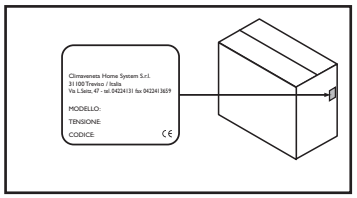
Handle the unit with the utmost care (see weight distribution table) to avoid damage..

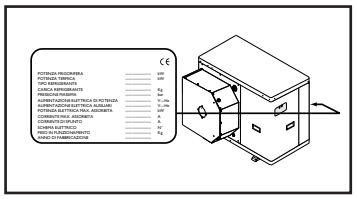
IDENTIFICATION

The chiller can be identified by the:

Packaging label
Giving the data identifying the product.

Rating plate
Giving the technical and performance data of the unit.
If this is lost, ask the After Sales Service for a replacement.





⚠ Tampering with or the removal or absence of rating plates or other means enabling the unit to be identified causes problems during installation and maintenance.

RECEIVING AND HANDLING THE PRODUCT

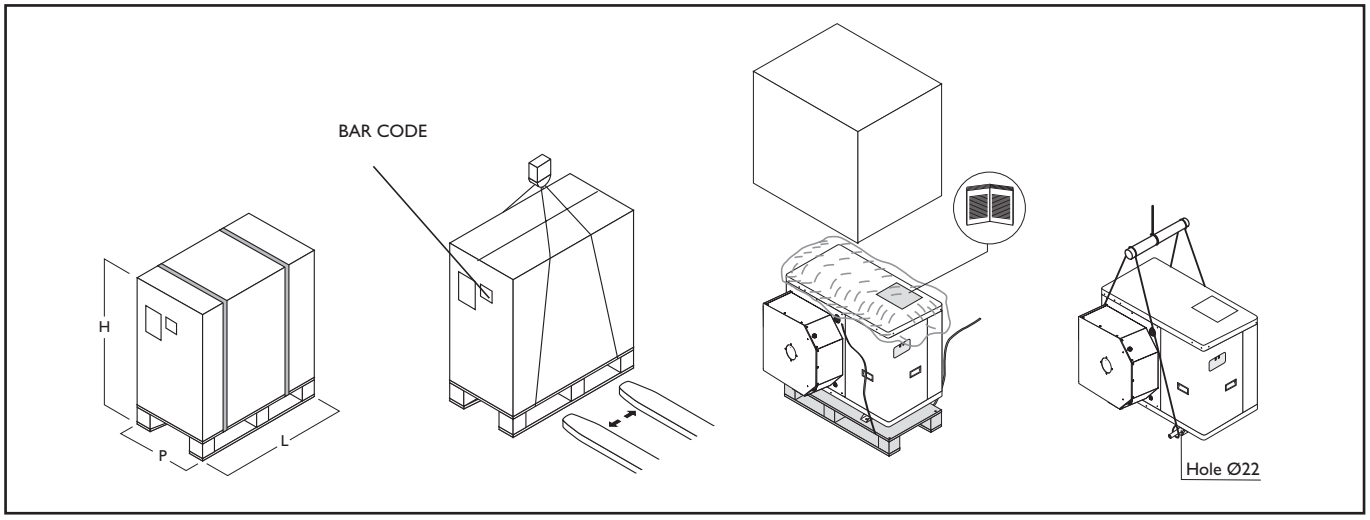
The chillers are supplied accompanied by:
- instruction manual;;
- guarantee certificate;
- CE declaration;
- list of the main components and sub-assemblies fitted on the product

These are contained in a plastic bag (A) attached to the top of the chiller.
The unit should always be handled by qualified personnel using equipment adequate for the weight of the chiller. If a forklift truck is used, insert the forks under the base, spacing the forks as wide apart as possible. If a crane is used, pass the cables through the bottom of the base, making sure they do not exert pressure on the unit. Once the packaging has been removed, the appliance can be lifted and moved by inserting two metal tubes (max. diameter 22mm) into the special holes in the feet and using suitable handling equipment

⚠ **The instruction manual** is an integral part of the unit and should therefore be read and kept carefully
It is recommended that the packaging should not be removed until the unit is located in the installation site.

⛔ **Do not dispose** of packaging materials in the environment or leave them within reach of children as they may represent a hazard.

⚠ **The weight of the chiller is biased** towards the compressor side (side of the packaging with the bar code, see figure at the foot of the page).
During transport, the chiller should be kept in a vertical position.



Model	0011	0021	0025	0031	0041	0051	0061
Dimension L	950	9150	950	950	950	950	950
Dimension P	660	660	660	660	660	660	710
Dimension H	650	650	950	950	1250	1250	1400
Gross weight BRA FF	120	125	140	145	190	210	220
Gross weight BRN FF	130	135	150	155	205	225	235

These air cooled reverse-cycle chillers with centrifugal fans operate with R410A refrigerant fluid and are suitable for both indoor and outdoor installation. The units conform to the essential requisites of EEC directive 98/37. 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

Hermetic rotary scroll compressor with sump heater and thermal cut-out .

EVAPORATORS

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, safety valve, manual filling assembly, pressure gauge and pump.

CONDENSING COILS

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

FANS

Electric centrifugal fans, with external impeller. Four-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 pressure transducer.**

REFRIGERANT CIRCUIT

Refrigerant circuit featuring the following components: filter, liquid flow indicator (models 0041-0061), thermostatic expansion valve with external equaliser. Pressure switches to control delivery and suction pressure. Unit supplied complete with non-freezing oil and R410A refrigerant charge, **factory tested.**

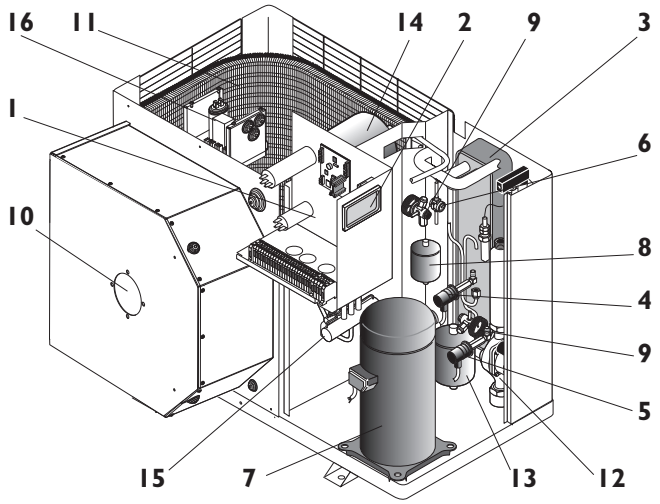
POWER AND CONTROL ELECTRICAL PANEL

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

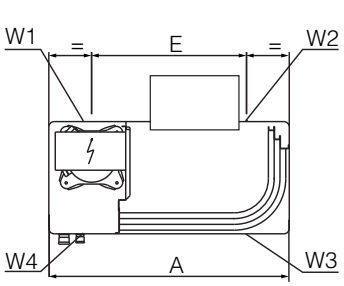
OPTIONAL ACCESSORIES

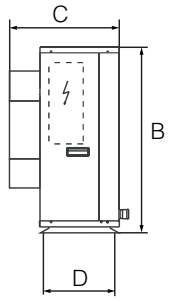
- Removable metal mesh filter.
- Pump kit (models 0041-0061).
- Storage tank.
- Storage tank connection pipes.
- Rubber vibration dampers.
- Remote keyboard kit.

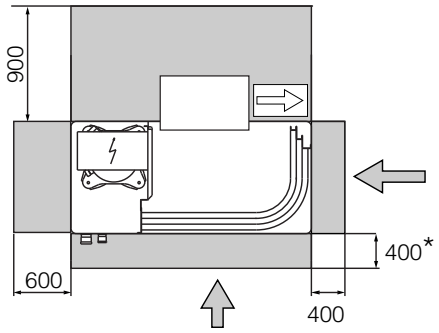
The above accessories are optional. Consult the relative documentation for assembly instructions and technical data.

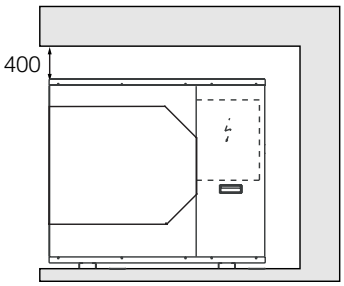


1 Electrical panel
2 Control panel
3 Heat exchanger installation side
4 Low pressure switch
5 High pressure switch
6 Flow indicator (0041 - 0061)
7 Scroll compressor
8 Filter
9 Thermostatic valve
10 Centrifugal fan
11 Heat exchanger external side
12 Pump
13 Liquid receiver (BRN FF only)
14 Expansion tank
15 Reversing valve (BRN FF only)
16 Fan board









⚠ * For installation with open outlet, the minimum distance is increased from 400mm to 1500mm

Dimension	0011	0021	0025	0031	0041	0051	0061
A	900	900	900	900	900	900	900
B	640	640	940	940	1240	1240	1390
C	580	580	580	580	580	580	630
D	320	320	320	320	320	320	370
E	580	580	580	580	580	580	580

Weight Distribution BRA FF	0011	0021	0025	0031	0041	0051	0061
W1	29	30	35	36	48	54	57
W2	10	11	12	13	17	19	20
W3	22	23	26	28	36	41	43
W4	39	41	47	49	64	72	76
TOT	100	105	120	125	165	185	195

Weight Distribution BRN FF	0011	0021	0025	0031	0041	0051	0061
W1	32	33	38	39	52	58	61
W2	11	12	13	14	18	20	21
W3	24	25	29	30	40	44	46
W4	43	45	51	53	70	78	82
TOT	110	115	130	135	180	200	210

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:

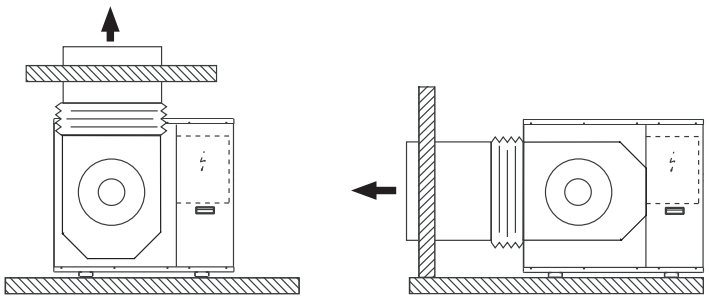
- check that the fixing points are adequate to support the weight of the unit;
- pay scrupulous respect to safety distances between the unit and other equipment or structures to ensure that air entering the unit and discharged by the fans is free to circulate.

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 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



⚠ For models 0011 - 0031, the air outlet can be turned from the side position to the top position

HYDRAULIC CONNECTIONS I A

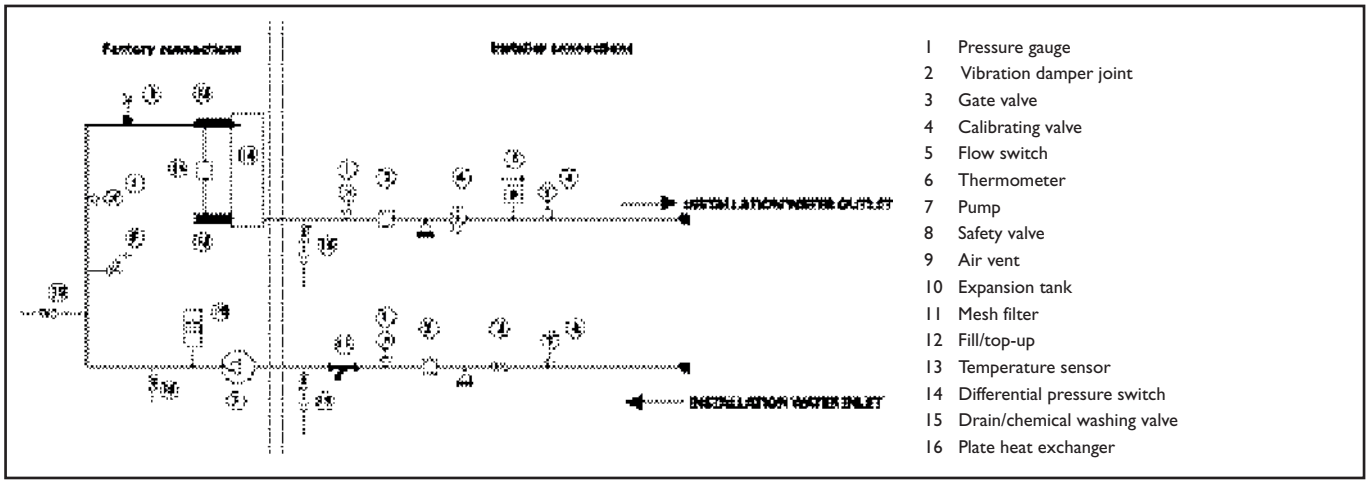
The choice and installation of components is the responsibility of the installer who should follow good working practice and current legislation. Before connecting the pipes, make sure they do not contain stones, sand, rust, dross or other foreign bodies which might damage the unit. Construction of a 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:

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) or a differential pressure switch (inlet-outlet).
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.

The flow of water to the refrigerating assembly must conform to the values given on page 16.

The flow of water must be maintained constant during operation. The water content of the unit must be such as to avoid disturbing operation of the refrigerant circuits.

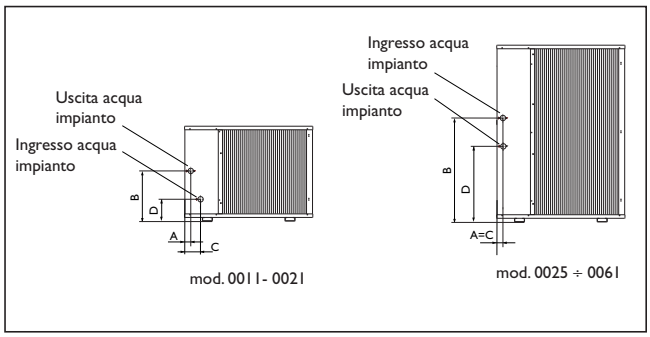
See the values given on page 24.



1 Pressure gauge
2 Vibration damper joint
3 Gate valve
4 Calibrating valve
5 Flow switch
6 Thermometer
7 Pump
8 Safety valve
9 Air vent
10 Expansion tank
11 Mesh filter
12 Fill/top-up
13 Temperature sensor
14 Differential pressure switch
15 Drain/chemical washing valve
16 Plate heat exchanger

If the installation requires a useful head higher than that obtained by installing a pump assembly and storage tank, it is recommended that an additional pump is installed on the unit. The pump can be easily installed on the unit by removing the special pipe stub provided.

⚠ **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. I**nstallations 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	nil
Ammonia ions	nil
Silicon ions	less than 30 ppm

DIMENSIONE E POSIZIONAMENTO ATTACCHI

Grandezza	0011	0021	0025	0031	0041	0051	0061
A (mm)	50	50	65	65	65	65	65
B (mm)	285	285	465	465	670	670	820
C (mm)	158	158	65	65	65	65	65
D (mm)	135	135	415	415	520	520	655
Attacchi idraulici (Ø)	3/4"	3/4"	3/4"	3/4"	1"1/4	1"1/4	1"1/4

FILLING THE INSTALLATION

- Before filling, check that the installation drain cock is closed.
- Open all installation, appliance and terminal air vents.
- Aprire i dispositivi di intercettazione dell'impianto.
- 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.

⚠ **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.

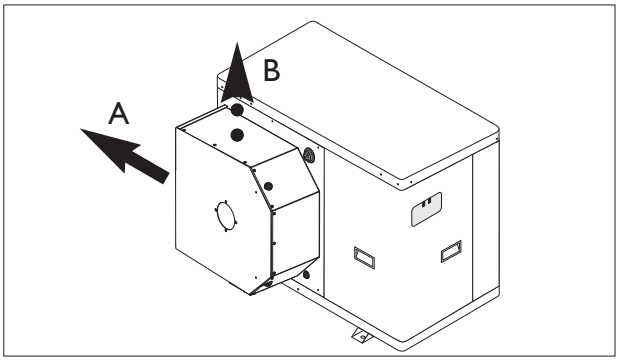
Check the hydraulic tightness of joints.

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.

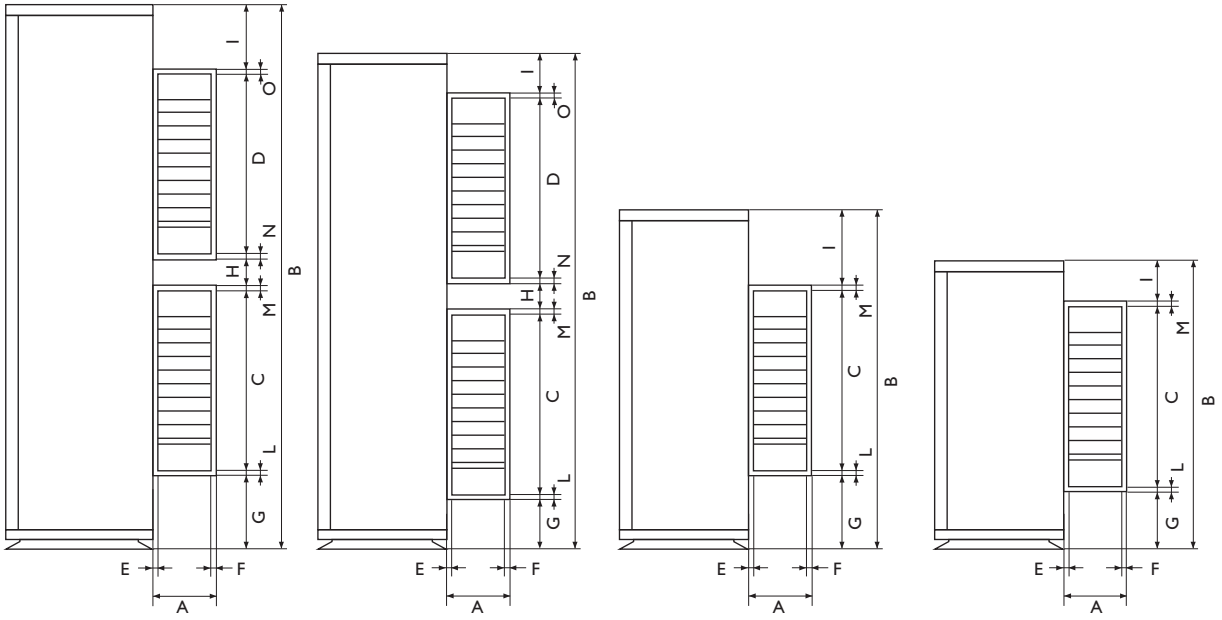
⚠ **If the fluid in the circuit contains anti-freeze,** it should not be allowed to drain freely as it is pollutant. It should be collected for possible reuse. When draining after heat pump operation, take care as the water may be hot (up to 50°).

The BRA-BRN FF chillers are designed for indoor and outdoor installation. The cooling air outlet can be ducted to the outside



Ducting the air outlet

The air outlet ducting connection has the following characteristics.



Model 0061 Model 0041 - 0051 Model 0025 - 0031 Model 0011 - 0021

BRA-BRN FF		0011	0021	0025	0031	0041	0051	0061
A	mm	203	203	203	203	203	203	203
B	mm	640	640	900	900	1240	1240	1390
C	mm	486	486	556	556	521	521	521
D	mm	-	-	-	-	521	521	521
E	mm	13	13	18	18	18,5	18,5	18,5
F	mm	18	18	18	18	18	18	18
G	mm	53	53	218	218	81,5	81,5	104
H	mm	-	-	-	-	11,5	11,5	121,5
I	mm	62	62	127	127	27	27	52
L	mm	19,5	19,5	19,5	19,5	19,5	19,5	19,5
M	mm	19,5	19,5	19,5	19,5	19,5	19,5	19,5
N	mm	-	-	-	-	19,5	19,5	19,5
O	mm	-	-	-	-	19,5	19,5	19,5

⚠ The length of the outlet ducts must be established by qualified personnel, considering the performance of the fan shown on pages 25.

⚠ Suitable measures should be taken to avoid the bypass of air between the outlet and intake.

⚠ For the heat pump appliances, the section of ducting inside the environment must be suitably insulated.

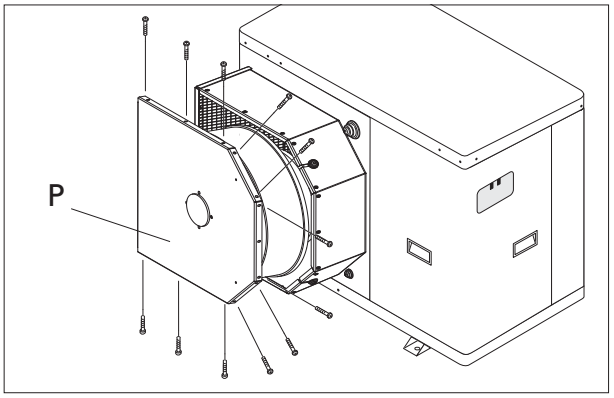
⚠ Use vibration damper joints on the duct fittings.

⚠ The outlet is supplied as standard on the side; for sizes 0011 - 0031 only, the air outlet can be turned from the side to the top position

The appliance is factory fitted with the air outlet in position A (side).

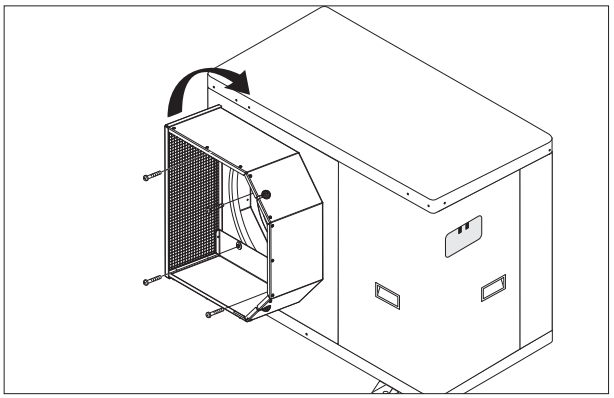
To move it to position B (top) for models 0011-0021.

– Undo the fastening screws and remove the fan holder cover P on the air outlet collar.

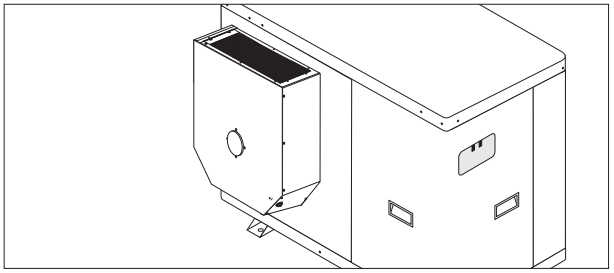


– Unscrew the four fastening bolts and remove the air outlet collar.

– Turn the air outlet collar 90° clockwise and fasten the four bolts that were removed previously.



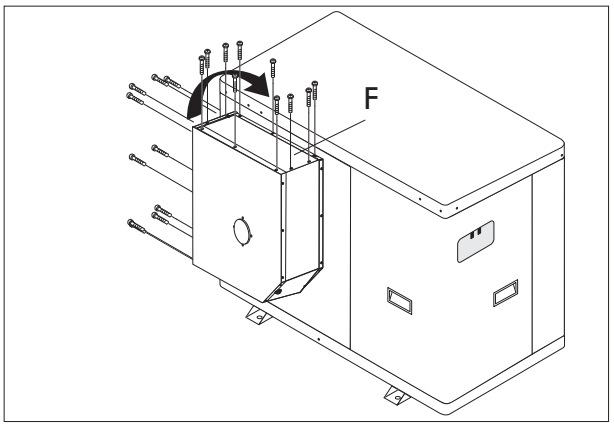
– Replace the fan holder cover P with the fan fitted and tighten the fastening screws.



To move it to position B (top) for models 0025 - 0031.

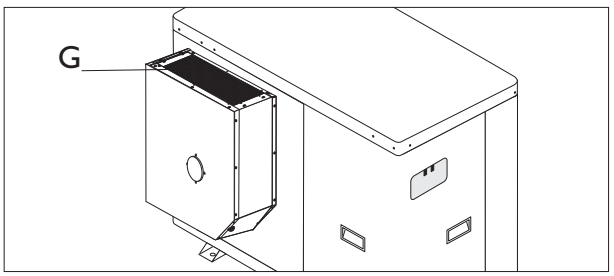
– Undo the fastening screws and remove the protection grill.

– Undo the fastening screws and remove the closed panel F.



– Invert the protection grid G with the panel F.

– Tighten the fastening screws.



The **BRA - BRN FF** 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.

⚠ **Voltage must** be within a tolerance of ±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 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

⛔ **Do not use water pipes** to earth the unit.

BRA FF ELECTRICAL DATA

Model	Electrical power supply (V-Ph-Hz)	Rated values (1)									Max values (3)		FUSES Glass 5x20mm 250V			
		Compressors			Fan/fans		Pump		Total							
		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)	FU1	FU2	FU3	FU4
0011	230~50	1,8	8,6	58	0,71	3,30	0,22	0,92	2,73	12,82	4,2	20,3	-	1A	1A	6,3A
0021	230~50	1,9	9,2	61	0,71	3,30	0,22	0,92	2,83	13,42	4,2	20,3	-	1A	1A	6,3A
0025	230~50	2,4	11,8	82	0,71	3,30	0,22	0,92	3,33	16,02	4,7	23,3	-	1A	1A	6,3A
0031	230~50	3,3	15,0	97	0,71	3,30	0,22	0,92	4,23	19,22	5,5	27,3	-	1A	1A	6,3A
0041	230~50	3,8	18,0	130	1,42	6,60	0,22	0,92	5,44	25,52	5,3	31,3	-	1A	2A	6,3A
0021	400-3N~50	1,9	3,6	32	0,71	3,30	0,22	0,92	2,83	7,82	3,8	9,8	-	1A	1A	6,3A
0025	400-3N~50	2,3	3,8	35	0,71	3,30	0,22	0,92	3,23	8,02	4,4	10,3	-	1A	1A	6,3A
0031	400-3N~50	3,0	5,3	48	0,71	3,30	0,22	0,92	3,93	952	5,1	12,3	-	1A	2A	6,3A
0041	400-3N~50	3,9	7,1	64	1,42	6,60	0,22	0,92	5,54	14,62	6,1	14,3	-	1A	2A	6,3A
0051	400-3N~50	4,4	7,7	64	1,42	6,60	0,22	0,92	6,04	15,22	7,4	16,1	-	1A	2A	6,3A
0061	400-3N~50	4,9	8,4	74	1,42	6,60	0,22	0,92	6,44	15,92	9,3	19,3	-	1A	8A	6,3A

BRN FF ELECTRICAL DATA

Model	Electrical power supply (V-Ph-Hz)	Rated values (2)									Max values (3)		FUSES Glass 5x20mm 250V			
		Compressors			Fan/fans		Pump		Total							
		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)	FU1	FU2	FU3	FU4
0011	230~50	2,1	10,0	58	0,71	3,30	0,22	0,92	3,03	14,22	4,2	20,3	-	1A	1A	6,3A
0021	230~50	2,2	10,7	61	0,71	3,30	0,22	0,92	3,13	14,92	4,2	20,3	-	1A	1A	6,3A
0025	230~50	2,7	13,3	82	0,71	3,30	0,22	0,92	3,63	17,52	4,7	23,3	-	1A	1A	6,3A
0031	230~50	3,4	15,5	97	0,71	3,30	0,22	0,92	4,33	19,72	5,5	27,3	-	1A	1A	6,3A
0041	230~50	4,2	19,9	130	1,42	6,60	0,22	0,92	5,84	27,42	5,3	31,3	-	1A	2A	6,3A
0021	400-3N~50	2,2	4,2	32	0,71	3,30	0,22	0,92	3,13	8,42	3,8	9,8	-	1A	1A	6,3A
0025	400-3N~50	2,6	4,3	35	0,71	3,30	0,22	0,92	3,53	8,52	4,4	10,3	-	1A	1A	6,3A
0031	400-3N~50	3,1	5,5	48	0,71	3,30	0,22	0,92	4,03	9,72	5,1	12,3	-	1A	2A	6,3A
0041	400-3N~50	4,4	8,0	64	1,42	6,60	0,22	0,92	6,04	15,52	6,1	14,3	-	1A	2A	6,3A
0051	400-3N~50	4,7	8,2	64	1,42	6,60	0,22	0,92	6,34	15,72	7,4	16,1	-	1A	2A	6,3A
0061	400-3N~50	5,1	8,7	74	1,42	6,60	0,22	0,92	6,74	16,22	9,3	19,3	-	1A	8A	6,3A

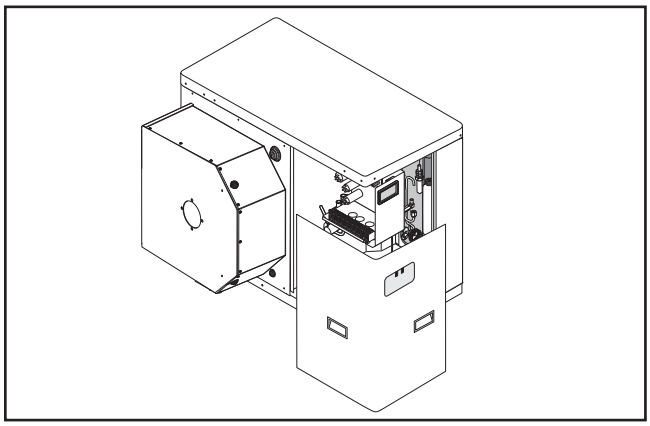
F.L.I. power input
F.L.A. current input
L.R.A. compressor start-up current

(1) Outside air temperature 35°C - Water temperature at evaporator 12/7°C.
(2) Outside air temperature 7°C - Water temperature at condenser 40/45°C.
(3) These values should be used to dimension protection switches and power cables.

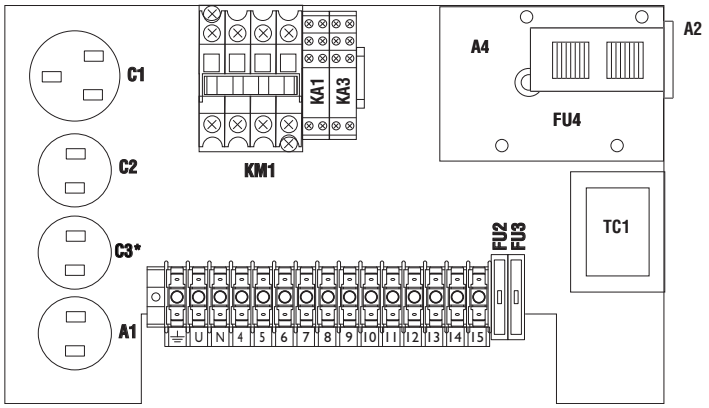
ELECTRICAL PANEL

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.

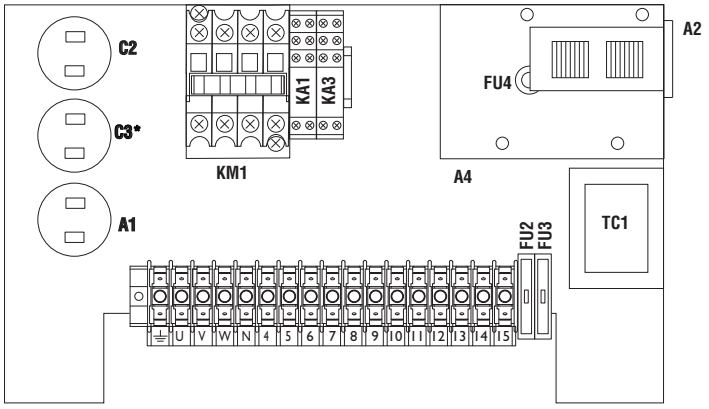
To access the electrical panel, remove the front panel of the unit by undoing the screws.



ELECTRICAL PANEL LAYOUT BRA-BRN FF SINGLE-PHASE



A1 Radio interference suppresser
A2 Electronic controller
A4 Pump electronic control board
C1 Compressor start capacitor
C2/C3 Fan start capacitor
FU2 Auxiliary circuit protection fuse
FU3 Fan protection fuse
FU4 Water pump protection fuse
KA1 High pressure switch relay
KA3 Alarm relay
KM1 Compressor contactor
TC1 Safety transformer
* Only 0041



A1 Radio interference suppresser
A2 Electronic controller
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C2/C3 Fan start capacitor
FU2 Auxiliary circuit protection fuse
FU3 Fan protection fuse
FU4 Water pump protection fuse
KA1 High pressure switch relay
KA3 Alarm relay
KM1 Compressor contactor
TC1 Safety transformer
* Only 0041 - 0061

ELECTRICAL POWER CONNECTIONS

For the functional connection of the unit, bring the power supply cable to the electrical panel inside the unit and connect it to terminals U-N and ⏚ respecting the (U) phase, (N) ⏚ neutral and ⏚ earth in the case of single phase units (230V~50Hz), or U-V-W phases, N neutral and PE earth in three phase units (400V-3N~ 50Hz).

AUXILIARY CONNECTIONS

All terminals referred to in the explanations below are to be found on the terminal board inside the electrical panel and described as "installer terminals".

REMOTE START UP AND SHUT DOWN

To fit a remote on/off device, the jumper must be replaced with a switch connected to terminals 6 and 7 on the installer terminal board. For timed operation, connect a daily or weekly timer between terminals 6 and 7.

REMOTE HEATING/COOLING CONTROL

To fit a remote summer/winter selector, the jumper must be replaced with a switch connected to terminals 8 and 9 on the installer terminal board. To activate the command, proceed as follows:

- Select the parameter H27 on the HSW7 control panel and set it to 1.

REMOTE ALARM

For remote display of unit shut-down due to malfunction, an audible or visual alarm warning device can be connected between terminals 10 and 11. Connect the phase to terminal 11 and the alarm signal device between terminal 10 and the neutral.

REMOTE KEYBOARD KIT

The remote keyboard kit can be used to display all unit functions and access the parameters of the electronic board from a point located at some distance from the unit itself.

It consists of a remote control module. To install the kit, proceed as follows:

- disconnect the power supply and then access the inside of the electrical panel;
- connect the remote control module with 3 wires to terminals 18, 19 and 20 on the installer terminal board:
  connect terminal 18 to terminal 26 on the module;
  connect terminal 19 to terminal 24 on the module;
  connect terminal 20 to terminal 25 on the module;

⚠

Make sure that parameter H27 is set to 0.

To avoid interference due to magnetic fields, the use of shielded cable is recommended. The cable should not be more than 100m long.

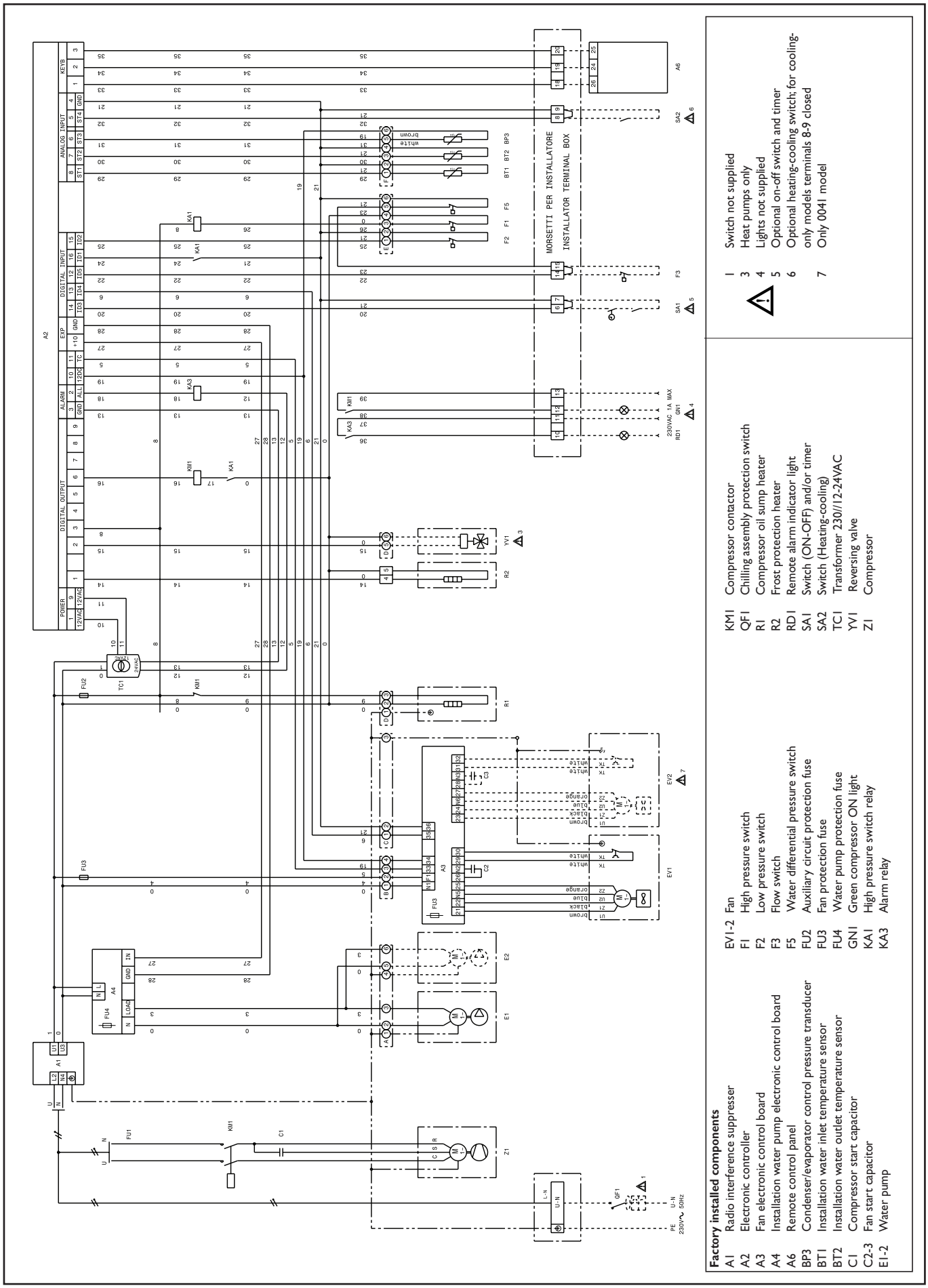
CONNECTING A FLOW SWITCH

If a flow switch is to be used, connect it to terminals 14 and 15 on the installer terminal board, after removing the jumper.

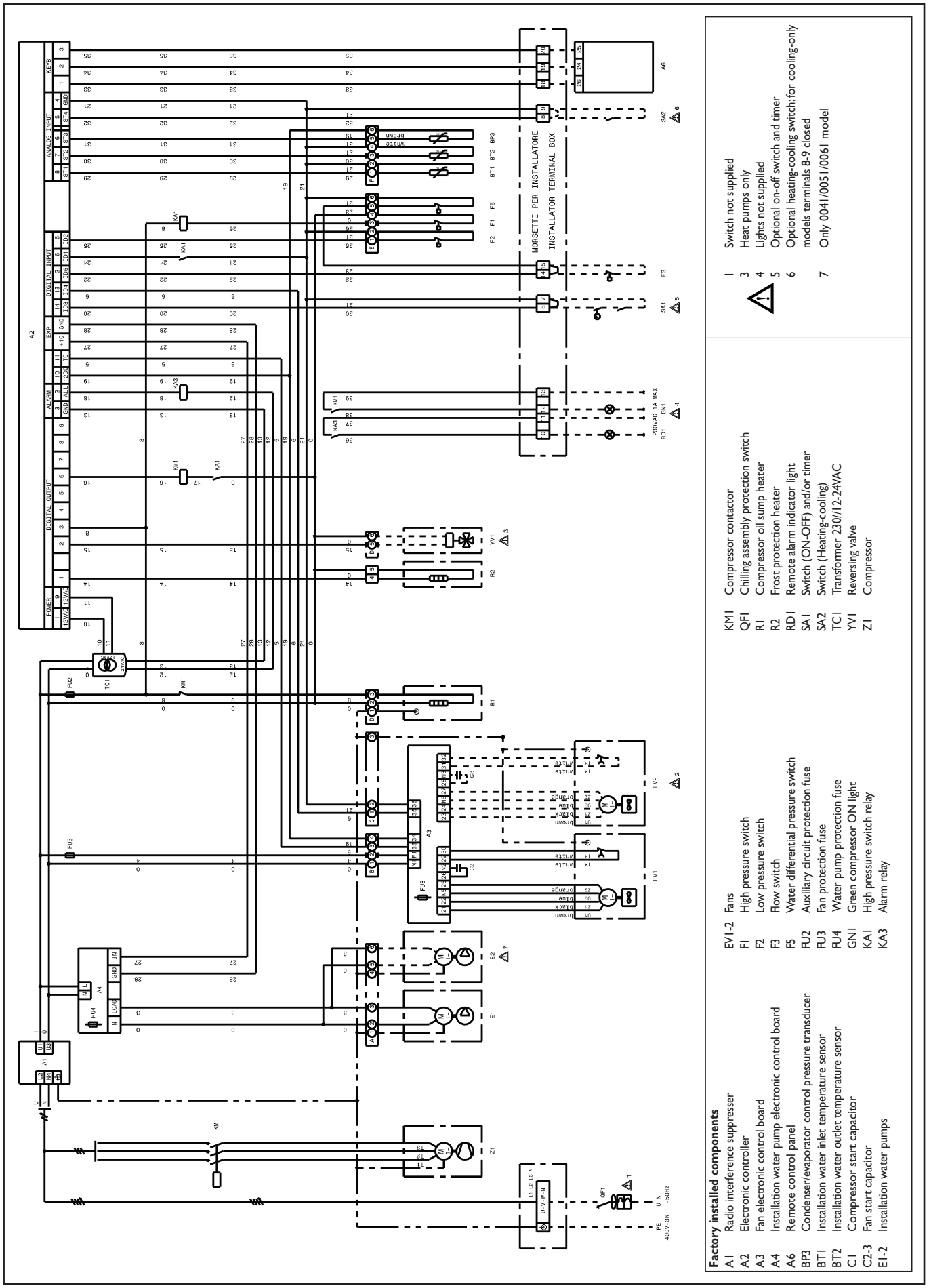
COMPRESSOR ON SIGNAL

If the operation of the compressor needs to be signalled in a remote position, terminals 12 and 13 can be connected to an audible or visual signal device. Connect the phase to terminal 13 and the signal device between terminal 12 and the neutral.

SINGLE-PHASE WIRING DIAGRAM BRA/N FF 0011-0031



THREE-PHASE WIRING DIAGRAM BRA/N FF 0021-0061



Factory installed components

A1	Radio interference suppresser	EV1-2	Fans
A2	Electronic controller	FI	High pressure switch
A3	Fan electronic control board	F2	Low pressure switch
A4	Installation water pump electronic control board	F3	Flow switch
A6	Remote control panel	F5	Water differential pressure switch
BP3	Condenser/evaporator control pressure transducer	FU2	Auxiliary circuit protection fuse
BT1	Installation water inlet temperature sensor	FU3	Fan protection fuse
BT2	Installation water outlet temperature sensor	FU4	Water pump protection fuse
C1	Compressor start capacitor	GN1	Green compressor ON light
C2-3	Fan start capacitor	KA1	High pressure switch relay
E1-2	Installation water pumps	KA3	Alarm relay
		KM1	Compressor contactor
		QF1	Chilling assembly protection switch
		R1	Compressor oil sump heater
		R2	Frost protection heater
		RD1	Remote alarm indicator light
		SA1	Switch (ON-OFF) and/or timer
		SA2	Switch (Heating-cooling)
		TC1	Transformer 230/12-24VAC
		YV1	Reversing valve
		Z1	Compressor

1 Switch not supplied
3 Heat pumps only
4 Lights not supplied
5 Optional on-off switch and timer
6 Optional heating-cooling switch; for cooling-only models terminals 8-9 closed
7 Only 0041/0051/0061 model

BRN FF		0011	0021	0025	0031	0041	0021	0025	0031	0041	0051	0061
Cooling capacity **(1)**	kW	4,6	5,4	6,6	8,2	10,4	5,3	6,7	8,2	10,8	12,6	14,6
Compressor power input **(1)**	kW	1,8	1,9	2,4	3,3	3,8	1,9	2,3	3,0	3,9	4,4	4,9
Heating capacity **(2)**	kW	5,7	6,5	8,1	10,0	12,4	6,4	8,8	9,7	12,8	14,4	16,8
Compressor power input **(2)**	kW	2,1	2,2	2,7	3,4	4,2	2,2	2,6	3,1	4,4	4,7	5,1
Compressors	n°	1	1	1	1	1	1	1	1	1	1	1
Rated water flow **(2)**	m^3/h	1,0	1,1	1,4	1,7	2,1	1,1	1,4	1,7	2,2	2,5	2,9
Rated water flow **(1)**	m^3/h	0,8	0,9	1,1	1,4	1,8	0,9	1,2	1,4	1,9	2,2	2,5
Residual head	kPa	49	46	42	41	43	46	42	41	43	35	32
Maximum allowable pressure PS L **(4)**	MPa	2,80	2,80	2,80	2,80	2,80	2,80	2,80	2,80	2,80	2,80	2,80
Maximum allowable pressure PS H **(4)**	MPa	3,93	3,93	3,93	3,93	3,93	3,93	3,93	3,93	3,93	3,93	3,93
Electrical power supply	V/ph/Hz	230 ~ 50					400-3 N ~ 50					
Total power input **(2)** *	kW	2,8	2,9	3,5	4,2	5,7	2,9	3,3	3,8	5,9	6,1	6,5
Electrical index of protection	IP	X4										
Fans	n°	1	1	1	1	2	1	1	1	2	2	2
Min. rotation speed	g/min	430	430	430	430	430	430	430	430	430	430	430
Max. rotation speed	g/min	760	870	870	760	870	870	870	760	870	870	860
Max. air flow	m3/s	0,9	0,9	1,0	1,0	1,9	0,9	1,0	1,0	1,9	1,8	1,9
Noise level **(3)**	dB(A)	55	55	55	55	60	55	55	55	55	60	60
R410A refrigerant charge	kg	1,50	1,75	2,90	3,00	3,00	1,75	2,90	3,00	3,00	4,00	4,60
Olio Mobil EAL Arctic 22 cc ** / ICI Emkarate RL 32 CF**	Lt	1,1	1,1	1,25	1,25	1,95	1,1	1,25	1,25	1,95	1,90	1,90
Operating weight	kg	110	115	130	135	180	115	130	135	180	200	210

BRA FF		0011	0021	0025	0031	0041	0021	0025	0031	0041	0051	0061
Cooling capacity **(1)**	kW	4,9	5,6	6,9	8,6	11,0	5,6	7,0	8,7	11,4	13,2	15,4
Compressor power input **(1)**	kW	1,8	1,9	2,4	3,3	3,8	1,9	2,3	3,0	3,9	4,4	4,9
Compressors	n°	1	1	1	1	1	1	1	1	1	1	1
Portata acqua nominale **(1)**	m^3/h	0,8	1,0	1,2	1,5	1,9	1,0	1,2	1,5	2,0	2,3	2,7
Residual head	kPa	49	46	42	41	43	46	42	41	43	35	32
Maximum allowable pressure L **(4)**	MPa	2,80	2,80	2,80	2,80	2,80	2,80	2,80	2,80	2,80	2,80	2,80
Maximum allowable pressure H **(4)**	MPa	3,93	3,93	3,93	3,93	3,93	3,93	3,93	3,93	3,93	3,93	3,93
Electrical power supply	V/ph/Hz	230 ~ 50				400-3 N ~ 50						
Total power input **(1)** *	kW	2,5	2,6	3,1	4,0	5,2	2,6	3,0	3,7	5,3	5,8	6,4
Electrical index of protection	IP	X4										
Fans	n°	1	1	1	1	2	1	1	1	2	2	2
Min. rotation speed	g/min	430	430	430	430	430	430	430	430	430	430	430
Max. rotation speed	g/min	760	870	870	760	870	870	870	760	870	870	860
Max. air flow	m3/s	0,9	0,9	1,0	1,0	1,9	0,9	1,0	1,0	1,9	1,8	1,9
Noise level **(3)**	dB(A)	55	55	55	55	60	55	55	55	55	60	60
R410A refrigerant charge	kg	1,35	1,70	2,65	2,35	2,35	1,70	2,65	2,35	2,35	3,25	3,75
Olio Mobil EAL Arctic 22 cc ** / ICI Emkarate RL 32 CF**	Lt	1,1	1,1	1,25	1,25	1,95	1,1	1,25	1,25	1,95	1,90	1,90
Operating weight	kg	100	105	120	125	165	105	120	125	165	185	195

(1) condenser air in 35°C,evaporator water in/out 12/7°C

(2) evaporator air in 7°C ,condenser water in/out 40/45°C

(3) at 1m in open field fan side

(4) the maximum and minimum operating pressure values refer to the activation of the pressure switches

* total power doesn't include value of water pump. See table pag.9

** the two types of oil are equivalents

SINGLE-PHASE

	Model	0011							Model	0021							Model	0025						
Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10
	Pf	5,1	5,3	5,5	5,6	5,8	6,0		Pf	5,9	6,1	6,3	6,5	6,7	6,8		Pf	7,3	7,5	7,8	8,0	8,2	8,5
	Pa	1,4	1,4	1,4	1,4	1,4	1,4		Pa	1,5	1,5	1,5	1,5	1,5	1,5		Pa	1,8	1,8	1,8	1,8	1,8	1,8
25	Pat	1,5	1,5	1,5	1,5	1,6	1,6	25	Pat	1,6	1,6	1,6	1,6	1,6	1,6	25	Pat	2,0	2,0	2,0	2,0	2,0	2,0
	Qev	0,9	0,9	0,9	1,0	1,0	1,0		Qev	1,0	1,0	1,1	1,1	1,1	1,2		Qev	1,3	1,3	1,3	1,4	1,4	1,5
	ΔPev	32	32	32	39	39	39		ΔPev	26	26	31	31	31	37		ΔPev	33	33	33	38	38	44
	Pf	4,9	5,0	5,2	5,4	5,5	5,7		Pf	5,6	5,8	6,0	6,1	6,3	6,5		Pf	6,9	7,1	7,4	7,6	7,8	8,0
	Pa	1,5	1,6	1,6	1,6	1,6	1,6		Pa	1,7	1,7	1,7	1,7	1,7	1,7		Pa	2,1	2,1	2,1	2,1	2,1	2,1
30	Pat	1,7	1,7	1,7	1,7	1,7	1,7	30	Pat	1,8	1,8	1,8	1,8	1,8	1,9	30	Pat	2,2	2,2	2,2	2,2	2,3	2,3
	Qev	0,8	0,9	0,9	0,9	0,9	1,0		Qev	1,0	1,0	1,0	1,1	1,1	1,1		Qev	1,2	1,2	1,3	1,3	1,3	1,4
	ΔPev	25	32	32	32	32	39		ΔPev	26	26	26	31	31	31		ΔPev	28	28	33	33	33	38
	Pf	4,8	4,9	5,1	5,2	5,4	5,5		Pf	5,5	5,7	5,8	6,0	6,2	6,4		Pf	6,8	7,0	7,2	7,4	7,6	7,9
	Pa	1,6	1,6	1,7	1,7	1,7	1,7		Pa	1,8	1,8	1,8	1,8	1,8	1,8		Pa	2,2	2,2	2,2	2,2	2,2	2,2
32	Pat	1,8	1,8	1,8	1,8	1,8	1,8	32	Pat	1,9	1,9	1,9	1,9	1,9	1,9	32	Pat	2,3	2,3	2,4	2,4	2,4	2,4
	Qev	0,8	0,8	0,9	0,9	0,9	1,0		Qev	0,9	1,0	1,0	1,0	1,1	1,1		Qev	1,2	1,2	1,2	1,3	1,3	1,4
	ΔPev	25	25	32	32	32	39		ΔPev	21	26	26	26	31	31		ΔPev	28	28	28	33	33	38
	Pf	4,6	4,7	4,9	5,0	5,2	5,3		Pf	5,3	5,5	5,6	5,8	6,0	6,2		Pf	6,5	6,7	6,9	7,1	7,4	7,6
	Pa	1,8	1,8	1,8	1,8	1,8	1,8		Pa	1,9	1,9	1,9	1,9	1,9	1,9		Pa	2,4	2,4	2,4	2,4	2,4	2,4
35	Pat	1,9	1,9	1,9	1,9	1,9	2,0	35	Pat	2,1	2,1	2,1	2,1	2,1	2,1	35	Pat	2,5	2,5	2,5	2,6	2,6	2,6
	Qev	0,8	0,8	0,8	0,9	0,9	0,9		Qev	0,9	0,9	1,0	1,0	1,0	1,1		Qev	1,1	1,2	1,2	1,2	1,3	1,3
	ΔPev	25	25	25	32	32	32		ΔPev	21	21	26	26	26	31		ΔPev	24	28	28	28	33	33
	Pf	4,3	4,4	4,5	4,7	4,8	5,0		Pf	4,9	5,1	5,3	5,4	5,6	5,8		Pf	6,1	6,3	6,5	6,7	6,9	7,1
	Pa	2,0	2,0	2,0	2,0	2,0	2,0		Pa	2,2	2,2	2,2	2,2	2,2	2,2		Pa	2,7	2,7	2,7	2,7	2,8	2,8
40	Pat	2,1	2,1	2,2	2,2	2,2	2,2	40	Pat	2,3	2,3	2,3	2,3	2,3	2,3	40	Pat	2,9	2,9	2,9	2,9	2,9	2,9
	Qev	0,7	0,8	0,8	0,8	0,8	0,9		Qev	0,8	0,9	0,9	0,9	1,0	1,0		Qev	1,0	1,1	1,1	1,2	1,2	1,2
	ΔPev	19	25	25	25	25	32		ΔPev	17	21	21	21	26	26		ΔPev	19	24	24	28	28	28
	Pf	4,1	4,2	4,3	4,5	4,6	4,8		Pf	4,7	4,9	5,0	5,2	5,4	5,5		Pf	5,8	6,0	6,2	6,4	6,6	6,8
	Pa	2,1	2,1	2,2	2,2	2,2	2,2		Pa	2,3	2,3	2,4	2,4	2,4	2,4		Pa	2,9	3,0	3,0	3,0	3,0	3,0
43	Pat	2,3	2,3	2,3	2,3	2,3	2,3	43	Pat	2,5	2,5	2,5	2,5	2,5	2,5	43	Pat	3,1	3,1	3,1	3,1	3,1	3,1
	Qev	0,7	0,7	0,7	0,8	0,8	0,8		Qev	0,8	0,8	0,9	0,9	0,9	1,0		Qev	1,0	1,0	1,1	1,1	1,1	1,2
	ΔPev	19	19	19	25	25	25		ΔPev	17	17	21	21	21	26		ΔPev	19	19	24	24	24	28

	Model	0031							Model	0041						
Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10	
	Pf	9,2	9,5	9,8	10,0	10,3	10,6		Pf	11,5	11,8	12,2	12,5	12,9	13,2	
	Pa	2,5	2,5	2,5	2,5	2,5	2,5		Pa	2,9	3,0	3,0	3,0	3,0	3,0	
25	Pat	2,6	2,6	2,6	2,7	2,7	2,7	25	Pat	3,2	3,3	3,3	3,3	3,3	3,3	
	Qev	1,6	1,6	1,7	1,7	1,8	1,8		Qev	2,0	2,0	2,1	2,2	2,2	2,3	
	ΔPev	31	31	35	35	39	39		ΔPev	25	25	28	31	31	34	
	Pf	8,7	8,9	9,2	9,5	9,8	10,0		Pf	10,9	11,3	11,6	11,9	12,2	12,6	
	Pa	2,8	2,8	2,9	2,9	2,9	2,9		Pa	3,3	3,3	3,4	3,4	3,4	3,4	
30	Pat	3,0	3,0	3,0	3,0	3,0	3,1	30	Pat	3,6	3,6	3,7	3,7	3,7	3,7	
	Qev	1,5	1,5	1,6	1,6	1,7	1,7		Qev	1,9	1,9	2,0	2,1	2,1	2,2	
	ΔPev	27	27	31	31	35	35		ΔPev	23	23	25	28	28	31	
	Pf	8,4	8,7	9,0	9,2	9,5	9,8		Pf	10,7	11,0	11,3	11,7	12,0	12,3	
	Pa	3,0	3,0	3,0	3,0	3,0	3,1		Pa	3,5	3,5	3,5	3,5	3,6	3,6	
32	Pat	3,1	3,1	3,2	3,2	3,2	3,2	32	Pat	3,8	3,8	3,8	3,8	3,9	3,9	
	Qev	1,5	1,5	1,5	1,6	1,6	1,7		Qev	1,8	1,9	2,0	2,0	2,1	2,1	
	ΔPev	27	27	27	31	31	35		ΔPev	21	23	25	25	28	28	
	Pf	8,1	8,4	8,6	8,9	9,1	9,4		Pf	10,3	10,6	11,0	11,3	11,6	11,9	
	Pa	3,2	3,2	3,3	3,3	3,3	3,3		Pa	3,7	3,7	3,8	3,8	3,8	3,8	
35	Pat	3,4	3,4	3,4	3,4	3,4	3,5	35	Pat	4,0	4,0	4,1	4,1	4,1	4,1	
	Qev	1,4	1,4	1,5	1,5	1,6	1,6		Qev	1,8	1,8	1,9	1,9	2,0	2,0	
	ΔPev	24	24	27	27	31	31		ΔPev	21	21	23	23	25	25	
	Pf	7,5	7,7	8,0	8,2	8,5	8,7		Pf	9,7	10,0	10,3	10,6	10,9	11,2	
	Pa	3,7	3,7	3,7	3,7	3,8	3,8		Pa	4,2	4,2	4,2	4,2	4,3	4,3	
40	Pat	3,8	3,8	3,9	3,9	3,9	3,9	40	Pat	4,5	4,5	4,5	4,5	4,6	4,6	
	Qev	1,3	1,3	1,4	1,4	1,5	1,5		Qev	1,7	1,7	1,8	1,8	1,9	1,9	
	ΔPev	20	20	24	24	27	27		ΔPev	18	18	21	21	23	23	
	Pf	7,1	7,4	7,6	7,8	8,1	8,3		Pf	9,3	9,6	9,9	10,2	10,5	10,8	
	Pa	4,0	4,0	4,0	4,0	4,0	4,1		Pa	4,5	4,5	4,5	4,5	4,5	4,6	
43	Pat	4,1	4,1	4,2	4,2	4,2	4,2	43	Pat	4,8	4,8	4,8	4,8	4,8	4,9	
	Qev	1,2	1,3	1,3	1,3	1,4	1,4		Qev	1,6	1,7	1,7	1,8	1,8	1,9	
	ΔPev	17	20	20	20	24	24		ΔPev	16	18	18	21	21	23	

Ta: outside air temperature (°C)
Tw: evaporator water outlet temperature (°C)
Pf: cooling capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qev: evaporator water flow (m^3/h)
ΔPev: evaporator pressure drop (kPa)

THREE PHASE

	Model 0021							Model 0025							Model 0031						
Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10
	Pf	5,9	6,1	6,3	6,5	6,7	6,9		Pf	7,6	7,8	8,0	8,3	8,5	8,7		Pf	9,2	9,5	9,8	10,1	10,4	10,7
	Pa	1,4	1,4	1,4	1,4	1,4	1,4		Pa	1,7	1,7	1,7	1,7	1,7	1,8		Pa	2,3	2,3	2,4	2,4	2,4	2,4
25	Pat	1,6	1,6	1,6	1,6	1,6	1,6	25	Pat	1,9	1,9	1,9	1,9	1,9	1,9	25	Pat	2,5	2,5	2,5	2,5	2,6	2,6
	Qev	1,0	1,0	1,1	1,1	1,1	1,2		Qev	1,3	1,3	1,4	1,4	1,5	1,5		Qev	1,6	1,6	1,7	1,7	1,8	1,8
	ΔPev	26	26	31	31	31	37		ΔPev	33	33	38	38	44	44		ΔPev	31	31	35	35	39	39
	Pf	5,6	5,8	6,0	6,2	6,3	6,5		Pf	7,1	7,3	7,6	7,8	8,0	8,2		Pf	8,7	9,0	9,2	9,5	9,8	10,1
	Pa	1,6	1,6	1,6	1,6	1,6	1,6		Pa	2,0	2,0	2,0	2,0	2,0	2,0		Pa	2,6	2,6	2,7	2,7	2,7	2,7
30	Pat	1,8	1,8	1,8	1,8	1,8	1,8	30	Pat	2,1	2,1	2,1	2,1	2,1	2,2	30	Pat	2,8	2,8	2,8	2,8	2,9	2,9
	Qev	1,0	1,0	1,0	1,1	1,1	1,1		Qev	1,2	1,3	1,3	1,3	1,4	1,4		Qev	1,5	1,5	1,6	1,6	1,7	1,7
	ΔPev	26	26	26	31	31	31		ΔPev	28	33	33	33	38	38		ΔPev	27	27	31	31	35	35
	Pf	5,5	5,7	5,8	6,0	6,2	6,4		Pf	6,9	7,1	7,4	7,6	7,7	7,9		Pf	8,5	8,8	9,0	9,3	9,6	9,8
	Pa	1,7	1,7	1,7	1,7	1,7	1,7		Pa	2,1	2,1	2,1	2,1	2,1	2,1		Pa	2,7	2,8	2,8	2,8	2,8	2,9
32	Pat	1,9	1,9	1,9	1,9	1,9	1,9	32	Pat	2,2	2,2	2,2	2,2	2,3	2,3	32	Pat	2,9	2,9	2,9	3,0	3,0	3,0
	Qev	0,9	1,0	1,0	1,0	1,1	1,1		Qev	1,2	1,2	1,3	1,3	1,3	1,4		Qev	1,5	1,5	1,6	1,6	1,6	1,7
	ΔPev	21	26	26	26	31	31		ΔPev	28	28	33	33	33	38		ΔPev	27	27	31	31	31	35
	Pf	5,3	5,5	5,6	5,8	6,0	6,1		Pf	6,6	6,8	7,0	7,2	7,4	7,6		Pf	8,2	8,4	8,7	8,9	9,2	9,5
	Pa	1,9	1,9	1,9	1,9	1,9	1,9		Pa	2,2	2,3	2,3	2,3	2,3	2,3		Pa	2,9	3,0	3,0	3,0	3,0	3,1
35	Pat	2,0	2,0	2,0	2,0	2,0	2,0	35	Pat	2,4	2,4	2,4	2,4	2,4	2,4	35	Pat	3,1	3,1	3,1	3,2	3,2	3,2
	Qev	0,9	0,9	1,0	1,0	1,0	1,1		Qev	1,1	1,2	1,2	1,2	1,3	1,3		Qev	1,4	1,4	1,5	1,5	1,6	1,6
	ΔPev	21	21	26	26	26	31		ΔPev	24	28	28	28	33	33		ΔPev	24	24	27	27	31	31
	Pf	4,9	5,1	5,2	5,4	5,6	5,7		Pf	6,1	6,3	6,5	6,7	6,9	7,0		Pf	7,6	7,8	8,1	8,3	8,6	8,8
	Pa	2,1	2,1	2,1	2,2	2,2	2,2		Pa	2,6	2,6	2,6	2,6	2,6	2,6		Pa	3,3	3,3	3,3	3,4	3,4	3,4
40	Pat	2,3	2,3	2,3	2,3	2,3	2,3	40	Pat	2,7	2,7	2,7	2,7	2,7	2,7	40	Pat	3,4	3,5	3,5	3,5	3,5	3,6
	Qev	0,8	0,9	0,9	0,9	1,0	1,0		Qev	1,1	1,1	1,1	1,2	1,2	1,2		Qev	1,3	1,4	1,4	1,4	1,5	1,5
	ΔPev	17	21	21	21	26	26		ΔPev	24	24	24	28	28	28		ΔPev	20	24	24	24	27	27
	Pf	4,7	4,8	5,0	5,1	5,3	5,5		Pf	5,8	6,0	6,2	6,3	6,5	6,7		Pf	7,3	7,5	7,7	8,0	8,2	8,5
	Pa	2,3	2,3	2,3	2,3	2,3	2,3		Pa	2,8	2,8	2,8	2,8	2,8	2,8		Pa	3,5	3,5	3,6	3,6	3,6	3,6
43	Pat	2,5	2,5	2,5	2,5	2,5	2,5	43	Pat	2,9	2,9	2,9	2,9	2,9	2,9	43	Pat	3,7	3,7	3,7	3,7	3,8	3,8
	Qev	0,8	0,8	0,9	0,9	0,9	0,9		Qev	1,0	1,0	1,1	1,1	1,1	1,2		Qev	1,2	1,3	1,3	1,4	1,4	1,5
	ΔPev	17	17	21	21	21	21		ΔPev	19	19	24	24	24	28		ΔPev	17	20	20	24	24	27

	Model 0041							Model 0051							Model 0061						
Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10
	Pf	12,0	12,4	12,7	13,1	13,4	13,8		Pf	13,9	14,3	14,8	15,2	15,7	16,1		Pf	16,2	16,7	17,2	17,7	18,2	18,7
	Pa	3,0	3,0	3,0	3,0	3,1	3,1		Pa	3,6	3,6	3,6	3,6	3,7	3,7		Pa	3,9	3,9	3,9	4,0	4,0	4,0
25	Pat	3,3	3,3	3,3	3,3	3,4	3,4	25	Pat	3,9	3,9	3,9	3,9	4,0	4,0	25	Pat	4,2	4,2	4,2	4,3	4,3	4,3
	Qev	2,1	2,1	2,2	2,2	2,3	2,4		Qev	2,4	2,5	2,5	2,6	2,7	2,8		Qev	2,8	2,9	3,0	3,1	3,1	3,2
	ΔPev	25	25	28	28	30	33		ΔPev	29	32	32	35	37	40		ΔPev	29	31	33	36	36	38
	Pf	11,4	11,7	12,1	12,4	12,7	13,1		Pf	13,2	13,6	14,0	14,5	14,9	15,3		Pf	15,4	15,9	16,3	16,8	17,3	17,8
	Pa	3,4	3,4	3,4	3,5	3,5	3,5		Pa	3,9	4,0	4,0	4,0	4,0	4,0		Pa	4,3	4,4	4,4	4,4	4,5	4,5
30	Pat	3,7	3,7	3,7	3,8	3,8	3,8	30	Pat	4,2	4,3	4,3	4,3	4,3	4,3	30	Pat	4,6	4,7	4,7	4,7	4,8	4,8
	Qev	2,0	2,0	2,1	2,1	2,2	2,3		Qev	2,3	2,3	2,4	2,5	2,6	2,6		Qev	2,6	2,7	2,8	2,9	3,0	3,1
	ΔPev	23	23	25	25	28	30		ΔPev	27	27	29	32	35	35		ΔPev	25	27	29	31	33	36
	Pf	11,1	11,5	11,8	12,1	12,5	12,8		Pf	12,9	13,3	13,7	14,1	14,6	15,0		Pf	15,0	15,5	16,0	16,4	16,9	17,4
	Pa	3,6	3,6	3,6	3,6	3,7	3,7		Pa	4,1	4,1	4,1	4,1	4,2	4,2		Pa	4,5	4,6	4,6	4,6	4,7	4,7
32	Pat	3,9	3,9	3,9	3,9	4,0	4,0	32	Pat	4,4	4,4	4,4	4,4	4,5	4,5	32	Pat	4,8	4,9	4,9	4,9	5,0	5,0
	Qev	1,9	2,0	2,0	2,1	2,1	2,2		Qev	2,2	2,3	2,4	2,4	2,5	2,6		Qev	2,6	2,7	2,8	2,8	2,9	3,0
	ΔPev	21	23	23	25	25	28		ΔPev	25	27	29	29	32	35		ΔPev	25	27	29	29	31	33
	Pf	10,8	11,1	11,4	11,7	12,1	12,4		Pf	12,4	12,8	13,2	13,6	14,0	14,4		Pf	14,5	15,0	15,4	15,9	16,3	16,8
	Pa	3,8	3,9	3,9	3,9	3,9	4,0		Pa	4,3	4,4	4,4	4,4	4,4	4,4		Pa	4,8	4,9	4,9	5,0	5,0	5,0
35	Pat	4,1	4,2	4,2	4,2	4,2	4,3	35	Pat	4,6	4,7	4,7	4,7	4,7	4,7	35	Pat	5,1	5,2	5,2	5,3	5,3	5,3
	Qev	1,9	1,9	2,0	2,0	2,1	2,1		Qev	2,1	2,2	2,3	2,3	2,4	2,5		Qev	2,5	2,6	2,7	2,7	2,8	2,9
	ΔPev	21	21	23	23	25	25		ΔPev	23	25	27	27	29	32		ΔPev	23	25	27	27	29	31
	Pf	10,1	10,4	10,7	11,0	11,3	11,7		Pf	11,5	11,9	12,3	12,7	13,1	13,5		Pf	13,6	14,0	14,4	14,8	15,3	15,7
	Pa	4,4	4,4	4,4	4,4	4,4	4,5		Pa	4,8	4,8	4,8	4,8	4,8	4,8		Pa	5,4	5,5	5,5	5,5	5,6	5,6
40	Pat	4,7	4,7	4,7	4,7	4,7	4,8	40	Pat	5,1	5,1	5,1	5,1	5,1	5,1	40	Pat	5,7	5,8	5,8	5,8	5,9	5,9
	Qev	1,7	1,8	1,8	1,9	2,0	2,0		Qev	2,0	2,1	2,1	2,2	2,3	2,3		Qev	2,3	2,4	2,5	2,6	2,6	2,7
	ΔPev	17	19	19	21	23	23		ΔPev	20	23	23	25	27	27		ΔPev	20	21	23	25	25	27
	Pf	9,7	10,0	10,3	10,6	10,9	11,2		Pf	11,0	11,3	11,7	12,1	12,5	12,9		Pf	13,0	13,4	13,8	14,2	14,6	15,0
	Pa	4,7	4,7	4,7	4,8	4,8	4,8		Pa	5,0	5,0	5,1	5,1	5,1	5,1		Pa	5,8	5,8	5,9	5,9	5,9	6,0
43	Pat	5,0	5,0	5,0	5,1	5,1	5,1	43	Pat	5,3	5,3	5,4	5,4	5,4	5,4	43	Pat	6,1	6,1	6,2	6,2	6,2	6,3
	Qev	1,7	1,7	1,8	1,8	1,9	1,9		Qev	1,9	2,0	2,0	2,1	2,2	2,2		Qev	2,2	2,3	2,4	2,4	2,5	2,6
	ΔPev	17	17	19	19	21	21		ΔPev	18	20	20	23	25	25		ΔPev	18	20	21	21	23	25

Ta: outside air temperature (°C)
Tw: evaporator water outlet temperature (°C)
Pf: cooling capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qev: evaporator water flow (m^3/h)
ΔPev: evaporator pressure drop (kPa)

SINGLE-PHASE

	Model	0011							Model	0021							Model	0025						
Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10
	Pf	4,9	5,0	5,2	5,4	5,5	5,7		Pf	5,6	5,8	6,0	6,1	6,3	6,5		Pf	6,9	7,2	7,4	7,6	7,8	8,1
	Pa	1,4	1,4	1,4	1,4	1,4	1,4		Pa	1,5	1,5	1,5	1,5	1,5	1,5		Pa	1,8	1,8	1,8	1,8	1,8	1,8
25	Pat	1,5	1,5	1,5	1,5	1,6	1,6	25	Pat	1,6	1,6	1,6	1,6	1,6	1,6	25	Pat	2,0	2,0	2,0	2,0	2,0	2,0
	Qev	0,8	0,9	0,9	0,9	0,9	1,0		Qev	1,0	1,0	1,0	1,1	1,1	1,1		Qev	1,2	1,2	1,3	1,3	1,3	1,4
	ΔPev	25	32	32	32	32	39		ΔPev	33	33	33	37	37	37		ΔPev	35	35	40	40	40	47
	Pf	4,6	4,8	4,9	5,1	5,2	5,4		Pf	5,3	5,5	5,7	5,8	6,0	6,2		Pf	6,6	6,8	7,0	7,2	7,4	7,6
	Pa	1,5	1,6	1,6	1,6	1,6	1,6		Pa	1,7	1,7	1,7	1,7	1,7	1,7		Pa	2,1	2,1	2,1	2,1	2,1	2,1
30	Pat	1,7	1,7	1,7	1,7	1,7	1,7	30	Pat	1,8	1,8	1,8	1,8	1,8	1,9	30	Pat	2,2	2,2	2,2	2,2	2,3	2,3
	Qev	0,8	0,8	0,8	0,9	0,9	0,9		Qev	0,9	0,9	1,0	1,0	1,0	1,1		Qev	1,1	1,2	1,2	1,2	1,3	1,3
	ΔPev	25	25	25	32	32	32		ΔPev	27	27	33	33	33	37		ΔPev	29	35	35	35	40	40
	Pf	4,5	4,7	4,8	5,0	5,1	5,3		Pf	5,2	5,4	5,5	5,7	5,9	6,1		Pf	6,4	6,6	6,8	7,0	7,3	7,5
	Pa	1,6	1,6	1,7	1,7	1,7	1,7		Pa	1,8	1,8	1,8	1,8	1,8	1,8		Pa	2,2	2,2	2,2	2,2	2,2	2,2
32	Pat	1,8	1,8	1,8	1,8	1,8	1,8	32	Pat	1,9	1,9	1,9	1,9	1,9	1,9	32	Pat	2,3	2,3	2,4	2,4	2,4	2,4
	Qev	0,8	0,8	0,8	0,9	0,9	0,9		Qev	0,9	0,9	1,0	1,0	1,0	1,0		Qev	1,1	1,1	1,2	1,2	1,2	1,3
	ΔPev	25	25	25	32	32	32		ΔPev	27	27	33	33	33	33		ΔPev	29	29	35	35	35	40
	Pf	4,4	4,5	4,6	4,8	4,9	5,1		Pf	5,0	5,2	5,4	5,5	5,7	5,8		Pf	6,2	6,4	6,6	6,8	7,0	7,2
	Pa	1,8	1,8	1,8	1,8	1,8	1,8		Pa	1,9	1,9	1,9	1,9	1,9	1,9		Pa	2,4	2,4	2,4	2,4	2,4	2,4
35	Pat	1,9	1,9	1,9	1,9	1,9	2,0	35	Pat	2,1	2,1	2,1	2,1	2,1	2,1	35	Pat	2,5	2,5	2,5	2,6	2,6	2,6
	Qev	0,7	0,8	0,8	0,8	0,8	0,9		Qev	0,9	0,9	0,9	0,9	1,0	1,0		Qev	1,1	1,1	1,1	1,2	1,2	1,2
	ΔPev	19	25	25	25	25	32		ΔPev	27	27	27	27	33	33		ΔPev	29	29	29	35	35	35
	Pf	4,0	4,2	4,3	4,5	4,6	4,7		Pf	4,7	4,8	5,0	5,2	5,3	5,5		Pf	5,8	6,0	6,2	6,4	6,5	6,7
	Pa	2,0	2,0	2,0	2,0	2,0	2,0		Pa	2,2	2,2	2,2	2,2	2,2	2,2		Pa	2,7	2,7	2,7	2,7	2,8	2,8
40	Pat	2,1	2,1	2,2	2,2	2,2	2,2	40	Pat	2,3	2,3	2,3	2,3	2,3	2,3	40	Pat	2,9	2,9	2,9	2,9	2,9	2,9
	Qev	0,7	0,7	0,7	0,8	0,8	0,8		Qev	0,8	0,8	0,9	0,9	0,9	0,9		Qev	1,0	1,0	1,1	1,1	1,1	1,2
	ΔPev	19	19	19	25	25	25		ΔPev	21	21	27	27	27	27		ΔPev	24	24	29	29	29	35
	Pf	3,9	4,0	4,1	4,2	4,4	4,5		Pf	4,5	4,6	4,8	4,9	5,1	5,2		Pf	5,5	5,7	5,9	6,1	6,3	6,5
	Pa	2,1	2,1	2,2	2,2	2,2	2,2		Pa	2,3	2,3	2,4	2,4	2,4	2,4		Pa	2,9	3,0	3,0	3,0	3,0	3,0
43	Pat	2,3	2,3	2,3	2,3	2,3	2,3	43	Pat	2,5	2,5	2,5	2,5	2,5	2,5	43	Pat	3,1	3,1	3,1	3,1	3,1	3,1
	Qev	0,7	0,7	0,7	0,7	0,8	0,8		Qev	0,8	0,8	0,8	0,8	0,9	0,9		Qev	0,9	1,0	1,0	1,0	1,1	1,1
	ΔPev	19	19	19	19	25	25		ΔPev	21	21	21	21	27	27		ΔPev	19	24	24	24	29	29

	Model	0031							Model	0041						
Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10
	Pf	8,7	9,0	9,3	9,5	9,8	10,1		Pf	10,9	11,3	11,6	11,9	12,2	12,5
	Pa	2,5	2,5	2,5	2,5	2,5	2,5		Pa	2,9	3,0	3,0	3,0	3,0	3,0
25	Pat	2,6	2,6	2,6	2,7	2,7	2,7	25	Pat	3,2	3,3	3,3	3,3	3,3	3,3
	Qev	1,5	1,5	1,6	1,6	1,7	1,7		Qev	1,9	1,9	2,0	2,0	2,1	2,0
	ΔPev	32	32	37	37	41	41		ΔPev	27	27	30	30	33	30
	Pf	8,2	8,5	8,8	9,0	9,3	9,5		Pf	10,4	10,7	11,0	11,3	11,6	11,9
	Pa	2,8	2,8	2,9	2,9	2,9	2,9		Pa	3,3	3,3	3,4	3,4	3,4	3,4
30	Pat	3,0	3,0	3,0	3,0	3,0	3,1	30	Pat	3,6	3,6	3,7	3,7	3,7	3,7
	Qev	1,4	1,5	1,5	1,6	1,6	1,6		Qev	1,8	1,8	1,9	1,9	2,0	2,1
	ΔPev	28	32	32	37	37	37		ΔPev	24	24	27	27	30	33
	Pf	8,0	8,3	8,5	8,8	9,0	9,3		Pf	10,2	10,5	10,8	11,1	11,4	11,7
	Pa	3,0	3,0	3,0	3,0	3,0	3,1		Pa	3,5	3,5	3,5	3,5	3,6	3,6
32	Pat	3,1	3,1	3,2	3,2	3,2	3,2	32	Pat	3,8	3,8	3,8	3,8	3,9	3,9
	Qev	1,4	1,4	1,5	1,5	1,6	1,6		Qev	1,7	1,8	1,9	1,9	2,0	2,0
	ΔPev	28	28	32	32	37	37		ΔPev	21	24	27	27	30	30
	Pf	7,7	7,9	8,2	8,4	8,7	8,9		Pf	9,8	10,1	10,4	10,7	11,0	11,3
	Pa	3,2	3,2	3,3	3,3	3,3	3,3		Pa	3,7	3,7	3,8	3,8	3,8	3,8
35	Pat	3,4	3,4	3,4	3,4	3,4	3,5	35	Pat	4,0	4,0	4,1	4,1	4,1	4,1
	Qev	1,3	1,4	1,4	1,5	1,5	1,5		Qev	1,7	1,7	1,8	1,8	1,9	1,9
	ΔPev	24	28	28	32	32	32		ΔPev	21	21	24	24	27	27
	Pf	7,1	7,4	7,6	7,8	8,1	8,3		Pf	9,2	9,5	9,8	10,1	10,4	10,7
	Pa	3,7	3,7	3,7	3,7	3,8	3,8		Pa	4,2	4,2	4,2	4,2	4,3	4,3
40	Pat	3,8	3,8	3,9	3,9	3,9	3,9	40	Pat	4,5	4,5	4,5	4,5	4,6	4,6
	Qev	1,2	1,3	1,3	1,3	1,4	1,4		Qev	1,6	1,6	1,7	1,7	1,8	1,8
	ΔPev	21	24	24	24	28	28		ΔPev	19	19	21	21	24	24
	Pf	6,8	7,0	7,2	7,4	7,7	7,9		Pf	8,8	9,1	9,4	9,7	10,0	10,3
	Pa	4,0	4,0	4,0	4,0	4,0	4,1		Pa	4,5	4,5	4,5	4,5	4,5	4,6
43	Pat	4,1	4,1	4,2	4,2	4,2	4,2	43	Pat	4,8	4,8	4,8	4,8	4,8	4,9
	Qev	1,2	1,2	1,2	1,3	1,3	1,4		Qev	1,5	1,6	1,6	1,7	1,7	1,8
	ΔPev	21	21	21	24	24	28		ΔPev	17	19	19	21	21	24

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

THREE PHASE

	Model 0021							Model 0025							Model 0031						
Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10
	Pf	5,6	5,8	6,0	6,2	6,3	6,5		Pf	7,2	7,4	7,6	7,8	8,0	8,2		Pf	8,8	9,0	9,3	9,6	9,9	10,1
	Pa	1,4	1,4	1,4	1,4	1,4	1,4		Pa	1,7	1,7	1,7	1,7	1,7	1,8		Pa	2,3	2,3	2,4	2,4	2,4	2,4
25	Pat	1,6	1,6	1,6	1,6	1,6	1,6	25	Pat	1,9	1,9	1,9	1,9	1,9	1,9	25	Pat	2,5	2,5	2,5	2,5	2,6	2,6
	Qev	1,0	1,0	1,0	1,1	1,1	1,1		Qev	1,2	1,3	1,3	1,4	1,4	1,4		Qev	1,5	1,6	1,6	1,6	1,7	1,7
	ΔPev	33	33	33	37	37	37		ΔPev	29	34	34	39	39	39		ΔPev	32	37	37	37	41	41
	Pf	5,3	5,5	5,7	5,9	6,0	6,2		Pf	6,8	7,0	7,2	7,4	7,6	7,7		Pf	8,3	8,5	8,8	9,0	9,3	9,6
	Pa	1,6	1,6	1,6	1,6	1,6	1,6		Pa	2,0	2,0	2,0	2,0	2,0	2,0		Pa	2,6	2,6	2,7	2,7	2,7	2,7
30	Pat	1,8	1,8	1,8	1,8	1,8	1,8	30	Pat	2,1	2,1	2,1	2,1	2,1	2,2	30	Pat	2,8	2,8	2,8	2,8	2,9	2,9
	Qev	0,9	0,9	1,0	1,0	1,0	1,1		Qev	1,2	1,2	1,2	1,3	1,3	1,3		Qev	1,4	1,5	1,5	1,6	1,6	1,6
	ΔPev	27	27	33	33	33	37		ΔPev	29	29	29	34	34	34		ΔPev	28	32	32	37	37	37
	Pf	5,2	5,4	5,5	5,7	5,9	6,1		Pf	6,6	6,8	7,0	7,2	7,4	7,5		Pf	8,1	8,3	8,6	8,8	9,1	9,3
	Pa	1,7	1,7	1,7	1,7	1,7	1,7		Pa	2,1	2,1	2,1	2,1	2,1	2,1		Pa	2,7	2,8	2,8	2,8	2,8	2,9
32	Pat	1,9	1,9	1,9	1,9	1,9	1,9	32	Pat	2,2	2,2	2,2	2,2	2,3	2,3	32	Pat	2,9	2,9	2,9	3,0	3,0	3,0
	Qev	0,9	0,9	1,0	1,0	1,0	1,0		Qev	1,1	1,2	1,2	1,2	1,3	1,3		Qev	1,4	1,4	1,5	1,5	1,6	1,6
	ΔPev	27	27	33	33	33	33		ΔPev	24	29	29	29	34	34		ΔPev	28	28	32	32	37	37
	Pf	5,0	5,2	5,3	5,5	5,7	5,8		Pf	6,3	6,5	6,7	6,9	7,1	7,2		Pf	7,8	8,0	8,2	8,5	8,7	9,0
	Pa	1,9	1,9	1,9	1,9	1,9	1,9		Pa	2,2	2,3	2,3	2,3	2,3	2,3		Pa	2,9	3,0	3,0	3,0	3,0	3,1
35	Pat	2,0	2,0	2,0	2,0	2,0	2,0	35	Pat	2,4	2,4	2,4	2,4	2,4	2,4	35	Pat	3,1	3,1	3,1	3,2	3,2	3,2
	Qev	0,9	0,9	0,9	0,9	1,0	1,0		Qev	1,1	1,1	1,2	1,2	1,2	1,2		Qev	1,3	1,4	1,4	1,5	1,5	1,5
	ΔPev	27	27	27	27	33	33		ΔPev	24	24	29	29	29	29		ΔPev	24	28	28	32	32	32
	Pf	4,7	4,8	5,0	5,1	5,3	5,4		Pf	5,8	6,0	6,2	6,3	6,5	6,7		Pf	7,2	7,5	7,7	7,9	8,2	8,4
	Pa	2,1	2,1	2,1	2,2	2,2	2,2		Pa	2,6	2,6	2,6	2,6	2,6	2,6		Pa	3,3	3,3	3,3	3,4	3,4	3,4
40	Pat	2,3	2,3	2,3	2,3	2,3	2,3	40	Pat	2,7	2,7	2,7	2,7	2,7	2,7	40	Pat	3,4	3,5	3,5	3,5	3,5	3,6
	Qev	0,8	0,8	0,9	0,9	0,9	0,9		Qev	1,0	1,0	1,1	1,1	1,1	1,2		Qev	1,2	1,3	1,3	1,4	1,4	1,4
	ΔPev	21	21	27	27	27	27		ΔPev	20	20	24	24	24	29		ΔPev	21	24	24	28	28	28
	Pf	4,4	4,6	4,7	4,9	5,0	5,2		Pf	5,5	5,7	5,8	6,0	6,2	6,3		Pf	6,9	7,1	7,3	7,6	7,8	8,0
	Pa	2,3	2,3	2,3	2,3	2,3	2,3		Pa	2,8	2,8	2,8	2,8	2,8	2,8		Pa	3,5	3,5	3,6	3,6	3,6	3,6
43	Pat	2,5	2,5	2,5	2,5	2,5	2,5	43	Pat	2,9	2,9	2,9	2,9	2,9	2,9	43	Pat	3,7	3,7	3,7	3,7	3,8	3,8
	Qev	0,8	0,8	0,8	0,8	0,9	0,9		Qev	0,9	1,0	1,0	1,0	1,1	1,1		Qev	1,2	1,2	1,3	1,3	1,3	1,4
	ΔPev	21	21	21	21	27	27		ΔPev	16	20	20	20	24	24		ΔPev	21	21	24	24	24	28

	Model 0041							Model 0051							Model 0061						
Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10
	Pf	11,4	11,7	12,1	12,4	12,7	13,1		Pf	13,2	13,6	14,0	14,4	14,9	15,3		Pf	15,4	15,9	16,4	16,9	17,3	17,8
	Pa	3,0	3,0	3,0	3,0	3,1	3,1		Pa	3,6	3,6	3,6	3,6	3,7	3,7		Pa	3,9	3,9	3,9	4,0	4,0	4,0
25	Pat	3,3	3,3	3,3	3,3	3,4	3,4	25	Pat	3,9	3,9	3,9	3,9	4,0	4,0	25	Pat	4,2	4,2	4,2	4,3	4,3	4,3
	Qev	2,0	2,0	2,1	2,1	2,2	2,3		Qev	2,3	2,3	2,4	2,5	2,6	2,6		Qev	2,7	2,7	2,8	2,9	3,0	3,1
	ΔPev	27	27	29	29	32	35		ΔPev	31	31	33	36	39	39		ΔPev	33	33	35	38	40	43
	Pf	10,8	11,1	11,5	11,8	12,1	12,4		Pf	12,5	12,9	13,3	13,7	14,1	14,5		Pf	14,6	15,1	15,5	16,0	16,4	16,9
	Pa	3,4	3,4	3,4	3,5	3,5	3,5		Pa	3,9	4,0	4,0	4,0	4,0	4,0		Pa	4,3	4,4	4,4	4,4	4,5	4,5
30	Pat	3,7	3,7	3,7	3,8	3,8	3,8	30	Pat	4,2	4,3	4,3	4,3	4,3	4,3	30	Pat	4,6	4,7	4,7	4,7	4,8	4,8
	Qev	1,9	1,9	2,0	2,0	2,1	2,1		Qev	2,2	2,2	2,3	2,4	2,4	2,5		Qev	2,5	2,6	2,7	2,8	2,8	2,9
	ΔPev	24	24	27	27	29	29		ΔPev	28	28	31	33	33	36		ΔPev	28	30	33	35	35	38
	Pf	10,6	10,9	11,2	11,5	11,8	12,2		Pf	12,2	12,6	13,0	13,4	13,8	14,2		Pf	14,3	14,7	15,2	15,6	16,1	16,5
	Pa	3,6	3,6	3,6	3,6	3,7	3,7		Pa	4,1	4,1	4,1	4,1	4,2	4,2		Pa	4,5	4,6	4,6	4,6	4,7	4,7
32	Pat	3,9	3,9	3,9	3,9	4,0	4,0	32	Pat	4,4	4,4	4,4	4,4	4,5	4,5	32	Pat	4,8	4,9	4,9	4,9	5,0	5,0
	Qev	1,8	1,9	1,9	2,0	2,0	2,1		Qev	2,1	2,2	2,2	2,3	2,4	2,5		Qev	2,5	2,5	2,6	2,7	2,8	2,8
	ΔPev	22	24	24	27	27	29		ΔPev	26	28	28	31	33	36		ΔPev	28	28	30	33	35	35
	Pf	10,2	10,5	10,8	11,1	11,5	11,8		Pf	11,8	12,2	12,6	12,9	13,3	13,7		Pf	13,8	14,2	14,6	15,1	15,5	15,9
	Pa	3,8	3,9	3,9	3,9	3,9	4,0		Pa	4,3	4,4	4,4	4,4	4,4	4,4		Pa	4,8	4,9	4,9	5,0	5,0	5,0
35	Pat	4,1	4,2	4,2	4,2	4,2	4,3	35	Pat	4,6	4,7	4,7	4,7	4,7	4,7	35	Pat	5,1	5,2	5,2	5,3	5,3	5,3
	Qev	1,8	1,8	1,9	1,9	2,0	2,0		Qev	2,0	2,1	2,2	2,2	2,3	2,4		Qev	2,4	2,4	2,5	2,6	2,7	2,7
	ΔPev	22	22	24	24	27	27		ΔPev	23	26	28	28	31	33		ΔPev	26	26	28	30	33	33
	Pf	9,6	9,9	10,2	10,5	10,8	11,1		Pf	10,9	11,3	11,7	12,1	12,4	12,8		Pf	12,9	13,3	13,7	14,1	14,5	14,9
	Pa	4,4	4,4	4,4	4,4	4,4	4,5		Pa	4,8	4,8	4,8	4,8	4,8	4,8		Pa	5,4	5,5	5,5	5,5	5,6	5,6
40	Pat	4,7	4,7	4,7	4,7	4,7	4,8	40	Pat	5,1	5,1	5,1	5,1	5,1	5,1	40	Pat	5,7	5,8	5,8	5,8	5,9	5,9
	Qev	1,6	1,7	1,8	1,8	1,9	1,9		Qev	1,9	1,9	2,0	2,1	2,1	2,2		Qev	2,2	2,3	2,4	2,4	2,5	2,6
	ΔPev	17	19	22	22	24	24		ΔPev	21	21	23	26	26	28		ΔPev	22	24	26	26	28	30
	Pf	9,2	9,5	9,8	10,1	10,4	10,7		Pf	10,4	10,8	11,1	11,5	11,9	12,2		Pf	12,3	12,7	13,1	13,5	13,9	14,3
	Pa	4,7	4,7	4,7	4,8	4,8	4,8		Pa	5,0	5,0	5,1	5,1	5,1	5,1		Pa	5,8	5,8	5,9	5,9	5,9	6,0
43	Pat	5,0	5,0	5,0	5,1	5,1	5,1	43	Pat	5,3	5,3	5,4	5,4	5,4	5,4	43	Pat	6,1	6,1	6,2	6,2	6,2	6,3
	Qev	1,6	1,6	1,7	1,7	1,8	1,8		Qev	1,8	1,9	1,9	2,0	2,0	2,1		Qev	2,1	2,2	2,3	2,3	2,4	2,5
	ΔPev	17	17	19	19	22	22		ΔPev	19	21	21	23	23	26		ΔPev	20	22	24	24	26	28

Ta: outside air temperature (°C)
Tw: evaporator water outlet temperature (°C)
Pf: cooling capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qev: evaporator water flow (m^3/h)
ΔPev: evaporator pressure drop (kPa)

SINGLE-PHASE

Ta.	Model	0011				Ta.	Model	0021				Ta.	Model	0025			
U.R.87%	Tw	35	40	45	50	U.R.87%	Tw	35	40	45	50	U.R.87%	Tw	35	40	45	50
	Pt	4,3	4,3	4,4	-		Pt	4,9	5,0	5,0	-		Pt	6,2	6,3	6,4	-
	Pa	1,6	1,8	2,0	-		Pa	1,7	2,0	2,3	-		Pa	2,1	2,4	2,8	-
-5	Pat	1,7	1,9	2,2	-	-5	Pat	1,9	2,1	2,4	-	-5	Pat	2,3	2,6	2,9	-
	Qc	0,7	0,8	0,8	-		Qc	0,8	0,9	0,9	-		Qc	1,1	1,1	1,1	-
	ΔPc	11	15	15	-		ΔPc	13	17	17	-		ΔPc	17	17	17	-
	Pt	4,8	4,8	4,9	4,9		Pt	5,5	5,5	5,6	5,6		Pt	6,9	6,9	7,0	7,1
	Pa	1,6	1,8	2,1	2,3		Pa	1,7	2,0	2,2	2,5		Pa	2,1	2,4	2,8	3,2
0	Pat	1,8	2,0	2,2	2,5	0	Pat	1,9	2,1	2,4	2,7	0	Pat	2,2	2,6	2,9	3,3
	Qc	0,8	0,8	0,8	0,9		Qc	1,0	1,0	1,0	1,0		Qc	1,2	1,2	1,2	1,2
	ΔPc	15	15	15	19		ΔPc	21	21	21	21		ΔPc	20	20	20	20
	Pt	5,7	5,7	5,7	5,6		Pt	6,5	6,5	6,5	6,5		Pt	8,1	8,1	8,1	8,1
	Pa	1,6	1,9	2,1	2,4		Pa	1,7	2,0	2,2	2,5		Pa	2,1	2,4	2,7	3,1
7	Pat	1,8	2,0	2,3	2,5	7	Pat	1,9	2,1	2,4	2,7	7	Pat	2,2	2,5	2,9	3,3
	Qc	1,0	1,0	1,0	1,0		Qc	1,1	1,1	1,1	1,1		Qc	1,4	1,4	1,4	1,4
	ΔPc	23	23	23	23		ΔPc	25	25	25	25		ΔPc	27	27	27	27
	Pt	6,2	6,1	6,1	6,0		Pt	7,0	7,0	6,9	6,9		Pt	8,8	8,7	8,7	8,7
	Pa	1,7	1,9	2,1	2,4		Pa	1,7	2,0	2,2	2,5		Pa	2,1	2,4	2,7	3,1
10	Pat	1,8	2,0	2,3	2,5	10	Pat	1,9	2,1	2,4	2,7	10	Pat	2,2	2,5	2,9	3,3
	Qc	1,1	1,1	1,1	1,0		Qc	1,2	1,2	1,2	1,2		Qc	1,5	1,5	1,5	1,5
	ΔPc	28	28	28	23		ΔPc	30	30	30	30		ΔPc	31	31	31	31
	Pt	7,0	6,9	6,8	6,7		Pt	7,9	7,8	7,7	7,6		Pt	10,0	9,9	9,9	9,8
	Pa	1,7	1,9	2,2	2,4		Pa	1,7	2,0	2,2	2,5		Pa	2,1	2,4	2,7	3,1
15	Pat	1,9	2,1	2,3	2,6	15	Pat	1,9	2,1	2,4	2,7	15	Pat	2,3	2,6	2,9	3,3
	Qc	1,2	1,2	1,2	1,2		Qc	1,4	1,4	1,3	1,3		Qc	1,7	1,7	1,7	1,7
	ΔPc	33	33	33	33		ΔPc	40	40	35	35		ΔPc	40	40	40	40

Ta.	Model	0031				Ta.	Model	0041			
U.R.87%	Tw	35	40	45	50	U.R.87%	Tw	35	40	45	50
	Pt	7,6	7,7	7,9	-		Pt	9,7	9,7	9,8	-
	Pa	2,7	3,1	3,5	-		Pa	3,3	3,8	4,3	-
-5	Pat	2,8	3,2	3,7	-	-5	Pat	3,6	4,1	4,6	-
	Qc	1,3	1,3	1,4	-		Qc	1,7	1,7	1,7	-
	ΔPc	16	16	18	-		ΔPc	13	13	13	-
	Pt	8,5	8,6	8,7	8,8		Pt	10,6	10,6	10,7	10,8
	Pa	2,6	3,0	3,5	4,0		Pa	3,3	3,7	4,3	4,8
0	Pat	2,8	3,2	3,6	4,1	0	Pat	3,6	4,0	4,6	5,1
	Qc	1,5	1,5	1,5	1,5		Qc	1,8	1,9	1,9	1,9
	ΔPc	21	21	21	21		ΔPc	14	16	16	16
	Pt	10,0	10,0	10,0	10,0		Pt	12,4	12,4	12,4	12,4
	Pa	2,6	3,0	3,4	3,9		Pa	3,3	3,8	4,2	4,8
7	Pat	2,8	3,2	3,6	4,1	7	Pat	3,6	4,1	4,5	5,1
	Qc	1,7	1,7	1,7	1,7		Qc	2,1	2,1	2,2	2,2
	ΔPc	27	27	27	27		ΔPc	19	19	21	21
	Pt	10,8	10,8	10,7	10,7		Pt	13,3	13,3	13,2	13,2
	Pa	2,6	3,0	3,4	3,9		Pa	3,4	3,8	4,3	4,8
10	Pat	2,8	3,2	3,6	4,0	10	Pat	3,7	4,1	4,6	5,1
	Qc	1,9	1,9	1,9	1,9		Qc	2,3	2,3	2,3	2,3
	ΔPc	34	34	34	34		ΔPc	23	23	23	23
	Pt	12,2	12,1	12,1	12,0		Pt	15,1	15,0	14,8	14,7
	Pa	2,7	3,0	3,4	3,9		Pa	3,4	3,8	4,3	4,8
15	Pat	2,8	3,2	3,6	4,0	15	Pat	3,7	4,1	4,6	5,1
	Qc	2,1	2,1	2,1	2,1		Qc	2,6	2,6	2,6	2,6
	ΔPc	41	41	41	41		ΔPc	29	29	29	29

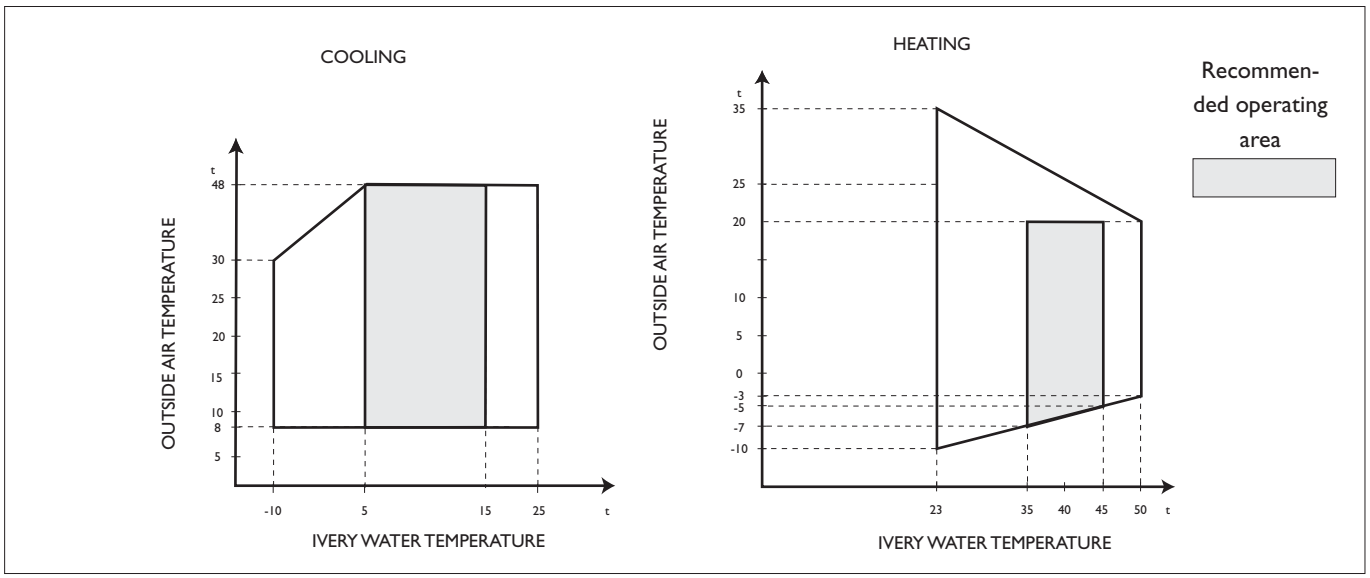
Ta: outside air temperature (°C)
Tw: condenser water outlet temperature (°C)
Pt: heating capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qc: condenser water flow (m^3/h)
ΔPc: evaporator pressure drop (kPa)
-: conditions outside of operating limits

THREE PHASE

Ta.	Model	0021				Ta.	Model	0025				Ta.	Model	0031			
U.R.87%	Tw	35	40	45	50	U.R.87%	Tw	35	40	45	50	U.R.87%	Tw	35	40	45	50
	Pt	4,9	5,0	5,1	-		Pt	6,1	6,1	6,1	-		Pt	7,3	7,4	7,4	-
	Pa	1,7	2,0	2,3	-		Pa	2,0	2,3	2,6	-		Pa	2,4	2,7	3,0	-
-5	Pat	1,9	2,2	2,5	-	-5	Pat	2,1	2,4	2,8	-	-5	Pat	2,5	2,8	3,2	-
	Qc	0,8	0,9	0,9	-		Qc	1,1	1,1	1,1	-		Qc	1,3	1,3	1,3	-
	ΔPc	13	17	17	-		ΔPc	17	17	17	-		ΔPc	16	16	16	-
	Pt	5,5	5,5	5,6	5,7		Pt	6,9	6,9	6,8	6,7		Pt	8,3	8,3	8,3	8,3
	Pa	1,7	2,0	2,3	2,6		Pa	2,0	2,3	2,6	3,0		Pa	2,4	2,7	3,0	3,4
0	Pat	1,9	2,1	2,4	2,8	0	Pat	2,1	2,4	2,8	3,1	0	Pat	2,5	2,8	3,2	3,6
	Qc	1,0	1,0	1,0	1,0		Qc	1,2	1,2	1,2	1,2		Qc	1,4	1,4	1,4	1,4
	ΔPc	21	21	21	21		ΔPc	20	20	20	20		ΔPc	18	18	18	18
	Pt	6,5	6,5	6,4	6,4		Pt	8,3	8,1	8,0	7,8		Pt	9,9	9,8	9,7	9,6
	Pa	1,7	1,9	2,2	2,5		Pa	2,0	2,3	2,6	2,9		Pa	2,4	2,7	3,1	3,4
7	Pat	1,8	2,1	2,4	2,7	7	Pat	2,1	2,4	2,7	3,1	7	Pat	2,6	2,9	3,2	3,6
	Qc	1,1	1,1	1,1	1,1		Qc	1,4	1,4	1,4	1,4		Qc	1,7	1,7	1,7	1,7
	ΔPc	25	25	25	25		ΔPc	27	27	27	27		ΔPc	27	27	27	27
	Pt	7,0	6,9	6,9	6,8		Pt	8,9	8,7	8,5	8,4		Pt	10,7	10,6	10,5	10,4
	Pa	1,7	1,9	2,2	2,5		Pa	2,0	2,3	2,6	2,9		Pa	2,5	2,8	3,1	3,5
10	Pat	1,8	2,1	2,3	2,6	10	Pat	2,1	2,4	2,7	3,1	10	Pat	2,6	2,9	3,3	3,6
	Qc	1,2	1,2	1,2	1,2		Qc	1,5	1,5	1,5	1,5		Qc	1,9	1,8	1,8	1,8
	ΔPc	30	30	30	30		ΔPc	31	31	31	31		ΔPc	34	30	30	30
	Pt	7,8	7,7	7,6	7,5		Pt	10,0	9,8	9,6	9,4		Pt	12,1	12,0	11,8	11,7
	Pa	1,7	1,9	2,2	2,5		Pa	2,0	2,3	2,6	2,9		Pa	2,5	2,8	3,2	3,5
15	Pat	1,8	2,1	2,3	2,6	15	Pat	2,1	2,4	2,7	3,0	15	Pat	2,7	3,0	3,3	3,7
	Qc	1,4	1,3	1,3	1,3		Qc	1,7	1,7	1,7	1,6		Qc	2,1	2,1	2,1	2,0
	ΔPc	40	35	35	35		ΔPc	40	40	40	35		ΔPc	41	41	41	37

Ta.	Model	0041				Ta.	Model	0051				Ta.	Model	0061			
U.R.87%	Tw	35	40	45	50	U.R.87%	Tw	35	40	45	50	U.R.87%	Tw	35	40	45	50
	Pt	10,0	10,1	10,2	-		Pt	11,1	11,0	10,8	-		Pt	12,7	12,7	12,8	-
	Pa	3,3	3,9	4,5	-		Pa	3,9	4,2	4,7	-		Pa	3,9	4,4	4,9	-
-5	Pat	3,6	4,2	4,8	-	-5	Pat	4,2	4,5	5,0	-	-5	Pat	4,2	4,7	5,2	-
	Qc	1,7	1,8	1,8	-		Qc	1,9	1,9	1,9	-		Qc	2,2	2,2	2,2	-
	ΔPc	13	14	14	-		ΔPc	14	14	14	-		ΔPc	14	14	14	-
	Pt	10,9	11,0	11,1	11,2		Pt	12,	12,4	12,2	12,0		Pt	14,3	14,3	14,2	14,2
	Pa	3,3	3,8	4,4	5,1		Pa	3,9	4,3	4,7	5,1		Pa	3,9	4,4	5,0	5,6
0	Pat	3,6	4,1	4,7	5,4	0	Pat	4,2	4,6	5,0	5,4	0	Pat	4,2	4,7	5,3	5,9
	Qc	1,9	1,9	1,9	2,0		Qc	2,2	2,2	2,1	2,1		Qc	2,5	2,5	2,5	2,5
	ΔPc	16	16	16	17		ΔPc	19	19	18	18		ΔPc	19	19	19	19
	Pt	12,8	12,8	12,8	12,9		Pt	14,9	14,7	14,4	14,2		Pt	17,0	16,9	16,8	16,6
	Pa	3,4	3,9	4,4	5,0		Pa	3,9	4,3	4,7	5,1		Pa	4,1	4,6	5,1	5,7
7	Pat	3,7	4,2	4,7	5,3	7	Pat	4,2	4,6	5,0	5,4	7	Pat	4,4	4,9	5,4	6,0
	Qc	2,2	2,2	2,2	2,2		Qc	2,6	2,6	2,5	2,5		Qc	3,0	2,9	2,9	2,9
	ΔPc	21	21	21	21		ΔPc	27	27	25	25		ΔPc	27	25	25	25
	Pt	13,7	13,7	13,7	13,7		Pt	16,0	15,8	15,5	15,2		Pt	18,4	18,2	18,0	17,8
	Pa	3,4	3,9	4,4	5,0		Pa	3,9	4,3	4,7	5,1		Pa	4,1	4,6	5,2	5,8
10	Pat	3,7	4,2	4,7	5,3	10	Pat	4,2	4,6	5,0	5,4	10	Pat	4,4	4,9	5,5	6,1
	Qc	2,4	2,4	2,4	2,4		Qc	2,8	2,7	2,7	2,6		Qc	3,2	3,2	3,1	3,1
	ΔPc	25	25	25	25		ΔPc	31	29	29	27		ΔPc	30	30	29	29
	Pt	15,6	15,5	15,4	15,3		Pt	18,0	17,7	17,4	17,0		Pt	20,8	20,5	20,2	20,0
	Pa	3,5	4,0	4,5	5,0		Pa	3,9	4,3	4,7	5,1		Pa	4,2	4,7	5,3	5,9
15	Pat	3,8	4,3	4,8	5,3	15	Pat	4,2	4,6	5,0	5,4	15	Pat	4,5	5,0	5,6	6,2
	Qc	2,7	2,7	2,7	2,7		Qc	3,1	3,1	3,0	3,0		Qc	3,6	3,6	3,5	3,5
	ΔPc	32	32	32	32		ΔPc	38	38	36	36		ΔPc	39	39	36	36

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



Thermal head min. max	4÷6
Water circuit pressure (bars)	1÷3
Max. storage temperature (°C)	63

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.

Freezing point (°C)						
	0	-5	-10	-15	-20	-25
Percentage of ethylene glycol in weight						
	0	12%	20%	28%	35%	40%
cPf	1	0,985	0,98	0,974	0,97	0,965
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: cooling capacity correction factor

cQ: flow rate correction factor

cdp: pressure drop correction factor

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	Evaporator		
(m² °C/W)	**fl**	**fkl**	**fxl**
4,4 x 10^{-5}	-	-	-
0,86 x 10^{-4}	0,96	0,99	0,99
1,72 x10^{-4}	0,93	0,98	0,98

fl capacity correction factor

fkl compressor power input correction factor

fxl total power input correction factor

SOUND PRESSURE LEVEL

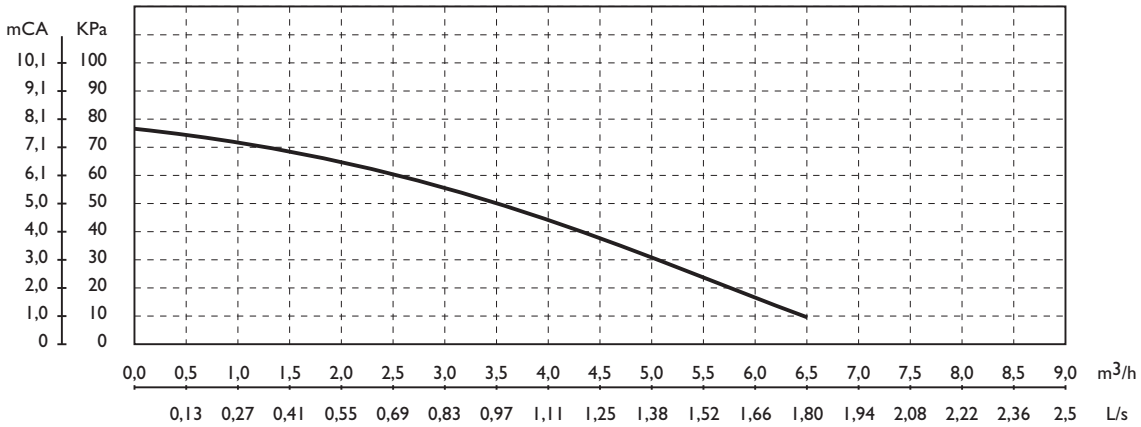
Metri / Gr.	1	5	10	15	20
0011	55	41	35	31	29
0021	55	41	35	31	29
0025	55	41	35	31	29
0031	55	41	35	31	29
0041	60	46	40	36	34
0051	60	46	40	36	34
0061	60	46	40	36	34

Reference point: in open field at 1m from the surface of the unit on the coil side and 1m above the support surface.

QUANTITY OF WATER IN INSTALLATION

Model		0011	0021	0025	0031	0041	0051	0061
Minimum water content BRN	l	19	24	27,3	31,5	40	46	57
Minimum water content BRA	l	14	18	20,3	24	30,5	36	43,5

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)

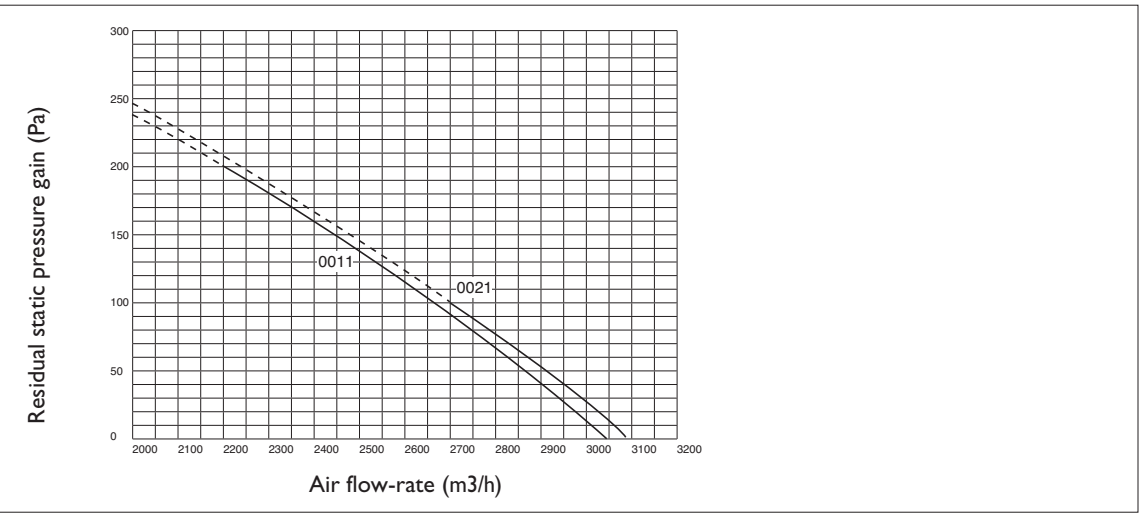
Model	Water flow	m³/h	0,6	0,8	1,00	1,2	1,5	1,6	1,8	
		l/sec	0,167	0,222	0,278	0,333	0,41	0,444	0,500	
0011		kPa	14	25	39	56	-	-	-	-
0021	Pressure	kPa	9	17	26	37	59	67	-	-
0025	drop	kPa	-	12	19	28	44	50	-	-
0031		kPa	-	8	12	17	27	31	39	-

Model	Water flow	m³/h	1,4	2,0	2,3	2,7	3,0	3,4	3,8	4,2
		l/sec	0,389	0,55	0,63	0,75	0,833	0,944	1,055	1,167
0041		kPa	12	23	34	46	57	-	-	-
0051	Pressure	kPa	10	20	27	37	46	59	-	-
0061	drop	kPa	-	15	20	27	33	43	53	-

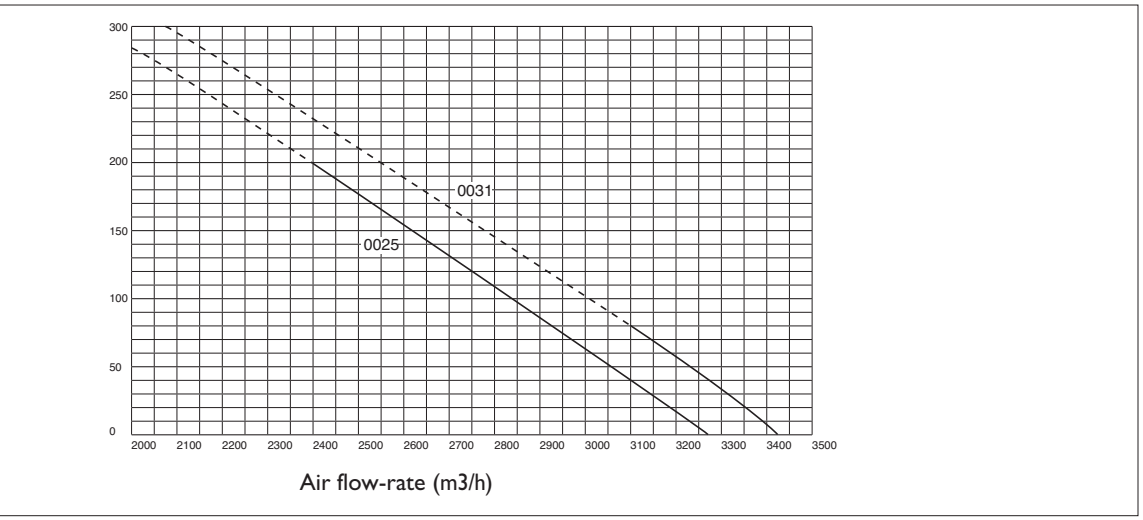
Note: the values highlighted refer to the rated flow

GRAPH OF FLOW-RATE - FAN PRESSURE GAIN

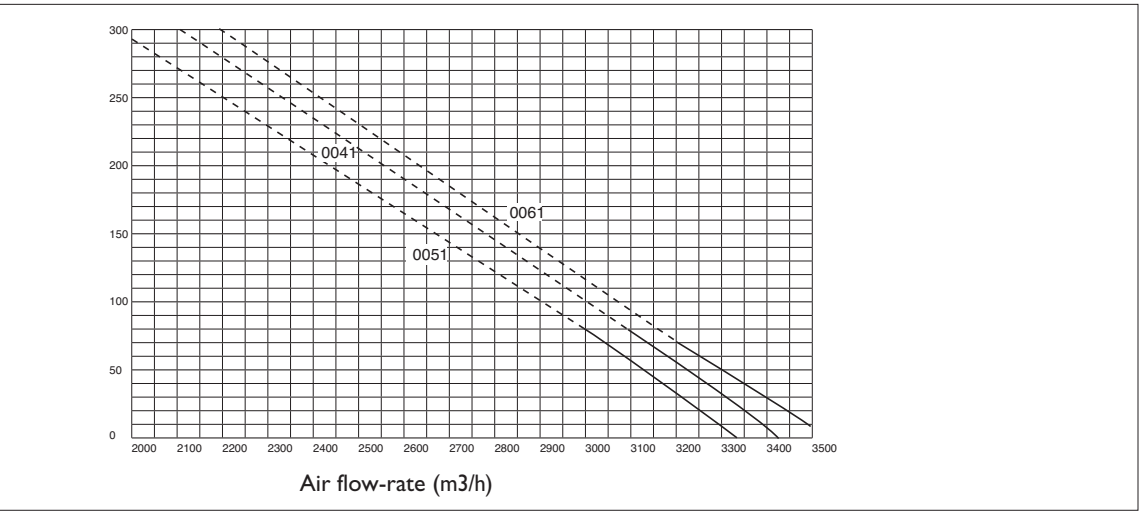
MOD. 0011-0021



MOD. 0025 - 0031



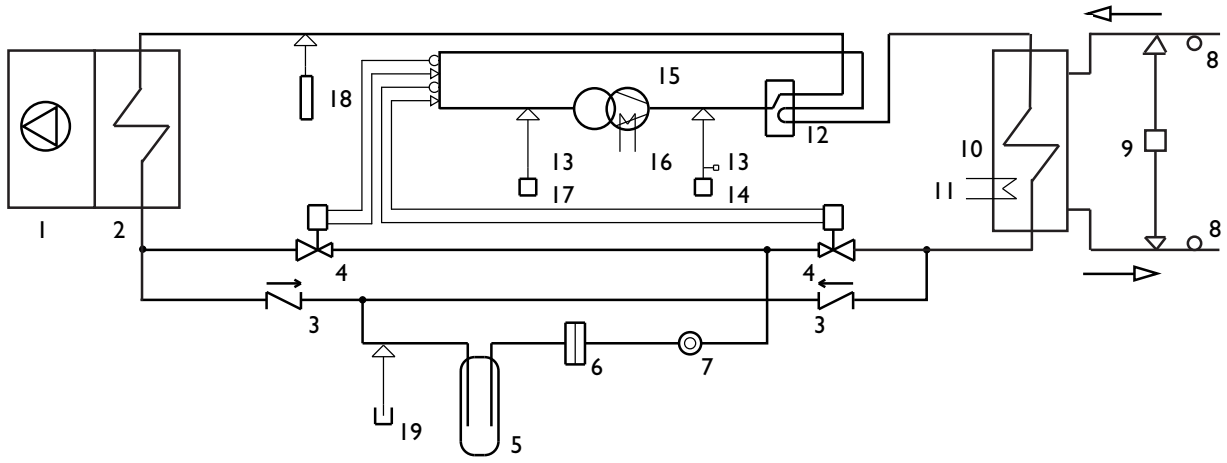
MOD. 0041-0061



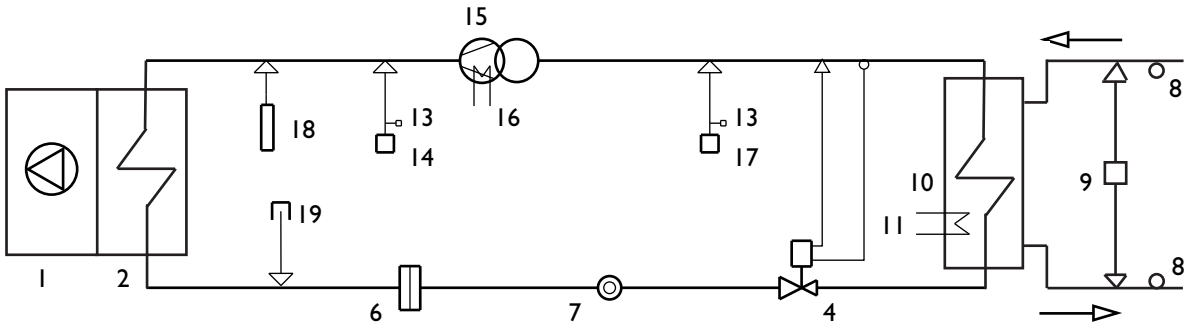
⚠ The characteristics indicated above refer to units with ducted outlets, with a 0.5m long straight duct and a cross-section equal to the cross-section of the fan.

⚠ The BRA-BRN 0041 - 0061 chillers are supplied with two fans

⛔ Non lavorare sulla parte tratteggiata della curva.



BRN FF UNIT



BRA FF UNIT

1 fan	6 filter	11 frost heater	16 sump heater
2 finned coil	7 liquid indicator (0041 - 0061 only)	12 reversing valve (BRN FF only)	17 low pressure switch
3 check valve (BRN FF only)	8 water temperature sensor	13 fill connections	18 pressure transducer
4 thermostatic valve	9 water differential pressure switch	14 high pressure switch	19 gas discharge fitting
5 liquid receiver (BRN FF only)	10 plate heat exchanger	15 compressor	

PREPARING FOR FIRST START UP

Restarting after shutting down for long periods

The chiller must be started up for the first time by the **Technical Service.**

Before starting up the chillers, make sure that:

- All safety conditions have been respected
- The chiller is adequately fixed to the surface it rests on
- Functional distances have been respected;
- Hydraulic connections have been carried out as indicated in the instruction manual
- The water circuit is filled and vented. When draining after heat pump operation, take care as the water may be hot;
- The water circuit valves are open
- Electrical connections have been carried out correctly
- Voltage is within a tolerance of 10% of the rated voltage for the unit
- The unit is correctly earthed
- All electrical and hydraulic connections are tight and have been completed correctly.

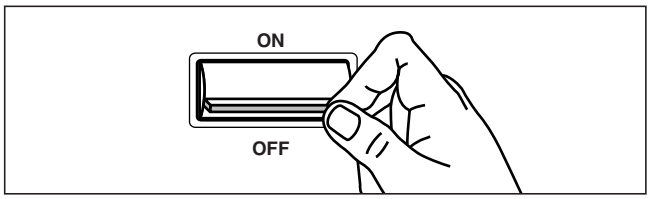
⚠ The unit must be started up for the first time with standard settings. Set point values may be modified only after testing has been completed. Before starting up, power the unit for at least two hours by switching QF1 and QS1 to ON and setting the control panel "HSW7" to OFF to allow the oil in the compressor sump to heat up.

STARTING UP FOR THE FIRST TIME

(after two hours)

Before activating the chiller:

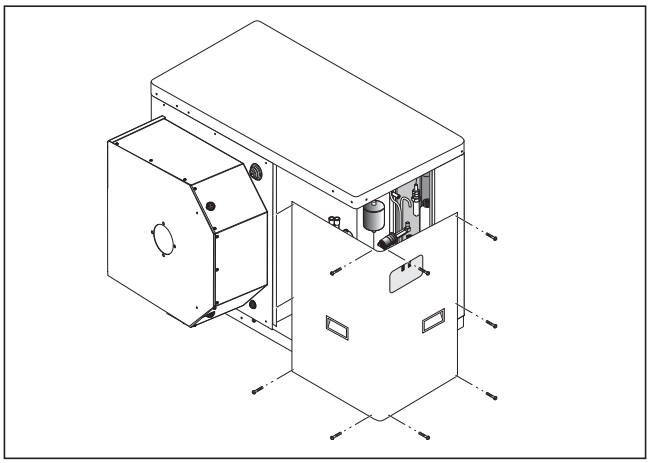
- Make sure the main remote switch QF1 is in the OFF position;



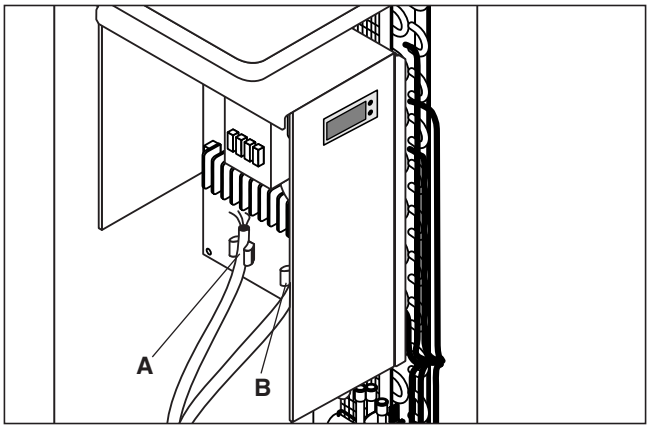
- Make sure the main remote switch QF1 is in the OFF position;
- Make sure the remote secondary switch SA1 is in the OFF position

To complete the electrical connections

- Remove the inspection panel by unscrewing the eight screws (0011 - 0031) - or ten screws (0041 - 0061)



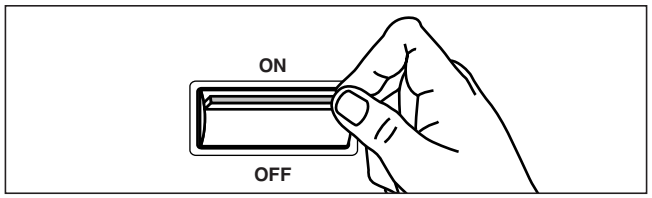
- Use grommet **A** for the electrical power cable and grommet **B** for the other external wires.



- Replace the inspection panel
- Position the main switch QF1 (outside the unit) in the "ON" position
- The "POWER" LED on the control panel "HSW7" comes on to signal that voltage is present.

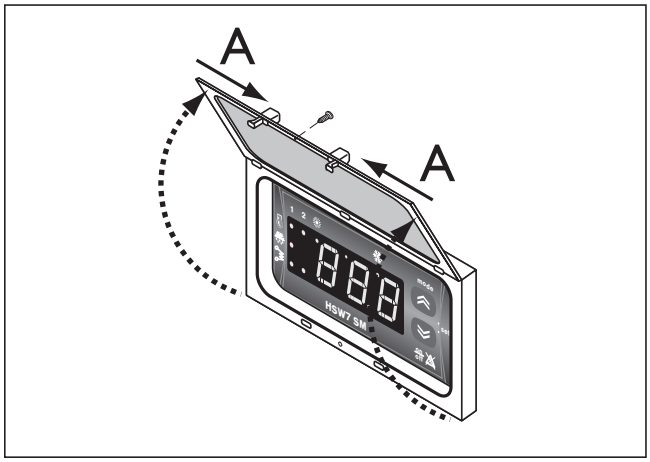
ACTIVATING AND DEACTIVATING THE UNIT

- Set the remote keyboard "A6" (if present) to ON.

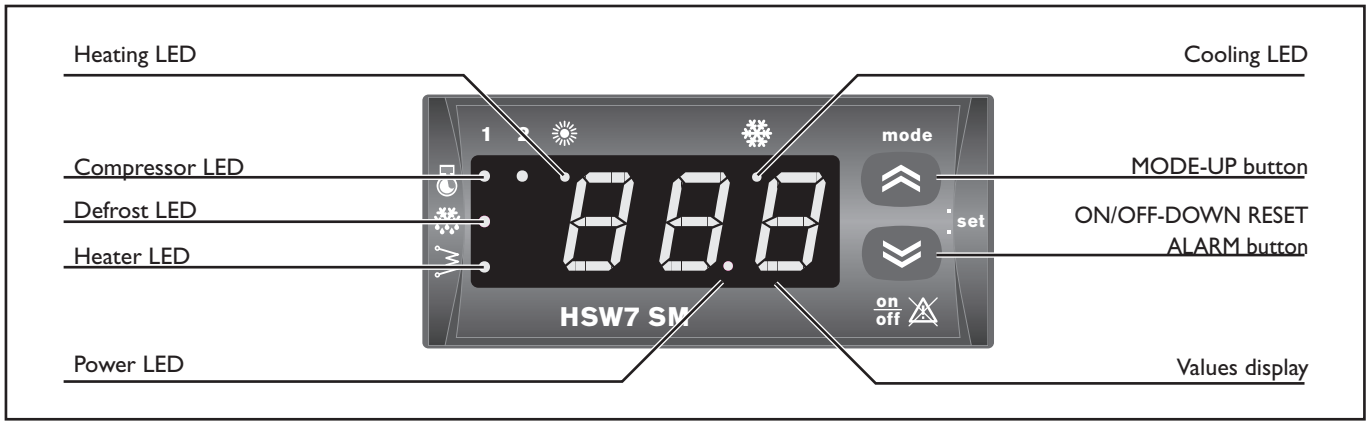


- To ACTIVATE and DEACTIVATE the COOLING and HEATING functions, use the "HSW7" control panel or the remote keyboard "A6" if present.

⚠ During this phase, if the following indications appear on the display, follow the instructions:
- E41 check water flow rate and the connections (14 - 15) of the flow switch or differential pressure switch.

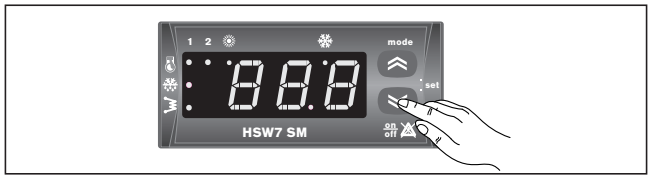


To access the control panel, open the door:
- remove the screw 1;
- press the points 2 simultaneously and lift the door 3.



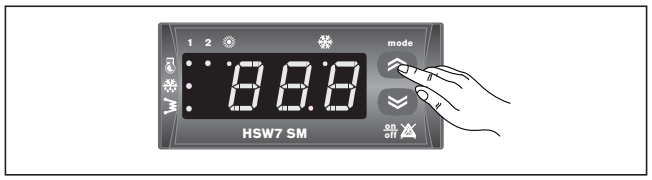
Activating:

- Press the ON/OFF button on the keyboard in the figure



The temperature of water returning from the installation appears on the "values display".

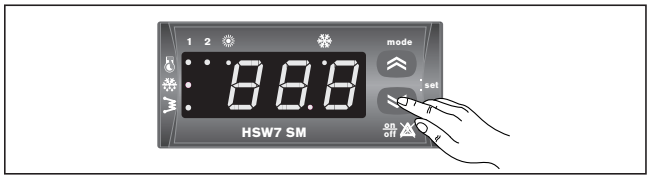
- Press the MODE button once.



The cooling LED comes on. After a couple of seconds, the compressor 1 LED flashes until the compressor comes on

Deactivating:

Press the ON/OFF button on the keyboard in the figure.



the "values display" goes off and the "POWER" LED remains on.

⚠ **At every change of season,** make sure the operating conditions fall within the limits specified on page 19.

Check that the compressor current input is less than the maximum indicated in the table of technical data.

In three-phase models, check that the noise levels of the compressor are not abnormal. If this is the case, reverse one phase.

Make sure the voltage is within the established limits and that, for three phase units, the unbalance between the phases is less than 3%. Check that the cover is closed again following the setting procedure.

Heating and cooling are activated and deactivated via the control panel. To activate and deactivate the unit, see page 28.

A SETTING THE SET POINTS

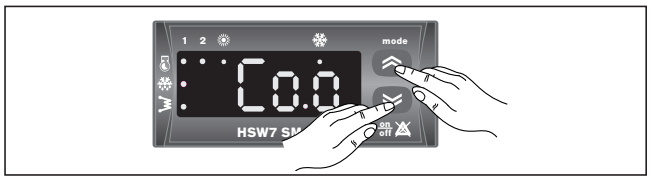
IMPOSTAZIONE SET POINT

The factory Set Point settings are: cooling 12°C, heating 40°C. To modify the set points, proceed as follows:

- press the ON/OFF and MODE buttons simultaneously;

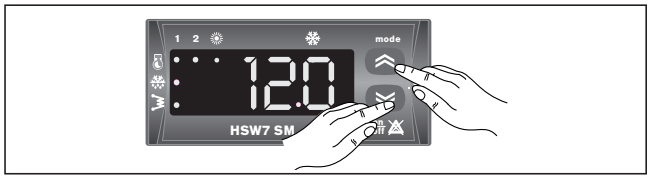
the parameter SEt appears on the display;

- press the ON/OFF and MODE buttons simultaneously;



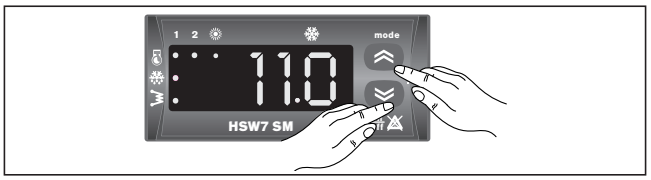
the parameter Coo appears on the display;

- press the ∧ and ∨ buttons to display heating mode;
- press the ON/OFF and MODE buttons simultaneously:

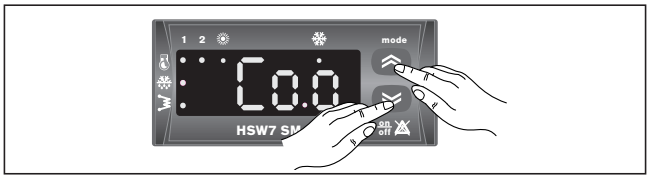


the parameter G01 appears on the display.

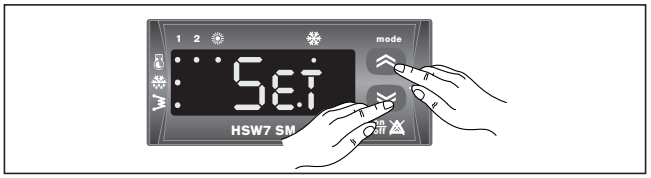
Use the ∧ and ∨ buttons to set the new Set Point;



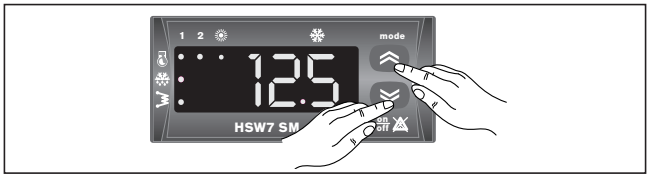
- to exit the Set Point setting phase, proceed as follows:
- press the ON/OFF and MODE buttons simultaneously for 2 seconds;



- press the ON/OFF and MODE buttons simultaneously again for more than 2 seconds;



- press the ON/OFF and MODE buttons simultaneously again for more than 2 seconds;



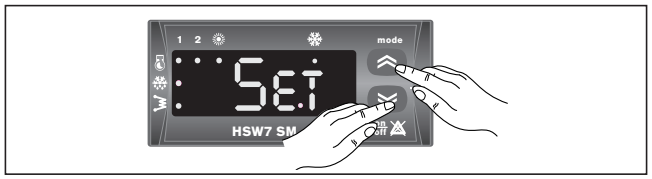
The water return temperature is displayed: the settings are complete. To display the status of the unit, the alarms and the operating hours, return to the SEt level, and then perform the procedure described above, selecting the desired index using the ∧ and ∨ buttons.

LIST OF ACCESSIBLE PARAMETERS			
Parameter	**Description**	**Unit of measure**	**Factory set point**
SEt	Cooling Set Point	°C	12
SEt	Heating Set Point	°C	40
TP	Operating status	value	-
Err	Alarm	value	-
PAr	Operating parameters	value	-
Pss	Password	value	-
OHr	Operating hours	value	-

Note: when setting the parameters the COMPRESSOR and HEATER LEDs will flash alternating with the DEFROST LED.

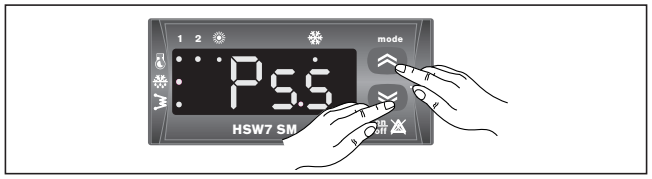
If the parameters set on the microprocessor need to be checked or modified, a password is necessary to enter a higher level, accessible only to authorised service centres. Proceed as follows:

- press the ON/OFF button;
- press the ON/OFF and MODE buttons simultaneously;

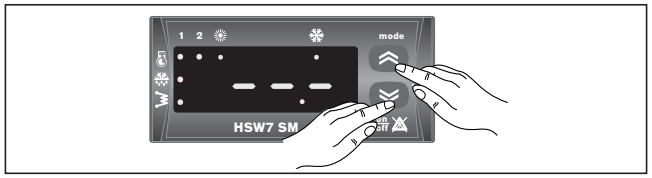


the parameter SEt appears on the display;

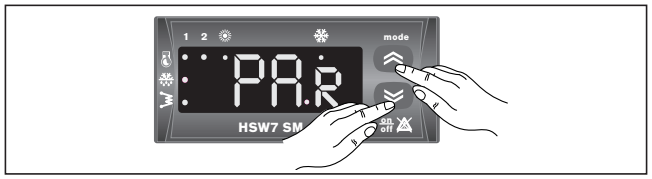
- press the ∧ and ∨ buttons to select the parameter Pss;



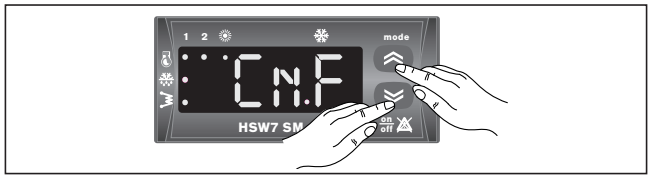
- press the ON/OFF and MODE buttons simultaneously;



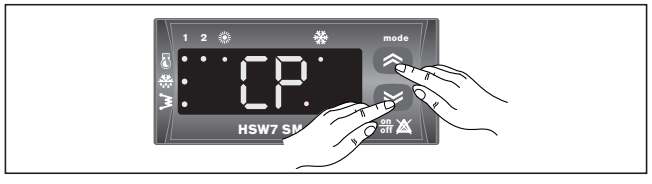
- press the ∧ and ∨ buttons to select the value of the password;
- press the ON/OFF and MODE buttons simultaneously for more than 2 seconds to confirm the password;
- press the ∧ and ∨ buttons to select the parameter PAr;



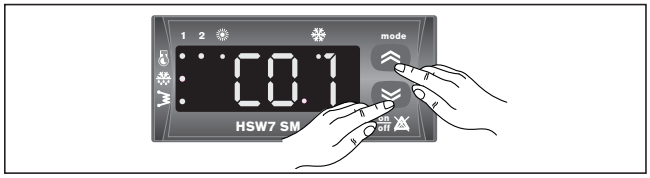
- press the ON/OFF and MODE buttons simultaneously;



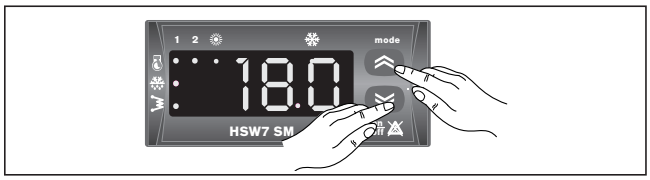
- press the ∧ and ∨ buttons to select the family of parameters to modify or display;



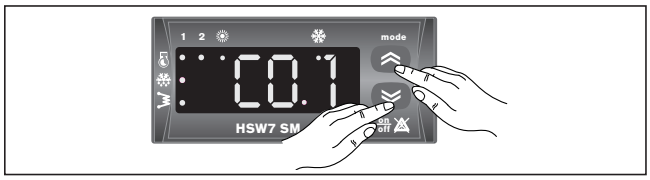
- press the ON/OFF and MODE buttons simultaneously;



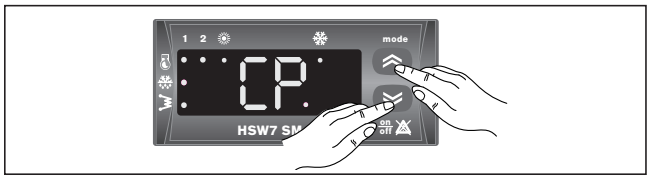
- press the ∧ and ∨ buttons to display the index of the selected parameter;



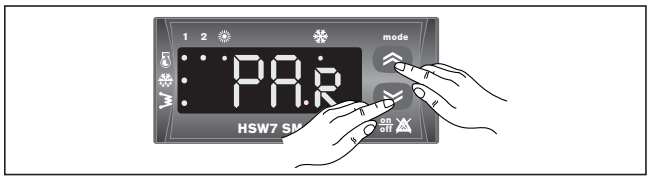
- press the ∧ and ∨ buttons to modify the value of the selected parameter;
- the settings are complete.
- To exit the upper level, proceed as follows:
- press the ON/OFF and MODE buttons simultaneously for more than 2 seconds;



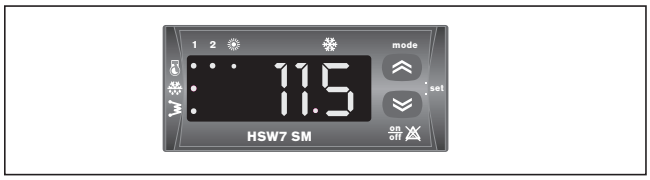
- press the ON/OFF and MODE buttons simultaneously again for more than 2 seconds;



- press the ON/OFF and MODE buttons simultaneously again for more than 2 seconds;



- press the ON/OFF and MODE buttons simultaneously again for more than 2 seconds;



- the temperature of the water returning from the installation is shown on the display.

⚠ For the list of parameters contact an authorised service centre.

- close the cover

LIST OF ACCESSIBLE PARAMETERS		
Parameter	**Description**	**Unit of measure**
CnF*	Machine configuration parameters	value
CP	Compressor parameters	value
FAn	Fan parameters	value
ALL	Alarm parameters	value
PUP	Pump parameters	value
Fro	Frost parameters	value
dFr	Defrost parameters	value

Note: when setting the parameters the COMPRESSOR and HEATER LEDs will flash alternating with the DEFROST LED.

*** To enable the remote heating-cooling switch set parameter H27 to 1.**

I A DISPLAYING ALARMS

FAULT	CAUSE	REMEDY
Values display indication E00	Remote switch in OFF position (automatic reset)	Position the remote switch to ON Reset the switch Reset the jumper between terminals 6-7
Values display indication E01	High pressure switch tripped manual reset after 3 activations in one hour	Check fault (see high discharge pressure page 35) Reset manually
Values display indication E02	Low pressure switch tripped automatic reset for the first three trips in an hour	Check fault
Values display indication E03	Fan overheat protection tripped model 0011-0061 (manual reset)	Check compressor motor Reset manually
Values display indication E05	Frost prevention alarm (manual reset)	Check water outlet temperature Check water flow Check set point temperature
Values display indication E06	Water delivery sensor BT2 malfunction (automatic reset)	Water delivery sensor BT2 malfunction (automatic reset)
Values display indication E07	Coil sensor BT3 malfunction (automatic reset)	Check electrical connections Replace component
Values display indication E40	Water return sensor BT1 malfunction (automatic reset)	Check electrical connections Replace component
Values display indication E41	Differential pressure switch or flow switch tripped automatic reset for the first six trips in an hour	Check for inadequate water flow Check presence of air in water circuit

Set point in cooling

(factory set) = 12°C, Hysteresis = 3°C. The compressor starts with water temperatures above 15°C. The compressor shuts down with water temperatures of less than 12°C.

Set point in heating

factory set) = 40°C, hysteresis = 3°C. The compressor starts with water temperatures below 37°C. The compressor shuts down with water temperatures above 40°C.

In the event of a temporary power failure, when power returns, the mode set previously will be retained in the memory.

COMPRESSOR START UP DELAY

Two functions prevent the compressor from starting up too frequently.

- Minimum time since last shut-down 180 seconds.
- Minimum time since last start-up 300 seconds.

PUMP

The electronic board includes a pump control output. The pump starts when the assembly is powered up and at least 60 seconds before the compressor starts up and stops 60 seconds after the assembly shuts down

After the first 60 seconds of pump operation when the water flow is at full speed, the water flow alarm functions are activated (differential pressure switch and flow switch).

FAN SPEED CONTROL

For correct operation of the unit with different outside temperatures, the microprocessor controls the fan speed based on the pressure reading via the pressure probe, thus enabling heat exchange to be increased and/or decreased, maintaining the condensing or evaporation pressures practically constant. The fan functions independently of the compressor.

FROST PREVENTION ALARM

To prevent the water in plate heat exchanger freezing and damaging the exchanger, the microprocessor shuts down the compressor if the temperature measured by the heat exchanger outlet temperature sensor is less than +3C.

The frost prevention temperature set point can be modified by an authorised service centre only and only after verifying that the water circuit contains antifreeze.

Tripping of this alarm shuts down the compressor but not the pump, which remains active. To reset normal functions, the outlet water temperature must rise to more than +7°C. Reset is manual.

WATER FLOW ALARM

The microprocessor provides for management of a water flow alarm controlled by a differential pressure switch fitted as standard on the appliance and a flow switch to be installed on the water delivery piping.

This safety device may trip after the first 60 seconds of pump operation when the water flow is up to speed.

Tripping of this alarm shuts down the compressor but not the pump, which remains active. To reset normal functions, the alarm contact must be deactivated for at least five seconds.

SHUTTING DOWN FOR LONG PERIODS A

When the unit is not expected to be used for long periods

After deactivating the chiller:

- Make sure the remote switch SA 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 CLOSED (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.

A ROUTINE MAINTENANCE

Do not carry out cleaning operations without first disconnecting the system from the electricity supply.
Terminals 10, 11, 12 and 13 may be live even after the unit has been disconnected. Check for voltage at these terminals before proceeding. 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 subcooling
- Efficiency of compressor heater
- Cleaning of finned coil (*)
- Cleaning of fan grills
- Cleaning of condensate drain pan (if installed).

(*) for BRN FF "Heat Pump" appliances the checks are to be performed quarterly.
For units installed near the sea, the intervals between maintenance should be halved.

A EXTRAORDINARY MAINTENANCE

Do not carry out cleaning operations without first disconnecting the system from the electricity supply.
Terminals 10, 11, 12 and 13 may be live even after the unit has been disconnected. Check for voltage at these terminals before proceeding.

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 vacuometer reads about 10 Pa. Wait a couple of minutes and check that this value does not rise to more than 50 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 16. 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 page 16 must not be used. The use of different oils may cause serious damage to the compressor.

A DISPOSAL

The unit must be disposed of according to the legislation in force in the country concerned

FAULT	CAUSE	REMEDY
The chiller does not start up	No voltage	Check presence of voltage Check safety systems upstream of the appliance
	Mains switch in OFF position Remote switch (if present) in OFF position Control panel set to OFF Main unit switch in OFF position Compressor thermal solenoid switch OFF	Switch ON
	Supply voltage too low	Check power line
	Contactor coil faulty Electronic board faulty Start-up capacitor faulty (if present) Compressor faulty	Replace the component
Insufficient output	Insufficient refrigerant Sizing of unit Operation outside recommended limits	Check
Compressor noisy	Liquid returning to compressor Inadequate fixing	Check
	Reversed phase (three phase units only)	Reverse one phase
Noise and vibrations	Contact between metal bodies	Check
	Weak foundations	Repair
	Loose screws	Tighten screws
The compressor stops due to the activation of the protection devices	Excessive delivery pressure Low suction pressure Low voltage Electrical connections not sufficiently tight Operation outside permitted limits	Check
	Faulty operation of pressure switches	Replace the component
	Thermal cut-out tripped	Check supply voltage Check electrical insulation of windings

ANOMALIA	CAUSA	RIMEDIO
High discharge pressure (greater than 3,5 MPa)*	High outside air temperature High water inlet temperature	Check
	Insufficient air flow Insufficient water flow	Check fan operation Check pump operation
	Faulty fan regulation	Check
	Air in water circuit	Vent air
	Excessive refrigerant charge	Check
Low discharge pressure (less than 1,8 MPa)*	Low outside air temperature Low water inlet temperature	Check
	Moisture in the refrigerant circuit (liquid indicator - moisture yellow)	Empty and refill
	Faulty fan regulation	Check
	Air in water circuit	Vent air
	Insufficient gas content	Check
High suction pressure (greater than 1,7 MPa)*	High outside air temperature High inflow water temperature Thermostatic expansion valve faulty or excessively open	Check
Low suction pressure (less than 0.62 bars)*	Low water inlet temperature Low air intake temperature Thermostatic expansion valve faulty or blocked Clogged water filter Blocked plate heat exchanger	Check

*Values indicative only

For information on technical assistance and obtaining spare parts, contact :

FIXED AIR-CONDITIONING TECHNICAL SERVICE DEPARTMENT
CLIMAVENETA HOME SYSTEM S.R.L.
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www.climaveneta.it
info@climavenetahs.it

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