

INSTALLATION - OPERATING MANUAL



Water chillers and air/water
heat pumps with
axial-flow fans.



HRAT-HRAN
0011÷0121

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



User



Important



Danger moving blade



Installer



Prohibition



Danger high temperatures



Assistance



Danger voltage



Climaveneta, is part of the Eurovent certification programme.

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

⚠ These units have been designed to chill and/or heat water and must be used in applications compatible with their performance characteristics. 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 current legislation in the country concerned.

This unit contains R22 refrigerant gas which damages the ozone layer. At the end of its working life, it should be taken to a special collection centre (article 12, Law no. 549). Care should be taken to avoid damage to the gas circuit and coil.

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.

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.

FUNDAMENTAL SAFETY RULES

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 operation, without disconnecting the unit from the electricity supply by placing the general installation switch in the "off" position.

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 general installation switch is in the off position.

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

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

⚠ **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 current legislation in the country concerned.

Hydraulic connections should be carried out as indicated in the instructions to guarantee correct operation of the unit. Empty the hydraulic 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.

The HRAT-HRAN chiller can be identified by the:

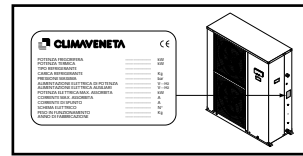
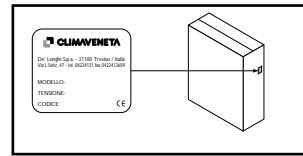
Packaging label

Gives the data identifying the product.

Rating plate

Gives 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.

HRAT-HRAN chillers are supplied accompanied with a plastic envelope (A) fixed to the top of the unit containing:

- instruction manual;
- guarantee certificate;
- CE declaration.

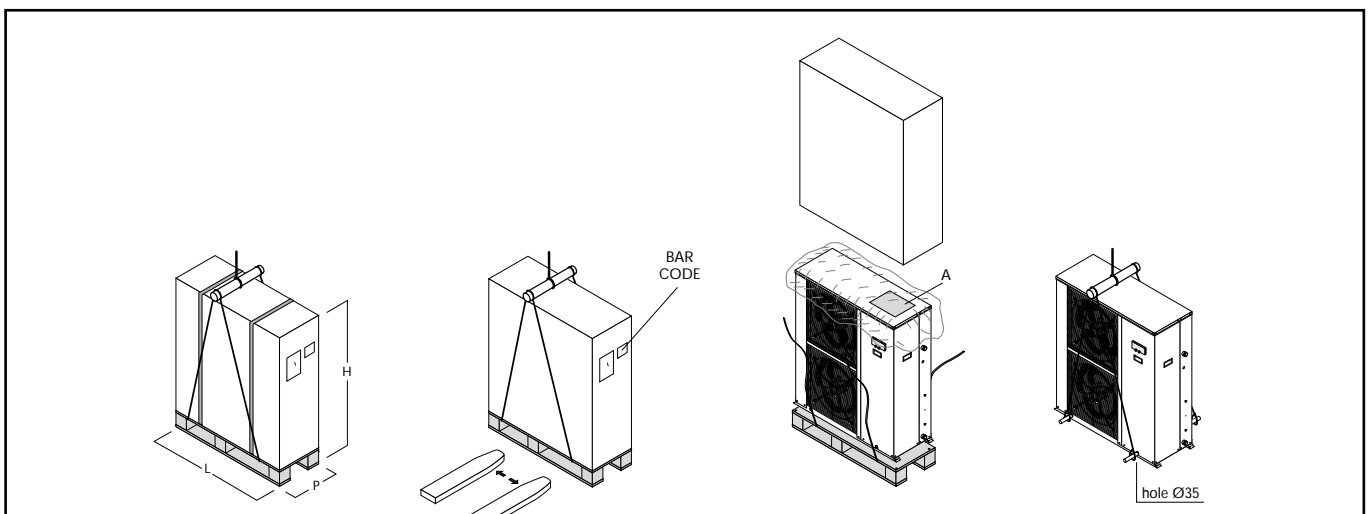
The unit should always be handled by qualified personnel using equipment adequate for the weight of the chiller. If a forklift truck is used, insert the forks under the bed plate, spacing the forks as wide apart as possible.

If a crane is used, pass the cables through the bottom of the bed plate, making sure they do not exert pressure on the unit. Once the packaging has been removed, the unit can be lifted and moved by inserting two metal tubes (max. diameter: 1") into the holes in the bed plate provided for this purpose 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 or source of pollution.

⚠ 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	0071	0091	0101	0121
Dimension L	1100	1100	1100	1100	1240	1240	1240	1600	1600	1600	1600
Dimension P	430	430	430	430	470	470	470	610	610	610	610
Dimension H	1030	1030	1280	1280	1280	1280	1280	1360	1360	1850	1850
Gross weight HRAT	102	107	120	125	143	147	157	260	263	325	330
Gross weight HRAN	110	116	129	135	152	158	164	272	275	341	345

These air cooled chillers with axial-flow fans and cycle reversal operate with R22 refrigerant fluid and are designed for external installation. The units conform to the essential requisites of EEC directive 89/392.

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

STRUCTURE

Panels and bed plate are made from **cataphoretic coated** galvanised steel to ensure total resistance to atmospheric agents.

COMPRESSORS

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

EVAPORATOR

AISI 316 stainless steel plate type evaporator complete with **electrical resistor and differential pressure switch**.

Casing lined with condensation prevention closed cell neoprene cladding.

CONDENSING COIL

With copper tubes and high surface area aluminium fins.

FANS

External impeller axial-flow fans. Six-pole electric motor with built-in thermal cut-out.

Housed in aerodynamic draught tubes with accident prevention grill. **Device for operation in low external air temperatures with pressure transducer** for continuous regulation of fan rotation speed.

REFRIGERANT CIRCUIT

The refrigerant circuit includes the following components: filter, fluid passage indicator, thermostatic expansion valve with external equaliser. Safety pressure switches to control delivery and intake pressures. Unit complete with nonfreezing oil and R22 refrigerant, **Factory tested**.

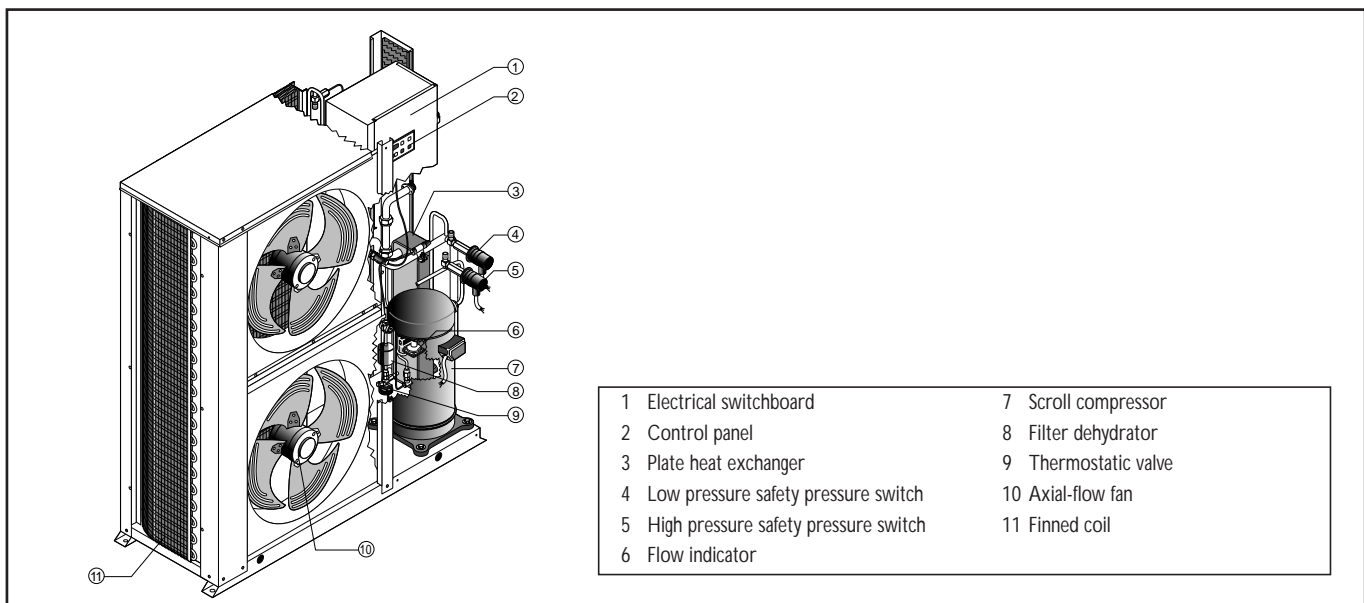
ELECTRICAL SWITCHBOARD

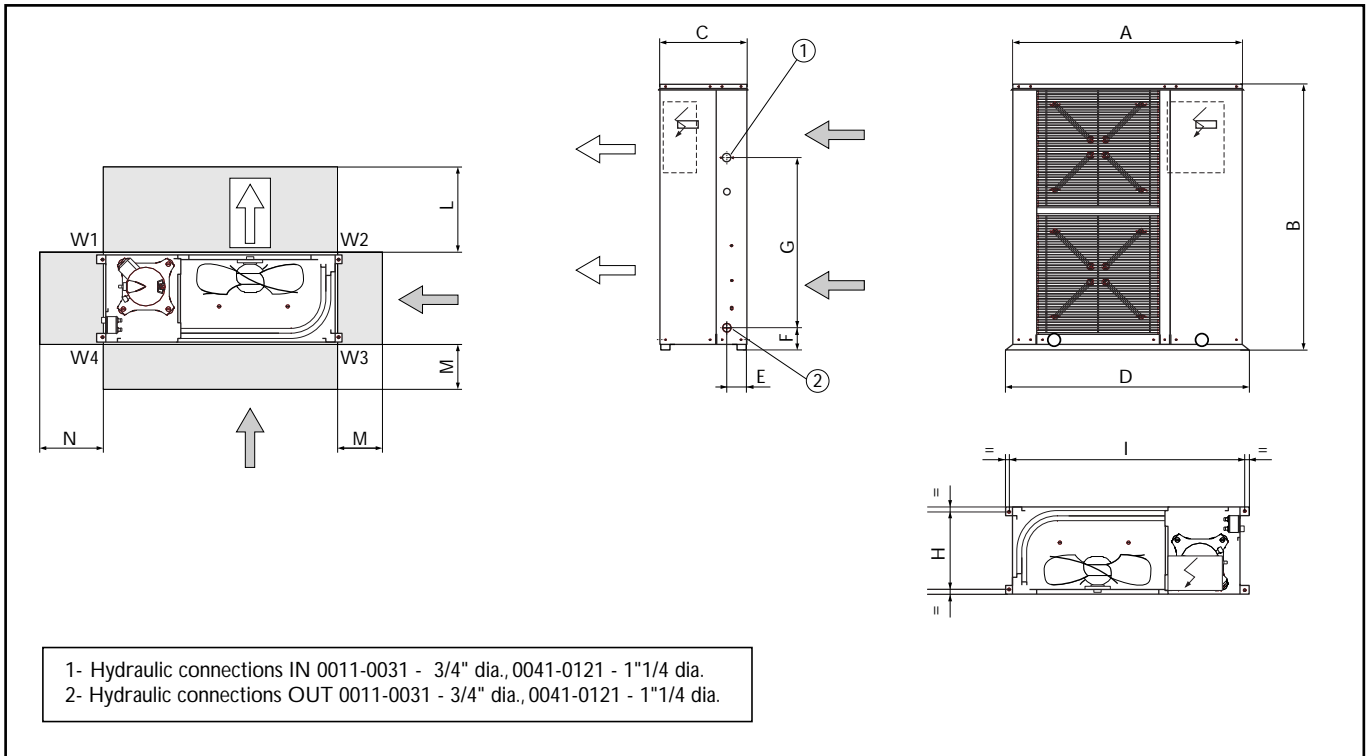
Power and control electrical switchboard constructed in accordance with IEC 204-1/EN60204-1, complete with contactor and thermal solenoid switch for the compressor and **door lock safety device**. **Complete control and regulation via the CVM2 control panel**.

OPTIONAL ACCESSORIES

- Removable metal mesh filter.
- Pump kit
- Inertial storage kit with pump, safety valve, filling assembly, air vent valve, expansion tank, pressure gauge and drain valve.
- Storage tank connection pipes.
- Rubber vibration dampers.
- Condensate collection pan kit.
- Remote keyboard kit.
- Serial interface kit.
- Protection grill kit.

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





Dimension	0011	0021	0025	0031	0041	0051	0061	0071	0091	0101	0121
A	970	970	970	970	1100	1100	1100	1450	1450	1450	1450
B	874	874	1125	1125	1125	1125	1125	1200	1200	1700	1700
C	370	370	370	370	420	420	420	550	550	550	550
D	1028	1028	1028	1028	1156	1156	1156	1507	1507	1507	1507
E	86	86	86	86	117	117	117	117	117	117	117
F	96	96	96	96	222	222	222	245	245	245	245
G	719	719	719	719	790	790	790	815	815	815	815
H	328	328	328	328	378	378	378	497	497	497	497
I	998	998	998	998	1126	1126	1126	1477	1477	1477	1477

Functional distances	0011	0021	0025	0031	0041	0051	0061	0071	0091	0101	0121
L	900	900	900	900	900	900	900	900	900	900	900
M	200	200	200	200	400	400	400	400	400	400	400
N	600	600	600	600	600	600	600	600	600	600	600

Weight distribution HRAT	0011	0021	0025	0031	0041	0051	0061	0071	0091	0101	0121
W1	30	31	37	40	45	46	50	83	84	106	107
W2	15	15	19	20	22	23	25	42	42	53	54
W3	14	15	18	18	21	22	23	40	40	49	50
W4	27	29	36	37	43	44	47	80	82	102	104
TOT	86	90	110	115	131	135	145	245	248	310	315

Weight distribution HRAN	0011	0021	0025	0031	0041	0051	0061	0071	0091	0101	0121
W1	32	33	41	42	48	50	52	87	88	111	112
W2	15	17	21	22	24	25	26	44	44	55	56
W3	15	16	19	20	23	23	25	41	42	52	53
W4	30	31	38	41	45	48	49	85	86	108	109
TOT	92	97	119	125	140	146	152	257	260	326	330

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.
- The unit must be installed in a space designed to house technical installations dimensioned according to current legislation in the country concerned and large enough to allow access for maintenance. **If this is not possible, then use of the protection grill kit is indispensable.**

POSITIONING

Before handling the unit, check the capacity of the lift 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 into the special holes in the bed plate of 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 bed plate 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, fit a condensate collection pan (available as accessory).

HYDRAULIC CONNECTIONS

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 by-pass 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 hydraulic circuit of the evaporator.

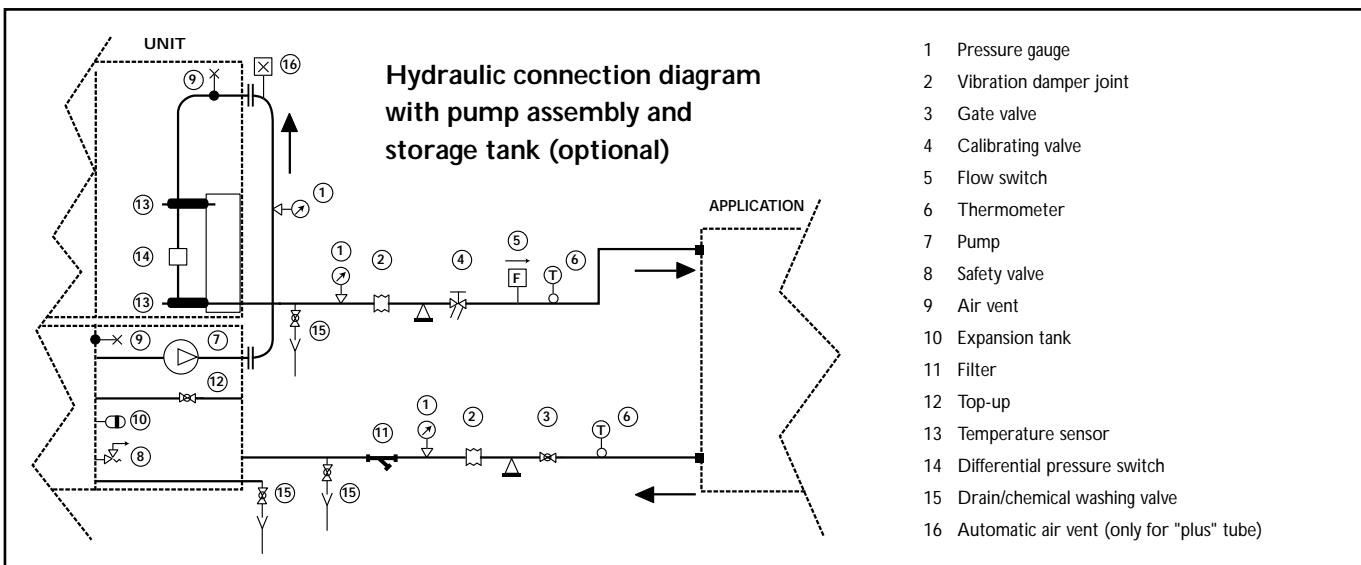
1. Two pressure gauges with a suitable scale (inlet and outlet);
2. Two vibration damper joints (inlet and outlet);
3. Two gate valves (normal in inlet and calibrating in outlet);

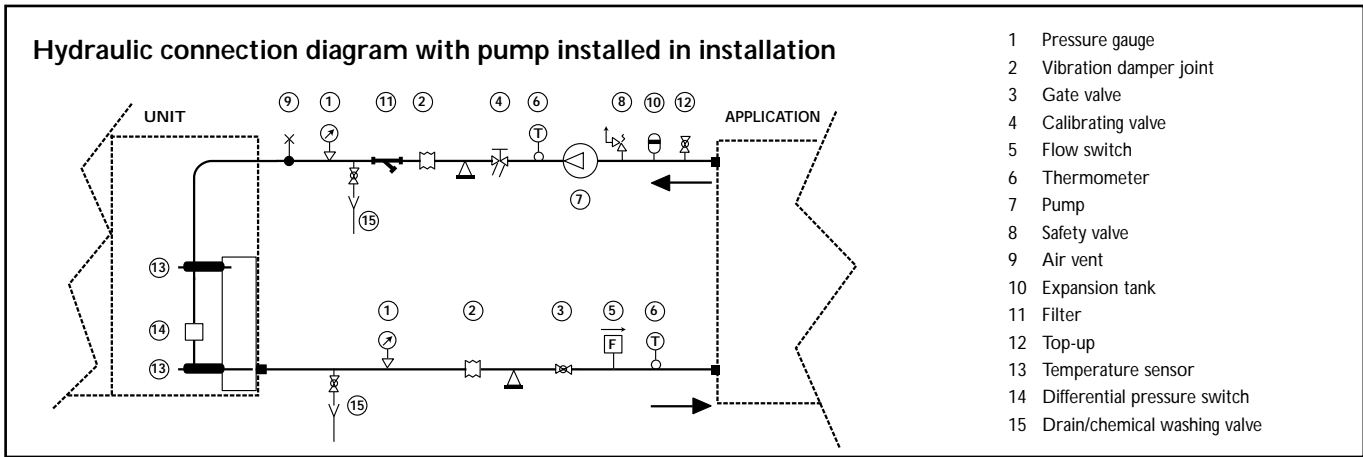
4. A flow switch (in inlet) or a differential pressure switch (inlet-outlet);
5. Two thermometers (inlet and outlet);
6. An inlet filter as close as possible to the evaporator and positioned to allow easy access for routine maintenance.

The flow of water to the refrigerating assembly must conform to the values given on page 13. 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 21.





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. Connect to terminal 4,5 on the electrical panel.

⚠ The manufacturer is not liable for obstruction, breakage or noise resulting from the **failure to install filters** or vibration dampers.

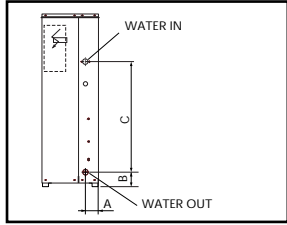
Particular types of water used for filling or topping up must be treated with appropriate treatment systems. For reference values, see the table.

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

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

SIZE AND LOCATION OF CONNECTIONS

Model	0011	0021	0025	0031	0041	0051	0061	0071	0091	0101	0121
A (mm)	86	86	86	86	117	117	117	117	117	117	117
B (mm)	96	96	96	96	222	222	222	222	245	245	245
C (mm)	719	719	719	719	790	790	790	790	815	815	815
hydraulic connections (dia)	3/4"	3/4"	3/4"	3/4"	1"1/4	1"1/4	1"1/4	1"1/4	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 and terminal air vents.
- Open the gate valves.
- Begin filling, slowly opening the water filling cock outside the unit.
- When water begins to leak out of the air vent valves of the terminals, 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 hydraulic connections for tightness.

EMPTYING THE INSTALLATION

- Before emptying, place the general installation 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 be not be allowed to drain freely as it is pollutant. It should be collected for possible reuse.

HRAT-HRAN chillers leave the factory completely cabled and ready for connection to the mains electricity supply and for the flow switch, remote ON/OFF switch and pump to be connected to the terminals provided. Electrical connections must be carried out by qualified personnel in respect of current legislation.

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 of other equipment being used at the same time.

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

All electrical connections must be carried out by qualified personnel in accordance with current legislation 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 $\pm 10\%$ of the rated power supply voltage for the unit (for three phase units, the unbalance between the phases must not exceed 3%).

If these parameters are not respected, contact the electricity supply company.

For electrical connections use double insulation cable in conformity with current legislation in the country concerned.

Install, if possible near the unit, an appropriate protection device to isolate the unit from the mains supply with delayed characteristic curve, contacts opening by at least 3 mm and an adequate interruption and differential protection capacity.

If this device is not visible visible from the electrical switchboard of the unit, it should 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.

HRAT-HRAN ELECTRICAL DATA

Model	Electrical power supply	Rated values (1)								FUSES					
		Compressors			Fans		Total		Max. values (2)		Glass 5x20mm 250 V				
		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)	FU1	FU1*	FU2	FU3	
0011	230~50	1,6	8	45,0	0,08	0,37	1,8	8,51	2,08	11,1		2,5A	4A	1A	0,63
0021	230~50	2,0	9,8	58,5	0,16	0,73	2,2	10,71	2,66	14,4		2,5A	4A	1A	0,63
0025	230~50	2,3	12,2	73,0	0,16	0,73	2,5	12,98	3,12	16,8		3,15A	5A	1A	0,63
0031	230~50	2,7	13,0	95,0	0,16	0,74	2,9	14,1	3,6	19,3		4A	5A	2A	0,63
0021	400-3N~50	1,97	3,72	31,0	0,16	0,73	2,24	4,94	2,77	5,5		2,5A	4A	1A	0,63
0025	400-3N~50	2,25	4,09	38,5	0,16	0,73	2,62	5,74	3,3	6,4		3,15A	5A	1A	0,63
0031	400-3N~50	2,6	4,6	43,5	0,16	0,74	2,92	6,23	3,81	7,3		4A	5A	2A	0,63
0041	400-3N~50	3,2	6,2	51,0	0,32	1,46	3,6	7,78	4,57	9,4		4A	5A	2A	0,80
0051	400-3N~50	4,2	7,1	59,5	0,32	1,46	4,5	8,6	5,78	11,5		4A	5A	2A	0,80
0061	400-3N~50	5,0	8,5	70,5	0,32	1,46	5,3	10,09	7,69	14,8		4A	5A	2A	0,80
0071	400-3N~50	6,0	11,2	94,0	0,67	3,3	6,9	14,63	8,4	17,9		10A	15A	5A	1A
0091	400-3N~50	7,5	13,2	116,0	0,67	3,3	8,2	18,0	10,3	21,2		10A	15A	5A	1A
0101	400-3N~50	8,1	15,1	127,0	0,76	3,9	9,0	20,6	11,1	23,1		10A	15A	5A	1A
0121	400-3N~50	10,5	18,9	159,0	0,76	3,9	11,3	24,3	13,3	26,9		10A	15A	5A	1A

F.L.I. Absorbed power

F.L.A. Absorbed current

L.R.A. Compressor start-up current

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

(2) Values refer to the lower rated voltage (50 Hz).

These values should be used to dimension protection switches and power cables.

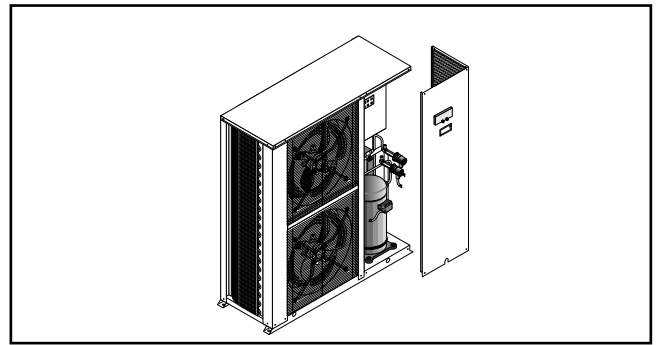
FU1* Fuse to replace FU1 if a storage tank pump + pump on unit are connected (supplied inside the electrical switchboard).

ELECTRICAL SWITCHBOARD

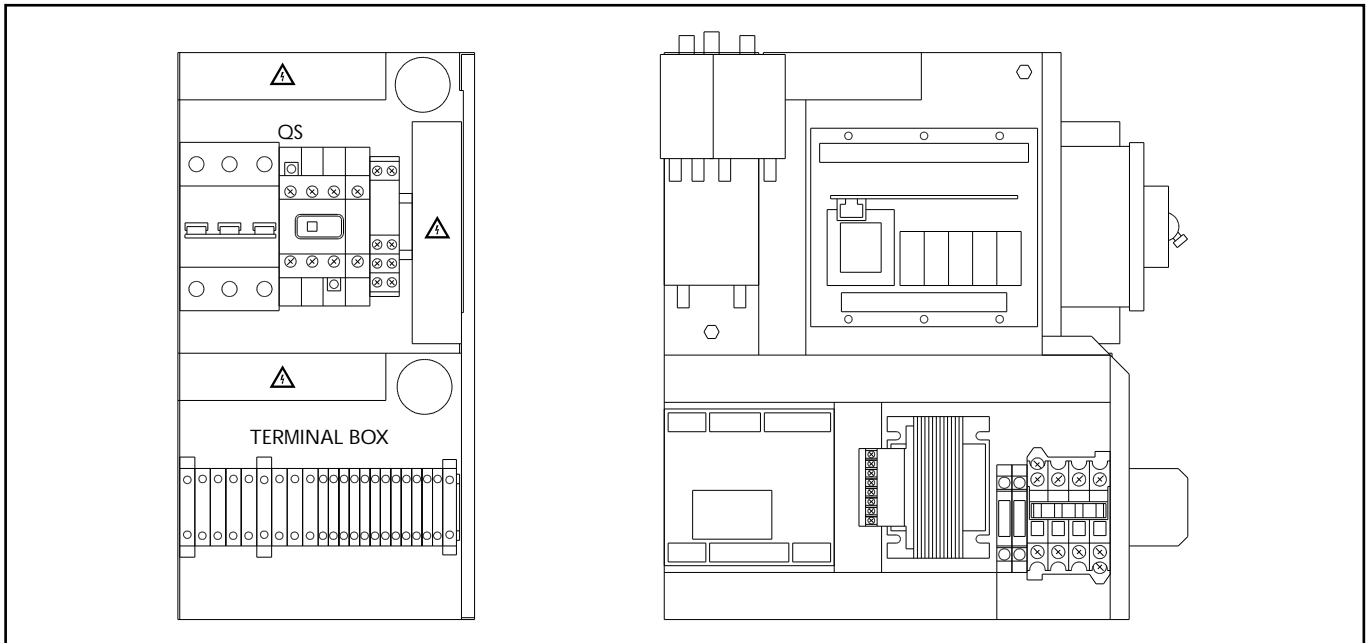
The electrical switchboard is located inside the unit at the top of the technical compartment where the various components of the refrigerant circuit are also to be found.

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

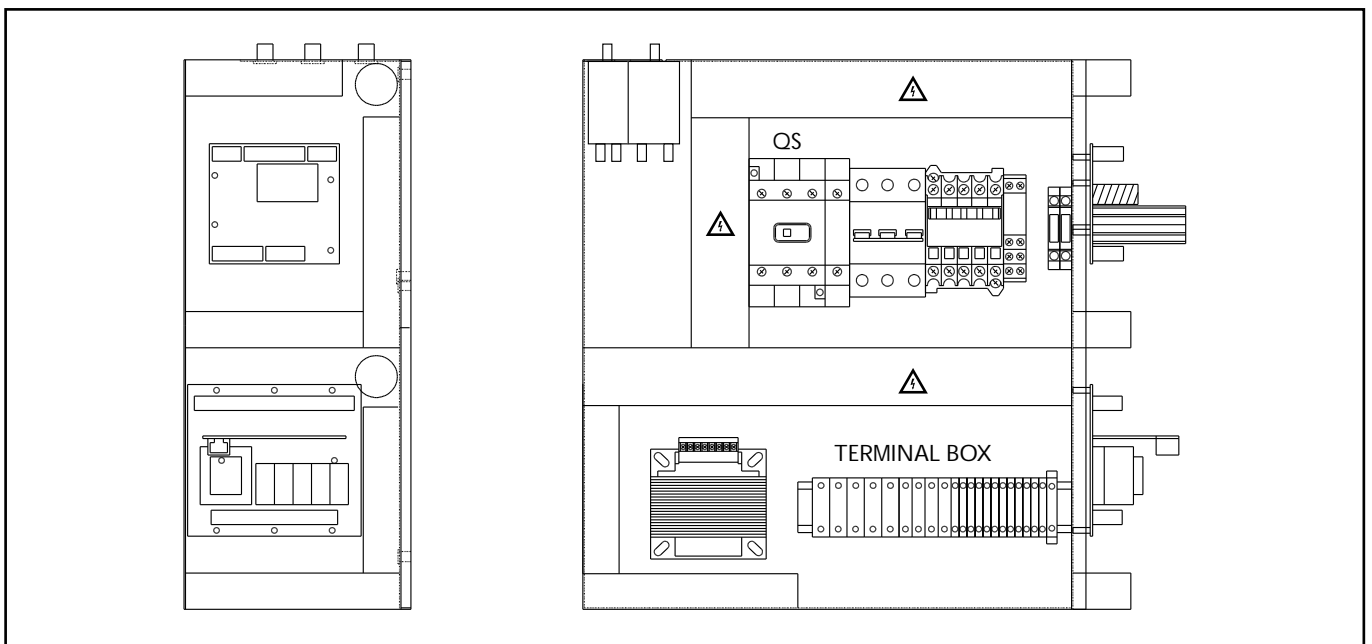
To access the components in the electrical switchboard and the terminal boards, undo the two screws on the switchboard itself.



ELECTRICAL SWITCHBOARD LAYOUT HRAT-HRAN 0011 - 0061



ELECTRICAL SWITCHBOARD LAYOUT HRAT-HRAN 0071 - 0121



Channels containing wires under tension, even when the door lock disconnecting switch (QS) is off.

ELECTRICAL POWER CONNECTIONS

For the functional connection of the unit, bring the power supply cable to the electrical switchboard inside the unit and connect it to terminals U-N and PE, respecting the (U) phase, (N) neutral and (PE) earth in the case of single phase units and 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 switchboard and described as "installer terminals".

REMOTE START UP AND SHUT DOWN

To use a remote on/off device, the jumper must be replaced with a switch connected to terminals 10 and 11 of the installer terminal board. For timed operation, connect a daily or weekly timer between terminals 10 and 11.

REMOTE ALARM

For remote display of unit shut-down due to malfunction, an acoustic or visual alarm warning device can be connected between terminals 8 and 9.

Connect the phase to terminal 9 and the alarm warning device between terminal 8 and the neutral (max. load: 1A with 230V~50Hz).


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 and a transformer.

To install the kit, proceed as follows:

- disconnect the power supply by means of the QS door lock disconnecting switch then access the inside of the electrical switchboard.
- remove the jumper between terminals 14 and 15 on the installer terminal board;
- connect the remote control module with 2 wires to terminals 14 and 15 of the installer terminal board. Terminal 14 should be connected to the IN terminal of the module and terminal 15 to the OUT terminal of the module;
- connect the transformer supplied with the control module to the 12V - 12V terminals, powering it with a voltage of 230V~50Hz.
- connect the jumper JMP1 on the back of the unit's CVM2 keyboard located on the electrical switchboard panel.

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

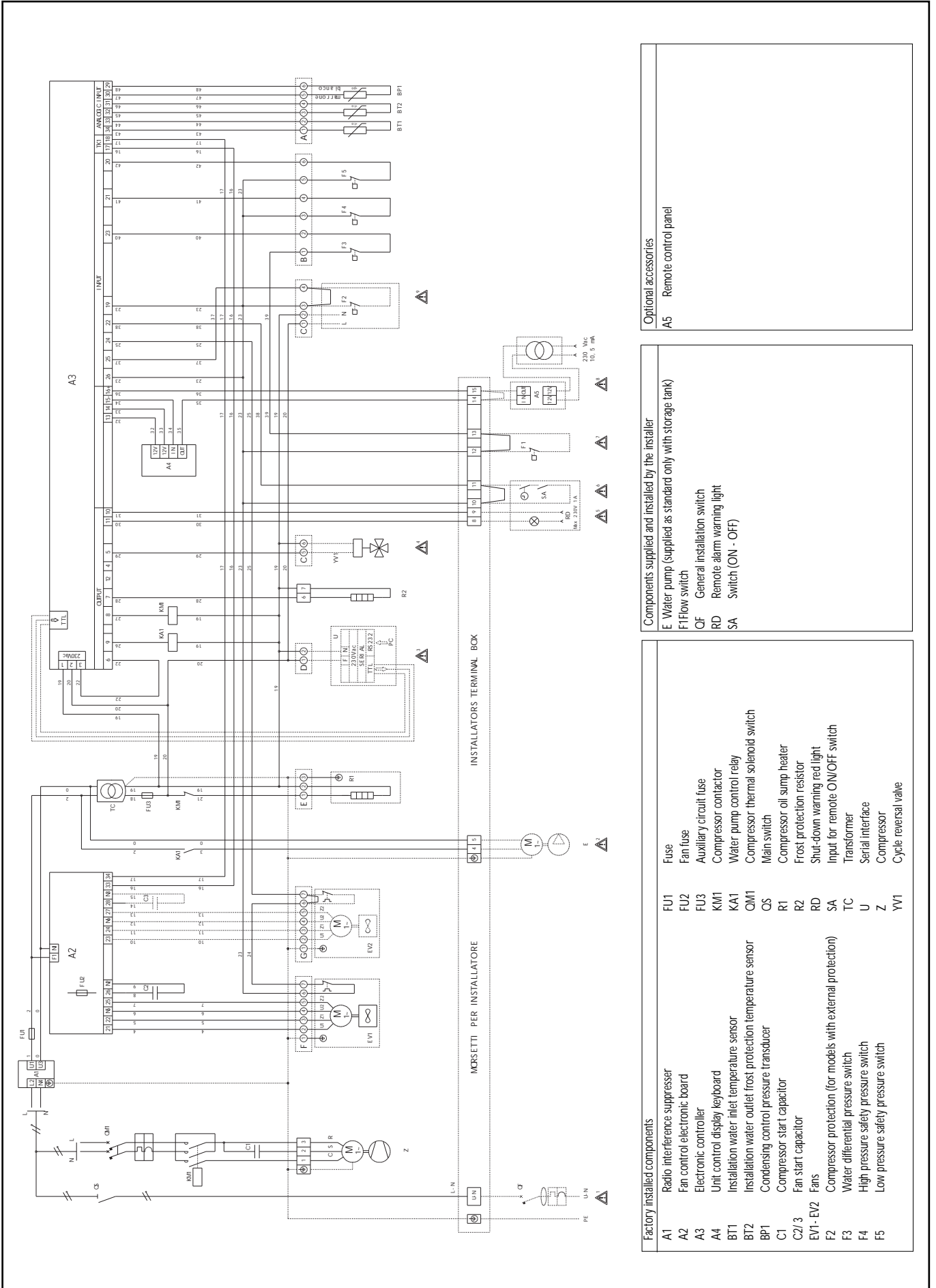
CONNECTING A PUMP

If a pump is to be fitted to the unit or storage tank, it should be connected to terminals 4, 5 and earth of the installer terminal board.

CONNECTING A FLOW SWITCH

If a flow switch is used, connect it to terminals 12 and 13 of the installer terminal board after removing the jumper.

ELECTRICAL DIAGRAM HRAT-HRAN SINGLE PHASE



Optional accessories

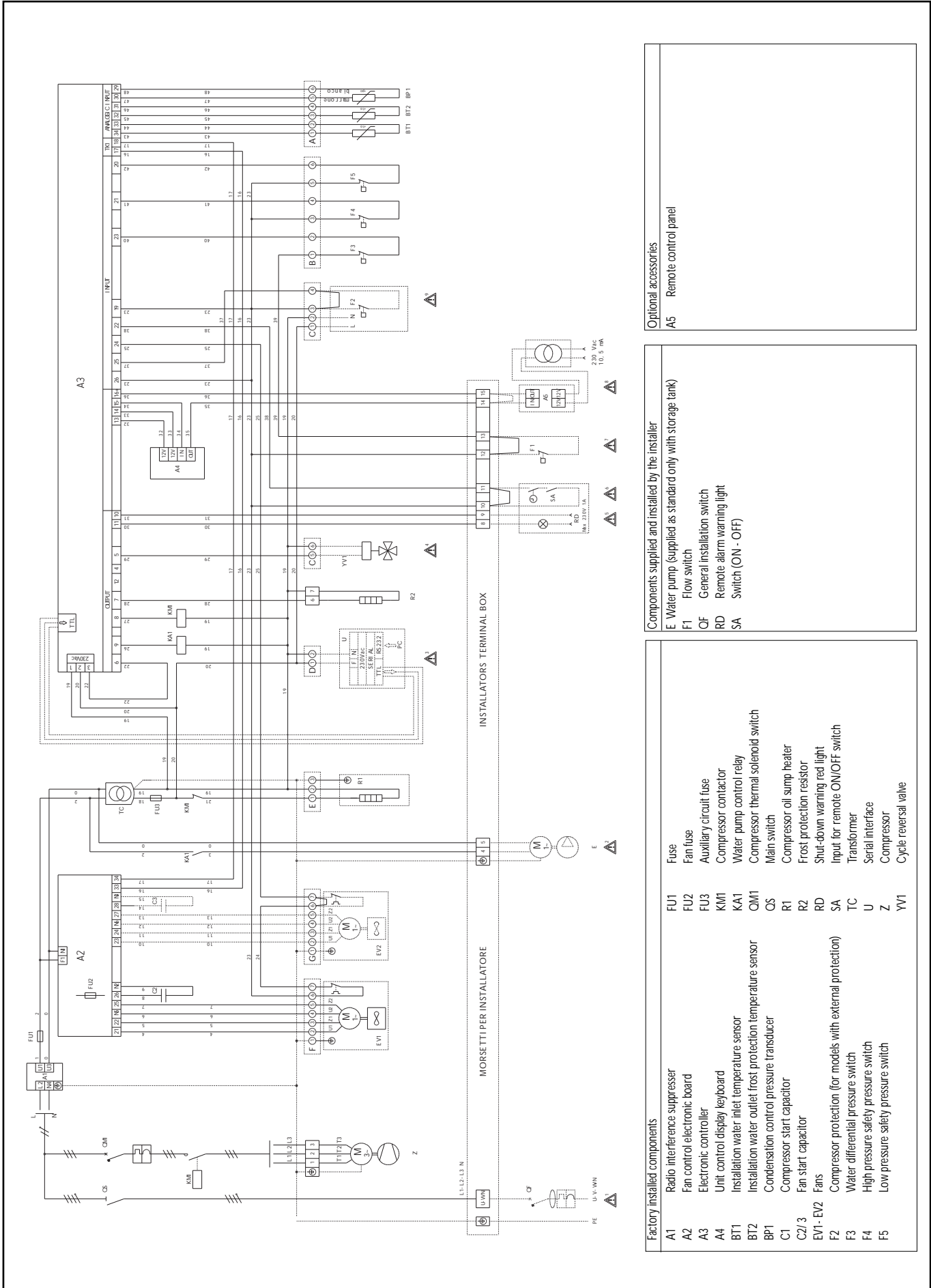
A5 Remote control panel

Components supplied and installed by the installer

E Water pump (supplied as standard only with storage tank)
 F1 Flow switch
 OF General installation switch
 RD Remote alarm warning light
 SA Switch (ON - OFF)

Factory installed components		Fuse
A1	Radio interference suppressor	FU1
A2	Fan control electronic board	FU2
A3	Electronic controller	FU3
A4	Unit control display keyboard	KW1
BT1	Installation water inlet temperature sensor	KA1
BT2	Installation water outlet frost protection temperature sensor	QM1
BP1	Condensing control pressure transducer	OS
C1	Compressor start capacitor	R1
C2/3	Fan start capacitor	R2
EV1 - EV2	Fans	RD
F1	Compressor protection (for models with external protection)	SA
F2	Water differential pressure switch	TC
F3	High pressure safety pressure switch	U
F4	Low pressure safety pressure switch	Z
F5		VY1

ELECTRICAL DIAGRAM HRAT-HRAN THREE PHASE



Factory installed components

A1	Radio interference suppressor	Fuse
A2	Fan control electronic board	FU1
A3	Electronic controller	FU2
A4	Unit control display keyboard	FU3
BT1	Installation water inlet temperature sensor	KM1
BT2	Installation water outlet frost protection temperature sensor	KA1
BP1	Condensation control pressure transducer	OM1
C1	Compressor start capacitor	OS
C2/3	Fan start capacitor	R1
EV1- EV2	Fans	R2
F2	Compressor protection (for models with external protection)	RD
F3	Water differential pressure switch	SA
F4	High pressure safety pressure switch	TC
F5	Low pressure safety pressure switch	U
		Z
		YV1

Components supplied and installed by the installer

E	Water pump (supplied as standard only with storage tank)
F1	Flow switch
QF	General installation switch
RD	Remote alarm warning light
SA	Switch (ON - OFF)

Optional accessories

A5	Remote control panel
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HRAT Model		0011	0021	0025	0031	0041	0051	0061	0071	0091	0101	0121
Refrigerating capacity (1)	kW	4,7	6,1	7,0	8,2	10,5	12,5	15,0	19,1	22,2	26,8	32,4
Absorbed power compressor (1)	kW	1,6	2,0	2,3	2,6	3,2	4,2	5,0	6,0	7,5	8,1	10,5
Total absorbed power (1)	kW	1,8	2,2	2,5	2,9	3,6	4,5	5,3	6,9	8,2	9,0	11,3
Total current absorbed at rated conditions (1)	A	8,5	10,7	13,0	14,1	7,8	8,6	10,1	14,6	18,0	20,6	24,3
Evaporator water flow rate	m ³ /h	0,8	1,0	1,2	1,4	1,8	2,2	2,6	3,2	3,8	4,6	5,6
Evaporator pressure drop	kPa	23	33	35	39	23	23	26	29	24	28	28
No. of fans	N°	1	1	1	2	2	2	2	1	1	2	2
Min. rotation speed	g/m	430	430	430	430	430	430	420	430	430	310	310
Max. rotation speed	g/m	760	870	870	760	870	870	860	870	870	620	620
Max. air flow	m ³ /h	2400	3500	3500	4200	6800	6800	6400	9800	9800	14000	14000
Type of compressor		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Number of compressors	N°	1	1	1	1	1	1	1	1	1	1	1
Number of circuits	N°	1	1	1	1	1	1	1	1	1	1	1
Power steps	N°	1	1	1	1	1	1	1	1	1	1	1
R22 refrigerant	Kg	1,6	1,8	2,4	2,2	2,8	2,9	3,1	5,4	5,7	9,8	9
White oil	Kg	1,0	1,0	1,1	1,1	2,0	2,0	1,65	-	-	-	-
Suniso 3GS oil	Kg	-	-	-	-	-	-	-	4,0	4,0	4,0	4,0
Operating weight	Kg	86	90	110	115	131	135	145	245	248	310	315
Width	mm	970	970	970	970	1100	1100	1100	1450	1450	1450	1450
Height	mm	874	874	1125	1125	1125	1125	1125	1200	1200	1700	1700
Depth	mm	370	370	370	370	420	420	420	550	550	550	550
Hydraulic connections in/out	Gas	3/4"	3/4"	3/4"	3/4"	1"1/4	1"1/4	1"1/4	1"1/4	1"1/4	1"1/4	1"1/4
Sound pressure level (2)	dB(A)	50	55	55	55	58	58	58	65	65	65	65

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

(2) at 1 m in open field fan side

HRAN Model		0011	0021	0025	0031	0041	0051	0061	0071	0091	0101	0121
Refrigerating capacity (1)	kW	4,4	5,8	6,6	7,9	10,0	11,9	14,2	18,2	21,2	25,6	30,9
Absorbed power compressor (1)(2)	kW	1,6	2,0	2,3	2,6	3,2	4,2	5,0	6,0	7,5	8,1	10,5
Total absorbed power (1)(2)	kW	1,8	2,2	2,5	2,9	3,6	4,5	5,3	6,9	8,2	9,0	11,3
Total current absorbed at rated conditions (1)(2)	A	8,5	10,7	13,0	14,1	7,8	8,6	10,1	14,6	18,0	20,6	24,3
Heating capacity (2)	kW	5,4	6,8	7,8	9,0	11,2	13,2	16,3	21,1	24,4	29,5	35,3
Water flow in heating (2)	m ³ /h	0,9	1,2	1,4	1,6	2,0	2,3	2,8	3,7	4,2	5,1	6,1
Pressure drop (2)	kPa	24	34	36	40	27	25	31	37	29	34	34
No. of fans	N°	1	1	1	2	2	2	2	1	1	2	2
Min. rotation speed	g/m	430	430	430	430	430	430	420	430	430	310	310
Max. rotation speed	g/m	760	870	870	760	870	870	860	870	870	620	620
Max. air flow	m ³ /h	2400	3500	3500	4200	6800	6800	6400	9800	9800	14000	14000
Type of compressor		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Number of compressors	N°	1	1	1	1	1	1	1	1	1	1	1
Number of circuits	N°	1	1	1	1	1	1	1	1	1	1	1
Power steps	N°	1	1	1	1	1	1	1	1	1	1	1
R22 refrigerant	Kg	2,95	2,3	3,1	2,8	3,3	4,8	6,9	7,2	7,2	10,9	9,8
White oil	Kg	1,0	1,0	1,1	1,1	2,0	2,0	1,65	-	-	-	-
Suniso 3GS oil	Kg	-	-	-	-	-	-	-	4,0	4,0	4,0	4,0
Operating weight	Kg	92	97	119	125	140	146	152	257	260	326	330
Width	mm	970	970	970	970	1100	1100	1100	1450	1450	1450	1450
Height	mm	874	874	1125	1125	1125	1125	1125	1200	1200	1700	1700
Depth	mm	370	370	370	370	420	420	420	550	550	550	550
Hydraulic connections in/out	Gas	3/4"	3/4"	3/4"	3/4"	1"1/4	1"1/4	1"1/4	1"1/4	1"1/4	1"1/4	1"1/4
Sound pressure level (3)	dB(A)	50	55	55	55	58	58	58	65	65	65	65

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

(3) at 1 m in open field fan side

(2) evaporator air in 7°C 85% R.H., condenser water in/out 40/45°C

		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			
25	Pf	4,9	5,0	5,2	5,3	5,4	5,6	25	Pf	6,3	6,5	6,7	6,9	7,0	7,2	25	Pf	7,2	7,5	7,7	7,9	8,1	8,3			
	Pa	1,3	1,3	1,3	1,3	1,4	1,4		Pa	1,6	1,6	1,6	1,6	1,6	1,6		Pa	1,8	1,8	1,9	1,9	1,9	1,9			
	Pat	1,4	1,4	1,4	1,4	1,4	1,4		Pat	1,7	1,8	1,8	1,8	1,8	1,8		Pat	2,0	2,0	2,0	2,0	2,0	2,1			
	Qev	0,8	0,9	0,9	0,9	0,9	1,0		Qev	1,1	1,1	1,1	1,2	1,2	1,2		Qev	1,2	1,3	1,3	1,4	1,4	1,4			
	ΔPev	24,6	26,0	27,6	29,2	30,8	32,5		ΔPev	35,2	37,4	39,5	41,8	44,2	46,6		ΔPev	37,8	40,0	42,3	44,7	47,2	49,7			
30	Pf	4,6	4,8	4,9	5,1	5,2	5,3	30	Pf	6,0	6,2	6,4	6,6	6,7	6,9	30	Pf	6,9	7,1	7,3	7,5	7,7	7,9			
	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		Pa	2,0	2,1	2,1	2,1	2,1	2,1			
	Pat	1,5	1,6	1,6	1,6	1,6	1,6		Pat	2,00	1,9	1,9	2,0	2,0	2,0		Pat	2,2	2,2	2,2	2,3	2,3	2,3			
	Qev	0,8	0,8	0,8	0,9	0,9	0,9		Qev	1,0	1,1	1,1	1,1	1,2	1,2		Qev	1,2	1,2	1,3	1,3	1,3	1,4			
	ΔPev	22,4	23,7	25,1	26,6	28,1	29,6		ΔPev	32,3	34,2	36,3	38,4	40,5	42,8		ΔPev	34,5	36,5	38,6	40,8	43,1	45,4			
32	Pf	4,6	4,7	4,8	5,0	5,1	5,2	32	Pf	5,9	6,1	6,3	6,4	6,6	6,8	32	Pf	6,8	7,0	7,2	7,4	7,6	7,8			
	Pa	1,5	1,5	1,6	1,6	1,6	1,6		Pa	1,9	1,9	1,9	1,9	1,9	1,9		Pa	2,1	2,2	2,2	2,2	2,2	2,2			
	Pat	1,6	1,6	1,6	1,6	1,7	1,7		Pat	2,0	2,0	2,0	2,0	2,1	2,1		Pat	2,3	2,3	2,3	2,4	2,4	2,4			
	Qev	0,8	0,8	0,8	0,9	0,9	0,9		Qev	1,0	1,0	1,1	1,1	1,1	1,2		Qev	1,2	1,2	1,2	1,3	1,3	1,3			
	ΔPev	21,5	22,8	24,1	25,5	27,0	28,5		ΔPev	3,1	33,0	34,9	37,0	39,1	41,3		ΔPev	33,1	35,1	37,1	39,2	41,4	43,7			
35	Pf	4,4	4,5	4,7	4,8	4,9	5,1	35	Pf	5,7	5,9	6,1	6,3	6,4	6,6	35	Pf	6,6	6,8	7,0	7,2	7,3	7,5			
	Pa	1,6	1,6	1,6	1,7	1,7	1,7		Pa	2,0	2,0	2,0	2,0	2,0	2,0		Pa	2,3	2,3	2,3	2,3	2,4	2,4			
	Pat	1,7	1,7	1,8	1,8	1,8	1,8		Pat	2,1	2,1	2,2	2,2	2,2	2,2		Pat	2,5	2,5	2,5	2,5	2,5	2,5			
	Qev	0,8	0,8	0,8	0,8	0,9	0,9		Qev	1,0	1,0	1,0	1,1	1,1	1,1		Qev	1,1	1,2	1,2	1,2	1,3	1,3			
	ΔPev	20,1	21,3	22,6	23,9	25,3	26,7		ΔPev	29,3	31,1	33,0	34,9	36,9	39,0		ΔPev	31,1	32,9	34,9	36,9	38,9	41,1			
40	Pf	4,1	4,3	4,4	4,5	4,7	4,8	40	Pf	5,4	5,6	5,8	6,0	6,1	6,3	40	Pf	6,2	6,4	6,6	6,8	6,9	7,1			
	Pa	1,8	1,8	1,9	1,9	1,9	1,9		Pa	2,2	2,2	2,2	2,2	2,3	2,3		Pa	2,6	2,6	2,6	2,6	2,6	2,6			
	Pat	1,9	1,9	1,9	2,0	2,0	2,0		Pat	2,4	2,4	2,4	2,4	2,4	2,4		Pat	2,7	2,7	2,8	2,8	2,8	2,8			
	Qev	0,7	0,7	0,8	0,8	0,8	0,8		Qev	0,9	1,0	1,0	1,0	1,1	1,1		Qev	1,1	1,1	1,1	1,2	1,2	1,2			
	ΔPev	17,8	18,9	20,1	21,3	22,5	23,8		ΔPev	26,4	28,0	29,8	31,5	33,4	35,3		ΔPev	27,7	29,4	31,1	32,9	34,8	36,7			
43	Pf	4,0	4,1	4,2	4,4	4,5	4,6	43	Pf	5,3	5,4	5,6	5,8	5,9	6,1	43	Pf	6,0	6,2	6,3	6,5	6,7	6,9			
	Pa	2,0	2,0	2,0	2,0	2,0	2,0		Pa	2,3	2,4	2,4	2,4	2,4	2,4		Pa	2,7	2,7	2,8	2,8	2,8	2,8			
	Pat	2,0	2,1	2,1	2,1	2,1	2,1		Pat	2,5	2,5	2,5	2,5	2,6	2,6		Pat	2,9	2,9	2,9	2,9	3,0	3,0			
	Qev	0,7	0,7	0,7	0,7	0,8	0,8		Qev	0,9	0,9	1,0	1,0	1,0	1,1		Qev	1,0	1,1	1,1	1,1	1,2	1,2			
	ΔPev	16,4	17,4	18,5	19,7	20,8	22,0		ΔPev	24,7	26,2	27,9	29,5	31,3	33,1		ΔPev	25,6	27,2	28,9	30,6	32,3	34,1			

		Model 0031									Model 0041									Model 0051						
Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10	Ta.	Tw	5	6	7	8	9	10			
25	Pf	8,6	8,8	9,1	9,3	9,6	9,8	25	Pf	10,9	11,2	11,5	11,8	12,2	12,5	25	Pf	13,1	13,5	13,8	14,2	14,6	15,0			
	Pa	2,1	2,1	2,1	2,1	2,1	2,2		Pa	2,6	2,6	2,7	2,7	2,7	2,7		Pa	3,4	3,4	3,5	3,5	3,6	3,6			
	Pat	2,2	2,2	2,3	2,3	2,3	2,3		Pat	2,9	3,0	3,0	3,0	3,0	3,1		Pat	3,7	3,8	3,8	3,8	3,9	3,9			
	Qev	1,5	1,5	1,6	1,6	1,6	1,7		Qev	1,9	1,9	2,0	2,0	2,1	2,2		Qev	2,3	2,3	2,4	2,5	2,5	2,6			
	ΔPev	42,2	44,7	47,3	50,0	52,8	55,7		ΔPev	24,5	26,0	27,5	29,1	30,8	32,5		ΔPev	23,8	25,2	26,7	28,2	29,8	31,4			
30	Pf	8,2	8,4	8,7	8,9	9,2	9,4	30	Pf	10,4	10,7	11,1	11,4	11,7	12,0	30	Pf	12,5	12,8	13,2	13,6	13,9	14,3			
	Pa	2,3	2,3	2,4	2,4	2,4	2,4		Pa	2,9	2,9	2,9	3,0	3,0	3,0		Pa	3,8	3,8	3,8	3,9	3,9	3,9			
	Pat	2,5	2,5	2,5	2,5	2,6	2,6		Pat	3,2	3,2	3,2	3,3	3,3	3,3		Pat	4,1	4,1	4,1	4,2	4,2	4,3			
	Qev	1,4	1,5	1,5	1,5	1,6	1,6		Qev	1,8	1,8	1,9	2,0	2,0	2,1		Qev	2,1	2,2	2,3	2,3	2,4	2,5			
	ΔPev	38,5	40,8	43,2	45,7	48,3	50,9		ΔPev	22,5	23,9	25,3	26,8	28,4	29,9		ΔPev	21,6	22,9	24,3	25,7	27,1	28,6			
32	Pf	8,0	8,3	8,5	8,7	9,0	9,2	32	Pf	10,2	10,5	10,8	11,2	11,5	11,8	32	Pf	12,2	12,6	12,9	13,3	13,6	14,0			
	Pa	2,4	2,4	2,5	2,5	2,5	2,5		Pa	3,0	3,0	3,0	3,1	3,1	3,1		Pa	3,9	3,9	4,0	4,0	4,1	4,1			
	Pat	2,6	2,6	2,6	2,6	2,7	2,7		Pat	3,3	3,3	3,4	3,4	3,4	3,4		Pat	4,2	4,3	4,3	4,3	4,4	4,4			
	Qev	1,4	1,4	1,5	1,5	1,5	1,6		Qev	1,8	1,8	1,9	1,9	2,0	2,0		Qev	2,1	2,2	2,2	2,3	2,4	2,4			
	ΔPev	37,0	39,3	41,6	44,0	46,4	49,0		ΔPev	21,7	23,0	24,4	25,8	27,3	28,8		ΔPev	20,7	22,0	23,2	24,6	26,0	27,4			
35	Pf	7,8	8,0	8,2	8,5	8,7	8,9	35	Pf	9,9	10,2	10,5	10,8	11,1	11,4	35	Pf	11,8	12,1	12,5	12,8	13,2	13,5			
	Pa	2,6	2,6	2,7	2,7	2,7	2,7		Pa	3,2	3,2	3,3	3,3	3,4	3,4		Pa	4,1	4,2	4,2	4,2	4,3	4,3			
	Pat	2,8	2,8	2,9	2,9	3,0	3,0		Pat	3,5	3,5	3,6	3,6	3,7	3,7		Pat	4,4	4,5	4,5	4,6	4,6	4,6			
	Qev	1,3	1,4	1,4	1,5	1,5	1,5		Qev	1,7	1,8	1,8	1,9	1,9	2,0		Qev	2,0	2,1	2,1	2,2	2,3	2,3			
	ΔPev	34,8	36,9	39,1	41,3	43,7	46,1		ΔPev	20,3	21,6	22,9	24,2	25,6	27,1		ΔPev	19,2	20,4	22,6	22,9	24,2	25,5			
40	Pf	7,3	7,6	7,8	8,0	8,2	8,5	40	Pf	9,3	9,6	9,9	10,1	10,4	10,7	40	Pf	11,0	11,3	11,6	11,9	12,3	12,6			
	Pa	2,9	2,9	3,0	3,0	3,0	3,0		Pa	3,5	3,5	3,5	3,6	3,6	3,6		Pa	4,5	4,6	4,6	4,7	4,7	4,8			
	Pat	3,1	3,1	3,1	3,1	3,2	3,2		Pat	3,8	3,8	3,9	3,9	3,9	4,0		Pat	4,9	4,9	4,9	5,0	5,0	5,1			
	Qev	1,3	1,3	1,3	1,4	1,4	1,5		Qev	1,6	1,6	1,7	1,7	1,8	1,8		Qev	1,9	1,9	2,0	2,1	2,1	2,2			
	ΔPev	31,0	32,9	34,9	36,9	39,1	41,3		ΔPev	17,9	19,0	20,2	21,4	22,6	23,9		ΔPev	16,7	17,7	18,8	19,8	21,0	22,1			
43	Pf	7,1	7,3	7,5	7,7	7,9	8,2	43	Pf	8,9	9,2	9,4	9,7	10,0	10,3	43	Pf	10,4	10,7	11,0	11,4	11,7	12,0			
	Pa	3,1	3,1	3,2	3,2	3,2	3,2		Pa	3,7	3,7	3,7	3,8	3,8	3,8		Pa	4,8	4,8	4,9	4,9	5,0	5,0			
	Pat	3,3	3,3	3,3	3,3	3,4	3,4		Pat	4,0	4,0	4,1	4,1	4,												

U.R.87%	Model 0011					U.R.87%	Model 0021					U.R.87%	Model 0025				
	Ta	Tw	35	40	45		50	Ta	Tw	35	40		45	50	Ta	Tw	35
-5	Pt	4,1	4,1	4,1	-	-5	Pt	5,0	5,1	5,1	-	-5	Pt	5,8	5,8	5,9	-
	Pa	1,3	1,5	1,6	-		Pa	1,6	1,8	2,0	-		Pa	1,8	2,0	2,3	-
	Pat	1,4	1,5	1,7	-		Pat	1,8	2,0	2,2	-		Pat	1,9	2,2	2,4	-
	Qc	0,7	0,7	0,7	-		Qc	0,9	0,9	0,9	-		Qc	1,0	1,0	1,0	-
	ΔPc	17,5	17,9	18,2	-		ΔPc	22,9	23,4	23,9	-		ΔPc	24,5	25,0	25,6	-
0	Pt	4,6	4,6	4,6	4,6	0	Pt	5,7	5,7	5,7	5,8	0	Pt	6,5	6,6	6,6	6,6
	Pa	1,3	1,5	1,7	1,9		Pa	1,6	1,8	2,0	2,3		Pa	1,8	2,0	2,3	2,6
	Pat	1,4	1,6	1,7	1,9		Pat	1,8	2,0	2,2	2,4		Pat	2,0	2,2	2,4	2,7
	Qc	0,8	0,8	0,8	0,8		Qc	1,0	1,0	1,0	1,0		Qc	1,1	1,1	1,1	1,2
	ΔPc	21,9	22,0	22,2	22,4		ΔPc	29,2	29,6	30,0	30,4		ΔPc	31,4	31,6	31,9	32,3
7	Pt	5,5	5,4	5,4	5,4	7	Pt	6,8	6,8	6,8	6,8	7	Pt	7,9	7,9	7,8	7,8
	Pa	1,4	1,5	1,7	1,9		Pa	1,7	1,9	2,1	2,3		Pa	1,9	2,1	2,3	2,6
	Pat	1,4	1,6	1,8	2,0		Pat	1,8	2,0	2,2	2,5		Pat	2,0	2,3	2,5	2,8
	Qc	0,9	0,9	0,9	0,9		Qc	1,2	1,2	1,2	1,2		Qc	1,4	1,4	1,4	1,4
	ΔPc	31,4	31,3	31,2	31,2		ΔPc	41,6	41,6	41,8	42,0		ΔPc	45,3	45,2	45,2	45,1
10	Pt	5,9	5,9	5,9	5,9	10	Pt	7,3	7,3	7,3	7,3	10	Pt	8,5	8,5	8,5	8,4
	Pa	1,4	1,5	1,7	1,9		Pa	1,7	1,9	2,1	2,3		Pa	1,9	2,1	2,4	2,6
	Pat	1,5	1,6	1,8	2,0		Pat	1,8	2,0	2,3	2,5		Pat	2,1	2,3	2,5	2,8
	Qc	1,0	1,0	1,0	1,0		Qc	1,3	1,3	1,3	1,3		Qc	1,5	1,5	1,5	1,5
	ΔPc	37,1	36,9	36,7	36,5		ΔPc	48,4	48,3	48,3	48,4		ΔPc	53,3	53,0	52,7	52,5
15	Pt	6,8	6,8	6,8	6,7	15	Pt	8,3	8,3	8,2	8,2	15	Pt	9,8	9,7	9,6	9,6
	Pa	1,4	1,6	1,7	1,9		Pa	1,7	1,9	2,1	2,4		Pa	2,0	2,2	2,4	2,7
	Pat	1,5	1,7	1,8	2,0		Pat	1,9	2,1	2,3	2,5		Pat	2,1	2,3	2,6	2,9
	Qc	1,2	1,2	1,2	1,2		Qc	1,4	1,4	1,4	1,4		Qc	1,7	1,7	1,7	1,7
	ΔPc	49,2	48,8	48,5	48,2		ΔPc	62,3	61,8	61,5	61,3		ΔPc	69,6	69,1	68,5	67,9

U.R.87%	Model 0031					U.R.87%	Model 0041					U.R.87%	Model 0051				
	Ta	Tw	35	40	45		50	Ta	Tw	35	40		45	50	Ta	Tw	35
-5	Pt	6,7	6,7	6,8	-	-5	Pt	8,3	8,3	8,3	-	-5	Pt	9,9	9,9	9,9	-
	Pa	2,0	2,3	2,6	-		Pa	2,6	2,8	3,1	-		Pa	3,1	3,4	3,7	-
	Pat	2,2	2,4	2,7	-		Pat	2,9	3,1	3,4	-		Pat	3,4	3,7	4,1	-
	Qc	1,2	1,2	1,2	-		Qc	1,4	1,4	1,4	-		Qc	1,7	1,7	1,7	-
	ΔPc	25,9	26,5	27,1	-		ΔPc	14,6	14,5	14,5	-		ΔPc	13,9	13,8	13,8	-
0	Pt	7,5	7,6	7,6	7,7	0	Pt	9,5	9,5	9,4	9,3	0	Pt	11,2	11,2	11,1	11,1
	Pa	2,1	2,3	2,6	2,9		Pa	2,6	2,9	3,2	3,5		Pa	3,2	3,5	3,9	4,2
	Pat	2,2	2,5	2,8	3,1		Pat	2,9	3,2	3,5	3,8		Pat	3,5	3,8	4,2	4,5
	Qc	1,3	1,3	1,3	1,3		Qc	1,7	1,6	1,6	1,6		Qc	1,9	1,9	1,9	1,9
	ΔPc	33,2	33,5	34,0	34,6		ΔPc	19,1	19,0	18,8	18,5		ΔPc	17,7	17,7	17,7	17,6
7	Pt	9,0	9,0	9,0	9,0	7	Pt	11,4	11,3	11,2	11,1	7	Pt	13,4	13,3	13,2	13,1
	Pa	2,1	2,4	2,7	3,0		Pa	2,7	3,0	3,3	3,6		Pa	3,3	3,7	4,0	4,4
	Pat	2,3	2,5	2,8	3,1		Pat	3,1	3,3	3,6	4,0		Pat	3,7	4,0	4,4	4,7
	Qc	1,6	1,6	1,6	1,6		Qc	2,0	2,0	2,0	1,9		Qc	2,3	2,3	2,3	2,3
	ΔPc	47,5	47,5	47,6	47,8		ΔPc	27,6	27,2	26,7	26,1		ΔPc	25,3	25,2	25,0	24,6
10	Pt	9,7	9,7	9,7	9,7	10	Pt	12,3	12,2	12,1	11,9	10	Pt	14,4	14,4	14,2	14,1
	Pa	2,1	2,4	2,7	3,0		Pa	2,8	3,1	3,4	3,7		Pa	3,4	3,7	4,1	4,5
	Pat	2,3	2,6	2,8	3,2		Pat	3,1	3,4	3,7	4,0		Pat	3,7	4,1	4,4	4,8
	Qc	1,7	1,7	1,7	1,7		Qc	2,1	2,1	2,1	2,1		Qc	2,5	2,5	2,5	2,5
	ΔPc	55,5	55,3	55,2	55,2		ΔPc	32,1	31,6	30,9	30,1		ΔPc	29,4	29,3	28,9	28,3
15	Pt	11,1	11,0	11,0	10,9	15	Pt	14,0	13,8	13,6	13,4	15	Pt	16,4	16,2	16,1	15,8
	Pa	2,2	2,5	2,7	3,1		Pa	2,9	3,2	3,5	3,8		Pa	3,5	3,9	4,3	4,7
	Pat	2,4	2,6	2,9	3,2		Pat	3,2	3,5	3,8	4,2		Pat	3,8	4,2	4,6	5,0
	Qc	1,9	1,9	1,9	1,9		Qc	2,4	2,4	2,4	2,3		Qc	2,8	2,8	2,8	2,8
	ΔPc	71,7	71,2	70,7	70,2		ΔPc	41,2	40,3	39,3	38,0		ΔPc	37,9	37,4	36,7	35,7

Ta: external air temperature (°C)

Tw: temperature of water leaving evaporator (°C)

Pt: heating capacity (kW)

Pa: power absorbed by compressors (kW)

Pat: total absorbed power (kW)

Qc: condenser water flow (m³/h)

ΔPc: evaporator pressure drop (kPa)

- conditions outside operating limits

U.R.87%	Ta. Model 0061					U.R.87%	Ta. Model 0071					U.R.87%	Ta. Model 0091				
	Tw	35	40	45	50		Tw	35	40	45	50		Tw	35	40	45	50
-5	Pt	10,9	10,9	10,9	-	-5	Pt	15,5	15,6	15,7	-	-5	Pt	17,8	18,0	18,2	-
	Pa	3,8	4,2	4,7	-		Pa	4,8	5,4	6,0	-		Pa	5,7	6,3	7,1	-
	Pat	4,1	4,5	5,0	-		Pat	5,5	6,1	6,7	-		Pat	6,3	7,0	7,7	-
	Qc	1,9	1,9	1,9	-		Qc	2,7	2,7	2,7	-		Qc	3,1	3,1	3,2	-
	ΔPc	13,8	13,8	13,9	-		ΔPc	19,6	19,9	20,3	-		ΔPc	15,3	15,6	16,0	-
0	Pt	13,2	13,1	13,2	13,2	0	Pt	17,7	17,8	17,8	17,9	0	Pt	20,4	20,4	20,5	20,7
	Pa	3,9	4,3	4,8	5,3		Pa	4,9	5,5	6,1	6,9		Pa	5,8	6,4	7,2	8,0
	Pat	4,2	4,6	5,1	5,6		Pat	5,6	6,2	6,8	7,5		Pat	6,4	7,1	7,9	8,7
	Qc	2,3	2,3	2,3	2,3		Qc	3,1	3,1	3,1	3,1		Qc	3,5	3,6	3,6	3,6
	ΔPc	20,0	20,0	20,1	20,3		ΔPc	25,5	25,7	25,9	26,2		ΔPc	20,0	20,2	20,5	20,8
7	Pt	16,4	16,3	16,3	16,2	7	Pt	21,3	21,2	21,1	21,1	7	Pt	24,4	24,4	24,4	24,4
	Pa	4,0	4,4	4,9	5,5		Pa	5,0	5,6	6,3	7,0		Pa	5,9	6,6	7,4	8,2
	Pat	4,3	4,7	5,2	5,8		Pat	5,7	6,3	7,0	7,7		Pat	6,6	7,3	8,1	8,9
	Qc	2,8	2,8	2,8	2,8		Qc	3,7	3,7	3,7	3,7		Qc	4,2	4,2	4,2	4,3
	ΔPc	31,0	30,9	30,8	30,8		ΔPc	36,7	36,6	36,6	36,6		ΔPc	28,8	28,8	28,9	29,0
10	Pt	17,8	17,7	17,6	17,5	10	Pt	23,0	22,8	22,7	22,6	10	Pt	26,4	26,3	26,2	26,2
	Pa	4,0	4,5	5,0	5,5		Pa	5,1	5,7	6,4	7,1		Pa	6,0	6,7	7,5	8,3
	Pat	4,4	4,8	5,3	5,9		Pat	5,8	6,4	7,1	7,8		Pat	6,6	7,4	8,2	9,0
	Qc	3,1	3,1	3,1	3,1		Qc	4,0	4,0	4,0	3,9		Qc	4,6	4,6	4,6	4,6
	ΔPc	36,5	36,3	36,1	35,9		ΔPc	42,8	42,5	42,3	42,1		ΔPc	33,5	33,4	33,3	33,4
15	Pt	20,2	20,0	19,8	19,7	15	Pt	26,0	25,8	25,6	25,4	15	Pt	29,8	29,7	29,5	29,4
	Pa	4,2	4,6	5,1	5,7		Pa	5,2	5,8	6,5	7,3		Pa	6,1	6,8	7,6	8,5
	Pat	4,5	4,9	5,4	6,0		Pat	5,9	6,5	7,2	7,9		Pat	6,8	7,5	8,3	9,2
	Qc	3,5	3,5	3,5	3,4		Qc	4,5	4,5	4,5	4,4		Qc	5,2	5,2	5,1	5,1
	ΔPc	47,0	46,4	45,8	45,1		ΔPc	54,9	54,3	53,7	53,2		ΔPc	42,8	42,5	42,2	42,0

U.R.87%	Ta. Model 0101					U.R.87%	Ta. Model 0121				
	Tw	35	40	45	50		Tw	35	40	45	50
-5	Pt	21,7	21,7	21,8	-	-5	Pt	25,9	26,1	26,3	-
	Pa	6,5	7,3	8,2	-		Pa	8,1	9,1	10,1	-
	Pat	7,3	8,1	8,9	-		Pat	8,9	9,8	10,9	-
	Qc	3,8	3,8	3,8	-		Qc	4,5	4,5	4,6	-
	ΔPc	18,3	18,5	18,8	-		ΔPc	18,0	18,3	18,7	-
0	Pt	24,8	24,8	24,8	24,8	0	Pt	29,6	29,6	29,8	29,9
	Pa	6,6	7,4	8,3	9,3		Pa	8,2	9,2	10,3	11,5
	Pat	7,4	8,2	9,1	10,0		Pat	9,0	10,0	11,1	12,3
	Qc	4,3	4,3	4,3	4,3		Qc	5,1	5,2	5,2	5,2
	ΔPc	24,0	24,1	24,2	24,4		ΔPc	23,4	23,6	23,9	24,3
7	Pt	29,8	29,6	29,5	29,4	7	Pt	35,4	35,4	35,3	35,3
	Pa	6,8	7,6	8,5	9,5		Pa	8,4	9,5	10,6	11,8
	Pat	7,6	8,4	9,3	10,3		Pat	9,2	10,2	11,4	12,6
	Qc	5,2	5,1	5,1	5,1		Qc	6,1	6,1	6,2	6,2
	ΔPc	34,6	34,4	34,2	34,1		ΔPc	33,6	33,6	33,7	33,8
10	Pt	32,1	31,9	31,7	31,5	10	Pt	38,2	38,1	38,0	37,9
	Pa	6,9	7,7	8,6	9,6		Pa	8,5	9,6	10,7	12,0
	Pat	7,7	8,5	9,4	10,4		Pat	9,3	10,3	11,5	12,7
	Qc	5,6	5,5	5,5	5,5		Qc	6,6	6,6	6,6	6,6
	ΔPc	40,3	39,9	39,6	39,3		ΔPc	39,1	39,0	38,9	38,9
15	Pt	36,3	36,0	35,7	35,4	15	Pt	43,2	43,0	42,7	42,5
	Pa	7,0	7,9	8,8	9,8		Pa	8,7	9,8	10,9	12,2
	Pat	7,8	8,7	9,6	10,6		Pat	9,5	10,5	11,7	13,0
	Qc	6,3	6,3	6,2	6,2		Qc	7,5	7,5	7,4	7,4
	ΔPc	51,7	50,9	50,2	49,5		ΔPc	50,1	49,6	49,3	48,9

Ta: external air temperature (°C)

Tw: temperature of water leaving evaporator (°C)

Pt: heating capacity (kW)

Pa: power absorbed by compressors (kW)

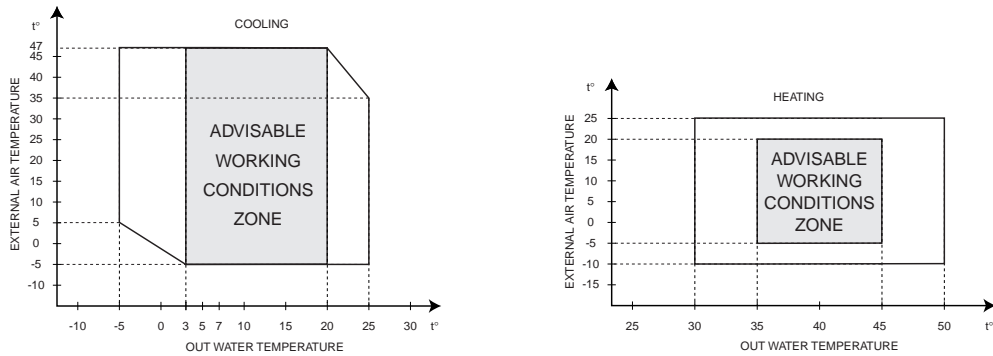
Pat: total absorbed power (kW)

Qc: condenser water flow (m³/h)

ΔPc: evaporator pressure drop (kPa)

- conditions outside operating limits

To operate the chiller, it is vital to respect the conditions given in the table:



Thermal head min. - max.	3÷8
Hydraulic circuit pressure (bars)	1÷3
Max. storage temperature (°C)	63

ETHYLENE GLYCOL SOLUTIONS

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

Freezing point (°C)						
	0	-5	-10	-15	-20	-25
Percentage of ethylene glycol in weight						
	0	12%	20%	28%	35%	40%
cPf	1	0,985	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: correction factor refrigerating capacity
 cQ: correction factor flow rate
 cdp: correction factor pressure drop

ENCRUSTATION FACTORS

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

Encrustation factors (m ² °C/W)	Evaporator		
	f1	fk1	fx1
4,4 x 10 ⁻⁵	-	-	-
0,86 x 10 ⁻⁴	0,96	0,99	0,99
1,72 x 10 ⁻⁴	0,93	0,98	0,98

f1 correction factor capacity
 fk1 correction factor compressor absorbed power
 fx1 correction factor total absorbed power

SOUND PRESSURE LEVEL

Model	Octave band (Hz)								Total dB(A)
	63	125	250	500	1000	2000	4000	8000	
Sound pressure level									
0011	58	48	47	46	43	39	33	35	50
0021	65	55	54	53	50	46	40	42	55
0025	65	55	54	53	50	46	40	42	55
0031	63	53	52	51	48	44	38	40	55
0041	68	58	57	56	53	49	43	45	58
0051	68	58	57	56	53	49	43	45	58
0061	68	58	57	56	53	49	43	45	58
0071	75	65	64	63	60	56	50	52	65
0091	75	75	64	63	60	56	50	52	65
0101	75	75	64	63	60	56	50	52	65
0121	75	75	64	63	60	56	50	52	65

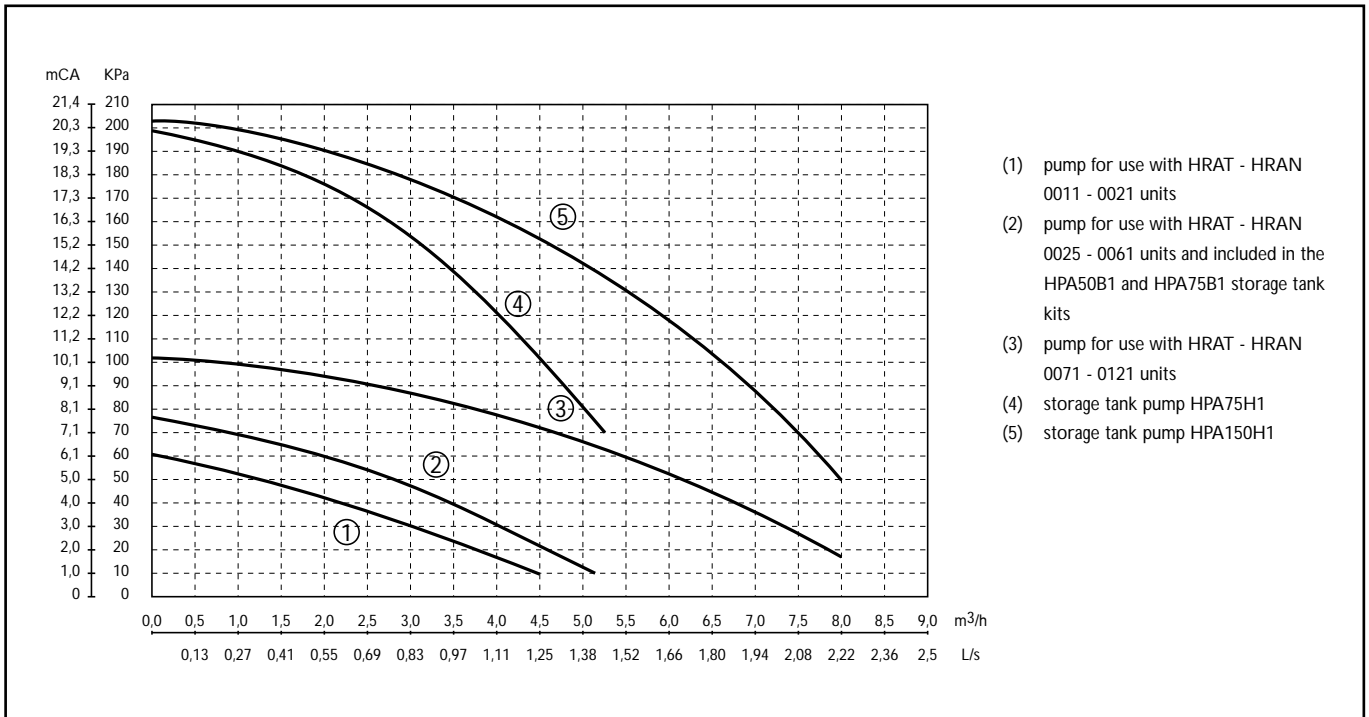
Metres Model	1	5	10	15	20
	0011	50	41	35	32
0021	55	46	40	37	34
0025	55	46	40	37	34
0031	55	46	40	37	34
0041	58	49	43	40	37
0051	58	49	43	40	37
0061	58	49	43	40	37
0071	65	56	50	47	44
0091	65	56	50	47	44
0101	65	57	52	49	46
0121	65	57	52	49	46

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

QUANTITY OF WATER IN INSTALLATION

Model HRAT/HRAN		0011	0021	0025	0031	0041	0051	0061	0071	0091	0101	0121
Minimum water content	l	50	70	80	100	110	130	150	220	250	300	350
Optimum water content	l	140	150	180	240	290	350	410	500	610	740	940

USEFUL PUMP HEAD CURVES (*)

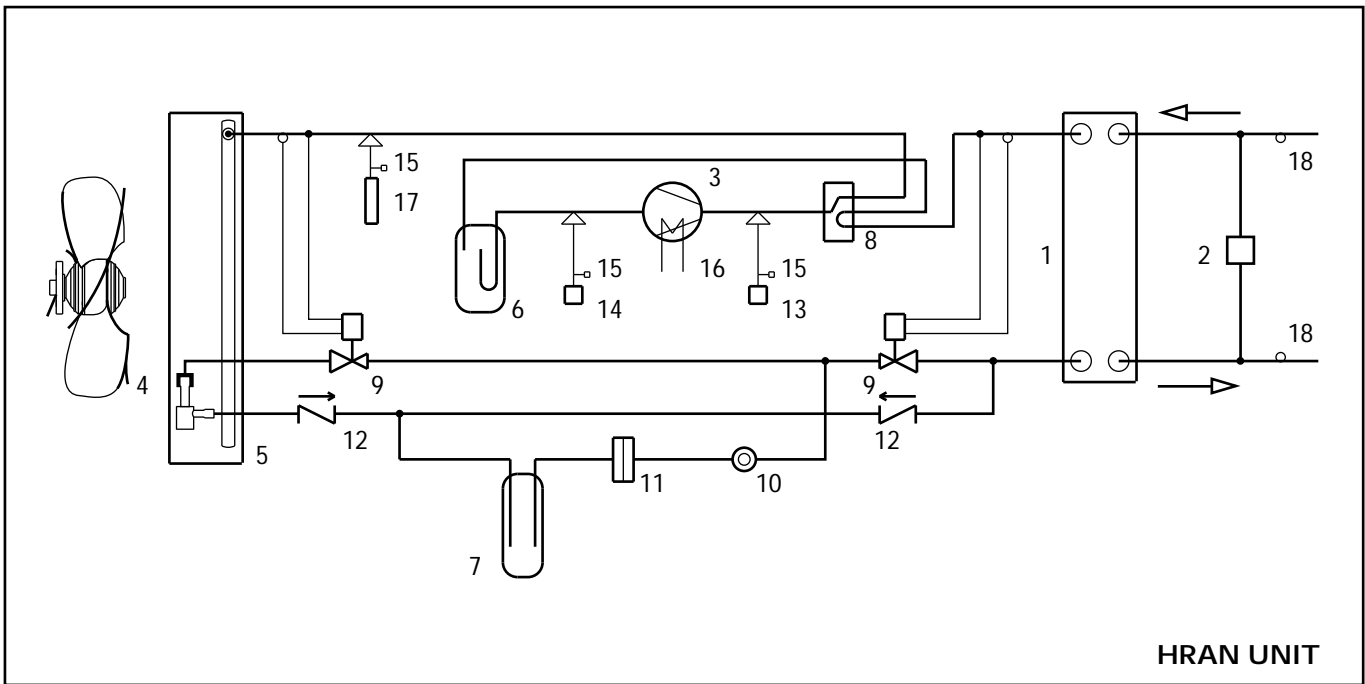
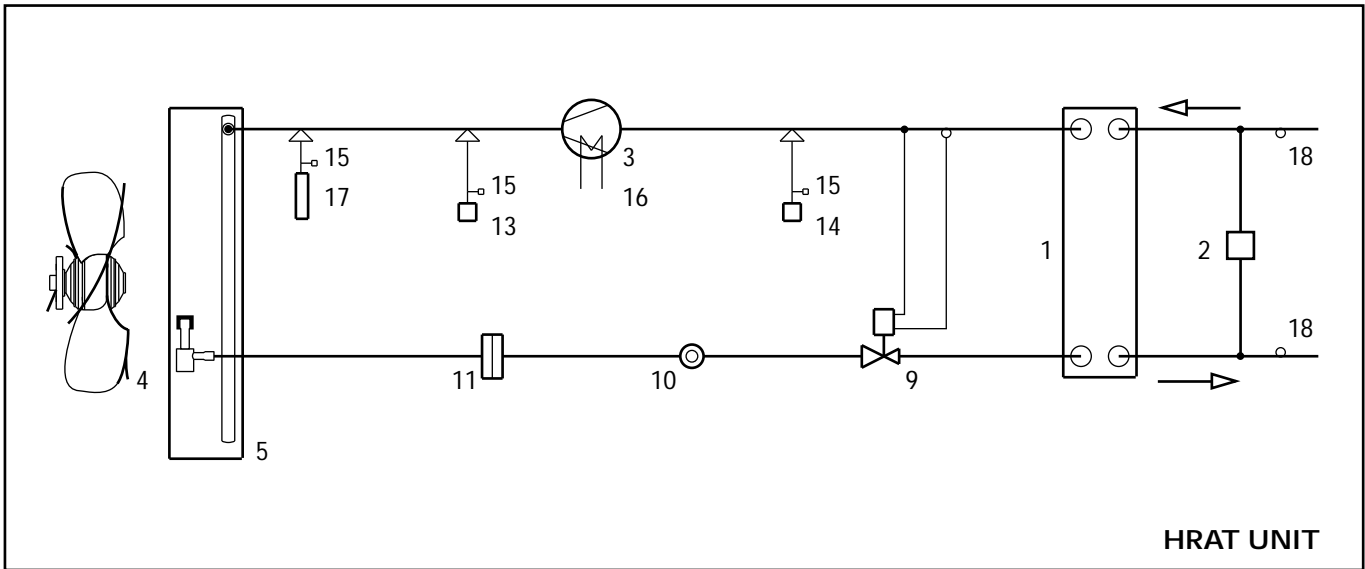


(*) To obtain the useful head of the installation, subtract the pressure drop of the plate heat exchanger.

HEAT EXCHANGER PRESSURE DROP (WATER SIDE)

Model	Water flow	m³/h	0,6	0,8	1,00	1,2	1,4	1,6	1,8		
HRAT - HRAN	flow	l/sec	0,167	0,222	0,278	0,333	0,389	0,444	0,500		
0011	Pressure drop	kPa	13	23	36	52	-	-	-		
0021		kPa	12	21	33	47	65	-	-		
0025		kPa	8	15	24	35	48	62	-		
0031		kPa	7	13	20	29	39	51	64		
Model	Water flow	m³/h	1,4	1,8	2,2	2,6	3,0	3,4	3,8	4,2	
HRAT - HRAN	flow	l/sec	0,389	0,500	0,611	0,722	0,833	0,944	1,055	1,167	
0041	Pressure drop	kPa	14	23	34	48	64	-	-	-	
0051		kPa	9	15	23	32	43	55	69	-	
0061		kPa	7	12	19	26	35	44	55	68	
Model	Water flow	m³/h	3,0	3,3	3,8	4,6	5,4	5,6	6,2	7,0	7,8
HRAT - HRAN	flow	l/sec	0,833	0,917	1,055	1,278	1,500	1,555	1,722	1,944	2,167
0071	Pressure drop	kPa	24	29	38	56	78	-	-	-	-
0091		kPa	14	18	24	35	48	52	64	-	-
0101		kPa	10	14	19	28	38	41	51	65	-
0121		kPa	-	10	13	19	26	28	34	44	54

Note: the values refer to nominal water flow



1 plate heat exchanger	6 liquid separator (for models 0041 - 0121)	11 filter	16 sump heater
2 water differential pressure switch	7 liquid recipient	12 check valve	17 pressure transducer
3 compressor	8 cycle reverse valve	13 high pressure safety pressure switch	18 water temperature sensor
4 fan	9 thermostatic valve	14 low pressure safety pressure switch	
5 finned coil	10 liquid indicator	15 filling connections	

PREPARING FOR FIRST START UP

The chiller must be started up for the first time by the Technical Assistance Service. Before starting up HRAT-HRAN chillers, make sure that:

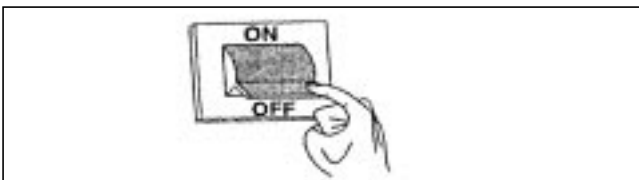
- all safety conditions have been respected;
- the chiller is adequately fixed to the surface it rests on;
- functional distances have been respected;
- hydraulic connections have been carried out as indicated in the instruction manual;
- the hydraulic circuit is filled and vented;
- the hydraulic circuit cocks are open;
- electrical connections have been carried out correctly and voltage is within a tolerance of 10% of the rated voltage for the unit;
- the unit is correctly earthed;
- all electrical connections are tight and all hydraulic connections have been carried out 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 up the unit for at least two hours by positioning QF and QS to ON and setting the control panel CVM2 to OFF to allow the oil in the compressor sump to heat up.

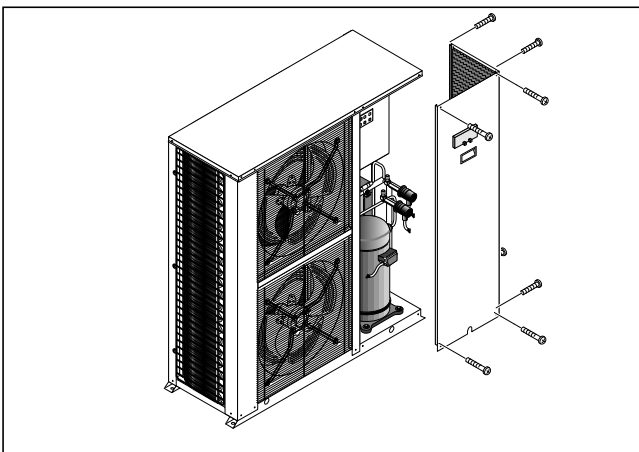
STARTING UP FOR THE FIRST TIME (after two hours)

Before activating the chiller:

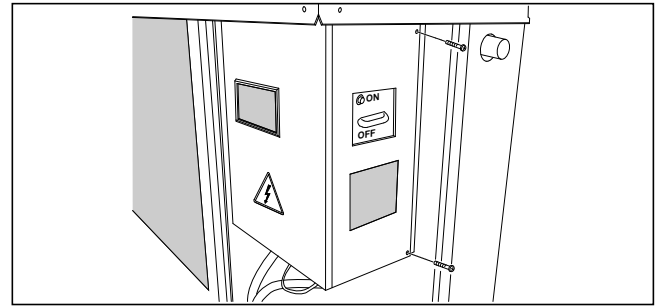
- make sure the remote general switch QF is in the OFF position;



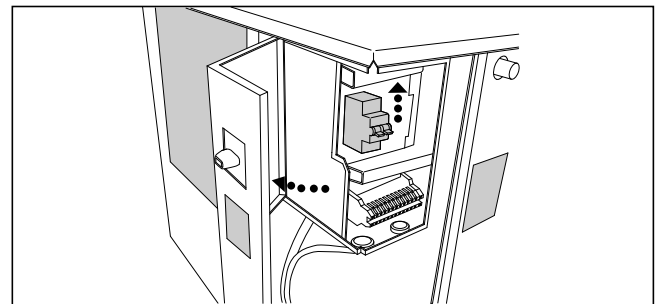
- make sure the remote secondary switch SA (if present) is in the OFF position;
- make sure the remote keyboard "A5" (if present) is set to OFF;
- remove the inspection panel;



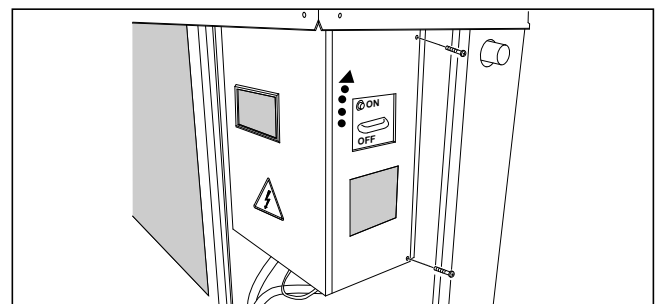
- open the door of the electrical switchboard, turning QS to OFF;



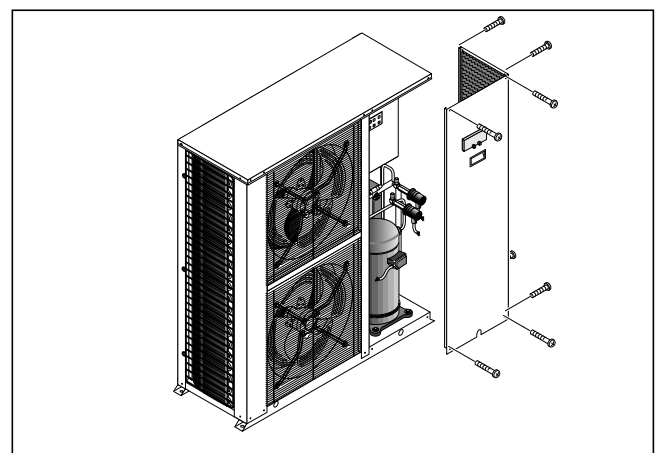
- place the compressor thermal solenoid switch QM1 in the ON position;



- close the electrical switchboard and tighten the closing screws;
- position the main unit switch QS in the ON position;



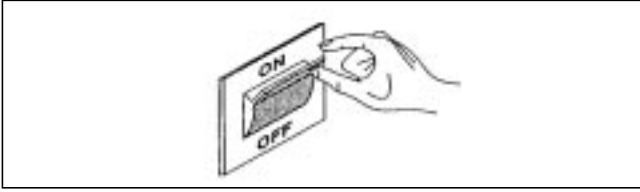
- replace the inspection panel;



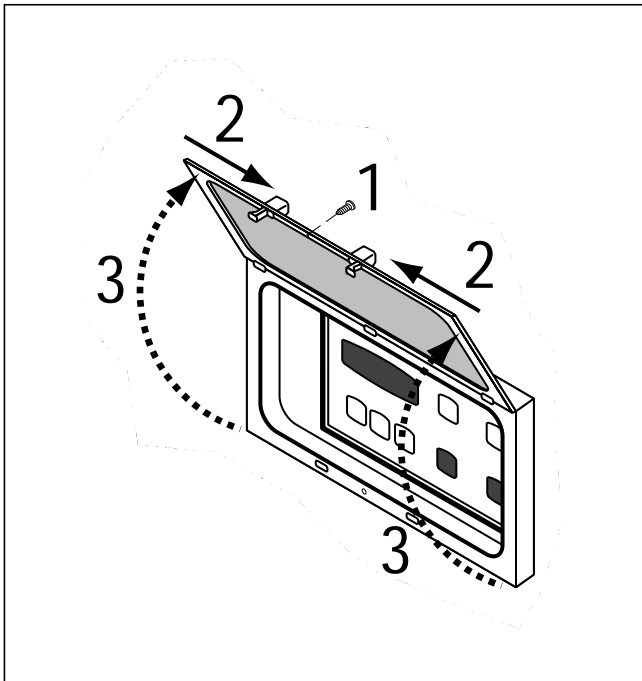
- position the general installation switch QF (outside the unit) in the ON position;
- the "POWER" LED on the CVM2 control panel lights up to indicate the presence of voltage.

ACTIVATING AND DEACTIVATING THE UNIT

- Place the remote switch SA (if present) in the ON position;



- Set the remote keyboard A5 (if present) to ON;
- To **ACTIVATE AND DEACTIVATE** the **COOLING** and **HEATING** functions, use the control panel CVM2 or the remote keyboard A5 (if present).

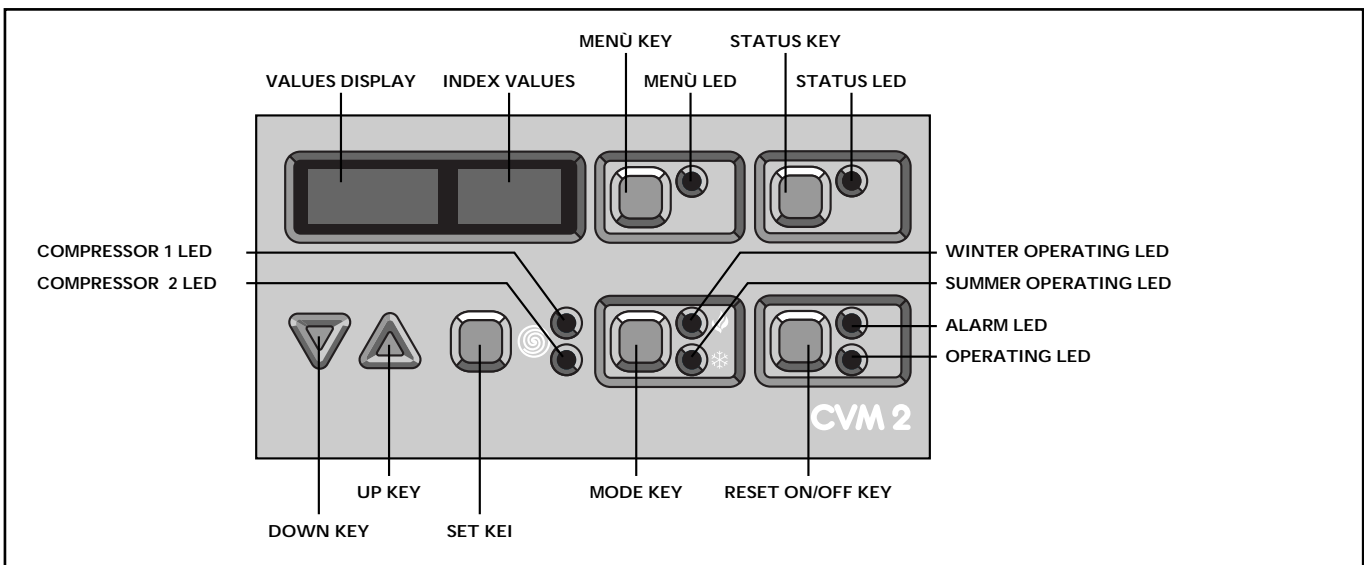


- ⚠ During this initial phase, if the following should appear, follow the instructions:

- E00 check connections to terminal 10 and 11;
- E41 check water flow and connection (12 - 13) of the flow switch or differential pressure switch.

To access the control panel, open the door:

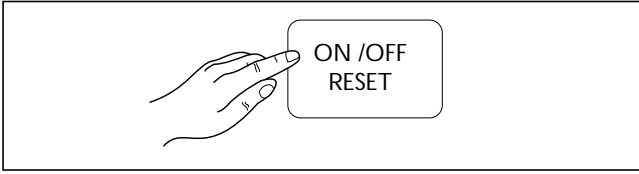
- remove the screw (1);
- press the points simultaneously (2) and lift the door.



HRAT UNIT

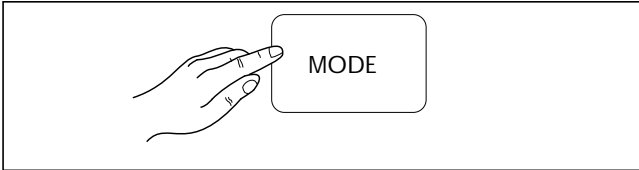
Activating:

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



On the "values display", the value of the installation water return temperature appears.

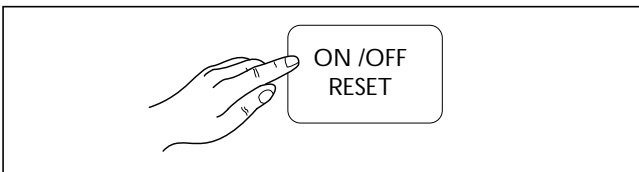
- Press the MODE button once.



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.

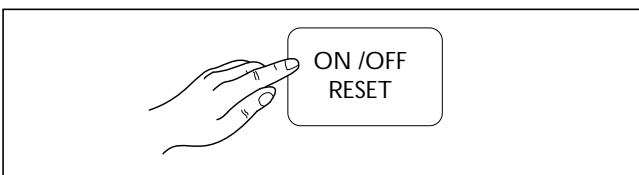


The "values display" goes off. The POWER LED remains on indicating the presence of voltage.

HRAN UNIT

Activating:

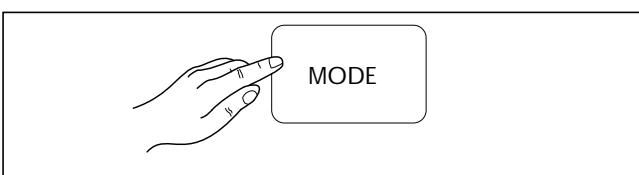
- Press the ON/OFF button on the keyboard in the figure.



On the "values display", the value of the installation water return temperature appears.

Heating:

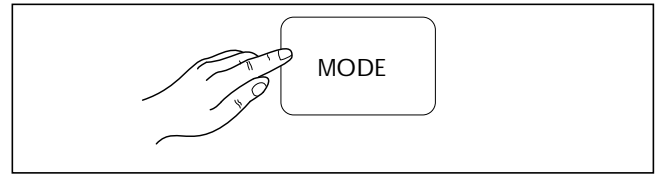
- Press the MODE button once.



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

Cooling:

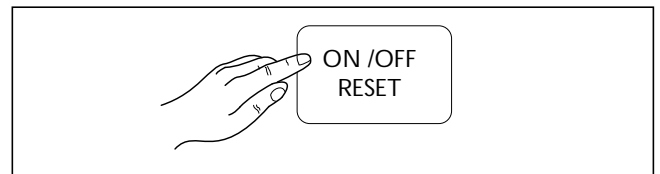
- Press the MODE button again.



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. The POWER LED remains on indicating the presence of voltage.

⚠ **At the beginning of each season**, check that the operating conditions fall within the limits given on page 20.

Check that the compressor absorption current is below the maximum given in the table of technical data.

In three phase models, **check** that the compressor is not abnormally noisy. If this is so, reverse one of the phases. Make sure the voltage falls within the limits specified and that the unbalance between the three phases (three phase power supply) is not more than 3%.

Heating and cooling are activated and deactivated via the control panel.

To activate and deactivate the unit, see pages 24 and 25.

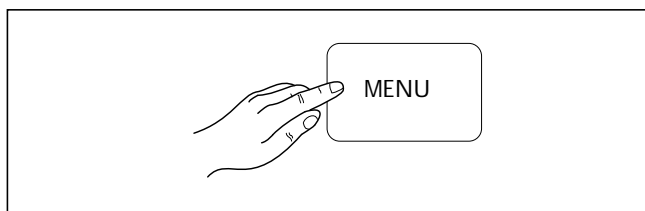
SETTING OPERATING PARAMETERS

SETTING THE SET POINTS

The factory set point settings are: 13.5°C in cooling and 43.5°C in heating.

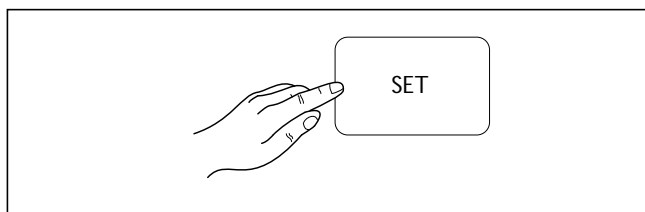
To modify the set points, proceed as follows:

- press the ON/OFF button on the keyboard in the figure (page 24);
- press the MENU button;



the following values will be displayed: 13.5 - 02;

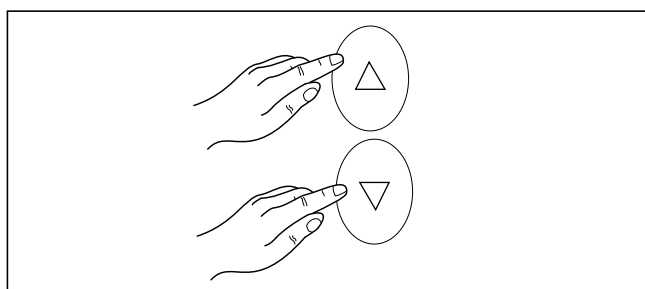
- press the SET button



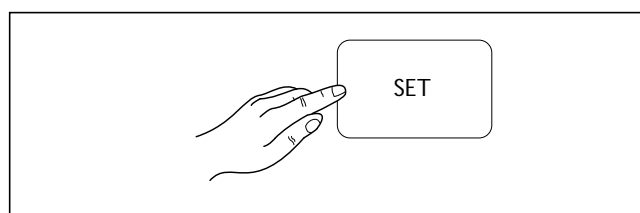
the value displayed will begin to flash (parameter 02);

To set the set point in heating:

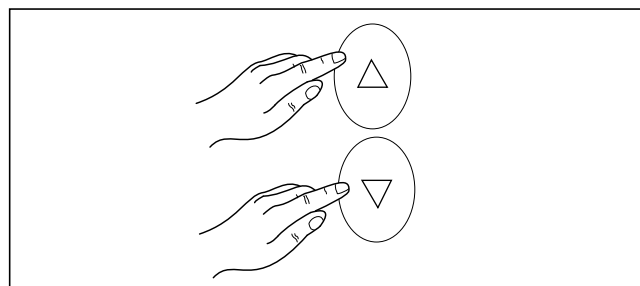
- press the UP/DOWN buttons



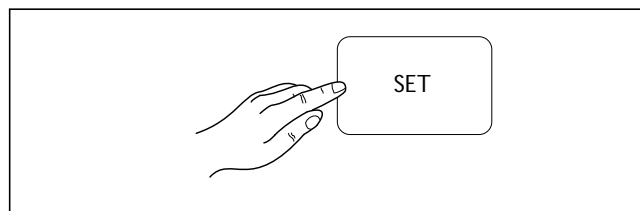
and select parameter 03, then press the SET button:



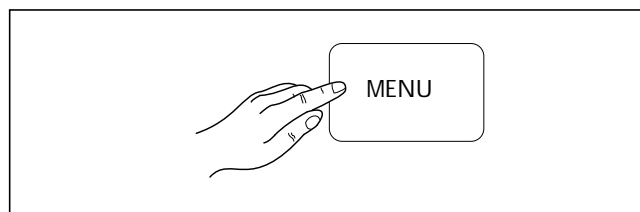
the value on the display will begin to flash. Set the new set point using the UP/DOWN buttons;



- press the SET button



and the MENU button.



Setting terminated.

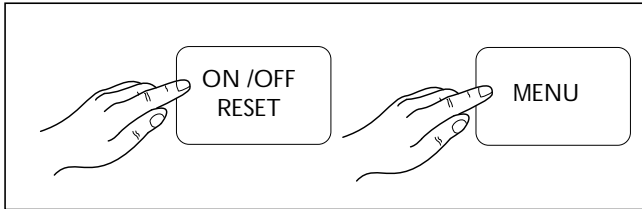
LIST OF ACCESSIBLE PARAMETERS

Parameter	Description	Unit of measurement	Factory set point
2	Summer set point	°C	13,5
3	Winter set point	°C	43,5
92	Password	unit	0

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

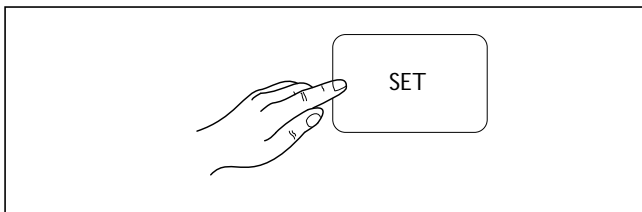
Proceed as follows:

- press the ON/OFF button;
- press the MENU button;



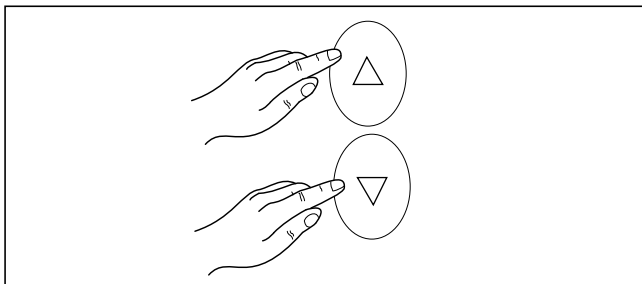
the following values will be displayed: 13.5 - O2;

- press the SET button:

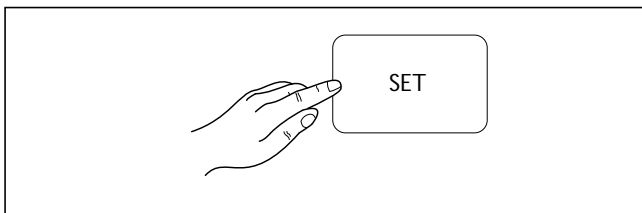


the value displayed will begin to flash (parameter O2);

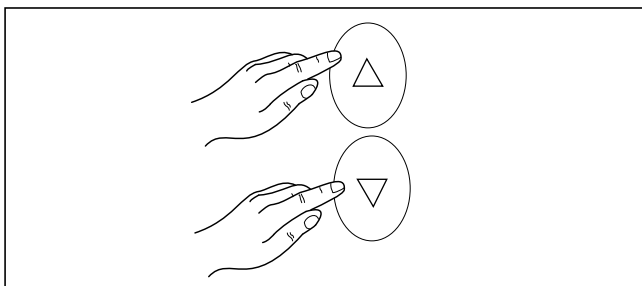
- press the UP/DOWN buttons



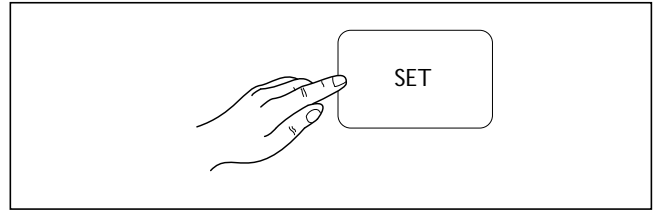
select parameter 92, press the SET button:



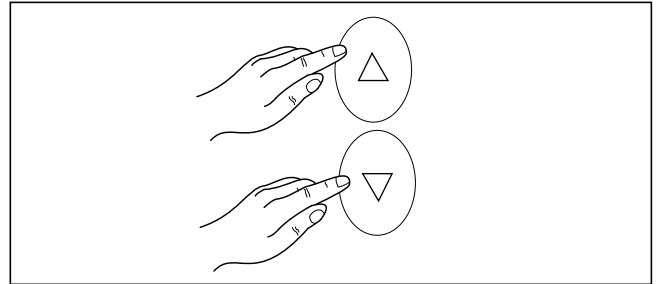
the value displayed will begin to flash. Set the password using the UP/DOWN buttons;



- press the SET button;

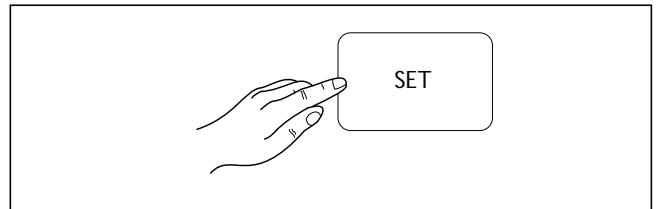


- press the UP/DOWN buttons

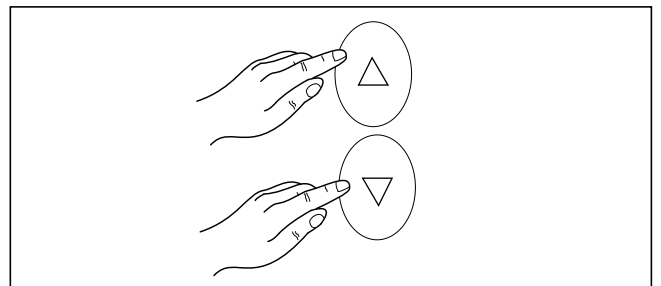


all parameters will now be displayed;

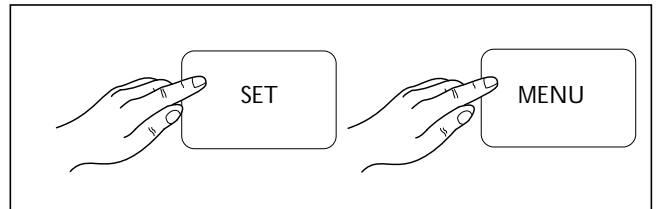
- to modify the setting of a parameter, press the SET button;



- use the UP/DOWN buttons



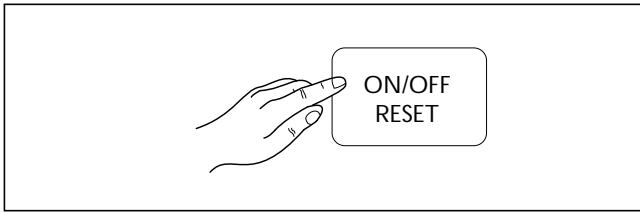
to set the new value, then press SET to move on to another parameter or the MENU button to exit.



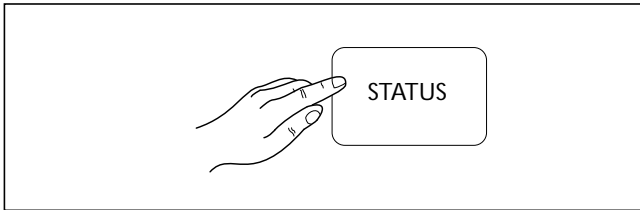
- ⚠ - to memorise the new value, press the SET button;
- when the two displays flash, the value set is incorrect and will not be memorised;
- to exit from the list of parameters, press the MENU button.

To display the operating status of the unit, proceed as follows:

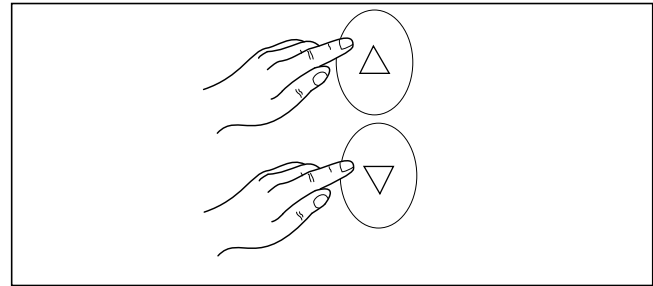
- press the ON/OFF button



- press the STATUS button



- with the UP/DOWN buttons



select the parameter corresponding to the unit operation to be displayed.

MEANING OF STATUS CODES			
Display index	Component	Values display	Meaning
01	Compressor	01	Operating in SUMMER mode
		02	Operating in WINTER mode
		03	Defrosting in progress
		04	Timed operation
		06	Inactive
02	Compressor	No. hours/100	Hours of operation from last reset M°x100=hours
03	Fans	01	Operating
		02	Off for defrosting
		06	Inactive
04	Defrosting	01	Active
		02	Compressor safety countdown
		03	Defrosting time countdown
		04	Defrosting delay active
		06	Inactive
05	Fan module output	%	Value, as a percentage of the input voltage applied to the fan.
40	BT1 temperature sensor Plate heat exchanger inlet	value	Value in tenths of a degree EER sensor in error
41	Remote On/Off	On or Off	Status of remote On/Off
42	BT2 temperature sensor	value	Value in tenths of a degree
			EER sensor in error
44	BP1 sensor value of condensing pressure	value	Value in BARs
			EER sensor in error
46	Pump	01	Active
			06
47	Pump	No.	Total number of pump operating hours M°x100=hours
48	Frost protection resistors	01	Resistors operating
			04

In the event of malfunction, the ALARM LED flashes and an alphanumeric code flashes on the control panel values display. Some alarms reset automatically, while others require manual reset (see list below).

AUTOMATIC RESET

After the cause of the alarm has been eliminated, the control panel returns automatically to normal operating mode.

MANUAL RESET

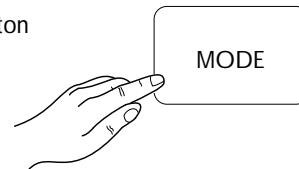
After the cause of the alarm has been eliminated, to reset:

- Press the ON/OFF RESET button twice



The unit is deactivated and reactivated

- Press the MODE button



and reselect the operating mode active when the malfunction occurred.

MALFUNCTION	CAUSE	REMEDY
E00 on values display	Remote switch in OFF position (automatic reset)	Position the remote switch to ON Reset the switch Reset the jumper between terminals 10 and 11
E01 on values display	High pressure safety pressure switch tripped (manual reset)	Check malfunction (see high discharge pressure page 33) Reset manually
E02 on values display	Low pressure safety pressure switch tripped (automatic reset)	Check malfunction
E03 on values display	Compressor thermal cut-out tripped (manual reset)	Check compressor motor Reset manually
E04 on values display	Fans thermal cut-out tripped (manual reset)	Check fan motor Reset manually
E05 on values display	Frost protection device activated (automatic reset)	Check water outlet temperature Check water flow Check set point temperature
E06 on values display	Faulty BT2 water outlet sensor (automatic reset)	Check electrical connections Replace component
E07 on values display	Faulty BP transducer (automatic reset)	Check electrical connection Replace components
E40 on values display	Faulty BT1 water return sensor (automatic reset)	Check electrical connections Replace component
E41 on values display	Differential pressure switch or flow switch tripped (automatic reset)	Check inadequate water flow Check presence of air in hydraulic circuit

Set point in cooling

factory set) = 13.5°C, hysteresis = ± 1.5°C.

The compressor starts up with water temperatures above 13.5°C+1.5°C (15°C).

The compressor shuts down with water temperatures of less than 13.5°C-1.5°C (12°C).

Set point in heating

factory set) = 43.5°C, hysteresis = ± 1.5°C.

The compressor starts up with water temperatures of less than 43.5°C-1.5°C (42.0°C).

The compressor shuts down with water temperatures above 43.5°C+1.5° (45.0°C).

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

COMPRESSOR START UP DELAY

There are two functions to prevent the compressor starting up too frequently:

- Minimum time since last shut-down 180 seconds;
- Minimum time since last start-up 240 seconds.

PUMP

The electronic board provides an output for management of the pump. This is activated when the pump assembly starts up and at least 60 seconds before the compressor starts up and is deactivated 60 seconds after the pump 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

To enable the unit to function correctly at different external temperatures, a microprocessor with transducer reading of pressure controls fan rotation speed. This allows the exchange of heat to be increased and/or decreased, maintaining condensation or evaporation pressures more or less constant.

The fan functions independently of the compressor.

DEFROSTING

In heating mode during extremely cold conditions or with high relative humidity, frost or ice may form on the external coil. To avoid the efficiency of the unit being affected, a function is activated to reverse the operating cycle and thus eliminate the ice from the coil.

This function has two phases:

- when the evaporation pressure drops below the value set in the factory, the microprocessor calculates a set time after which defrosting is activated.

if evaporation pressure exceeds the factory set value during that time, the microprocessor suspends the count-down;

- the cycle is reversed until the external coil condensing pressure has exceeded a given value or until the set time has transpired.

FROST PREVENTION ALARM

To prevent the water freezing and damaging the plate heat 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 hydraulic 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 an external water flow alarm, the flow switch.

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.

After deactivating the chiller:

- check that the remote switch SA (if present) is in the OFF position;
- check that the remote keyboard (if present) is set to "OFF";
- position QF and QS on OFF;
- deactivate the internal terminal units, placing the switch of each unit in the OFF position;
- close the water cocks.



If there is a possibility that the water temperature may drop below zero, there is a risk of freezing. The hydraulic circuit **MUST BE EMPTIED AND CLOSED** or antifreeze must be added in the proportion recommended by the manufacturer.

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;
- electrical absorption
- tightness of electrical and hydraulic connections;
- condition of the compressor solenoid switch;

- efficiency of the plate heat exchanger resistor;
- verification of operating pressure, over-heating and over-cooling;
- efficiency of compressor resistor;
- cleaning of finned coil (*)
- cleaning of fan grills;
- cleaning of condensate drain pan (if installed);

(*) in the case of HRAN "Heat Pump" units, three-monthly;

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

CHEMICAL WASHING

You are recommended to chemically wash the plate heat exchanger after every 3 years of operation.

REFRIGERANT GAS CONTENT

The chillers are filled with R22 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 topped up, operating in respect of Law no. 549 of December 28, 1993, on substances causing damage to the ozone layer and using special equipment to collect the refrigerant in order to protect the environment.

Proceed as follows:

- Empty and dry the entire refrigerant circuit using a vacuum pump connected to either the low or high pressure tap until the vacuum reads about 10 Pa. Wait a

couple of minutes and check that this value does not rise to more than 200 Pa.

- Connect the refrigerant gas cylinder or a filling cylinder to the low pressure line pressure tap.
- Fill with the quantity of refrigerant gas indicated on the rating plate of the unit;
- Always check the overheating and overcooling values. Under nominal operating conditions, these should be between 6 and 10°C and between 4 and 6°C respectively.
- After a couple of hours operation, check that the liquid indicator indicates circuit dry (dry-green).



Operating conditions other than nominal conditions may produce considerably different values.

Seal testing or identification of leaks must be carried out using R22 refrigerant gas or nitrogen only.



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

MALFUNCTION	CAUSE	REMEDY
The chiller does not start up	No electricity	- Check presence of voltage - Check safety systems upstream of unit
	General switch in OFF position Remote switch (if present) in OFF position Control panel set to OFF Main switch in OFF position Compressor thermal solenoid switch in OFF position	Turn ON
	Voltage too low	Check power line
	Solenoid switch coil faulty Electronic board faulty Start-up capacitor (if present) faulty Compressor faulty	Replace component
Insufficient output	Insufficient refrigerant Dimensioning of unit Operation outside recommended conditions	Check
Compressor noisy	Liquid returning to compressor Inadequate fixing	Check
	Reversed phase (three phase units only)	Reverse one phase
Noise and vibration	Contact between metal bodies	Check
	Weak foundations	Reset
	Loose screws	Tighten screws
Protection devices trip and shut down the compressor	Excessive outlet pressure Low intake pressure Low power supply voltage Electric connections too loose Operation outside permitted limits	Pressure switches faulty
	Replace component	Thermal cut-out trips
	Check power supply voltage	Check electrical insulation of windings

MALFUNCTION	CAUSE	REMEDY
High discharge pressure (greater than 23 bars) *	High external temperature High inlet water temperature	Check
	Insufficient air flow Insufficient water flow	Check fan operation Check pump operation
	Fan regulation malfunction	Check
	Air in hydraulic circuit	Vent
	Excessive refrigerant content	Check
Low discharge pressure (less than 12 bars)*	Low external air temperature Low inlet water temperature	Check
	Moisture in refrigerant circuit (liquid indicator - moisture yellow)	Empty and refill
	Fan regulation malfunction	Check
	Air in hydraulic circuit	Vent
	Insufficient gas content	Check
High intake pressure (greater than 10 bars)*	High external air temperature High water inlet temperature Thermostatic expansion valve faulty or excessively open	Check
Low intake pressure (less than 3.2 bars)*	Low water inlet temperature Low air inlet temperature Thermostatic expansion valve faulty or obstructed Clogged water filter Obstructed plate heat exchanger	Check

* Values indicative only

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

- DE' LONGHI spa switchboard: +39-04224131

- INTERNET SITE: www.delonghi.com

