USER'S MANUAL

IMMERGAS

Instruction and recommendation booklet **IE**

AUDAX TOP

18 - 21 ErP

1.040572ENG

Dear Customer,

Our compliments for having chosen a top-quality Immergas product, able to assure well-being and safety for a long period of time. As an Immergas Customer, you can also count on a qualified after-sales service, prepared and updated to guarantee constant efficiency of your heat pump. Read the following pages carefully: you will be able to draw useful suggestions regarding the correct use of the appliance. By respecting these suggestions, you will no doubt be satisfied with your Immergas product.

For any assistance and scheduled maintenance please contact Immergas Authorised Centres: they have original spare parts and are specifically trained by the manufacturer.

General recommendations

All Immergas products are protected with suitable transport packaging.

The material must be stored in a dry place protected from the weather.

The instruction book is an integral and essential part of the product and must also be given to the new user in the case of transfer or succession of ownership.

It must be stored with care and consulted carefully, as all of the warnings provide important safety indications for installation, use and maintenance stages.

This instruction manual provides technical information for installing the Immergas pack. As for the other issues related to pack installation (e.g. safety in the work site, environment protection, injury prevention), it is necessary to comply with the provisions specified in the regulations in force and principles of good practice.

In compliance with the legislation in force, the systems must be designed by qualified professionals, within the dimensional limits established by the Law. Installation and maintenance must be performed in compliance with the regulations in force, according to the manufacturer's instructions and by professionally qualified staff, intended as staff with specific technical skills in the system sector, as envisioned by the Law.

Improper installation or assembly of the appliance and/or Immergas components, accessories, kit and devices can cause unexpected problems to people, animals and objects. Read the instructions provided with the product carefully to ensure proper installation.

Maintenance must be carried out by authorised technical personnel. The Immergas Authorised After-sales Service represents a guarantee of qualifications and professionalism.

The appliance must only be destined for the use for which it has been expressly declared. Any other use will be considered improper and therefore potentially dangerous.

If errors occur during installation, operation and maintenance, due to non-compliance with technical laws in force, standards or instructions contained in this book (or however supplied by the manufacturer), the manufacturer is excluded from any contractual and extra-contractual liability for any damages and the appliance warranty is invalidated.

For further details on the product CE marking, request a copy of the Declaration of Conformity from the manufacturer, specifying the appliance model and the language of the country.

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1 INTRODUCTION

1.1 INTRODUCTION.

Before proceeding to initial startup of the Audax Top 18-21 ErP units, the personnel in charge must be familiar with these instructions and technical installation data.

The Audax Top 18-21 ErP have been designed to ensure a very high safety level, such to make installation, start-up, operation and maintenance easier and safer. If used within their fields of application, they ensure a safe and reliable service.

The machines are designed for an operational life of 15 years, assuming a 75% utilisation factor; which approximately corresponds to 100.000 hours of operation.

The procedures in this manual are organised in the same order convenient to install, start, manage or service these heat pumps.

Make sure you fully understand and implement all the safety procedures and precautions contained in the instructions provided with the machine, as well as those listed in this manual, which: personal protective equipment, such as gloves, goggles, safety shoes, suitable tools, appropriate skills and qualifications (electricity, air conditioning, local legislation).

The conformity of these products with the European Directives (safety of machinery, low voltage, electromagnetic compatibility, under pressure equipment, etc.) can be ascertained by consulting their declaration of conformity.

1.2 SAFETY.

1.2.1. Considerations about the safety of installation.

The unit must be carefully inspected once it reaches the site and before it is put into operation. In particular, make sure that the cooling circuits are intact and that no component is deformed or damaged, for example due to a bump. If in doubt, perform a leak test. If upon arrival the unit is found to be damaged, it is essential to immediately submit a written complaint to the carrier.

This appliance may be used by children of 8 years or over, and by adults with impaired physical, sensory or mental abilities, or those inexperienced or ignorant on the subject if they are properly supervised or if they have been given instructions about the safe use of the appliance, and made aware of the associated risks.

Children must be constantly supervised to ensure they do not play with the appliance.

Do not remove the pallet or packaging before the unit reaches the final installation position. These devices can be moved by means of forklift truck, provided that the forks are inserted only in the positions indicated on the appliance itself.

It is also possible to lift the units by means of specific slings (see Par. 2.2).

Therefore, to perform lifting they must be harnessed with strong ropes and always strictly follow the lifting instructions stated in the certified drawings for the appliance.

Safety is only guaranteed provided that such instructions are strictly followed. Otherwise, there would be a risk of ruining the material and injuring the personnel in charge of carrying out such operations.

NEVER COVER THE SAFETY DEVICES.

The above applies to any fuse caps and safety valves present in the cooling and heat transfer fluid circuits. Also ensure the presence of caps on the safety valves outputs. These caps are made of plastic and must not be reused. If still present, remove them. It is essential to install devices on the outputs of the safety valves or on the free ends of the drainage lines possibly connected to them, that inhibit the penetration of foreign bodies (dust, debris, etc.) and/or of rainwater that may cause the formation of rust or ice caps. Just like the drainage lines, these devices must not prevent operation or cause head losses in excess of 10% of the controlled pressure.

Classification and control

In accordance with Pressure Equipment Directive and EU regulations on monitoring and use at national level, the protective devices of these machines are classified as in table 1-1:

Do not remove the valves and fuses, not even for those plants where the risk of fire is under strict control. This is due to the fact that there would be no guarantee that these accessories would be reassembled in case of change in the system features or transport of the gas load appliance.

Should the unit be subject to fire, the safety devices prevent breakage due to the overpressure releasing the coolant. Therefore, the fluid can be decomposed in toxic residues when subjected to flame, and therefore:

- **Keep away from the unit.**
- **Set warnings and recommendations for personnel to stop a fire.**
- **The fire extinguishers suitable for the system and type of coolant must be easily accessible.**

All factory-installed pressure relief valves are sealed to prevent any alteration in their calibration.

The drain valves must be periodically checked. See Par. 1.2.4. "Considerations about the safety of repair interventions".

Provide a drain ditch in the drain circuit, in the vicinity of each drain valve, to avoid an accumulation of condensate or rainwater.

The coolant must be handled carefully following all legislation requirements locally applicable.

The accumulation of coolant inside an enclosed space could decrease the oxygen and cause suffocation or explosions.

The inhalation of high concentrations of vapour is harmful and may cause heart failure, loss of consciousness or death. Being heavier than air, the steam reduces the amount of oxygen available for breathing. These products cause eye and skin irritation. Decomposition products can be hazardous.

Intervention		Name of technician responsible for commissioning	National regulations applicable	Verification body
Date	Type of intervention (1)			

(1) Maintenance, repairs, regular checks (EN 378), leaks, etc.

1-1

1.2.2 Under pressure components and equipment.

These products include under pressure components or equipment made by the manufacturers. Please refer to the combination of competent category at national level or the owner of the under pressure components or equipment (declaration, re-qualification, re-examination, etc.). The features of this equipment/these components are shown on the identification plate or documentation provided with the products. These units comply with the European Under Pressure Equipment Directive.

The units should be kept and used in environment where the temperature is not below the minimum allowable temperature indicated on the plate.

Both during the test and during the operation, you must avoid introducing significant static or dynamic pressures in cooling circuits or in hydraulic circuits in which the heat exchange takes place.

N.B.: monitoring during operation, re-qualification, re-examination, exemption from re-examination:

- **Follow the local regulations on the monitoring of under pressure equipment.**
- **The user or operator are usually required to create and keep a monitoring and maintenance log.**
- **In the absence or integration of regulations, follow the guidelines of EN 378 and ISO 5149.**
- **Follow the local professional recommendations, if any.**
- **Regularly monitor the surface of components for any signs of corrosion. To do this, check a non-insulated part of the machine or a joint of the insulation.**
- **Regularly check the possible presence of impurities (e.g. silicone particles) in the fluids for heat exchange. These impurities can cause wear and/or pitting corrosion.**
- **Filter the fluid for heat exchange.**
- **The reports of periodical checks by the user or operator must be attached to the monitoring and maintenance log.**

Repair:
any repair or change of a pressure component is prohibited.
It is only permitted to replace the component with an original by the manufacturer. In this case, the replacement must be carried out by a qualified technician. The made component replacement must be indicated on the monitoring and maintenance log.

Recycling:
the pressure equipment may be recycled in whole or in part. After use, it may contain coolant vapours and oil residues. Some components are painted.

1.2.3 Considerations about the safety of maintenance interventions.

With regard to the log, the Manufacturer recommends adhering to the following formulation (the table at the bottom of the page should not be considered as reference and does not imply any responsibility for the Manufacturer).
The professional technicians working on electrical components or coolants, must be appropriately authorised, trained and qualified for this purpose.
All operations on the cooling circuits must only be performed by trained personnel and fully qualified to work on this type of machine. The training of such personnel must have been specifically focused on the knowledge of these units and resolution of their installation problems. All welding must be carried out by skilled technicians.
The units use R-410A high pressure coolant (the operating pressure of the unit is above 40 bar; the pressure with a 35°C air temperature is 50% higher than R-22). This is why, whenever you intervene on the cooling circuit, it is essential to use special equipment (pressure gauges, connection hoses, etc.).

Do not clean the unit with hot water or steam. This can cause an increase in coolant pressure.
Only qualified and authorised technicians can intervene (opening or closing) on the shut-off valves, in full compliance with the applicable regulations (e.g. during drainage). Stop the unit before performing these actions.
The qualified technician intervening on the unit for handling, maintenance and assistance operations must be provided with appropriate gloves, goggles, footwear and protective clothing designed to ensure the necessary safety.
Never work on a unit that is still energised.
Never work on the unit electrical components unless you have previously interrupted the power supply circuit.
Before performing any maintenance on the unit, lock the power supply circuit in open position.
Should maintenance be interrupted, always make sure before resuming it, that all circuit are still de-energised.

N.B.: the unit maintenance and cleaning cannot be performed by children and adults with impaired physical, sensory or mental abilities, or those inexperienced or ignorant on the subject.

	Safety accessory*	Accessory to limit damages in case of external fire**
Coolant side		
High pressure switch	X	
Safety valve outside***		X
Rupture disc		X
Fuse cap		X
Heat transfer fluid side		
External discharge valve	****	****

* Classified for protection under normal operating conditions.
** Classified for protection under abnormal operating conditions.
*** The 10% instantaneous overpressure of the operating pressure does not apply to this abnormal operating condition. The control pressure can be higher than the operating pressure, and in these cases the limit thermostat for design pressure and the high pressure switch guarantee that in normal operating conditions the design pressure cannot be exceeded.
**** The classification of these discharge valves is the exclusive competence of the personnel in charge of completing the entire hydronic part of the installation.

Attention: the power supply circuit remains energised even after stopping the unit, unless the unit or main disconnecting switch of the customer circuit has remained open. For further details, refer to the wiring diagram. Affix the safety labels correctly. When working on the unit fans, specifically if the grids must be removed, isolate the power supply of fans to prevent their operation.

Attention: the condensers on the circuit of variators (VFD) assembled on the units have a 5 minute discharge time from the moment the power supply is disconnected.

After disconnecting the power supply from the control panel, wait 5 minutes before accessing it.

Before any intervention, check that there is no voltage in any accessible conductor of the electric circuit.

It is also necessary to take caution when coming into contact with high-temperature surfaces inside the unit, which may arise once the intervention on the unit itself (coolant and electronic components) is over.

We recommend installing an indicator of any coolant leaks from the valve. The presence of oil at the outlet orifice is indicative of a coolant leak from the appliance. Keep the outlet orifice clean at all times, to ensure that any coolant leaks are evident. Normally, the calibration of a valve that leaked coolant is minor compared to the original calibration of the same valve. The new calibration may affect the operating range of the valve. To prevent unnecessary interventions or coolant leaks, replace it or calibrate the valve again.

Operational checks:

- **Important information on the coolant used:**

This product contains fluorinated greenhouse gases governed by the Kyoto protocol.

Type of coolant: R-410A

Global warming potential (GWP) : 2088

According to some European or local regulations, it may be necessary to perform periodic inspections aimed at detecting any coolant leaks. For further information, contact your local dealer.

Attention:

1) **Any work on the cooling circuit of this product must be carried out in accordance with current legislation. In the European Union, the regulation is called F-Gas, No. 517/2014.**
2) **During installation, maintenance or disposal of the machine, check that the coolant is never released in the atmosphere.**
3) **It is forbidden to deliberately release gases in the atmosphere.**
4) **If the coolant leaks, make sure the leak is stopped and repaired as quickly as possible.**
5) **Only qualified and certified personnel is authorised to perform installation, maintenance, cooling circuit leak tests, as well as dispose of the equipment and recover the coolant.**
6) **The customer is responsible for the recovery of gas for recycling, reclamation or destruction.**
7) **Periodic leak tests must be carried out by the customer or by third parties. The EU Regulation sets the frequency shown in the table at the bottom of the page:**
8) **You must keep a record for the equipment subjected to periodic leak tests. It must contain the amount and type of fluid in the system (added and recovered), the amount of fluid recycled, reclaimed or destroyed, the date and result of the leak test, the operator designation and company of pertinence, etc.**
9) **If you have any questions, please contact your local dealer or installer.**

Checks to be performed on the protective devices:

- **Where there are no national regulations, check that the protective devices in use on the installation site comply with the EN 378 / ISO 5149 requirements: once a year for high pressure switches, every five years for external discharge valves.**

The company or body testing the pressure switches, has an obligation to define and implement a detailed procedure on the following:

- Safety measures.
- Calibration of the measuring equipment.
- Validation of the protective tools.
- Test protocols.
- Appliance re-start.

Please contact the After-sales Service for this type of test. In these instructions, the Manufacturer simply refers to the principle of a test that does not require the removal of the pressure switch:

- Check and record the setpoint of pressure switches and overpressure devices (valves and any rupture discs).
- Promptly deactivate the main power supply disconnecting switch (on the unit or system), if the pressure switch does not activate (overpressure should be avoided).
- Connect a calibrated pressure gauge (with Schrader ½ UNF female joint - fine thread).
- Test the AP Pressure Switch, as indicated by the function in the remote panel shown on the next page:

System WITHOUT leak detection		No control	12 Months	6 Months	3 Months
System WITH leak detection		No control	24 Months	12 Months	6 Months
Charge/cooling circuit (CO_2 equivalent)		< 5 Tons	5 ≤ Charge < 50 Tons	50 ≤ Charge < 500 Tons	Charge > 500 Tons*
Charge/Cooling Circuit (kg)	R134A (GWP 1430)	Charge < 3.5 kg	3.5 ≤ Charge < 34.9 kg	34.9 ≤ Charge < 349.7 kg	Charge > 349.7 kg
	R407C (GWP 1774)	Charge < 2.8 kg	2.8 ≤ Charge < 28.2 kg	28.2 ≤ Charge < 281.9 kg	Charge > 281.9 kg
	R410A (GWP 2088)	Charge < 2.4 kg	2.4 ≤ Charge < 23.9 kg	23.9 ≤ Charge < 239.5 kg	Charge > 239.5 kg
	HFO: R1234ze	No requirement			
* From 01/01/2017, all units must be equipped with a leak detection system					

Menù Service ->Test switch Max pres		
Menu item	Description	Range
Test Pressure switch	Test method for high pressure switch. N.B. to run the test, set the value to 1 and wait for the test result	0 = Off 1 = Test required N.B. the following states are managed by the machine DO NOT USE 2 = AP Test in progress 3 = AP Test performed correctly 4 = AP Test failed for maximum time reached 5 = AP Test failed for flow switch error 6 = AP Test failed for low water temperature 7 = AP Test failed for inverter error

N.B.: the Test mode has been implemented for the execution of tests. When the Test mode is active, the water temperature set point is ignored by the control system.
When the Test mode is active, the pump operation is forced.

Attention: if the test shows the need to replace the pressure switch, you must recover the coolant charge, this type of pressure switch is not installed on automatic valves (Schrader type).
Visually inspect the protection tools (valves, pressure switches), at least once a year.
If the chiller works in a place where the atmosphere is corrosive, the protective device must be inspected more frequently.
Periodically search for leaks, immediately eliminating all those eventually found.
Periodically ascertain that the vibration level is contained within the standard limits, meaning that it is close to that emitted at the time of first chiller start-up.
Before opening a cooling circuit, make sure to transfer the coolant in the cylinders specifically designed for this purpose and consult the pressure gauges.
Following the failure of equipment, replace the coolant observing the procedure described in NF E29-795 or have the coolant analysed by a specialised laboratory.
If the cooling circuit remains open after an intervention (i.e. the replacement of a component, etc.):
- **seal the openings if duration is less than one day;**
- **if longer than 1 days, charge the circuit with nitrogen without oxygen (principle of inertia).**

The purpose is to prevent the penetration of atmospheric humidity and resulting corrosion.

1.2.4. Considerations about the safety of repair interventions.

The maintenance of all installation components must be performed by authorised personnel, in order to prevent the risk of deterioration and injuries. Promptly eliminate any defects and leaks. The authorised technician is obliged to promptly repair the fault detected. After repairing the individual units, make sure that the protection devices work properly and fill out a verification report of the parameters.
Observe the rules and recommendations prescribed for the unit, as well as the safety standards of the HVAC systems, such as: EN 378, ISO 5149, etc.
If the power supply cable is damaged, it must be replaced by the manufacturer, its assistance service or personnel with similar requirements, in order to avoid the arising of a potentially dangerous situation.

RISK OF EXPLOSION.
When purging and pressurising the cooling circuit required for leak detection, do not use either air or gas containing oxygen. Mixtures of pressurised air or gases containing oxygen can cause explosions. The oxygen triggers a violent reaction if it comes into contact with oils and lubricants.
Therefore, for leak detection, it is essential to use only nitrogen, possibly supplemented with suitable gas tracer.
Failure to comply with these recommendations could imply serious consequences, even fatal, for people, as well as serious damage to the system.
Never exceed the maximum operating pressures specified. Check the minimum and maximum test pressures allowed, comparing them with that indicated on this manual and with the pressures indicated on the unit plate.
Do not unsolder or cut with cutting torch the coolant pipes or any cooling circuit components before all the coolant (liquid and vapour) and oil have been made to flow through the heat pump. The steam traces must be expelled from the circuit by blowing dry nitrogen. If in contact with an open flame, the coolant generates toxic gases.
For this reason it is necessary to have the required protection means and have a flame extinguishing system at hand which is suitable to the appliance features and type of coolant used in it.
The coolant must never be decanted for siphoning.
Prevent the liquid coolant from coming into contact with the skin or sprayed in the eyes.
Wear protective gloves and goggles. If the coolant falls on the skin, was it off with abundant water and soap. If the coolant is sprayed in the eyes, immediately rinse them with running water and then immediately consult a doctor.

The accidental release of coolant, caused by minor leaks or significant leaks following the rupture of a pipe or sudden leak from a discharge valve, can cause frostbite and burns to exposed personnel. Do not ignore such injuries. Installers, owners and skilled technicians of the assistance service of these units must:
- **Contact a doctor before treating these injuries.**
- **Have access to a first aid kit, especially to treat eye injury.**

We recommend observing the provisions of EN 378-3 Appendix 3 and ISO5149.
Never use open flames or live steam on the cooling circuit. Otherwise, dangerous pressure may develop inside them.

During the recovery and storage of the coolant, it is essential to observe all rules and regulations locally in force. The rules that allow the recovering and reconditioning of halogenated hydrocarbons under optimum quality conditions for the products and of maximum safety for things, persons and the environment, are described in the NF E29-795 Standard. Do not make changes to the unit aimed at adding devices usable for charging, removal and purging of the coolant or lubricant. All these devices are provided with the unit.

Refer to the certified dimensions drawings of the units.

Never reuse the disposable cylinders (i.e. non-returnable ones), nor attempt to fill them once empty: When the cylinders are empty, it is necessary to bleed the residual gas pressure. Subsequently, they will have to be transported at the premises used for their recovery. Do not destroy the cylinders through incineration.

Do not attempt to disassemble fittings, components, etc., when the appliance inside is under pressure or while the appliance itself is running. Before removing one or more components or opening a circuit, make sure that the pressure inside the unit is 0 kPa and that the unit has been stopped and de-energised.

Never attempt to overhaul or repair a safety valve if it appears corroded or shows accumulation of foreign substances, such as rust, dirt, scale, etc., on the body or mechanisms. Replace the device, where necessary. Do not install safety valves in sequence or back pressure.

Attention: no unit component can be used as walkway, shelf or support. Periodically check all components and pipes, repairing or replacing them as soon as the slightest sign of damage is found.

Do not step on the coolant pipes. Otherwise they could break causing the coolant to leak with serious danger to the physical integrity of persons.

Do not climb on the appliances. Always use a platform or scaffold.

Use suitable devices (crane, hoists, winches, etc.) to lift or move heavy components. If the hand-lifting of a lightweight component can also compromise the operator's balance, it is best to perform such lifting using a mechanical device.

To replace or repair the components, use only original spare parts having the part number specified in the list of recommended spare parts.

Do not purge the hydraulic circuits containing industrial brine, without having first informed the technical assistance department at the installation site or a competent body.

Before intervening on the components installed inside the circuit (net filter, pump, water flow switch, etc.), it is necessary to close the shut-off valves at the water inlet and outlet, and purge the hydronic unit circuit.

Periodically inspect all valves, connections and pipes of the hydraulic circuit and of the cooling circuit to ensure there is no trace of corrosion or leaks.

We recommend wearing protective ear muffs when performing work near the appliance and it is working.

Before loading the unit, make sure to have chosen the correct coolant.

Loading coolants different to the original charge type (R-410A) will compromise the machine operation and might even cause irreparable damage to the compressors. The compressors work with R-410A and are loaded with asymptotic polyester oil.

Before any intervention on the cooling circuit, the coolant charge must be recovered in full.

1.3 PRELIMINARY CHECKS.

Check the received appliances:

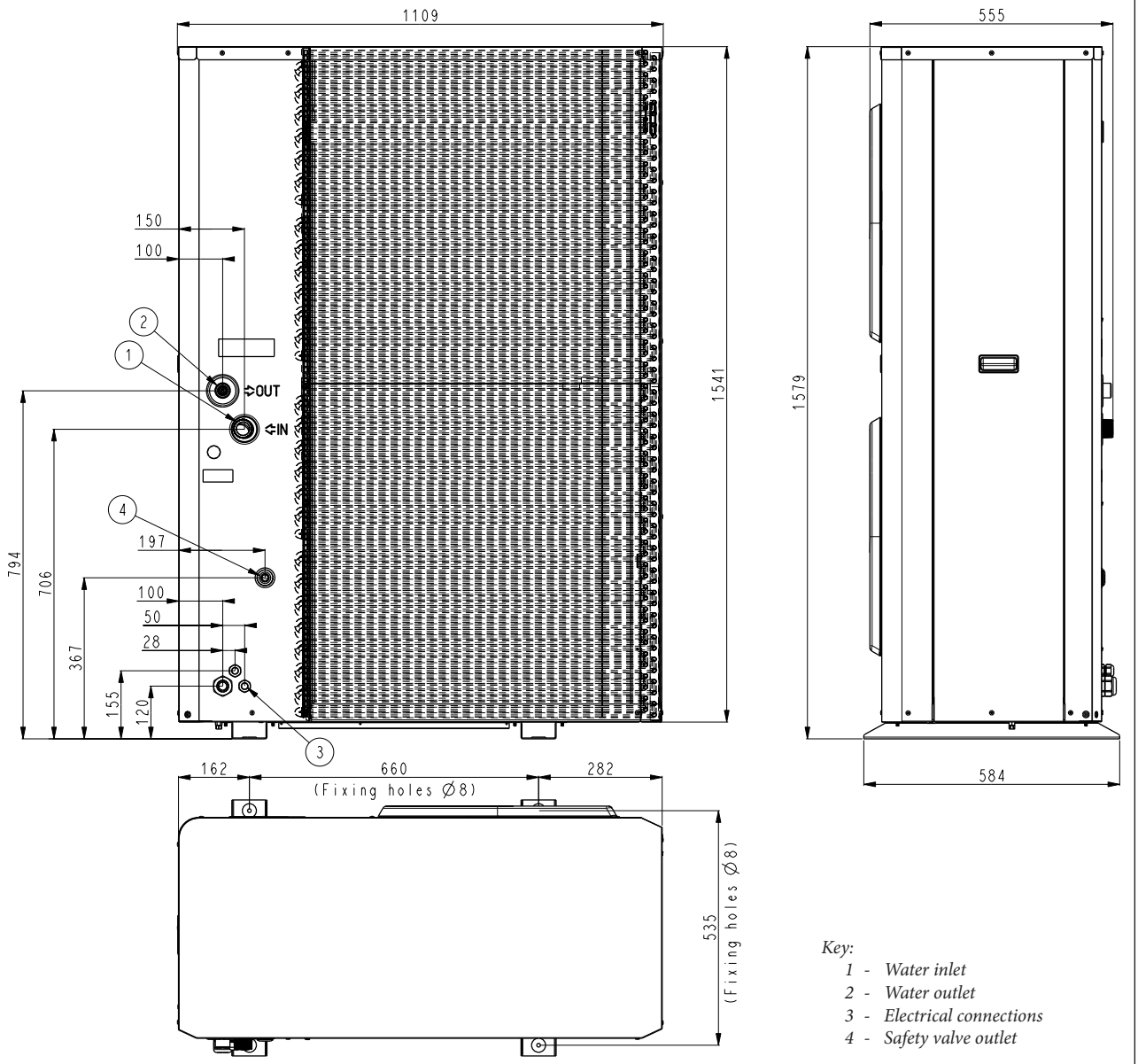
- Inspect the unit in order to detect any damage or ensure that there are no missing parts. If a damage is found, or in case of incomplete supply, promptly file a complaint with the shipping company.
- Check that the unit received matches that ordered. Check that the data on the unit identification plate match the order and the delivery note.
- The identification plate is fixed on two different points of the unit:
  - outside one of the two sides of the unit
  - inside.
- The unit identification plate must bear the following information:
  - Model number - dimensions.
  - CE Marking.
  - Serial number:
  - Year of manufacture, static test and seal test dates.
  - Fluid carried.
  - Coolant used.
  - Coolant charge for each circuit.
  - PS: Min./max. pressure allowed (low pressure side and high pressure side).
  - TS: Min./max. temperature allowed (low pressure side and high pressure side).
  - Switch-off pressure.
  - Unit leak test pressure.
  - Voltage, frequency, number of phases.
  - Maximum current absorbed.
  - Maximum inlet power supply.
  - Unit net weight.
- Make sure that all options ordered for on-site installation have been delivered and are not damaged.

The unit must be subjected to periodic checks, if necessary removing the thermal and acoustic insulation along its entire life cycle in order to check that no impact caused by tools or other may have damaged it. Any damaged part must be immediately repaired or replaced, as appropriate. See also Chap. 5. "Maintenance".

1.4 DIMENSIONS, SERVICE SPACES.

1.4.1 Dimensions and location of hydronic connections.

1-2

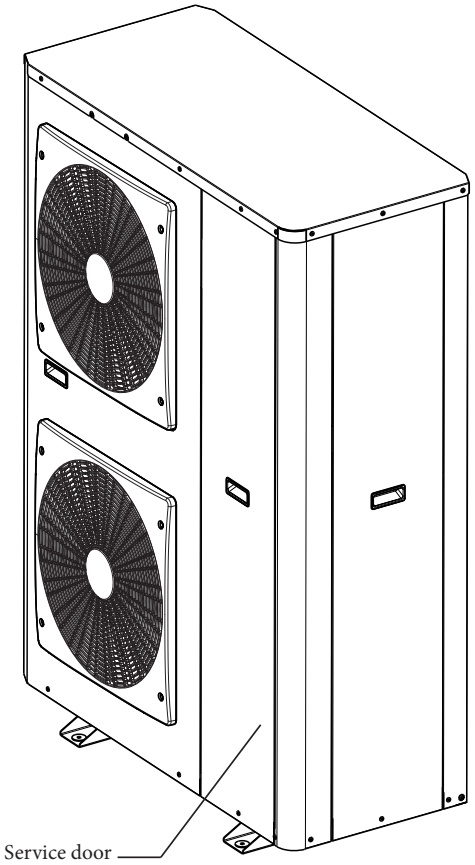


Key:

1 - Water inlet
2 - Water outlet
3 - Electrical connections
4 - Safety valve outlet

1.4.2 Service door.

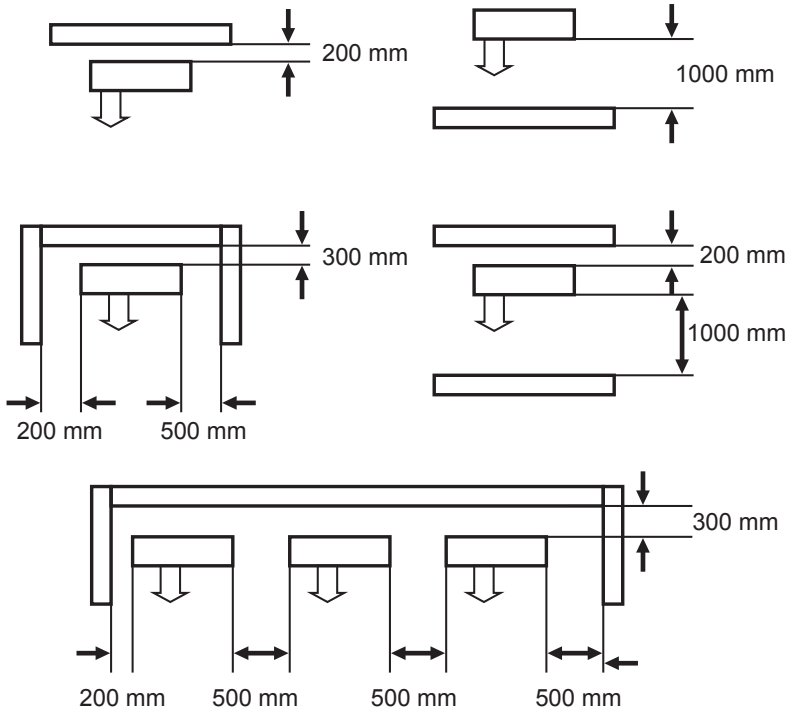
1-3



1.4.3 Service space aimed at ensuring a correct air flow.

Fig. 1-4 reproduces the minimum distances from the wall, in order to ensure proper air flow on the air heat exchanger*.

1-4



* Before positioning the unit (access to various components / panel opening / component replacement...), you must program the different maintenance interventions to be performed

1.5 TECHNICAL AND ELECTRICAL DATA OF THE AUDAX TOP 18-21 ERP UNITS.

1.5.1 Technical data of the Audax Top 18-21 ErP units.

Audax Top		**18**	**21**
Sound power level			
Standard unit			
Sound power level**	dB(A)	71	74
Sound pressure level at 10 m*++	dB(A)	40	43
Dimensions - Standard unit			
Equivalent length	mm	1109	1109
Width	mm	584	584
Height	mm	1579	1579
Operating weight*			
Standard unit	kg	190.9	199.4
Compressors	Rotary compressor	1	1
Refrigerant	**R410A**		
Load *	kg	8	8
Potentiality check			
Minimum potentiality *****	%	33%	41%
Air heat exchanger	Grooved copper pipes, aluminium fins		
Fans - Standard unit	Helical fan		
Quantity		2	2
Total maximum air flow	l/s	2000	2400
Maximum rotation speed	RPS	14	16
Water heat exchanger	Plate Brazed Heat Exchanger		
Water content	l	1.52	1.9
Maximum operating pressure water side without hydronic module	kPa	1000	1000
Hydronic module (options)	**Pump, discharge valve, blade flow switch, expansion vessel**		
Pump	Centrifuge pump (at fixed or variable speed)		
Expansion vessel volume	l	8	8
Water side maximum operating pressure ****	kPa	300	300
Hydraulic connections			
Inlet diameter (BSP GAS) ******	inch	1-1/4	1-1/4
Output diameter (BSP GAS)	inch	1	1
Frame paint	Colour code:	Pantone 400C	Pantone 400C

* The values are a mere guideline. Refer to the unit plate.

** In dB rif=10^{-12} W, (A) weighted. Declared dualnumber (or "twin-track") sound emission values in compliance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). Measured in compliance with ISO 9614-1 and certified by Eurovent.

*** In dB ref 20 µPa, (A) weighted. Declared dualnumber (or "twin-track") sound emission values in compliance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). For information, it must be said that they are calculated based on sound power level Lw(A).

**** The minimum operating pressure water side is of 40kPa.

***** Eurovent Cooling Condition

****** Hydraulic connection reduction from 1 - 1/4 to 1 inch standard supplied

1.5.2 Electrical data of the Audax Top 18-21 ErP units.

Audax Top 18-21 ErP (all options)		**18**	**21**
Power supply circuit			
Rated power supply voltage	V-ph-Hz	400-3+N-50	400-3+N-50
Voltage variation field	V	360-440	360-440
Control circuit power supply		24Vac through internal transformer	
Nominal current absorbed by the unit (Un) *	A	12.5	14.3
Maximum power absorbed by the unit (Un) **	kW	10.8	12.4
Cos Phi unit to maximum power **		0.93	0.93
Maximum current absorbed by the unit (Un-10%)***	A	18.5	21.2
Maximum current absorbed by the unit (Un)****	A	16.7	19.1
Maximum start-up current, standard unit †	A	Not applicable (below operating current)	

* Conditions equivalent to Eurovent standardised conditions (inlet/outlet evaporator water temperature = 12 °C/7 °C, external temperature = 35 °C).

** Power absorbed by compressors and fans at the limit operating conditions (i.e. with saturated intake temperature equal to 15°C and saturated condensing temperature equal to 68,3°C) with rated power supply voltage of 400 V (data on the unit identification plate).

*** Maximum operating current of unit at maximum unit power input and at 360 V.

**** Maximum operating current of unit at maximum unit power input and at 400 V (values shown on the unit plate).

† Maximum instantaneous start-up current at operating limits (maximum operating current of smaller comperessor(s) + fan current + stationary rotor current of larger compressor(s)).

2 INSTALLING THE UNIT.

2.1 GENERALITIES.

Proceed as follows to install the unit Audax Top 18-21 ErP:

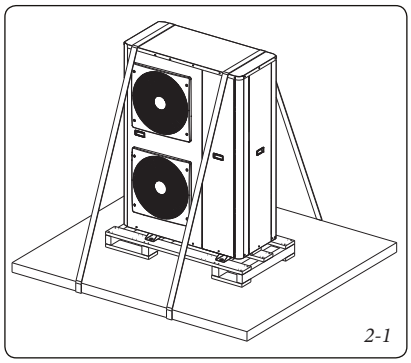
- Positioning the unit
- Hydraulic connections / System filling with water
- Electrical connections
- Detection of any water leaks / Water flow rate control
- Commissioning

2.2 APPLIANCE HANDLING AND POSITIONING.

2.2.1 Movement.

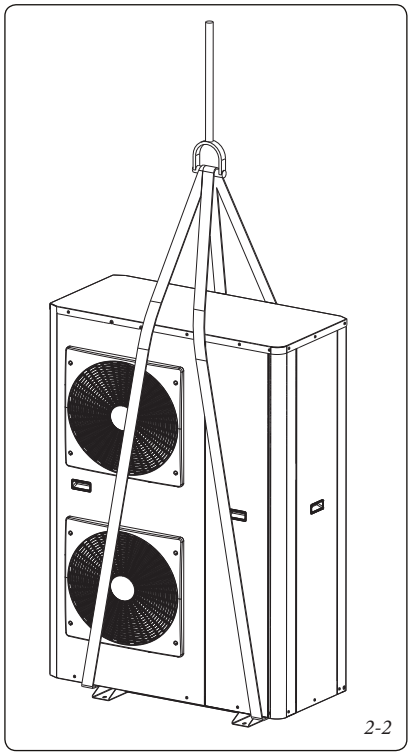
See Par. 1.2.1 Considerations about the system safety.

Transport configuration



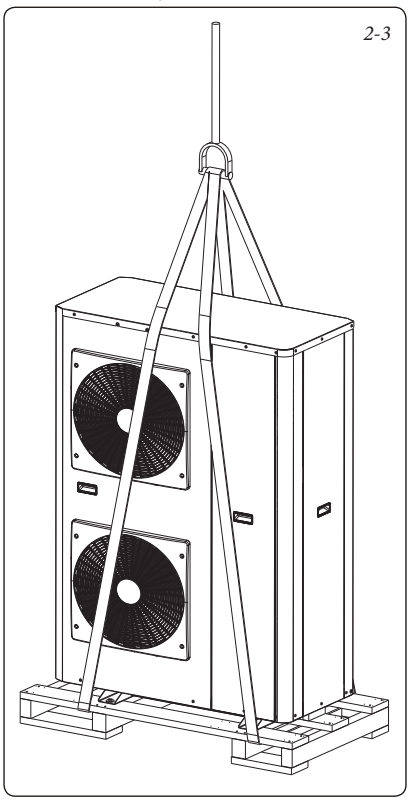
2-1

Unloading configuration



2-2

Installation configuration



2-3

2.2.2 Positioning.

If the appliance is particularly developed in height, the installation environment should be equipped with everything that can allow access and maintenance of each appliance component.

Always refer to Par. 1.4. "Dimensions and service spaces" to verify the availability of spaces required for all connections and maintenance operations. As for the centre of gravity coordinates, the position of the assembly holes and the distribution of weights, refer to the certified drawings supplied with the unit.

Resistant to earthquakes is not required for the typical applications of these units. The earthquake resistance was not verified.

Attention: only use suitable slinks in the lifting points indicated (see Fig. 2-2 to unload the unit and Fig. 2-3 to place the unit in the final position).

Before positioning the unit, check that:

- The structure on which it must be placed is able to withstand the load imposed by the appliance; otherwise the structure must be adequately strengthened.
- Should it be necessary to operate the unit as a heat pump with temperatures below 0°C, arrange for it to be raised at least 300 mm from the ground. This is necessary to prevent the accumulation of ice on the unit and to correct the unit operation at the points where the snow level may reach such a height.
- The unit is installed horizontally on an even surface (the maximum tolerance is of 5 mm along both axes).
- There is free space above the unit necessary for air circulation and access to components (refer to the dimensional drawings).
- The number of support is adequate and that they are in the correct positions.
- The seat is not subject to flooding.
- If the unit is installed outdoors in geographical areas where heavy snow falls may occur, the necessary precautions have been implemented to prevent the accumulated snow from reaching the base of the unit. Deflectors may be necessary to protect the unit from strong winds. These deflectors must be studied so as to avoid obstructing the normal air circulation.

Attention: before lifting the unit, check that all covering panels are securely fastened in position. Lift and lower the unit with the utmost care. Inclinations and shaking can damage the appliance, making its operation problematic.

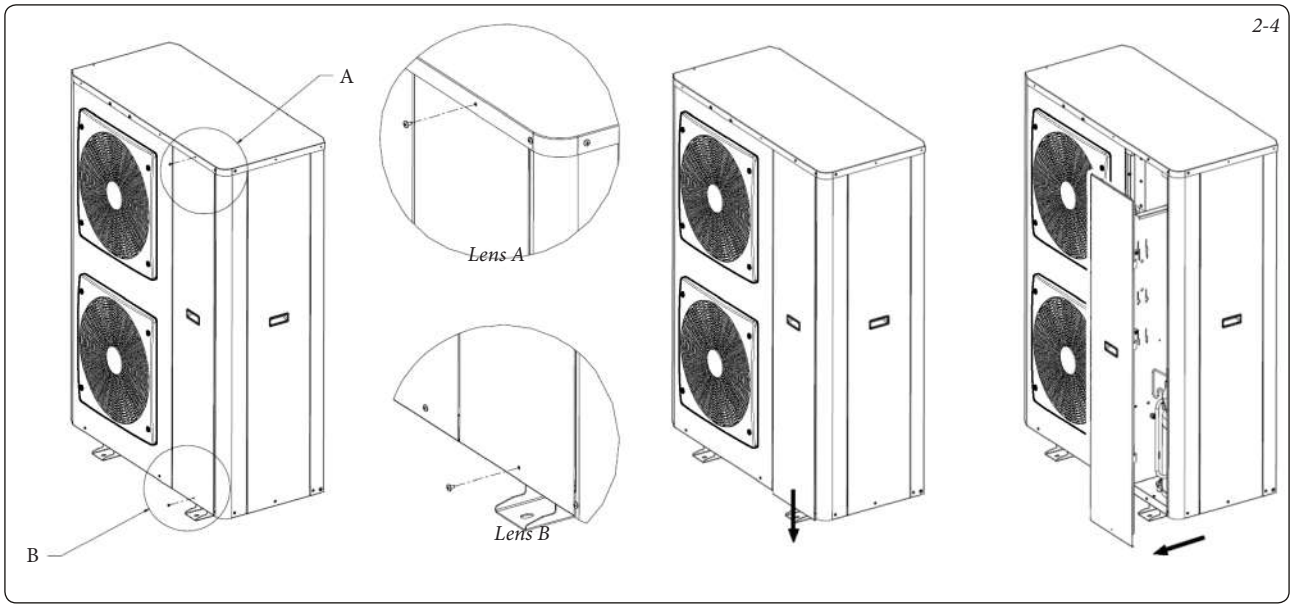
If the Audax Top 18-21 ErP units are lifted by belts or ropes, we recommend protecting the air coils to prevent them from crushing during the handling of one or more units. To lift you must insert spacers or beams between the ropes so that they cannot damage the appliance. The latter must never be subjected to inclinations greater than 15°.

Attention: do not, under any circumstance, apply stresses to the unit closing panels. Only the unit frame base is designed to withstand such stresses. The hydronic module and pump piping must be installed so as not to be subjected to stresses. The hydronic module piping must be installed so as not to weigh down on the pump.

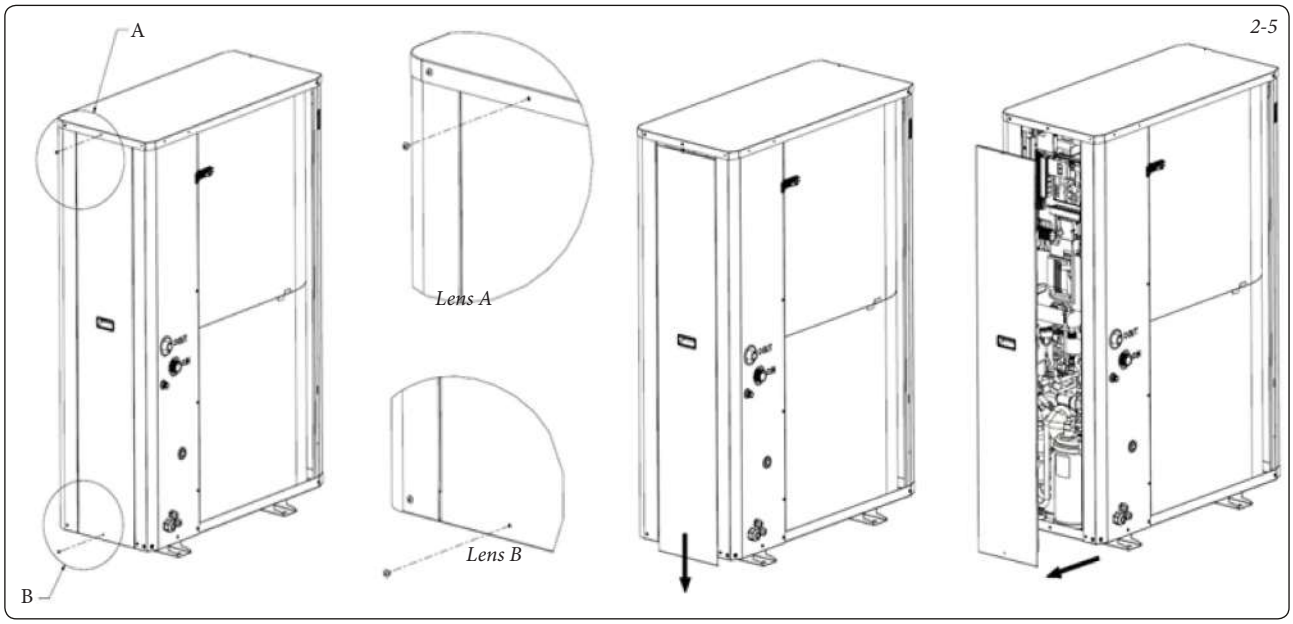
2.2.3 Removal of the unit panel.

You can remove the panel to access the unit (components containing coolant / electrical components). This must be done by a qualified technician.

How to remove the front panel



How to remove the right panel



2.2.4 Checks to be performed before starting the system.

Before starting the system, check that it, including the chiller unit, has been installed following the instructions on the installation diagrams, dimensional drawings, diagrams related to the piping and instrumentation of the system as well as on the wiring diagrams.
To perform these checks, you must strictly follow the regulations in force on the national territory. If the national regulations do not contain the relevant details, refer to EN 378 / ISO5149 as follows:
External visual checks to be performed:

- Make sure that the machine is charged with coolant. Check on the unit plate that the "carried fluid" is R-410A and not nitrogen.
- Compare the complete system with the cooling system and power supply circuit diagrams.
- Make sure that all components comply with the design specifications.
- Make sure that all documents and protection devices provided by the manufacturer (dimensional diagrams, piping and instrumentation diagrams (P&ID), declarations, etc.) are present, in order to comply with the applicable regulations and standards.
- Make sure that all devices and systems for the safety and protection of the environment provided by the manufacturer are effectively installed in compliance with current regulations.
- Check that all documents relating to pressure vessels, certificates, papers to be kept and manuals provided by the manufacturer comply with current regulations.
- Ensure the actual presence of all free spaces required for service, maintenance and safety.
- Monitor compliance with all directives relating to the prevention of the intentional removal of refrigerant gases.
- Verify the installation of connections.
- Check the supports and fixing elements (materials, routing and connection).
- Check the quality of welds and of other joints.
- Check the protection against mechanical damages.
- Check the protection against heat.
- Check the protection of moving parts.
- Verify accessibility for maintenance or repair and check the piping.
- Check the state of the valves.
- Check the quality of the thermal insulation and steam barriers.

2.3 HYDRAULIC CONNECTIONS.

For the dimensions and locations of the water inlet/outlet hydraulic connections, refer to the dimensional drawings provided with the unit. The pipes must not transmit vibrations nor radial or axial stress to the heat exchanger.
It will be necessary to analyse the supplied water and provide appropriate filtration, treatment and control devices, integrating the closing valves, purge valves and circuits designed to avoid the risk of corrosion (e.g.: damage to the pipe surface protection if the fluid is polluted), fouling and deterioration of the pump fittings.
Before start-up, verify that the heat exchanger fluid is compatible with the materials and coating of the hydraulic circuit.
When using additives or fluids other than those recommended by the manufacturer, make sure that the fluids are not considered as gaseous substances, and that they are class 2, as defined in Directive 97/23/CE.

Recommendations on heat exchange fluids:

- The water used must not contain ammonia ions NH^{4+} as they are very damaging for copper. The absence of such ions is the key factor for the duration of the copper pipes. Over time, even a few tenths of mg/l of this ion can cause severe corrosion phenomena on the copper parts.
- Even chlorine ions Cl^- have harmful effects on copper, since they involve the risk of perforation caused by pitting corrosion. Possibly keep them below 10 mg/l.
- Sulphate ions SO_4^{2-} can cause pitting corrosion if their content is above 30 mg/l.
- Absence of fluoride ions (<0.1 mg/l).
- If the dissolved oxygen content in the water is not negligible, there must be no iron ions Fe^{2+} and Fe^{3+}. The maximum content of dissolved iron must be < 5 mg/l with a dissolved oxygen content < 5 mg/l.
- Dissolved silicon: silicon is an acid element of the water that can also cause risk of corrosion. Content < 1mg/l.
- Water hardness: > 0.5 mmol/l. We recommend keeping the values between 1 and 2.5 mmol/l. This facilitates the formation of a scale deposit that can limit copper corrosion. With the passing of time, too high values of water hardness may cause the pipes to clog. It is desirable for the complete alkalimetric title (CAT) to be less than 100.
- Dissolved oxygen: Avoid any sudden change in water oxygenation conditions. The water de-oxygenation obtained by mixing with an inert gas, is equally dangerous for its hyper-oxygenation obtained by introducing pure oxygen. The disturbance of the oxygenation conditions favours the destabilisation of the copper hydroxides and the increase in size of the particles present.
- Electrical conductivity: 0,001-0,06 S/m (10-600 µS/cm).
- pH: Ideal case neutral pH at 20-25°C (7 < pH < 8).

Attention: the charge, addition or drainage of fluid from the hydraulic circuit must be performed by qualified personnel, through the use of vents and materials suitable to the products. The hydraulic circuit charging devices are customised.
The charge and removal of the heat exchange fluids must be carried out through the use of devices preliminarily assembled on the hydraulic circuit by the installer. Never use the unit heat exchangers to add fluid for the heat exchange.

Attention: it is forbidden to use the unit in an open circuit.

2.3.1 Recommendations and precautions on use.

The hydraulic circuits must be designed so as to have the lowest number of bends possible and avoiding siphoning of the pipes as much as possible. The following are the main precautions to be taken to make the connections: Observe the input and output indications affixed on the hydraulic connections of the unit.

- Respect the water inlet/outlet connections indicated on the unit.
- Install manual or automatic vent valves on all high points of the circuit.
- Use a pressure reducer to maintain a stable pressure inside the circuit(s) and install a discharge valve and an expansion vessel if the one present inside the machine is not enough.
- Install thermometers on the water inlet and outlet pipes.
- Install discharge connections at all low points to allow purging the circuit.
- Install stop valves near the water inlet and outlet pipes.
- Use flexible fittings to reduce the transmission of vibrations.
- After verifying that there are no leaks, insulate all pipes to both reduce heat losses and prevent condensation.
- Wrap the insulation in a demisting screen.
- If the water pipes are located in an area where there is a probability that the ambient temperature falls below 0°C, they must be protected from frost (anti-freeze solution or electrical resistance heaters).
- The use of various metals on hydraulic pipes could generate electrolytic couples and, consequently, corrosion. Therefore, check for the need to install sacrificial anodes.

Do not introduce high static or dynamic pressure in the heat exchange circuit (limited to operating design pressures).

The products which can be integrated for the thermal insulation of vessels during connection of the water pipes, must be chemically neutral with respect to the material and coatings for which they are used. This principle also applies to the products originally supplied by the manufacturer.

2.3.2 Generalities.

For further details on the diameters of fittings, see Par. 1.5.1 "Technical data of the Audax Top 18-21 ErP units" (see Fig. 2-6).

2.3.3 Minimum hydraulic circuit volume.

The minimum hydraulic circuit volume, expressed in litres, is obtained by applying the following formula:

Volume (l) = CAP (kW) x N

Where CAP is the rated cooling capacity under nominal operating conditions.

Application	N
Air conditioning	3.5
Application for central heating or DHW	6
Industrial cooling process	See following note

N.B.: For applications involving an industrial cooling process which requires the achievement of a high degree of stability of the water temperature levels, it will be necessary to increase the above defined values. For these special applications, we recommend contacting the manufacturer.

This volume is used to obtain stable and precise temperatures. To achieve it, it may be necessary to integrate the circuit with a storage tank. The tank must be fitted with deflectors which allow mixing the fluid (water or brine).

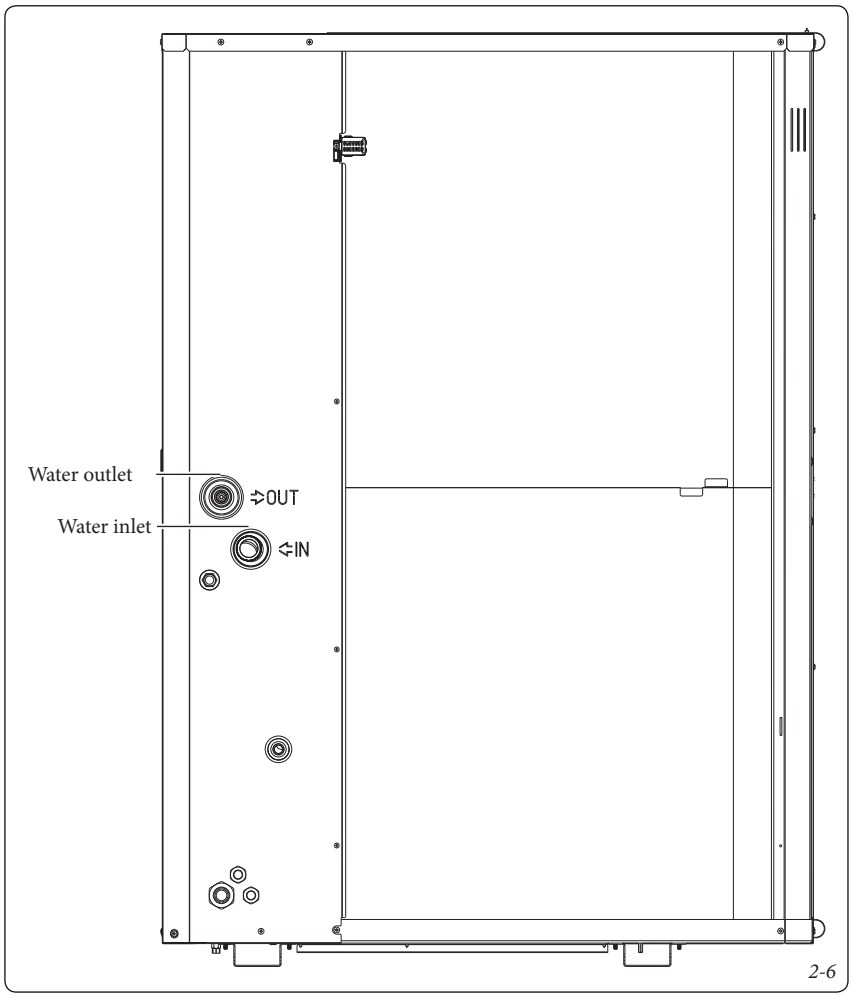
2.3.4 Maximum hydraulic circuit volume.

The following table indicates the maximum circuit volume for pure water or ethylene glycol in various concentrations.

If the total volume is higher than the above values, the installer must integrate another expansion tank suitable for the additional volume.

Maximum water volume (L)		
Audax Top 18-21 ErP		
Static pressure (bar)	**1.5**	**3**
Fresh water	200	50
Ethylene glycol 10%	150	28
Ethylene glycol 20%	110	28
Ethylene glycol 30%	90	23
Ethylene glycol 40%	76	19

Hydraulic connection of the unit

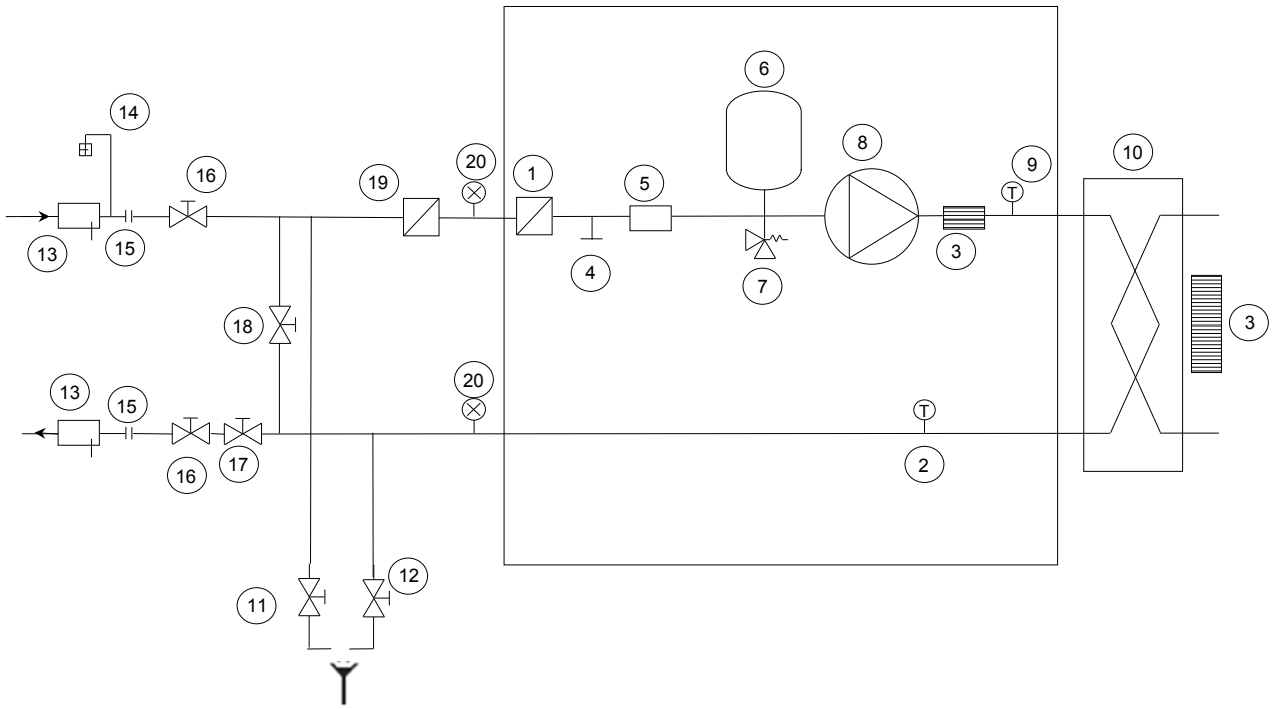


2-6

2.3.5 Hydronic circuit.

Typical hydronic circuit diagram 18-21 kW

2-7



Key:

HYDRONIC COMPONENTS

- *1 - Mesh filter*
- *2 - Temperature sensor*
- *3 - Anti-freeze electric heater*
- *4 - Water drain valve*
- *5 - Blade flow switch*
- *6 - Expansion vessel*
- *7 - Safety valve*
- *8 - Pump*
- *9 - Temperature sensor*
- *10 - Plate Brazed Heat Exchanger*

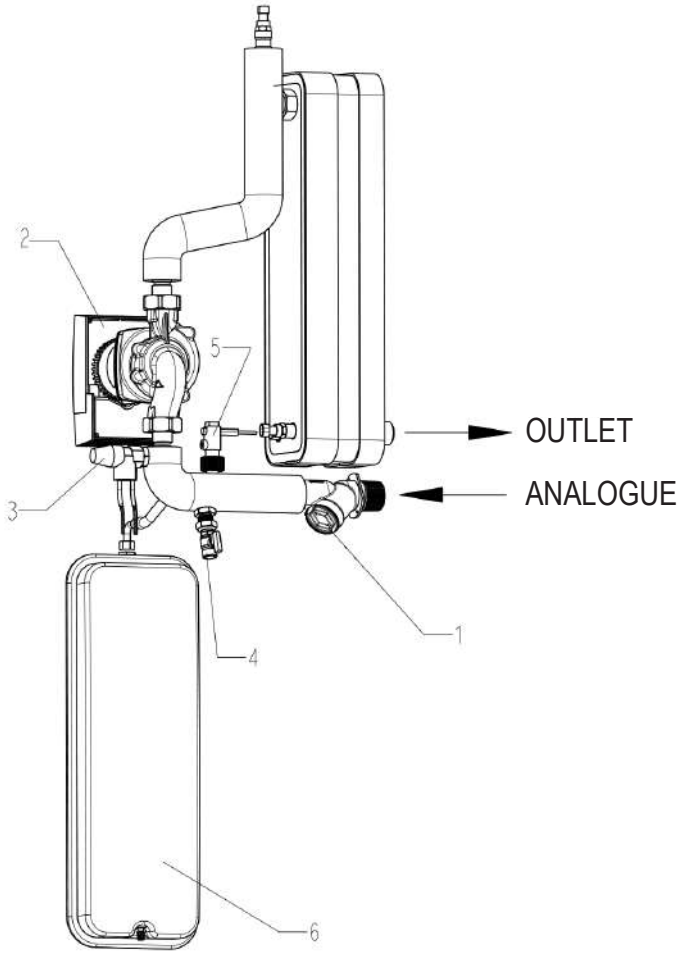
SYSTEM COMPONENTS

- *11 - System water drain valve*
- *12 - Coolant – water exchanger water drain valve*
- *13 - Temperature sensor sample point*
- *14 - Air purge*
- *15 - Connection hoses*
- *16 - ON/OFF valve*
- *17 - Water flow control valve (supplied by the manufacturer, to be installed on-site)*
- *18 - Junction valve for anti-freeze protection (when, during the winter season, the ON/OFF valve is closed)*
- *19 - Mesh filter*
- *20 - Manometer*

Note: The unit must be protected against frost

Hydronic module fitted with simple pump at low pressure variable speed with expansion tank and water filling system

2-8



Key:

1 - Mesh filter
2 - Pump
3 - Safety valve
4 - Water drain valve
5 - Blade flow switch
6 - Expansion vessel

Minimum and maximum pressures required inside the hydraulic circuit for the proper operation of the unit.

Minimum pressure in the pump intake duct to avoid cavitation (40 kPa).	**Maximum pressure in the pump intake duct before the opening of the water discharge valve (300 kPa).**

2.4 ELECTRICAL CONNECTIONS.

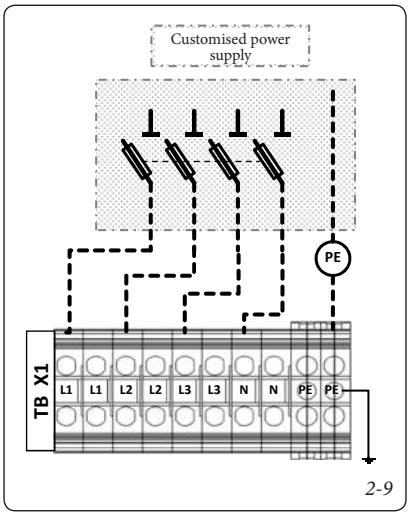
Refer to the wiring diagrams inside this manual.

2.4.1 Power supply.

The power supply must comply with the heat pump plate specifications. The power supply voltage must be within the range specified in the electrical features table. For the connections, refer to the wiring diagrams and dimensional drawings.

Attention: After commissioning the unit, the power supply can only be deactivated for quick maintenance interventions (maximum one day). For longer maintenance interventions or when the unit is decommissioned and placed in storage (e.g. during the winter season or in case the unit must not generate cooling), the power supply must not be deactivated so as to ensure the supply of energy necessary to the electric heaters (heater of compressor air coils, anti-freeze protection unit).

Connection to standard power supply



2.4.2 Recommended cable sections.

The installer is responsible for sizing the cables according to the features and regulations applicable to each installation site. The following is merely indicative and does not make the Manufacturer liable in any way. Once the cables are sized, the installer, using the dimensional drawings, must be sure to have identified a simple connection mode and defined any change that might be necessary on-site.

The terminal board for power supply cables has been designed for the number and type of cables listed in the following table.

The calculations are based on the maximum machine current (see plate and electrical data tables) and on the standard methods of installation applied in accordance with IEC 60364, table 52C:

- No. 17: suspended overhead lines,
- No. 61: buried duct with derating coefficient 20.

The calculation is based on PVC or XLPE insulated cables with copper core. A maximum ambient temperature of 46°C was considered. The indicated length of cables limits the voltage drop to < 5% (length L expressed in metres - see table below).

Important: before connecting the main power supply cables (L1 - L2 - L3 – N - PE) on the terminal board, it is mandatory to check the exact order of the 3 phases. Then connect these cables and the neutral filter, making sure to place it properly (an incorrect connection of the neutral conductor cable may irreversibly damage the unit).

MINIMUM AND MAXIMUM SECTION OF CONNECTION CABLES (FOR EACH PHASE) TO THE AUDAX TOP 18-21 ERP UNITS

	Max. connectable section*	**Calculation of favourable case:**			**Calculation of unfavourable case:**		
		- Suspended overhead lines (standardised routing No.17) - XLPE insulated cable			**- Conductor cables in ducts or multi-conductors in closed ducts (standardised routing No.41) - PVC insulated cable, if possible**		
Audax Top 18-21 ErP	**Section**	**Section****	**Maximum length for voltage drop <5%**	**Type of cable**	**Section****	**Maximum length for voltage drop <5%**	**Cable mode****
	mm² (per phase)	**mm² (per phase)**	**m**	-	**mm² (per phase)**	**m**	-
18	5G6²	5G4²	100	H07RNF	5G4²	80	H07RNF
21	5G6²	5G4²	100	H07RNF	5G4²	80	H07RNF

PLEASE NOTE:

* Connection capacities actually available for each machine, defined in compliance with the connection terminal size, size of access to the control panel and space available inside the control panel.

** Result of the selection simulated considering the indicated hypothesis.

*** If the maximum section calculated is for XLPE cable mode, this means that a basic selection on a PVC mode cable can exceed the actually available connection capacity. Pay special attention to the selection.

Insertion of the power supply cables

The power supply cables must be inserted in cable glands from the back of the unit.

Attention: use the black ferrite supplied as accessory, placing it as a king of cable clamp around the power supply cable. Position it as a kind of cable clamp immediately after the customer's terminal board.

2.4.3 Recommended customer electrical protection.

The installer is responsible for the electrical protection according to the features and regulations applicable to each installation site. The following is merely indicative and does not make the Manufacturer liable in any way.

Audax Top		**18**	**21**
Manifold:			
Type		C	C
Current	A	25	25
Fuses:			
Type		gG	gG
Current	A	25	25

Notes on the electrical data and operating conditions:

- The Audax Top 18-21 ErP units have a single connection power to the power supply, located upstream of the customised power supply connections.
- The control panel includes the below listed standard components:
  - control and protection devices of the pump motor,
  - compressor and fans frequency inverter,
  - control devices.
- **Customised connections:**

  all connections to the system and the electrical system must fully comply with the local regulations in force.
- The Audax Top 18-21 ErP units have been designed and built according to EN 60335-1 and 2 *.

PLEASE NOTE:

- The operating environment of the Audax Top 18-21 ErP units is described below:

1) Physical environment**. The classification of the environments is specified in EN 60364:
   - outdoor installation: IP44 protection **
   - operating temperature range: from -20°C to +46°C
   - storage temperature range: from -20°C to +48°C
   - altitude: ≤ 2000 m (see note for table 1.5.4 - Electrical data, hydronic module)
   - presence of hard solids, class AE3 (no significant presence of dust)
   - presence of corrosive and polluting substances, class AF1 (negligible)
2) Variation of power supply frequency: ± 2 Hz.
3) The neutral conductor cable (N) must always be connected to the unit
4) The overcurrent protections of the power supply conductors are not provided with the unit.
5) The units have been designed to allow easy connection to the TN networks (IEC 60364).

Attention: if particular aspects of the actual installation do not comply with the above conditions, or there are other conditions that require attention, contact the Authorised Technical Assistance Centre.

* The absence of the main disconnecting switch on the machine is an exception to be considered for on-site installation.

** The protection level required for this class is IP43BW (as per IEC 60529). All Audax Top 18-21 ErP units meet this protection requirement:
- For closed electrical panel: IP44

2.5 WATER FLOW RATE ADJUSTMENT.

2.5.1 Water leaks.

Check that the water side connections are clean and do not show signs of leakage.

2.5.2 Minimum water flow rate.

If the installation flow rate is below the minimum flow rate, there is a risk of excessive fouling.

2.5.3 Maximum water flow rate.

It is limited by the head loss permitted for water heat exchangers. You must also ensure as a minimum a 2.8 K ΔT for water exchangers, which corresponds to a water flow rate of 0.09 l/s for each kW.

2.5.4 Heat exchanger water flow rate.

Data applicable for:
- Fresh water at 20°C
- If glycol is used, the maximum water flow rate is reduced.

	Minimum water flow rate, l/s	**Maximum water flow rate, l/s**
18 kW	0.45	1.2
21 kW	0.57	1.2

2.5.5 Adjustment of the system's nominal water flow rate.

The water circulation pumps of the Audax Top 18-21 Erp units have been sized to allow the hydronic modules to cover all possible configurations according to the specific installation conditions, that is for various temperature differences between the inlet and outlet water (ΔT) at full load, which can vary between 3 and 10 K.

This temperature difference required between the inlet and outlet water temperatures, determines the nominal flow rate of the system. To identify the operating conditions of the system, use these specifications for the unit selection.

In particular, gather the data to be used to control the system flow rate:

- control of constant adjustable speed: nominal flow rate,
- temperature difference adjustment: ΔT heat exchanger (variable flow rate).

CLEANING, PURGING AND DEFINITION OF THE HYDRAULIC CIRCUIT FLOW RATE

	N°	With hydronic module at variable speed Constant adjustable speed	With hydronic module at variable speed ΔT
Cleaning procedure	1	The manual control valve is not required for the variable speed hydronic module	
	2	Set the system pump*	
	3	Detect data relating to the external static pressure available...	
		...taking into account the difference of data of the pressure gauge connected at the unit input and output (elements 20***).	
	4	Operate the pump for two consecutive hours to rinse the system's hydronic circuit (presence of solid contaminants).	
	5	Perform another detection.	
	6	Compare this value with the initial value.	
	7	If the external available static pressure...	
		... has decreased, it means that you need to remove and clean the mesh filter, as the hydronic circuit contains solid particles.	
	8	If so, stop the pump* and close the water inlet/outlet shut-off valves (elements 16 ***) and remove the mesh filter (element 19) after emptying the hydronic section of the unit (elements 11 and 12 ***).	
	9	If necessary, repeat the procedure to make sure that the filter is not contaminated.	
Purging procedure	1	After completing the water filling, wait about 24 hours before activating the purging procedure.	
	2	Activate the pump*: the pump must operate continuously at maximum speed to purge the hydraulic circuit whatever the value indicated by the flow switch**.	
	3	The machine already has an automatic air vent.	
		In case of automatic vent, the air will automatically blow out of the circuit.	
		In case of manual vent, open the valve to release the air from the circuit.	
Water flow rate adjustment procedure	1	When the circuit is clean and purged, operate the pump in manual mode *, and read the detected pressures (inlet water pressure - outlet water pressure) on the pressure gauges, ...	Thanks to the ΔT control, it is not necessary to adjust the flow rate. On the other hand, it is necessary to adjust the Minimum pump speed to ensure the flow switch closure*.
	2	Compare this value with the external static pressure graph available using the appropriate speed curve (Graphs 1 and 2).	
	3	If the corresponding flow rate is greater, reduce the pump speed* and vice-versa.	
	4	Gradually adjust the pump speed until the desired water flow rate is achieved.	

* For the configuration details, consult paragraph 3.10 "Programming".

** **Attention:** Make sure there is water inside the circuit so as not to damage the pump.

*** Refer to Fig. 2-7

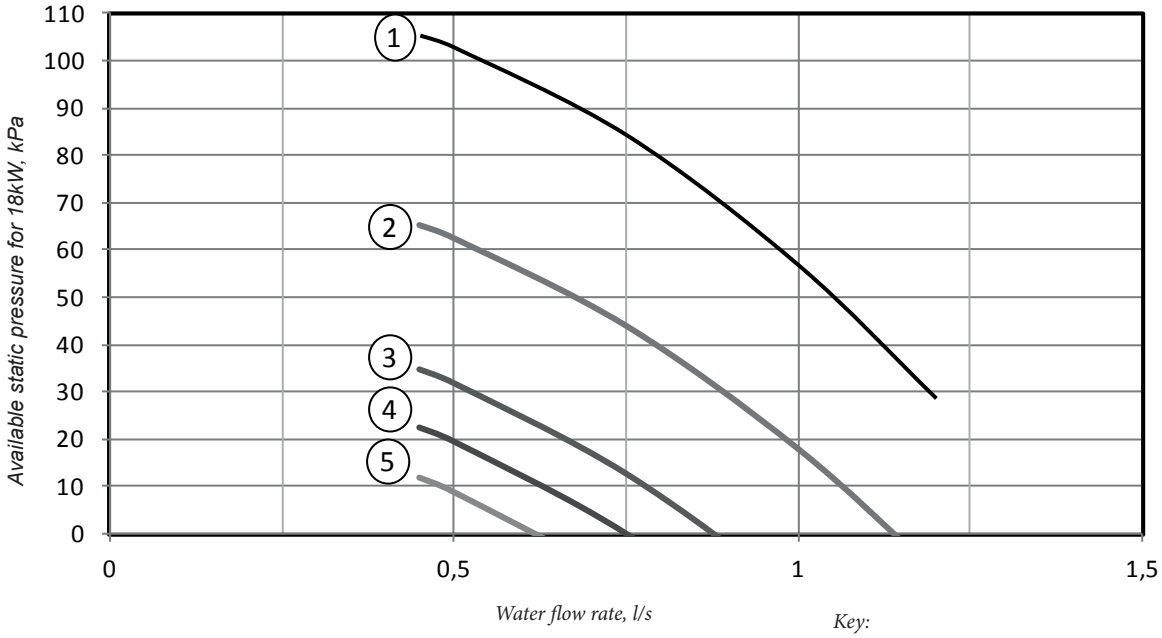
N.B.: if the system has an excessive head loss compared to the static pressure available supplied by the system pump, it will not be possible to obtain the nominal water flow rate (as the nominal flow rate obtained is lower) and the water temperature difference between water heat exchanger inlet and outlet will increase.

To reduce the head losses of the hydronic system:
- reduce the individual head losses as much as possible (curves, level changes, options, etc.).
- properly size the pipe diameter.
- avoid, in as far as possible, expanding the hydronic system.

2.5.6 External available static pressure.

Data applicable for:
- fresh water at 20°C;
- if glycol is used, the maximum water flow rate will reduce.

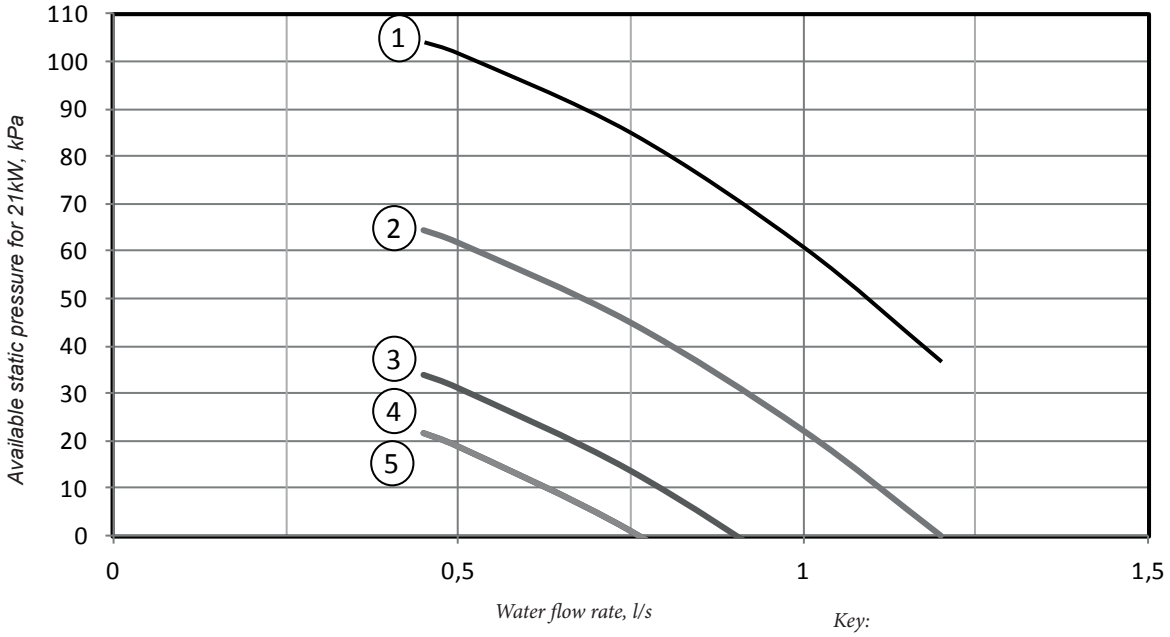
Graph 1: External available static pressure of the unit 18 kW



Key:
1 - Pump speed = 100%
2 - Pump speed = 75%
3 - Pump speed = 50%
4 - Pump speed = 38%
5 - Pump speed = 25%

2-10

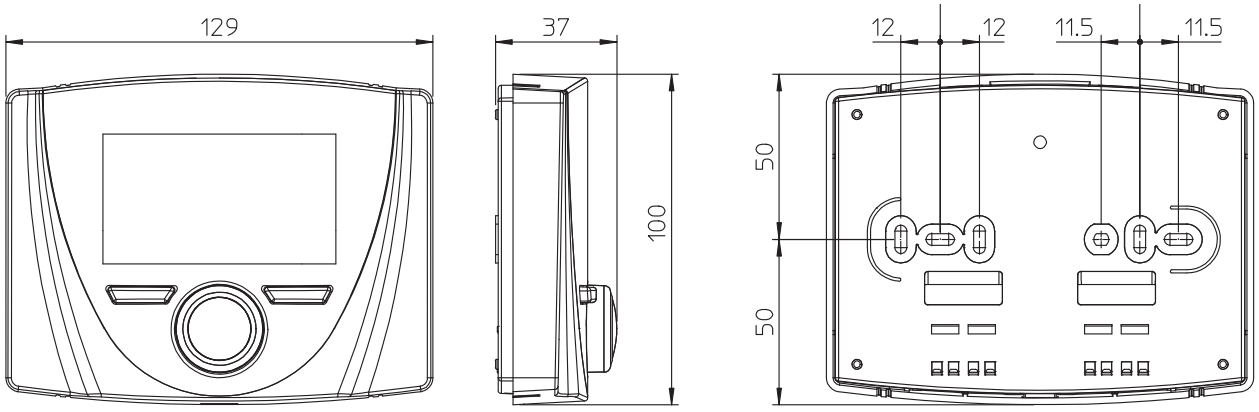
Graph 2: External available static pressure of the unit 21 kW



Key:
1 - Pump speed = 100%
2 - Pump speed = 75%
3 - Pump speed = 50%
4 - Pump speed = 38%
5 - Pump speed = 25%

2-11

2.6 REMOTE PANEL MAIN DIMENSIONS.



2-12

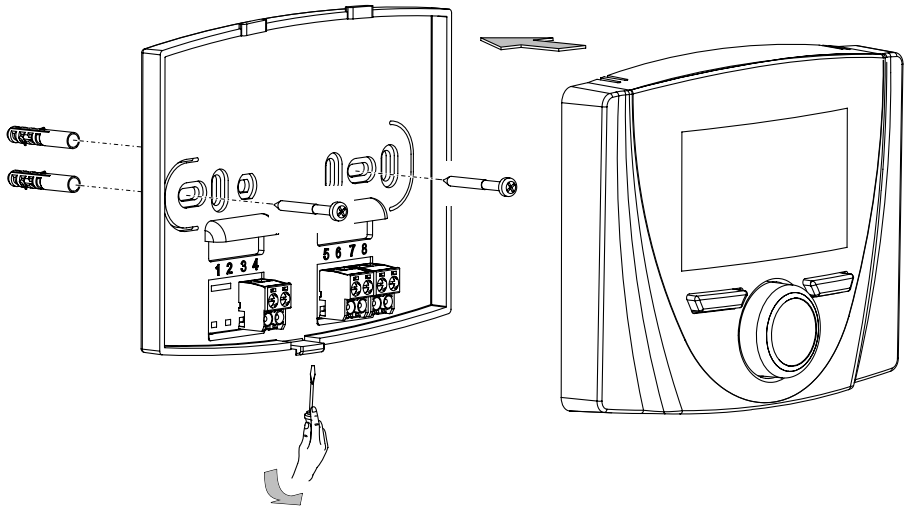
2.7 REMOTE PANEL INSTALLATION OPERATIONS.

1) Separate the fixing template from the body of the remote panel using a screwdriver as a lever in the relative recess (Fig. 2-14). Install the remote panel away from heat sources and in a suitable position to detect the room temperature correctly.
2) Install the remote panel using the openings on its rear part directly onto the wall or on a recess box using the relative supplied screws.
3) Connect the remote panel to the electronic management clamps, as indicated in the diagram (Fig. 3-1).

   The connection is made using wires with a minimum section of 0.50 mm^2 and maximum section of 1.5 mm^2 and with a maximum length of 50 metres.

   N.B.: for correct installation, prepare a dedicated line to connect the remote control according to the Standards in force regarding electrical systems. If this is not possible, interference due to other electric cables could cause malfunctioning of the remote control itself.
4) Fix the body of the remote control to the mount template, engaging it with pressure.
5) After the device has been powered, wait about 30 seconds before regulation so that communication between remote panel and the device has established.

2-13



2.8 COMMISSIONING MODE.

Important: the customised connection of the interface circuits could pose safety risks: any changes to the control panel must maintain the equipment compliance with local regulations. Precautions must be taken to prevent accidental electrical contacts between circuits fed by different sources:

- **the selection and features of the conductor insulation must ensure double electrical insulation.**
- **In case of accidental disconnection, the conductor fixing between different conductors and/or in the control panel must prevent any contact between the conductor ends and a live active component.**

Refer to the wiring diagrams of the Audax Top 18-21 ErP units provided with the unit, for the possible configuration wiring.

2.9 CHECKS BEFORE STARTING THE UNIT.

Do not start the heat pump without reading, and fully understanding, the operating instructions and without having performed the following pre-start checks:

- Make sure that all electrical connections are properly tightened.
- Make sure that the unit is on a flat surface and securely fastened.
- Verify that the hydraulic circuit has sufficient water flow and that the connection pipes correspond to the installation diagram.
- Make sure there are no water leaks. Verify the correct operation of the valves installed.
- All panels must be assembled and securely fastened with appropriate screws.
- Make sure there is sufficient space for the assistance and maintenance operations.
- Make sure there are no coolant leaks.
- Verify that the electricity source complies with the data on the unit plate, wiring diagrams and other documents relating to the unit itself.
- Make sure the power supply complies with the applicable regulations.
- Make sure that the compressor can freely move on the assembly springs.

Attention:

- **The heat pump commissioning and start-up must be monitored by a qualified refrigeration technician.**
- **The start-up and operating tests must be performed with a thermal load applied and with water circulating in the water heat exchanger.**
- **All set-point adjustments and control tests must be performed before starting the unit.**

Make sure that all safety devices are working. In particular, make sure that the high pressure switches work constantly and that the alarms are acknowledged.

N.B.: failure to comply with the Manufacturer's instructions (electrical connections, hydraulic connection + installation), automatically voids the Manufacturer's warranty.

3 INSTALLING THE SYSTEM.

This section provides a detailed description of the main electrical connection and configuration phases, together with some examples of standard installation:

- Installation with electric heaters fitted with auxiliary device
- Installation with DHW production.

The set-point configurations with remote panel supplied are also described.

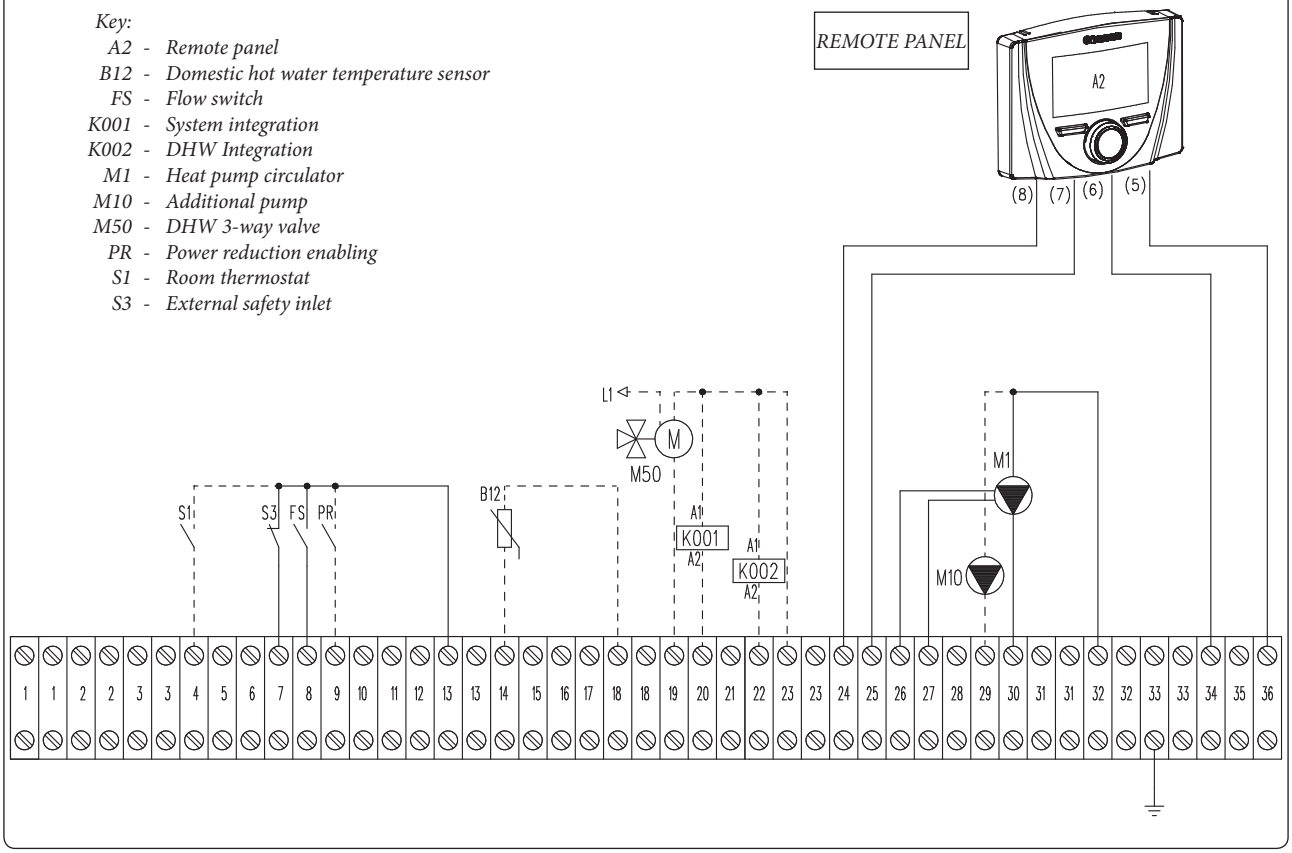
3.1 CUSTOMER MAIN ELECTRICAL CONNECTION THROUGH TERMINAL BOARD.

Customer electrical connection through terminal board

3-1

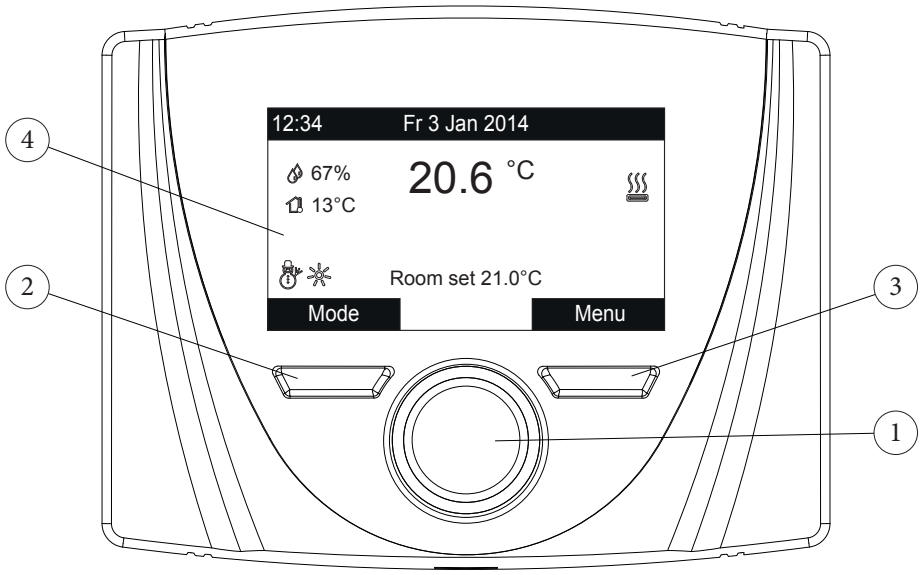
Key:

A2	-	*Remote panel*
B12	-	*Domestic hot water temperature sensor*
FS	-	*Flow switch*
K001	-	*System integration*
K002	-	*DHW Integration*
M1	-	*Heat pump circulator*
M10	-	*Additional pump*
M50	-	*DHW 3-way valve*
PR	-	*Power reduction enabling*
S1	-	*Room thermostat*
S3	-	*External safety inlet*



3.2 REMOTE PANEL.

3-2



Key:

1 - Main parameters switch with button to confirm and save data
2 - Left context button
3 - Right context button
4 - Display

3.3 SYSTEM USE.

Once the device has been powered, it goes into the status prior to switch-off. Press the "Mode" button to cyclically select the desired mode amongst those available.
The current operating mode in use is displayed by the relative icon at the bottom left corner (Fig. 3-3).

Also, depending on the system's configuration, the main screen displays various information regarding the system, amongst which:

State	Description
nn	Room humidity value (if humidity probe is present)
nn	External temperature value (external probe enabled)
	Request for room central heating or cooling in progress
	Comfort temperature operation
	Economy temperature operation
	Operation in manual mode
	External probe enabled
	Anomaly present
	DHW Comfort temperature operation. **N.B.** in the absence of the icon, the DHW will work with eco temperature.

The information that can be changed for the area is shown at the centre of the display.
The lower part of the display shows the parameter that can be changed (it varies according to configuration). Once the system has captured the data (indicated with the text "Attesa dati..." (Waiting for data...), it is possible to change the value by turning the main switch and pressing to confirm the parameter change.

The values that can be found according to the configuration, are:

- Set room: defines the room zone temperature.
- Set flow: defines the system's flow temperature to the zone.
- Flow offset: changes the operation curve of the external probe.

3-3

State	Description	DHW	Cooling	Central heating	Anti-freeze
	Stand-by	Disabled	Disabled	Disabled	Enabled
	Summer	Enabled	Disabled	Disabled	Enabled
	Cooling	Enabled	Enabled	Disabled	Disabled
	Winter	Enabled	Disabled	Enabled	Enabled

3.4 COMFORT / ECONOMY / MANUAL OPERATION.

Once the calendar is set and the relative association of days is executed, the system operates automatically by switching from "Comfort" to "Economy" according to what has been set.

- **Comfort ( ).** During periods in comfort mode, a relative icon appears next to the operation mode.
- **Economy ( ).** During periods in economy mode, a relative icon appears next to the operation mode.
- **Manual ( ).** If the remote panel was set to manage the room temperature of the zone, if required, it is possible to change the value manually for a determined range.

  Turning the main switch changes the room temperature, and pressing it confirms the change. The change is displayed by the symbol " ". This change remains active until the next time range is changed from the active calendar.

3.5 OPERATION WITH EXTERNAL PROBE.

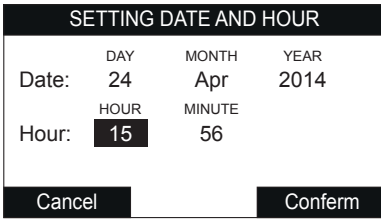
When the system is associated with the external probe, the relative symbol ( ) **is displayed.** From this moment, the system's flow temperature for room central heating is managed by the external probe depending on the external temperature measured. It is possible to change the operation curve by using the main switch and changing the external probe offset.

3.6 CLOCK AND PROGRAMS.

From this menu, it is possible to set the system's date and time as well as the time ranges for operation in Comfort and Economy mode.

- Date and time. On first electric supply voltage from the remote panel, or in the event of a voltage drop, you must set the date and time. Proceed as follows:
  - Press the "Menu" button (ref. 3 Fig. 3.2), select by pressing the main selector (ref. 1 Fig. 3.2) the item "Time and Program", then "Date and time".
  - Once you have accessed the menu, adjust the various items highlighted by turning the main switch. Set the value and save it by pressing the main switch. Each time it is saved, it moves to the next item.
  - After programming, press "Confirm".

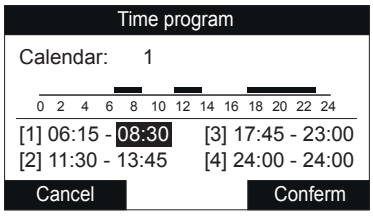
3-4



- **Time slots.** The remote panel enables you to set 4 calendars with 4 time operating ranges in system comfort mode. The system will operate in economy mode during out-of-range time of these 4 time ranges.

  After setting these 4 calendars it is possible to associate them to the various days of the week and DHW function according to one's needs.
  - Press the "Menu" button, select by pressing the main selector (ref. 1 Fig. 3-2) the item "Time and Program", then "Time slots".
  - Once you have accessed the menu, adjust the various items highlighted by turning the main switch. Set the value and save it by pressing the main switch. Each time it is saved, it moves to the next item.
  - After programming, press "Confirm".

3-5

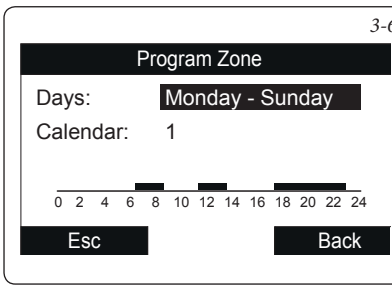


- **Area Program and DHW program.** Time ranges (Calendars from 1 to 4) are assigned to Zone and DHW in these menus. You can assign the calendar to a single day or to a group of days.(single day, Monday - Friday, Saturday - Sunday, Monday - Saturday, Monday - Sunday).

  Therefore each day may be personalised with 4 different operating programs.

  For convenient selection, the bottom part displays the graphics of the relevant calendar being selected (refer to the following Fig.).

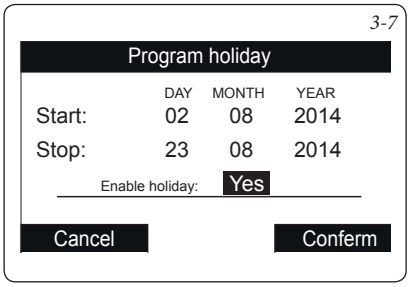
3-6



- **Holiday program ( ).** If required, it is possible to pause system operation for an established period. Access the "Time and Program" menu, select "Program Holiday" and set the period in which you wish to pause system operation. During this time, the previously set calendars will not be taken into consideration.

The antifreeze function is still ensured during the holiday period.

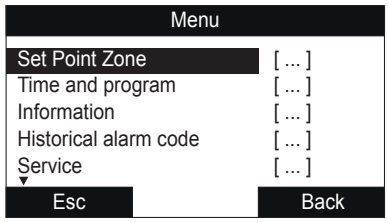
3-7



3.7 SETTINGS MENU.

Press the "Menu" button to access a list of variables that enable you to customise use of the system.
To browse the menus, which can be accessed by pressing the relative "RH" or "LH" context buttons, scroll through the sub-menus displayed by turning the main switch. Press the said selector to select the one highlighted. By pressing repeatedly, you can scroll down the menu levels and go back to a previous level by pressing the "Back" context button. To exit the menu completely, press the "Esc" button, which will take you back to the initial page of normal operation.
To confirm the parameter change, press the main switch.

3-8



Hereunder is a list of available menus.

MAIN MENU	
Menu item	Description
Set Point Zone	Defines the operating parameters to manage the zone
Set Point DHW	Defines the operation parameters in domestic circuit mode
Time and Program	Defines the date/time and time operating ranges
Information	Display system operating data
Historical alarm code	Displays the list of the last 10 anomalies
Service	Password protected menu dedicated to a qualified technician
Language	Defines the remote panel operation language

Menù Set Point Zone				
Menu item	Description	Range	Default	Customised value
Set comfort heat.	Room temperature in central heating zone Comfort mode	15 ÷ 35 °C	20	
Set economy heat.	Room temperature in central heating zone Economy mode	5 ÷ 25 °C	17	
Set flow heat.	Flow temperature in room zone central heating mode	(*) 20 ÷ 60 °C	40	
Offset flow heat.	Offset temperature for central heating zone	- 15 ÷ + 15°C	0	
Set comfort cool.	Room temperature in cooling zone Comfort mode	15 ÷ 35 °C	25	
Set economy cool.	Room temperature in cooling zone Economy mode	15 ÷ 35 °C	28	
Set flow cool.	Flow temperature in room zone cooling mode	(*) 4 ÷ 25 C	8	
Offset flow cool.	Offset temperature for cooling zone	-15 ÷ + 15 °C	0	

(*) **N.B.:** the range depends on the configuration in the Cooling / central heating thermoregulation menu.

Menù Set Point DHW				
Menu item	Description	Range	Default	Customised value
Set Comfort	DHW storage temperature in Comfort phase	30 ÷ 60 °C	50	
Set Economy	DHW storage temperature in Economy phase	30 ÷ 45 °C	30	

Menù Time and Program				
Menu item	Description	Range	Default	Customised value
Date and Time	Current date and time setting			
Time slots	Defines the time range for operation in Comfort and Economy mode			
Program Zone	Time programming for controlled zone		Mon - Fri Cal 1 Sat - Sun Cal 3	
Program DHW	DHW operation time programming		Mon - Sun Cal 1	
Program Holiday	Defines the period during which the system disables both hot water heating and room central heating and/or cooling functions. At the end of the set days, the previously active functions will be reset.		Disabled	

Information Menu	
Menu item	Description

Menù Information	
Menu item	Description
Flow temperature	Instant outlet temperature from the system
Return temperature	Instant inlet temperature to the system
External temperature	External temperature detected by the external probe
Flow temp. system calc.	Flow temperature requested by the generators
Dew point	Dew temperature
Temp DHW	Storage water temperature
Firmware board version	Heat pump board software revision
Firmware display version	Display software revision installed on the remote panel
H.P. hours of operation	Number of operating hours of the heat pump
Mode of operation H.P.	Describes the heat pump operation mode.

Menù Historical alarm code
Description
Displays the history log of the last 10 anomalies, refer to par. 3.8

Menù Service				
Menu item	Description	Range	Default	Customised value
Password protected menu dedicated to a qualified technician				

Menù Language				
Menu item	Description	Range	Default	Customised value
Language	Defines the remote panel operation language	ITA - ENG	ITA	

3.8 FAULT AND ANOMALY SIGNALS.

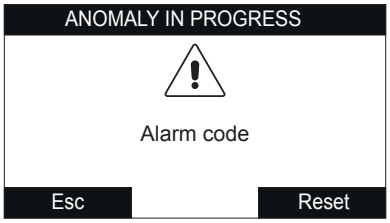
The system signals any anomalies by displaying the attention screen with the relative anomaly code (Fig. 3-9).

Press the "Esc" button to go back to the main screen and the anomaly is displayed with the symbol.

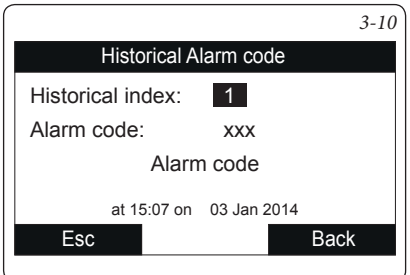
You must access the "Historical alarm code" menu to display the anomalies log where the last 10 system anomalies are displayed in time order (Fig. 3-10). Turn the main switch to scroll through the list.

From the "Historical alarm code" menu, it is also possible to reset the list by selecting "Alarm reset".

3-9



3-10



3.9 ALARMS DESCRIPTION.

The possible causes and likely effects on the unit, as well as the type of reset, are listed in the alarms tables below.

Error code	Description	Unit state	Reset type			Survey / corrective actions
			Automatic	Operation after a restart	Comment	
1	Return sensor error	Continue	X		When the values falls in the correct range again	1. Check the system return sensor. 2. Check the NHC board.
2	Flow sensor error	Stop	X		When the values falls in the correct range again	1. Check the system flow sensor. 2. Check the NHC board.
3	Coolant temperature sensor error (TR)	Stop compressor	X		When the values falls in the correct range again	1. Check the TR sensor. 2. Check the NHC board.
4	Outdoor temperature sensor error	Continue	X		When the values falls in the correct range again	1. Check the external temperature sensor. 2. Check the NHC board.
5	DHW sensor error	DHW failed	X		When the values falls in the correct range again	1. Check the DHW sensor. 2. Check the NHC board.
6	Heat exchanger TEMP sensor error		X		When the values falls in the correct range again	1. Check the heat exchanger TEMPCHW sensor. 2. Check the NHC board.
9	Spare part sensor error	Continue	X		When the values falls in the correct range again	1. Check the spare part sensor. 2. Check the NHC board.
10	Compressor discharge temperature sensor error (TD)	Stop compressor		X	After 4 attempts, the error becomes permanent.	1. Check the discharge temp. sensor (TD).
11	Air coil temperature sensor error (TE)	Stop compressor		X	After 4 attempts, the error becomes permanent.	1. Check the temp. sensor (TE).
12	Liquid temperature sensor error (TL)	Stop compressor		X	After 4 attempts, the error becomes permanent.	1. Check the temp. sensor (TL).
13	Outdoor temperature sensor error	Continue		X	The unit continues to work in Integration Mode. TO sensor value set at 30°C in Heat Mode and at 10°C in Cool Mode When the TO sensor detects a different value, the Integration Mode is cancelled.	1. Check the outdoor temp. sensor (TO)
14	Intake temperature sensor error (TS)	Stop compressor		X	After 4 attempts, the error becomes permanent.	1. Check the intake temp. sensor (TS).
15	Inverter dissipator temperature error	Stop compressor		X	After 8 attempts, the error becomes permanent.	1. Verify the correct operation of the fans
16	TS and TE sensors not connected properly	Stop compressor		X	After 4 attempts, the error becomes permanent.	1. Check the temp. sensor (TE, TS).
17	Intake pressure sensor error (PS)	Stop compressor		X	The error becomes permanent after 2 attempts for detecting the disconnection and after 4 attempts for the high pressure.	1. Check the intake pressure sensor (LP).
21	Communication with inverter interrupted	Stop compressor	X		When the inverter receives a new message	
22	Communication error between the inverter boards	Stop compressor		X	Only delay in communication	

Error code	Description	Unit state	Reset type			Survey / corrective actions
			Automatic	Operation after a restart	Comment	
31	Safety inlet	Stop the unit O Stop the central heating O Stop the cooling	X		When the safety inlet is closed	
32	Flow switch error	Stop compressor		X	After 5 attempts, the error becomes permanent.	
33	High pressure error	Stop compressor		X	Error detected when the flow pressure exceeds the limit value of the pressure set in the AP pressure switch.	1. Check external fan functioning. 2. Check the external fan motor error. 3. Check if the pulse modulation valve (PMV) is clogged. 4. Check if the heat exchanger is clogged. 5. Check the air recirculation around the air heat exchanger.
50	Antifreeze protection of the exchanger on the Water temp (in Cool Mode)	Stop	X		Chiller heater energised while the alarm is active. Force the pump operation.	
51	Antifreeze protection of the exchanger on the Coolant temp (in Cool Mode)	Stop		X	Chiller heater energised while the alarm is active. Force the pump operation until it is possible to reset the alarm manually The error becomes permanent after more than 12 attempts carried out over 2 hours	
60	Protection of the reversing valve	Stop compressor		X	After 4 attempts, the error becomes permanent.	1. Check the operation of the four-way valve. 2. Check the air heat exchanger (TE) and the intake temp. sensor (TS). 3. Check the BPHE sensor (TR). 4. Check the air coil of the four-way valve. 5. Check the PMV (pulse modulation valve).
61	Fan error	Stop compressor		X	After 8 attempts, the error becomes permanent. Error detected in one of the following conditions; 1. Fan motor block 2. IPM fan motor in overcurrent conditions at start-up 3. Abnormal fan IPDU direct current (DC)	1. Check the fan motor block device. 2. Check the power supply voltage between L2 and N.
62	Compressor inverter short circuit protection	Stop compressor		X	After 8 attempts, the error becomes permanent. Error detected in one of the following conditions; 1. Compressor IPM short circuit detection at start-up 2. Compressor IPM short circuit detection during the air coil heating phase	
63	Compressor motor position detection error	Stop compressor		X	After 8 attempts, the error becomes permanent. Error detected when the compensation voltage of the motor current sensor is abnormal before the start of the compressor.	

Error code	Description	Unit state	Reset type			Survey / corrective actions
			Automatic	Operation after a restart	Comment	
64	Compressor fault	Stop compressor		X	After 8 attempts, the error becomes permanent. Error detected in one of the following conditions; 1. Compressor in overcurrent conditions 2. Compressor IPM short circuit 3. Compressor motor control error	1. Check the power supply voltage. 2. Cooling circuit operation in overload
65	Compressor block	Stop compressor		X	After 8 attempts, the error becomes permanent. Error detected in one of the following conditions; 1. Compressor motor block 2. IPM compressor motor in overcurrent conditions at start-up	1. Compressor faults (block, etc.): Replace the compressor. 2. Compressor wiring error (open phase)
70	Compressor thermal switch release error	Stop compressor		X	After 10 attempts, the error becomes permanent.	1. Check the thermostat casing and the connector. 2. Check for gas leaks, and recharge if necessary 3. Check the PMV (pulse modulation valve). 4. Check if the pipe is broken.
71	Intake pressure too low	Stop compressor		X	After 8 attempts, the error becomes permanent.	1. Check if the pulse modulation valve (PMV) is clogged. 2. Check the two-way valve circuit. 3. Check Ps sensor error (LP). 4. Check if the coolant filter is clogged. 5. Check if the coolant pipe is clogged. 6. Verify the operation of the fans (in Heat Mode). 7. Check if the coolant volume is insufficient.
72	High pressure system error (pressure switch, compressor casing temperature, power supply)	Stop		X	After 10 attempts, the error becomes permanent.	1. Check the external heat exchanger sensor (TL). 2. Check the fan. 3. Check the PMV (pulse modulation valve). 4. Check for clogging or short-circuits in the heat exchanger. 5. Coolant overload.Recharge
73	Current detector circuit error	Stop compressor		X	After 8 attempts, the error becomes permanent. Error detected in one of the following conditions;1. Motor current sensor error	
74	Flow temperature too high	Stop compressor		X	After 4 attempts, the error becomes permanent.	1. Check the cooling circuit (gas leak). 2. Check the electronic expansion valve. 3. Check the discharge temp. sensor (TD).
75	Phase missing in the power supply cable	Stop compressor		X	After 8 attempts, the error becomes permanent.	1. Check the power supply voltage.

Error code	Description	Unit state	Reset type			Survey / corrective actions
			Automatic	Operation after a restart	Comment	
76	Inverter dissipator temperature too high	Stop compressor		X	After 4 attempts, the error becomes permanent.	1. Check the air flow path in the dissipator.
80	Internal clock error synchronised in real time on the NHC board	Continue	X			
81	EEPROM damaged on the NHC board	Continue		X		
82	Inverter EEPROM not legible or EEPROM number out of range	Stop		X	Only delay in communication	
90	Configuration not valid	Stop	X		Automatic when the configuration is correct	
100	Emergency stop	Stop	X		Automatic when [P055] is reset	
200	External alarm	Continue	X		When the contact is closed	

3.10 PROGRAMMING.

The water heater is set up for possible programming of several operation parameters. By modifying these parameters as described below, the system can be adapted according to specific needs.

Access the "Service" menu by pressing the right "Menu" button and turning the main switch until selecting the desired menu. Press the main switch to confirm the selection. Insert the relative access code and customise the parameters according to your requirements.

Menù Service		
Menu item	Description	Range
Definition of zone	Zone system sub-menu settings	-
Defining plant	Sub-menu to define the devices connected to the system	-
Device configuration	Sub-menu to set the device's configuration	-
Thermoreg. heat.	Central heating thermoregulation setting sub-menu	-
Thermoreg. cool	Cooling thermoregulation setting sub-menu	-
Thermoreg. parameters	Parameters thermoregulation setting sub-menu	-
Integration	System integration setting sub-menu	-
Heat pump	Heat pump operating parameters sub-menu	-
Manual	Manual operating parameters sub-menu	-
Factory settings	Default settings restore sub-menu	-

Menù Service -> Definition of Zone				
Menu item	Description	Range	Default	Customised value
Room Control Interface	Enable operation of the supplied remote control if set on "R. Panel". If "TA" set, the central heating and cooling requests will be made based on the request of an external thermostat.	Remote Panel/T.A.	R.Panel	
Enable dew point	Enable operation with a humidity probe in the remote panel.	Yes / No	No	

Menù Service -> Defining plant				
Menu item	Description	Range	Default	Customised value
External probe	Enables operation with the external probe.	No / PdC	No	
Enable DHW	operation in domestic circuit	Yes / No	No	
Reduction function	Enable PdC operation frequency reduction, which is controlled by the said terminal board.	Yes / No	No	
Power	Power percentage in reduction mode.	50% ÷ 100%	75%	
Circulator control	Enable the pump operation with speed set "Max.speeed" or the modulating mode with tracking of the "Modulating" temperature differential.	Max.speed/ Modulating	Modulating	
Speed min	Value of minimum speed used in modulating operation.	19% ÷ 50%	50%	
Speed max	Value of maximum speed used in modulating operation.	50% ÷ 100%	100%	
Delta T	Temperature delta to be maintained with modulating operation.	2 ÷ 20	5	

Menù Service -> Device configuration				
Menu item	Description	Range	Default	Customised value
H.P. control	Setting "Yes", the default remote control supplied manages the heat pump. Setting "No", the remote control does not control the heat pump and must be coupled with other Immergas systems (System Manager). If "No" is set, it displays another item "slave address". **N.B.:** if it is erroneously set to "No", it is still possible to change the selection.	Yes / No	Yes	
Slave address	Address to configure according to the zone where the device is installed (e.g.: zone 1 = 41, zone 2 = 42, zone 3 = 43, etc...).	1 ÷ 247	21	

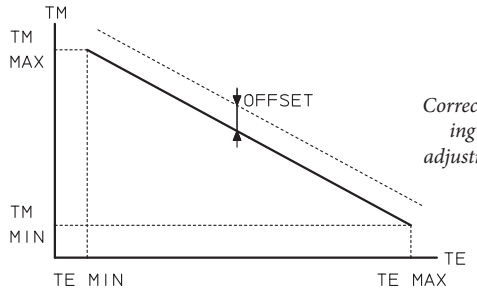
Assistance Menu -> Central Heating thermoregulation				
Menu item	Description	Range	Default	Customised value

Menù Service -> Thermoreg. heat				
Menu item	Description	Range	Default	Customised value
Discharge Set min	Without the external probe it defines the minimum flow temperature that can be set by the user. With the external probe present it defines the minimum flow temperature corresponding to operation with maximum external temperature	20 ÷ 45 °C	30°C	
Discharge Set max	Without the external probe it defines the maximum flow temperature that can be set by the user. With the external probe present it defines the maximum flow temperature corresponding to operation with minimum external temperature	35 ÷ 60 °C	50 °C	
External Temp. min	With the external probe present it defines at what minimum external temperature the system must operate at the maximum flow temperature	-25 ÷ +15 °C	-5 °C	
External Temp. max	With the external probe present it defines at what maximum external temperature the system must operate at the minimum flow temperature	-5 ÷ +45 °C	20°C	

Menù Service -> Thermoreg. cool				
Menu item	Description	Range	Default	Customised value
Discharge Set min	Without the external probe it defines the minimum flow that can be set by the user. With the external probe present it defines the minimum flow temperature corresponding to operation with maximum external temperature	4 ÷ 20 °C	7 °C	
Discharge Set max	Without the external probe it defines the maximum flow that can be set by the user. With the external probe present it defines the maximum flow temperature corresponding to operation with minimum external temperature	10 ÷ 25 °C	12 °C	
External Temp. min	With the external probe present, it defines at what maximum external temperature the system must operate at the minimum flow temperature	20 ÷ 45 °C	20°C	
External Temp. max	With the external probe present, it defines at what minimum external temperature the system must operate at the maximum flow temperature	20 ÷ 45 °C	35°C	

Menù Service -> Thermoreg. parameters				
Menu item	Description	Range	Default	Customised value
Room probe modul.	It enables you to set operation of the remote panel as modulating ON/OFF: Set "Yes", the flow temperature will be varied depending on the room temperature set. Set "No", the flow temperature will be kept constant until the desired room temperature is reached. **N.B.:** if an external temperature probe is present, the flow temperature will be set depending on the relative functioning curve.	Yes / No		
System inertia	It establishes the system reaction speed according to the type of system present. Example: 5 system with little heat inertia 10 system with normal dimensions with radiators 20 system with a lot of heat inertia (e.g. floor-standing system)	1 ÷ 20		
Antifreeze enable	Enables the room antifreeze function.	Yes / No	Yes	
Antifreeze set	Allows to set the room temperature for activation of the anti-freeze function.	0 ÷ 10 °C	5 °C	

External temperature probe.
The system is set up to use the external probe on the heat pump.
The correlation between system flow temperature and external temperature is determined by the parameters set in assistance menu "Thermoreg. heat" according to the curves represented in the diagram (Fig. 3-11).



EXTERNAL PROBE
Correction law of the flow temperature depending on the external temperature and user adjustments of the central heating temperature.

TM-MAX/MIN = Selected flow temperature range.
TE = External temperature.

3-11

Menù Service -> Integration				
Menu item	Description	Range	Default	Customised value
Electrical integration	It establishes the type of integration in the system: “Sys.” enables the system integration, “San” the DHW integration, “San+Sys.” enables both integrations	- None - Sys. - N.A. - N.A. - N.A. - San - San + Sys.	None	
Contemp. Temp. intgr.	Temperature threshold below which integration is activated and the heat pump maintained on.	-20 ÷ +15 °C	-20 °C	
Min. temp. of integration	Temperature threshold below which integration is activated and the heat pump is switched off.	-20 ÷ +15 °C	-20 °C	
Waiting time integration	Standby to reach the set value before activating integration when outdoor temperature is below the previously set temperature values (minimum integration temperature and simultaneous integration temperature).	5 ÷ 120’	60’	
Counter reset H.P.	Reset the number of operating hours of the heat pump	Yes / No	No	

Menù Heat pump		
Menu item	Description	Range
Working parameters	Sub-menu for working data	-
State	Sub-menu for operating state	-
Auxiliary info	Sub-menu with other operating data	-

Menù Heat pump -> Working parameters		
Menu item	Description	Range
Flow temperature	Instant outlet temperature from the system	
Return temperature	Instant inlet temperature to the system	
Flow temp. system calc.	Flow temperature requested by the generator	
Comp. discharge temp.	Current heat pump compressor temperature	
Comp. suction temp.	Compressor inlet temperature	
Comp. suction sat. temp.	Compressor inlet saturation temperature	
BPHE refrigerant temp.	Coolant temperature inside the plate heat exchanger	
Battery low part temp.	Coil temperature, low side	
Battery high part temp.	Coil temperature, high side	
External temperature	External room temperature	
Pdc frequency	Current compressor frequency	
System mode	Indicates the system's operating mode	0=Off 1 = Cooling 2 = Central heating 4 = DHW 6 = Central heating integration 7 = Defrosting 24 = DHW met 100 = Anomaly 101 = Cooling anomaly 102 = Central heating anomaly 104 = DHW anomaly 106 = Integration anomaly 107 = Defrosting anomaly

Menù Heat pump -> State		
Menu item	Description	Range

Menù Heat pump -> State		
System status	Indicates the current system mode	0 = Off 1 = Wait after ignition 2 = Minimum compressor on time 3 = Minimum compressor off time 4 = delay for mode change 5 = Step 1 compressor 6 = Step 2 compressor 7 = Step 3 compressor 8 = Step 4 compressor 9 = Compressor stop delay 11 - Frequency reduction on 20 = Defrosting 39 = Minimum external temperature for central heating 40 = Maximum external temperature for central heating 41 = Maximum flow/return value in central heating 42 = Low external temperature in central heating 43 = Very high external temperature in central heating 44 = High external temperature (compressor limitation) 45 = Step 1 High temperature protection in central heating 46 = Step 2 High temperature protection in central heating 47 = Step 3 High temperature protection in central heating 48 = Step 4 High temperature protection in central heating 50 = Minimum external temperature for cooling phase 51 = Minimum machine inlet temperature for cooling phase 52 = External temperature <15°C in cooling phase 53 = External temperature >26°C in cooling phase 54 = External temperature >40°C in cooling phase 55 = Low saturation temperature 57 = Step 2 antifreeze protection in cooling 58 = Step 1 antifreeze protection in cooling 61 = External temperature <0°C and flow temperature > 12°C in cooling phase 62 = External temperature <0°C in cooling phase 70 = Protection for lack of flow rate 80 = Protection for oil return 85 = Compressor off from inverter 91 = Central heating integration

Menù Heat pump -> State		
Integration status	Indicates the operating mode of the part of integration	-1 = integration disabled 0 = Off 1 = Integration on 2 = Integration on 3 = Integration on during defrosting 4 = Integration on for heat pump anomaly 5 = Integration on for low external temperature 12 = Integration off for DHW request 13 = Capacity Limit 50 = Integration not allowed 51 = No CH request 100 = Integration anomaly
DHW status	Indicates the operating mode during DHW request	-1 = DHW disabled 0 = DHW enabled 1 = DHW not active (request for central heating or cooling) 2 = Three-way DHW drive 100 = DHW anomaly
Flow switch	Indicates circulation inside the hydraulic circulator	On/off
Input status ON/OFF	Indicates the input state for the on/off control	On/Off
DHW Request	Indicates the presence of a heat request by the DHW storage	On/Off
Input status Reducing	Indicates the input state for the reduction control	On/Off
Fault (Current alarm code)	Current anomaly code	
Fault inverter	Inverter anomaly code	

Menù Heat pump -> Auxiliary info		
Menu item	Description	Range
Overheating temp.	Indicates the overheated gas temperature	
Overheating target temp.	Indicates the overheated gas required temperature	
Inverter Temp.	Indicates the inverter temperature	
Max freq. compressor	Indicates the maximum frequency that can be reached by the compressor with the present conditions	
Requested frequency	Indicates the frequency requested from the compressor	
Fan speed Top	Indicates the upper fan speed	
Fan speed Low	Indicates the lower fan speed	
Circulator speed	Indicates the pump speed	
Water control point	Temperature control set	
Water temp. control	Reference probe for the temperature control set	

Menù Service -> Test maximum press.		
Menu item	Description	Range

Menù Service-> Test switch Max pres		
Test Pressure switch	Test method for high pressure switch. N.B. to run the test, set the value to 1 and wait for the test result	0 = Off 1 = Test required N.B. the following states are managed by the machine DO NOT USE 2 = AP Test in progress 3 = AP Test performed correctly 4 = AP Test failed for maximum time reached 5 = AP Test failed for flow switch error 6 = AP Test failed for low water temperature 7 = AP Test failed for inverter error

Menù Service-> Manual				
Menu item	Description	Range	Default	Customised value
Manual operation	Forcing of the heat pump operation **N.B.** all controls on the flow and return sensors are disabled with these modes.	0 = Off 1 = Test cooling 2 = Test central heating 3 = Test cooling with ramp 4 = Test central heating with ramp	0	
Circulator speed	Pump speed forcing	0% ÷100%	0%	
Flow switch	Indicates circulation inside the hydraulic circulator	Off/On		
Three way DHW	Force the output for the DHW 3-way control	Off/On	Off	

4 OPERATION.

4.1 UNIT RANGE.

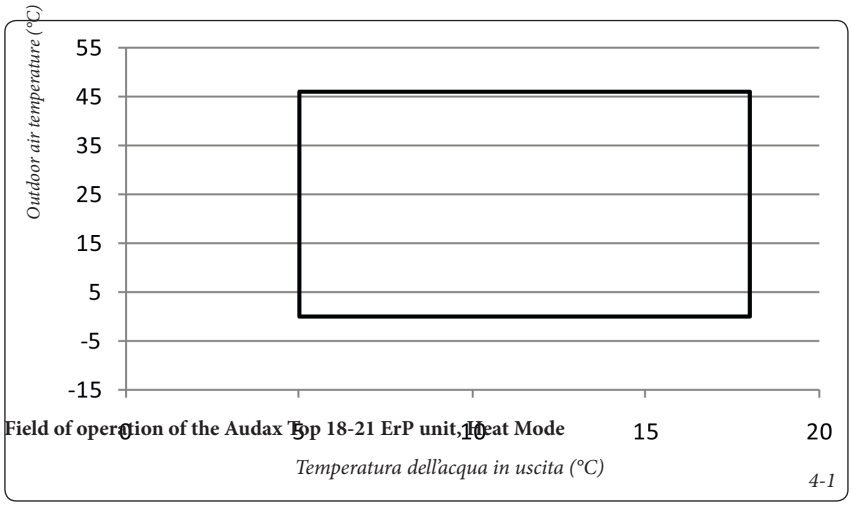
Audax Top 18-21 ErP

Cooling Cycle			
Evaporator Water Temperature	**°C**	**Minimum**	**Maximum**
Input water temperature on start-up		6	30
Output water temperature during functioning		5	18
Condenser Air Temperature	**°C**	**Minimum**	**Maximum**
Standard unit		0	46
Central Heating Cycle			
Condenser Water Temperature	**°C**	**Minimum**	**Maximum**
Input water temperature on start-up		10	45
Output water temperature during functioning		20	60 / 57 (1)
Evaporator Air Temperature	**°C**	**Minimum**	**Maximum**
Standard unit		-20 (2)	30

(1) 60°C for the Audax Top 18 ErP unit and 57°C for the Audax Top 21 ErP unit

(2) When operating with an external temperature below 0°C (Cooling mode and Central heating mode), a water antifreeze protection is required. Furthermore, according to the type of hydraulic system, the technician can prepare a suitable antifreeze protection on the hydraulic circuit, in the form of antifreeze solution or electrical resistance heater.

Field of operation of the Audax Top 18-21 ErP unit, Cool Mode

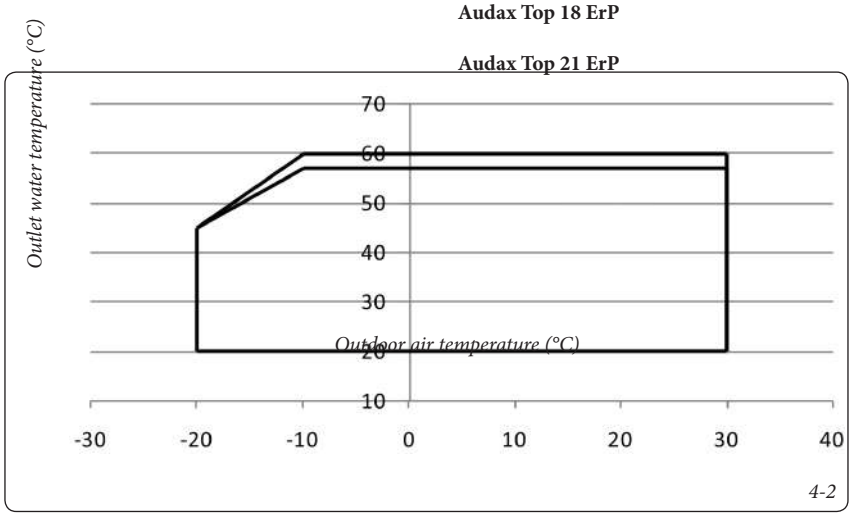


4-1

Field of operation of the Audax Top 18-21 ErP unit, Heat Mode

Audax Top 18 ErP

Audax Top 21 ErP



4-2

4.2 OPERATING MODE.

4.2.1 Method of use.

Depending on the type of unit configuration, you can control the system in two ways. The first contemplates the use of set-points, where the external air temperature does not affect the temperature set by the control device. The second is based on the climatic curve. In this case, the water temperature is regulated in view of the external temperature variations.
The type of use can be manually set by the user or automatically according to the type of programming made (see paragraph 3.2 and subsequent).

4.2.2 Operating mode.

The user can normally choose one of the three operating modes available, namely Cool, Heat or domestic hot water production only.

The unit can operate in the following methods:

: unit switch-off is required.

: unit operation is required in cooling and DHW mode.

: unit operation is required in central heating and DHW mode.

: unit operation is required in DHW production mode only.

By selecting the Mode, the heat pump will work so as to cool the hydraulic circuit up to the set temperature.

When in Mode, the heat pump heats the hydraulic circuit up to the set temperature. When the external air temperature is very low, the electrical integration may intervene, if configured, to meet the central heating demand.

When the system is in mode, the heat pump is off (except in the presence of antifreeze protection).

4.2.3 Anti-freeze protection for water.

When the outside temperature is low and the pump is off, there is a high risk of the exchanger and water pipes freezing. In these conditions the pump will be regularly put into operation to circulate the water, thus reducing such risk. In some cases, the electric heaters of the pipes and plate exchanger are activated (see Fig. 2-8).
The pump control procedure is the following:

- It the outside temperature drops below 6°C, the pump starts every 15 minutes for 1 minute at maximum speed.
- It the outside temperature drops below 6°C and the temperature on the return or flow probe drops below 4°C, the pump will operate constantly at maximum speed.
- To get out of these two conditions, apply a hysteresis of 1 K.

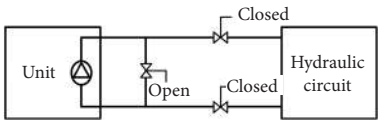
The control procedure of the electric heaters inside the machine is the following:

- The electric heaters are fed for 1 minute during defrosting, after the defrosting phase has completed.
- The electric heaters are fed if the outside temperature is below 6°C and if the temperature on the return or flow probe is below 4°C.
- The electric heaters are turned off if the outside temperature is above 7°C or if the temperature on the return or flow probe is above 4.5°C.
- The electric heaters are fed even if the alarm 50 or 51 is active.

Do not de-energise the unit: otherwise the effectiveness of the antifreeze protection will not be guaranteed. For this reason the customer circuit disconnecting switch must always remain closed.

If a shut-off valve has been installed, integrate a junction as shown in Fig. 4.3 and 4.4.

Winter Position



4-3

Important: depending on the territory atmospheric conditions, this procedure must be performed during the winter season once the unit has been stopped:

- **Add ethylene glycol or propylene glycol at a concentration such to ensure the system protection up to a temperature of 10 K below the lowest temperature that could be detected on the installation site.**
- **If the unit is not used for a long period it must be emptied, taking care to add ethylene glycol or propylene glycol in the exchanger as a precautionary measure, using the fitting of the inlet water drain valve.**
- **On the arrival of the new season, fill the unit with water and add an inhibitor.**
- **To install auxiliary equipment, the installer must follow the basic rules, especially with regard to the minimum and maximum flow rates, which must always be within the values listed in the operating limit table (application data).**
- **In order to prevent corrosion for differential aeration, the perfectly emptied heat transmission circuit must be charged with nitrogen for one month. If the heat transmission fluid does not comply with the manufacturer's requirements, the nitrogen charge must be promptly integrated.**
- **If the antifreeze protection is subject to the operation of resistance heaters, these must never be disconnected from the power supply.**
- **If electric resistance heaters are not used, or in case of prolonged black-out, the hydraulic system of the unit must be emptied to protect the unit itself.**
- **The heat exchanger temperature sensors constitute an integral part of the antifreeze protection: If you use electric resistance heaters for pipes, make sure that external heaters do not affect the detection capabilities of the sensors.**

Attention: please note that the "water antifreeze protection" and the "room antifreeze protection" are two very different methods. The water antifreeze protection is used to reduce the risk of freezing the water heat exchanger and water pipes, while the room antifreeze protection is used to maintain the minimum room temperature stable.

4.2.4 DHW mode.

For heat pumps with DHW tank, the DHW mode is used to produce hot water for sanitary purposes. The system manages the maintenance of the temperature set inside the DHW tank and diverter valve.
After activating the DHW Mode, the pump will be controlled via the logic of the constant adjustable speed (no logic ΔT).

a - DHW 3-way valve
The units can activate a three-way valve to control the heating of the DHW storage tank. If there is a demand for DHW, the operating logic controls the three-way valve responsible for channelling the hot water in the storage tank.

b - DHW temperature sensor

	NTC Temperature sensor
Features	Accessory Resistance = 10 KOhm

The production of DHW is possible when the Summer mode is selected and if there is a demand for the production of DHW (temperature conditions).

c - DHW Electrical integration
When the unit is required to operate in DHW Mode, you can use the DHW electric backup (if configured) for the production of domestic hot water. The output in the terminal board can control a contactor (not supplied with the unit) to feed the DHW integration resistance.

Features	Coil Contactor: 230 VAC 50Hz

The electrical integration starts when the tank temperature is below the DHW set-point and one of the below listed conditions is present:

- The outdoor temperature is below the Contemporary integration temperature (Assistance M -> Integration); in this case, the heat pump and the integration work simultaneously.
- The outdoor temperature is below the minimum integration temperature; in this case the heat pump remains off and only the electric resistance is enabled.
- The outdoor temperature is above 30°C.
- Defrosting enabled.
- In case of unit failure.

Important: the electric heating is deactivated in case of DHW temperature sensor failure.

d - DHW tank
The water in the DHW tank must be constantly monitored in order to minimise any risk of contamination, even by the legionella bacteria. That said, we believe it is important to inform the user on the importance of monitoring the water temperature.

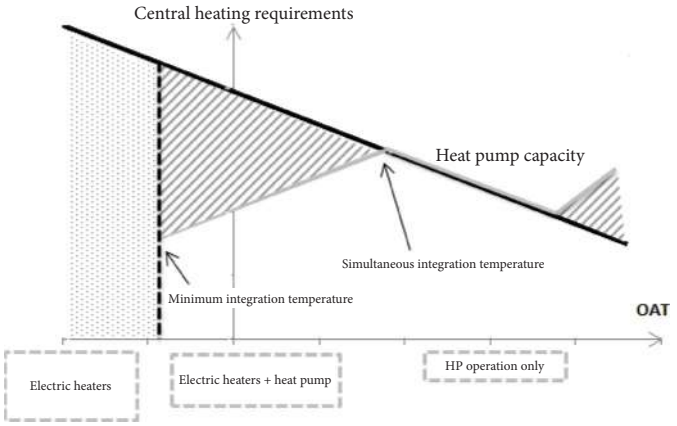
If the temperature is above 50°C, the legionella bacteria will not survive. If the water temperature is set at 60°C, the risk of contamination is almost inexistent.

4.2.5 - System electrical integration.

N.B.: the installer must ensure that the system complies with the applicable thermoelectric safety regulations.

Electric heaters can be integrated in the hydraulic circuit so that central heating is guaranteed in case of low outdoor temperatures or heat pump failure.
When the outdoor temperature is below the Contemporary integration temperature (Service Menu -> Integration), the electric integration is activated if correctly configured in the Service Menu -> Integration.
When the outdoor temperature is below the minimum integration temperature (Service Menu -> Integration), the heat pump stops, allowing the activation of the electric heaters (see Fig. 4-4).

System integration operation



4-4

4.2.6 Compressor heating control.

Attention: the compressor may be powered when the unit is not in operation. The control has the task of heating the compressor, by applying current to the stopped compressor instead of using a heater with resistors.

This control is to prevent the stagnation of coolant inside the compressor.

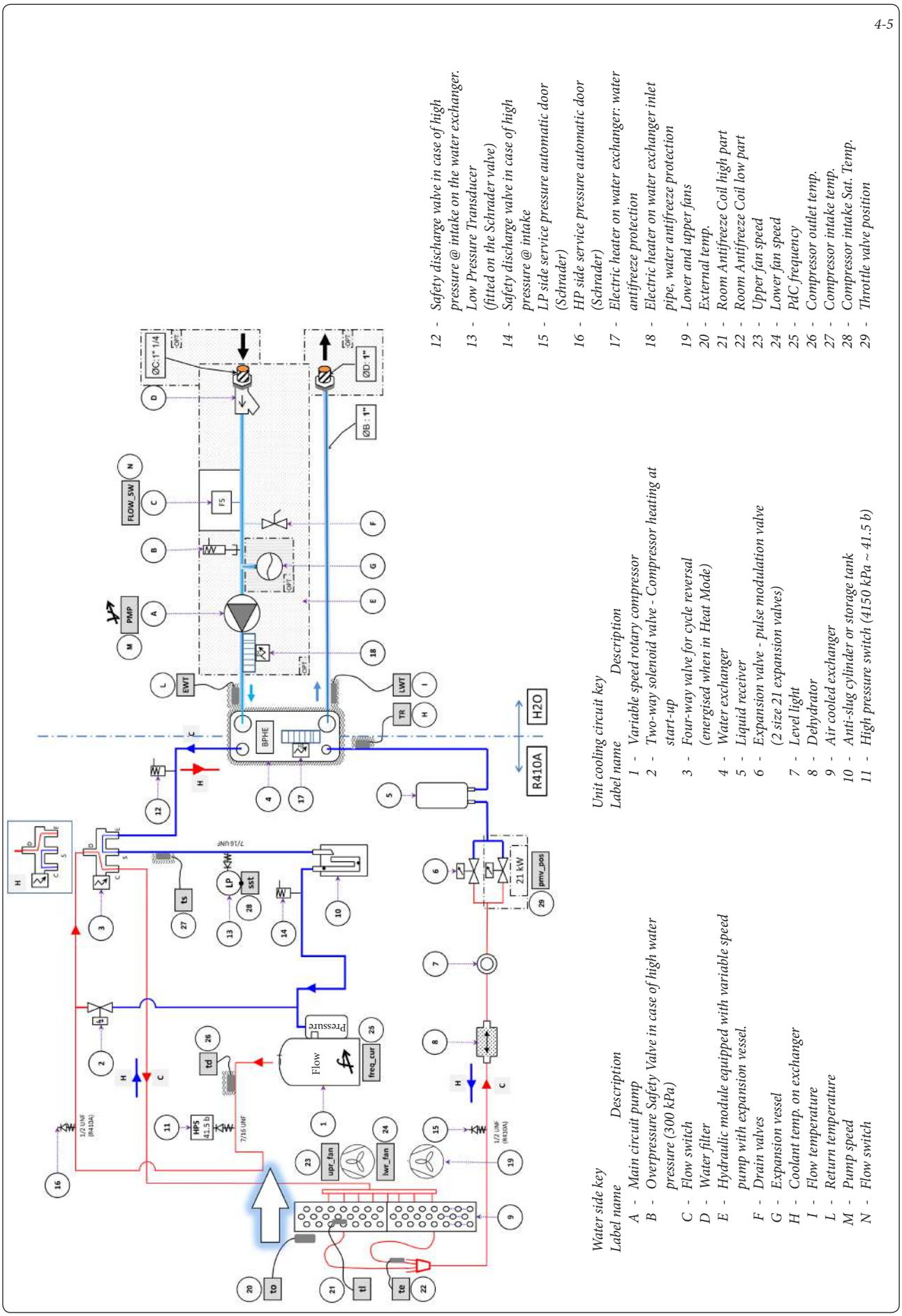
4.2.7 Defrosting cycle.

When the outside air temperature is low and the ambient humidity high, the probability of brine forming on the air coil surface significantly increases. The presence of brine on the air coil may reduce the air flow in the coil and prevent the proper operation of the unit. Where necessary, the control starts the defrosting cycle to remove the brine from the coil.
The cooling circuit is forced to Cool Mode during the defrosting cycle. To prevent the hydraulic circuit from cooling, you can start the electric heaters in the pipes and the one in the unit plate exchanger.

Attention: please note that the "defrosting" and "home antifreeze protection" are two very different operating modes. Defrosting is used to remove the brine covering the external air coil, while the home antifreeze protection is used to maintain the minimum ambient temperature stable.

4.3 MAIN SYSTEM COMPONENTS.

4.3.1 Generalities – Coolant Section.



4-5

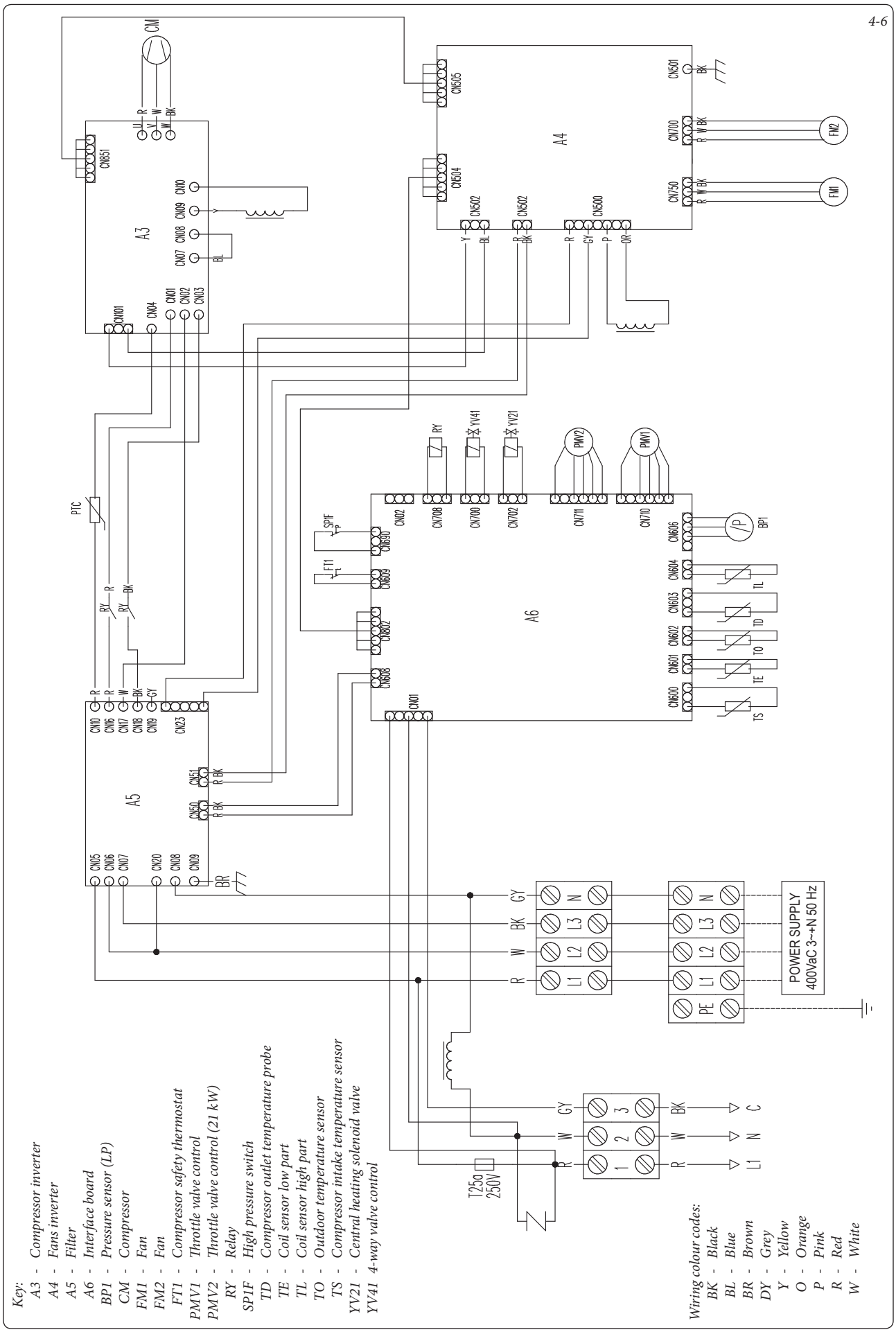
Water side key

Label name	*Description*
A	*Main circuit pump*
B	*Overpressure Safety Valve in case of high water pressure (300 kPa)*
C	*Flow switch*
D	*Water filter*
E	*Hydraulic module equipped with variable speed pump with expansion vessel.*
F	*Drain valves*
G	*Expansion vessel*
H	*Coolant temp. on exchanger*
I	*Flow temperature*
L	*Return temperature*
M	*Pump speed*
N	*Flow switch*

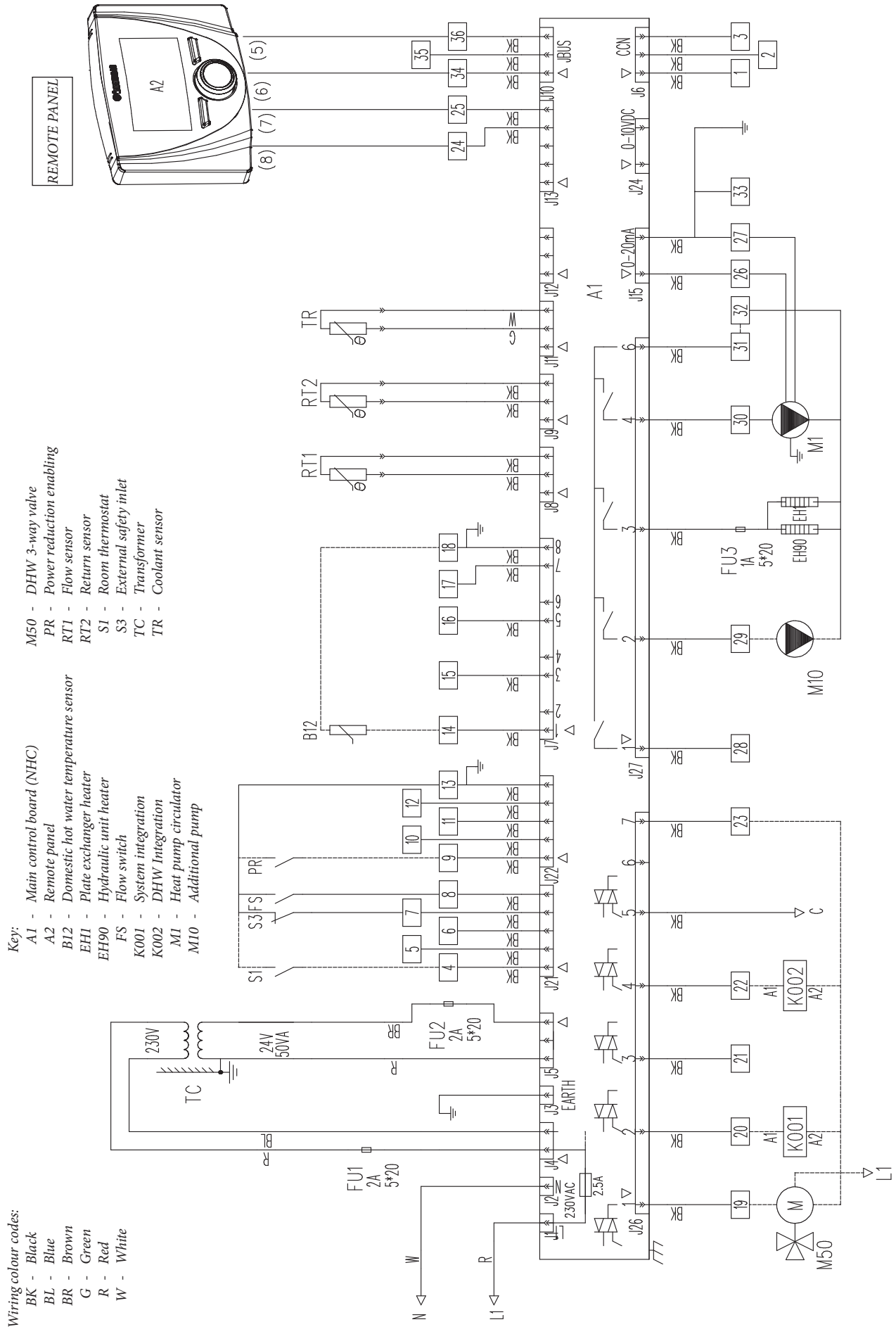
Unit cooling circuit key

Label name	*Description*
1	*Variable speed rotary compressor*
2	*Two-way solenoid valve - Compressor heating at start-up*
3	*Four-way valve for cycle reversal (energised when in Heat Mode)*
4	*Water exchanger*
5	*Liquid receiver*
6	*Expansion valve - pulse modulation valve (2 size 21 expansion valves)*
7	*Level light*
8	*Dehydrator*
9	*Air cooled exchanger*
10	*Anti-slug cylinder or storage tank*
11	*High pressure switch (4150 kPa ~ 41.5 b)*
12	*Safety discharge valve in case of high pressure @ intake on the water exchanger.*
13	*Low Pressure Transducer (fitted on the Schrader valve)*
14	*Safety discharge valve in case of high pressure @ intake*
15	*LP side service pressure automatic door (Schrader)*
16	*HP side service pressure automatic door (Schrader)*
17	*Electric heater on water exchanger: water antifreeze protection*
18	*Electric heater on water exchanger inlet pipe, water antifreeze protection*
19	*Lower and upper fans*
20	*External temp.*
21	*Room Antifreeze Coil high part*
22	*Room Antifreeze Coil low part*
23	*Upper fan speed*
24	*Lower fan speed*
25	*PdC frequency*
26	*Compressor outlet temp.*
27	*Compressor intake temp.*
28	*Compressor intake Sat. Temp.*
29	*Throttle valve position*

4.3.2 Inverter wiring diagram.



4.3.3 Control board wiring diagram.



4.3.4 Compressors.

The Audax Top 18-21 ErP units use a rotary hermetic compressor controlled by a variable frequency drive (VFD). The rotary compressor has a heater for the oil embedded in the casing. The compressor is supplied with:

- Anti-vibrating elements between the unit frame and the compressor frame.
- A high pressure switch or a thermostat embedded in the compressor casing and located on its discharge side.

The compressors installed on these units have a specific oil charge.

N.B.: do not use coolants or lubricants in addition to those specified. Do not compress the air (there must be no air suction due to any leaks in the cooling circuits).

4.3.5 Air condenser/evaporator.

The Audax Top 18-21 ErP air coils are heat exchangers fitted with copper pipes with internal groove and aluminium fins.

4.3.6 Fans.

The fans are drive by permanent magnet synchronous motors. The motors are controlled by a variable frequency drive (VFD).
In compliance with Regulation No. 327/2011 which implements Directive 2009/125/EC relating to the eco design requirements for fans driven by motors with an electric input between 125 W and 500 kW.

Product		**Audax Top 18-21 ErP**
Global efficiency	%	29.1
Measurement category		A
Efficiency category		Static
Desired level of efficiency for ERP2015		N(2015) 40
Level of efficiency in the point of optimum efficiency		40.6
Variable speed		YES
Year of manufacture		See label name on unit
Fans manufacturer		Complast Industrie SRL
Motors manufacturer		Nidec
Fan code		C025223H01
Motor code		B036870H01
Motor nominal output	kW	0.15
Flow rate	m3/s	0.84
Pressure with optimum energy efficiency	Pa	51
Nominal speed	rpm	847
Specific coefficient		1.002
Relevant information to facilitate dismantling, recycling or removal of the product at end of life		See Maintenance Manual
Relevant information to minimise impact on the environment		See Maintenance Manual

In compliance with Regulation No. 640/2009 and amendment 4/2014 which implements Directive 2005/32/EC relating to the eco design requirements for electric motors.

Type of motor	**Permanent magnet synchronous motor**
Motor included in the field of application of Regulation 640/2009 and subsequent amendment of 4/2014	NO

4.3.7 Modulating Expansion Valve (PMV).

Each PMV is fitted with step-by-step motor (0-500 pulses). The 18 kW units have one PMV, while the 21kW units have two PMV connected in parallel.

4.3.8 Liquid light.

Located on the liquid duct, this indicator monitors the unit charge and the presence of humidity in the circuit. The presence of bubbles in the sight glass could mean an insufficient charge or non-condensable products in the system. The presence of humidity changes the colour of the indicator paper inside the sight glass.

4.3.9 Dryer filter.

It is a one-piece brazed dryer filter, located in the liquid duct. The task of the dryer filter is to maintain the circuit free from impurities and any trace of humidity. The liquid light indicates the need to replace the dryer filter. The dryer filter is a bi-flow device present on the units. This means that it filters and dehydrates in both operating modes. The head loss is much more conspicuous in the Heat Mode. Each noticeable temperature difference between the coolant inlet and outlet connections, indicates that the cartridge must be replaced because clogged.

4.3.10 Water condenser/evaporator.

The evaporator/condenser is a plate heat exchanger. The hydraulic connection of the heat exchanger is threaded. It has a 6 to 13 mm thick polyurethane foam thermal insulation and includes, as standard accessory, an antifreeze protection.
The products which can be integrated for the thermal insulation of vessels during connection of the water pipes, must be chemically neutral with respect to the material and coatings for which they are used. This principle also applies to the products originally supplied by the manufacturer.

NOTE - Monitoring during operation:

- **Follow the regulations on the monitoring of under pressure equipment.**
- **The user or operator are usually required to keep a monitoring and maintenance file.**
- **In the absence of specific regulations or even only to integrate them, follow the control programs provided by EN 378 or ISO 5149.**
- **Follow the professional recommendations, if any, applicable to the specific context.**
- **Regularly check the possible presence of impurities (e.g. silicone particles) in the fluids for heat exchange. Such impurities may cause wear or pitting corrosion.**
- **Reports on periodical checks to be prepared by the user or operator must be attached to the monitoring and maintenance file.**

4.3.11 Coolant.

The Audax Top 18-21 ErP units work with R-410A coolant.

4.3.12 High pressure switch.

The Audax Top 18-21 ErP units are equipped with automatic reset safety pressure switches positioned on the high pressure side. For the alarms recognition procedure, see Par. 3.9 "Alarms description".

4.3.13 Receiver.

The Audax Top 18-21 ErP units are equipped with mechanically welded storage tanks, in which any coolant excess is deposited when the unit works in Heat Mode.

4.3.14 Four-way valve.

For the Audax Top 18-21 ErP units, this device allows reversing the cooling cycle to allow operation in Cool Mode, Heat Mode and during defrosting cycles.

4.3.15 Inverter sub-group of compressors and fans.

The Audax Top 18-21 ErP units are equipped with inverter modules that control the motors of compressors and fans.

4.3.16 Storage tank

The Audax Top 18-21 ErP units are provided with storage tank inside the intake duct of the compressors, which prevents the liquid from being channelled in the compressors, especially during defrosting and transient operations.

5 MAINTENANCE.

5.1 STANDARD MAINTENANCE.

To ensure an optimum level of efficiency and reliability of the unit, we recommend entering into a maintenance contract with the authorised Technical Assistance Centre. The contract must define the inspections to be performed regularly by the maintenance technicians, so that any malfunction can be detected and corrected quickly, avoiding the risk of serious damages.
The maintenance contract is the best way to ensure maximum equipment duration. Moreover, the competence of our technicians is the ideal solution for a profitable management of the system. The air conditioning equipment must be serviced only by professional technicians, while routine checks can be performed on-site by less specialised personnel. See EN 378-4 or ISO5149.
The coolant must be charged, bled and drained by a qualified operator using appropriate equipment for the appliance being worked on. Any improperly executed interventions could give rise to uncontrolled fluid or pressure leaks.

Attention: before performing any type of work on the machine, make sure that the power supply is deactivated. If one of the cooling circuits is opened, it is mandatory to empty it, reload it and inspect it for leaks. Before performing any work on the cooling circuit, it must be completely emptied of the charge by means of an appropriate recovery device.

The execution of simple preventive maintenance operations on this equipment also allows to maintain optimum levels of:
- optimisation of the cooling and central heating performances
- reduced energy consumption
- prevention of accidental component failure
- prevention of complex interventions involving a considerable waste of time and money
- environmental protection

N.B.: non-compliance or deviation from the above maintenance criteria automatically voids the warranty conditions originally planned for the unit, as well as any manufacturer liability.

5.1.1 First level maintenance.

See note in Par. 5.1.3 Third level.

The user can perform some simple operations on a weekly basis:
- Visual inspection to detect any oil traces (indicative of a coolant leak),
- Cleaning of the air heat exchanger - see Par. 5.4 Air heat exchanger,
- Inspection to detect possible removal of protective devices and/or presence of incorrectly closed panels,
- Inspect the report on the unit alarms when this is not in operation,
- General visual inspection to detect the presence of deterioration signs,
- Check the charge through the level light.

Check that the water temperature difference between the heat exchanger inlet and outlet is correct.

5.1.2 Second level maintenance.

This level requires specific skills in the electrical, hydronic and mechanical sectors.
The frequency of interventions for this maintenance level can be monthly or annually, depending on the type of checks to be performed.
In these conditions, we recommend executing the maintenance interventions described below.
Perform all planned first level interventions plus the following:

Electrical checks
- Tighten the power supply circuit connections at least once a year (see Par. 5.2 and 5.3 Tightening torques of the main electrical connections and bolts and screws).
- When necessary, check and tighten all control/command connections again (see Par. 5.2 and 5.3 Tightening torques of the main electrical connections and bolts and screws).
- When necessary, remove dust and clean inside the control panels.
- Check the state of contactors, disconnecting switches and condensers.
- Check the presence and conditions of the electrical protection devices.
- Check the proper operation of all electric heaters.
- Make sure that water has not entered into the control panel.

Mechanical checks
- Check the tightening of the support of fans, fan, compressor and fixing bolts of the control panel.

Hydraulic circuit checks
- When working on the hydraulic circuit, always make sure that the adjacent condenser is not damaged.
- Check the hydraulic connections.
- Check that the expansion vessel does not show too many signs of corrosion or gas head loss. Replace it, if necessary.
- Purge the hydraulic circuit (see Par. 2.5 Water flow rate adjustment).
- Clean the water filter (see Par. 2.5 Water flow rate adjustment).
- Check the proper operation of the water low flow rate safety device.
- Check the thermal insulation state of the pipes.
- Check the concentration of antifreeze protection solution (ethylene glycol or propylene glycol).

Cooling circuit
- Clean the air heat exchangers thoroughly with a low pressure jet and biodegradable detergent.
- Check the operating parameters of the unit and compare them with previous values.
- Run an oil contamination test.
- Check the correct functioning of the high pressure switch. If faulty, replace it.
- Check the fouling of the dryer filter. Replace it, if necessary.
- Keep and maintain a maintenance sheet, attached to each Central Heating, Ventilation and Air Conditioning unit.

All these interventions require strict observance of the appropriate safety measures: personal protective equipment, compliance with all applicable industry and local regulations and, not least, the use of common sense.

5.1.3 Third level (or higher) maintenance.

Since this level of maintenance required for specific and duly approved skills/tools/know-how, the execution of interventions is only permitted to the manufacturer or an authorised Technical Assistance Centre. The maintenance interventions concern, for example:
- The replacement of key components (compressor, evaporator),
- Any intervention on the cooling circuit (coolant handling),
- Change the factory default parameters (change of application),
- Unit removal or disassembly,
- Any intervention following lack of programmed maintenance intervention,
- Any under warranty intervention.
- One or two annual inspections to detect any leaks to be performed by a qualified technician equipped with a certified leak detector.

To reduce the environmentally harmful substances to be disposed of, it is essential to recover both the oil and the coolant according to applicable regulations, by adopting methods that limit the coolant leaks and pressure drops, and using materials suitable for these products.

Any leaks must be promptly eliminated.

The compressor oil recovered during maintenance, contains coolant and must be appropriately handled.

The under pressure coolant must not be purged into the atmosphere.

If one of the cooling circuits is open, close all orifices. If the intervention requires one day or more, charge the nitrogen circuit.

N.B.: non-compliance or deviation from these maintenance criteria automatically voids the warranty conditions originally planned for the unit, as well as any manufacturer liability.

5.2 TIGHTENING TORQUES FOR THE MAIN ELECTRICAL CONNECTIONS.

Component	Designation inside the unit	Value (N.m)
Disconnecting switch (option)	L1 /L2 /L3/N/PE	2
Terminal board X1	L1 /L2 /L3/N/PE	From 1.5 to 1.8
Terminal board X3		from 0.6 to 0.8
Transformer		1.7
Compressor fittings		
Tighten the phases (Only for 21kW)		2.5
Compressor speed variator		
6 M10 Nuts	L1 /L2 /L3/N	1.2
2 M10 or M8 Nuts	PE	1.2
9 M8 Nuts (with fuses and bus-bars)	1/2/3	1.2

5.3 TIGHTENING TORQUES FOR THE MAIN SCREWS AND BOLTS.

Type of screws	Use	Value (N.m)
Wood screw M8 H	Frame fixing to shipping pallet	13
M8 Nut H	Compressor fixing to plate exchanger lower manifold and Receiver fixing	15
Self-tapping screw d=4.2mm	Sheet metal components, plastic grid and electrical components	4.2
Self-tapping screw D=3mm	Deflector assembly on the front panel	2
Self-tapping screw M6	Fans sub-group and frame mounted on feet	7
M8 screw	Water pump assembly on the divider panel	15
D1" and D1"1/4" Gas duct nuts	Water pump inlet/outlet fittings	70
D1/2" Gas duct nuts	Screws assembly at water pump pipe inlet	20
Nut M6 H	Assembly of propellers on fan motor	7

5.4 AIR HEAT EXCHANGER.

We recommend regularly inspecting the finned air coils to check the level of fouling.
This depends on the environment where the unit is installed. The level of fouling will be worse in urban and industrial sites, as well as near trees that lose their leaves.
There are two maintenance levels to clean the coils:

- If the air heat exchangers are encrusted, clean them gently with a brush in a vertical direction.
- Turn off the fans before working on the air heat exchangers.
- To perform this type of intervention, stop the unit only if the maintenance considerations allow it.
- Perfectly clean air heat exchangers ensure an optimal operation of the unit. When the air heat exchangers begin to encrust, they must be cleaned. The cleaning frequency depends on the season and location of the unit (ventilated, wooded, dusty, etc.).

Clean the air coil using suitable products.
Attention: do not use pressurised water without a large diffuser. Do not use high-pressure cleaners for Cu/Cu and Cu/Al air coils.
Concentrated and/or rotating water jets are strictly prohibited. Never use fluid with a temperature above 45°C to clean the air heat exchangers.
Proper and frequent cleaning (approx. every three months) prevents 2/3 of corrosion problems.

5.5 WATER HEAT EXCHANGER MAINTENANCE.

Check that:

- the layer of insulating foam is intact and firmly in place;
- the plate exchanger and electric heaters of pipes work, and are properly and firmly positioned;
- the water side connections are clean and do not show signs of leakage.

5.6 UNIT MAINTENANCE.

Attention: before working on the unit, make sure that the circuit is isolated and that there is no voltage present. Note that it may take 5 minutes for the circuit condensers to completely discharge after isolating the circuit. Interventions on variable frequency drives (VFD) are only permitted to qualified personnel.
In case of alarms or persistent problems with the variable frequency drives, contact the Technical assistance centre.
The variable frequency drives fitted on the Audax Top 18-21 ErP units should not be subjected to insulation test, even when replaced, as they are systematically checked before delivery. Furthermore, the filtering components installed on the variable frequency drives can distort the measurements and also be damaged. Should it be necessary to test the insulation of the unit components (motors and pumps of fans, cables, etc.), the variable frequency drives must be disconnected from the power supply circuit.

5.7 COOLANT VOLUME.

It is necessary to operate the unit in Cool Mode to verify if the charge is correct, checking the actual subcooling.
Following a small coolant leak, you can note, in the Cool Mode, that, compared to the initial charge, the coolant volume has decreased, altering the subcooling value detected at outlet of the air heat exchanger (condenser). However, you cannot notice these changes in Heat Mode.

Important: It is not, therefore, possible to optimise the coolant charge in Heat Mode following a leak. To verify whether additional charge is required, it is necessary to operate the unit in Cool Mode.

5.8 R-410A FEATURES.

Saturation temperatures referred to the actual pressure in kPag					
Saturated Temp. °C	**Manometer kPag**	**Saturated Temp. °C**	**Manometer kPag**	**Saturated Temp. °C**	**Manometer kPag**
-20	297	**11**	1020	**42**	2429
-19	312	**12**	1053	**43**	2490
-18	328	**13**	1087	**44**	2551
-17	345	**14**	1121	**45**	2614
-16	361	**15**	1156	**46**	2678
-15	379	**16**	1192	**47**	2744
-14	397	**17**	1229	**48**	2810
-13	415	**18**	1267	**49**	2878
-12	434	**19**	1305	**50**	2947
-11	453	**20**	1344	**51**	3017
-10	473	**21**	1384	**52**	3088
-9	493	**22**	1425	**53**	3161
-8	514	**23**	1467	**54**	3234
-7	535	**24**	1509	**55**	3310
-6	557	**25**	1596	**56**	3386
-5	579	**26**	1552	**57**	3464
-4	602	**27**	1641	**58**	3543
-3	626	**28**	1687	**59**	3624
-2	650	**29**	1734	**60**	3706
-1	674	**30**	1781	**61**	3789
0	700	**31**	1830	**62**	3874
1	726	**32**	1880	**63**	3961
2	752	**33**	1930	**64**	4049
3	779	**34**	1981	**65**	4138
4	807	**35**	2034	**66**	4229
5	835	**36**	2087	**67**	4322
6	864	**37**	2142	**68**	4416
7	894	**38**	2197	**69**	4512
8	924	**39**	2253	**70**	4610
9	956	**40**	2311		
10	987	**41**	2369		

The units use R-410A high pressure coolant (the operating pressure of the unit is above 40 bar; the pressure with a 35°C air temperature is 50% higher than R-22). This is why, whenever you intervene on the cooling circuit, it is essential to use special equipment (pressure gauges, connection hoses, etc.).

6 START-UP CHECKLIST OF THE AUDAX TOP 18-21 ERP UNIT HEAT PUMPS (TO BE USED FOR THE WORK ARCHIVE).

6.1 GENERAL INFORMATION.

Presentation	
Client	
Installation site	
Installer	
Distributor	
Start-up carried out by	Date
Equipment	
Type of unit	
Serial number:	
Software version	
Compressor	Model number
	Serial number:
Air Treatment Appliance	
	Manufacturer
	Model number
	Serial number:

6.2 CHECKS TO BE PERFORMED BEFORE STARTING THE UNIT.

		Yes	No	Comment
CHECKS TO BE PERFORMED BEFORE START-UP	Are there transport damages?			
	The unit has been installed at level			
	The power supply voltage complies with the identification plate instructions			
	The electrical circuit cables have been properly sized			
	The unit has been earthed			
	The neutral conductor of the unit has been connected			
	All terminals are tight			
	All cables and thermistors were inspected for the presence of any tangled wires			
	All cover units are tight			
	All terminal units are in operation			
	All water valves are open			
	All fluid intake lines are properly connected			
	All air has been vented from the system			
	The pump is working in the right direction of rotation			
	The pump control has been properly interlocked to the heat pump			
	The unit (including fittings) has been inspected to detect any leaks: Locate, repair and report any coolant leaks			
	All power supply voltages comply with the specifications on the coolant plate.			

6.3 CHECKS TO BE PERFORMED DURING UNIT OPERATION.

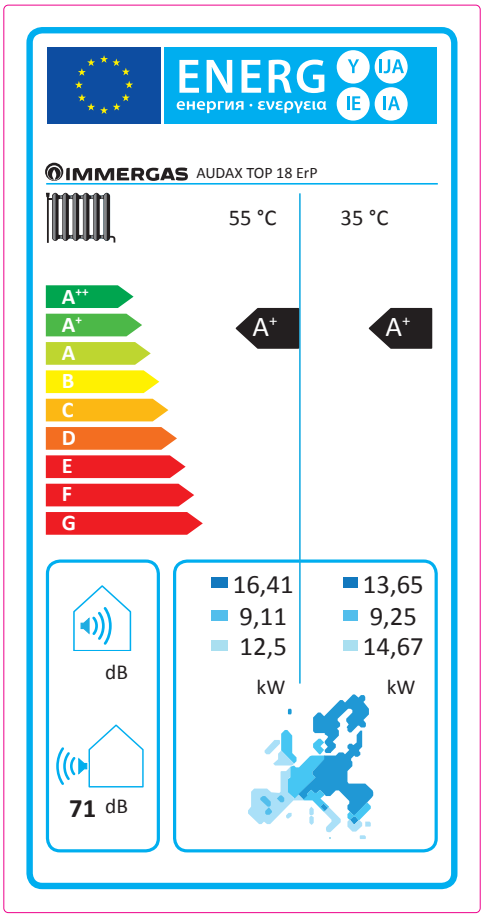
Date / Time								
CHECKS TO BE PERFORMED DURING OPERATION	Air	External Air Temp	°C					
	Water	Return temperature	°C					
		Flow temperature	°C					
		Water temp control	°C					
	Pressure	Compressor intake Sat. Temp.	°C					
		Compressor intake temp.	°C					
		Overheating Temp.	K					
		Target Overheating Temp.	K					
	Gas	Compressor outlet temp.	°C					
		Coolant temp. on exchanger	°C					
	Compressor	Requested frequency	Hz					
		PdC frequency	Hz					
	Water adjustment	Water control point	°C					
		Flow switch state	-					
		Safety switch state	-					
	Water flow rate / pressure	Water pressure at heat exchanger inlet	kPa					
		Water pressure at heat exchanger outlet	kPa					
		External pressure available	kPa					
		Curve flow rate	l/s					
	Power	Mains voltage	V					
		Input amperage	A					

6.4 CHECKS TO BE PERFORMED DURING MAINTENANCE.

Date / Time						
CHECKS TO BE PERFORMED DURING MAINTENANCE	Check	Mechanical check				
		Leak check				
		AP Pressure switch operation test				
		Drain valve control				
		Electrical connection control				
	Antifreeze protection	Antifreeze protection control				
		Add glycol to water (%)				
	Cleaning	Cleaning of air coils				
		Cleaning of water filter				

Observations:

6.5 PRODUCT FICHE (IN COMPLIANCE WITH REGULATION 811/2013).



Low temperature (30/35)

Parameter	Value	Colder zones	Average zones	Hotter zones
Annual energy consumption for the central heating function (Q_{HE})	kWh/year	10.390	5.169	3.425
Room central heating seasonal efficiency (η_s)	ηs %	121	144	225
Nominal heat output	kW	13.65	9.25	14.67

Average temperature (47/55)

Parameter	Value	Colder zones	Average zones	Hotter zones
Annual energy consumption for the central heating function (Q_{HE})	kWh/year	13.894	6.260	4.383
Room central heating seasonal efficiency (η_s)	ηs %	108	118	149
Nominal heat output	kW	16.41	9.11	12.5

For proper installation of the appliance refer to chapter 1 of this booklet (for the installer) and current installation regulations. For proper maintenance refer to chapter 3 of this booklet (for the maintenance technician) and adhere to the frequencies and methods set out herein.

Low temperature table (30/35) colder zones

Model: **Audax TOP 18 ErP**							
Air/water heat pump: yes							
Water/water heat pump: no							
Brine/water heat pump: no							
Low temperature heat pump: no							
With additional central heating device: no							
Mixed central heating device with heat pump: no							
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application							
The parameters are declared for colder climatic conditions.							
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	13.65	kW		**Room central heating seasonal energy efficiency**	η_s	121	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*	8.26	kW		T_j = – 7 °C	*COPd*	2.12	–
T_j = + 2 °C	*Pdh*	5,81	kW		T_j = + 2 °C	*COPd*	4.03	–
T_j = + 7 °C	*Pdh*	3.47	kW		T_j = + 7 °C	*COPd*	7.38	–
T_j = + 12 °C	*Pdh*	4.11	kW		T_j = + 12 °C	*COPd*	10,02	–
T_j = bivalent temperature	*Pdh*	8.26	kW		T_j = bivalent temperature	*COPd*	2.12	–
T_j = temperature operating limit	*Pdh*	4	kW		T_j = temperature operating limit	*COPd*	1.65	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	-7	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	60	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	8.93	kW
Thermostat mode off	P_{TO}	0.024	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 71	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	10.390	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

Low temperature table (30/35) average zones

Model: **Audax TOP 18 ErP**								
Air/water heat pump: yes								
Water/water heat pump: no								
Brine/water heat pump: no								
Low temperature heat pump: no								
With additional central heating device: no								
Mixed central heating device with heat pump: no								
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application								
The parameters are declared for average climatic conditions.								
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	9.25	kW		**Room central heating seasonal energy efficiency**	η_s	144	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*	8.18	kW		T_j = – 7 °C	*COPd*	2.14	–
T_j = + 2 °C	*Pdh*	5.70	kW		T_j = + 2 °C	*COPd*	3.56	–
T_j = + 7 °C	*Pdh*	3.39	kW		T_j = + 7 °C	*COPd*	5.30	–
T_j = + 12 °C	*Pdh*	4.08	kW		T_j = + 12 °C	*COPd*	8.00	–
T_j = bivalent temperature	*Pdh*	8.18	kW		T_j = bivalent temperature	*COPd*	2.14	–
T_j = temperature operating limit	*Pdh*	6.83	kW		T_j = temperature operating limit	*COPd*	2.01	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	-7	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	60	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	2.42	kW
Thermostat mode off	P_{TO}	0.024	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 71	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	5.169	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

Low temperature table (30/35) hotter zones

Model: **Audax TOP 18 ErP**							
Air/water heat pump: yes							
Water/water heat pump: no							
Brine/water heat pump: no							
Low temperature heat pump: no							
With additional central heating device: no							
Mixed central heating device with heat pump: no							
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application							
The parameters are declared for hotter climatic conditions.							
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	14.67	kW		**Room central heating seasonal energy efficiency**	η_s	225	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*		kW		T_j = – 7 °C	*COPd*		–
T_j = + 2 °C	*Pdh*	14.67	kW		T_j = + 2 °C	*COPd*	2.82	–
T_j = + 7 °C	*Pdh*	9.43	kW		T_j = + 7 °C	*COPd*	3.96	–
T_j = + 12 °C	*Pdh*	3.88	kW		T_j = + 12 °C	*COPd*	9.46	–
T_j = bivalent temperature	*Pdh*	14.67	kW		T_j = bivalent temperature	*COPd*	2.82	–
T_j = temperature operating limit	*Pdh*	14.67	kW		T_j = temperature operating limit	*COPd*	2.82	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	2	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	60	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	0.00	kW
Thermostat mode off	P_{TO}	0.024	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—	2600	m^3/h
Indoor/outdoor sound level	L_{WA}	x / 71	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	3.425	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

Average temperature table (47/55) colder zones

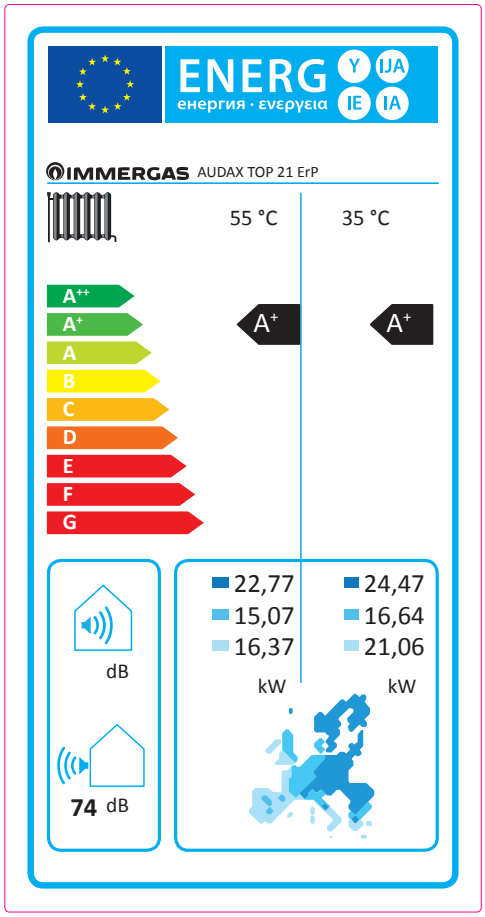
Model: **Audax TOP 18 ErP**							
Air/water heat pump: yes							
Water/water heat pump: no							
Brine/water heat pump: no							
Low temperature heat pump: no							
With additional central heating device: no							
Mixed central heating device with heat pump: no							
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application							
The parameters are declared for colder climatic conditions							
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	16.41	kW		**Room central heating seasonal energy efficiency**	η_s	108	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*	9.93	kW		T_j = – 7 °C	*COPd*	2.03	–
T_j = + 2 °C	*Pdh*	6.05	kW		T_j = + 2 °C	*COPd*	3.52	–
T_j = + 7 °C	*Pdh*	3.74	kW		T_j = + 7 °C	*COPd*	5.19	–
T_j = + 12 °C	*Pdh*	3.91	kW		T_j = + 12 °C	*COPd*	6.74	–
T_j = bivalent temperature	*Pdh*	9.93	kW		T_j = bivalent temperature	*COPd*	2.03	–
T_j = temperature operating limit	*Pdh*	4.69	kW		T_j = temperature operating limit	*COPd*	1.36	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	-7	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	60	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	10.85	kW
Thermostat mode off	P_{TO}	0.044	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 71	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	13.894	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

Average temperature table (47/55) average zones

Model: **Audax TOP 18 ErP**							
Air/water heat pump: yes							
Water/water heat pump: no							
Brine/water heat pump: no							
Low temperature heat pump: no							
With additional central heating device: no							
Mixed central heating device with heat pump: no							
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application							
The parameters are declared for average climatic conditions							
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	9.11	kW		**Room central heating seasonal energy efficiency**	η_s	118	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*	8.15	kW		T_j = – 7 °C	*COPd*	1.78	–
T_j = + 2 °C	*Pdh*	4.84	kW		T_j = + 2 °C	*COPd*	2.97	–
T_j = + 7 °C	*Pdh*	3.37	kW		T_j = + 7 °C	*COPd*	4.21	–
T_j = + 12 °C	*Pdh*	3.89	kW		T_j = + 12 °C	*COPd*	5,81	–
T_j = bivalent temperature	*Pdh*	8.15	kW		T_j = bivalent temperature	*COPd*	1.78	–
T_j = temperature operating limit	*Pdh*	7.61	kW		T_j = temperature operating limit	*COPd*	1.64	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	-7	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	60	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	1.6	kW
Thermostat mode off	P_{TO}	0.044	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 71	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	6,189	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

Average temperature table (47/55) hotter zones

Model: **Audax TOP 18 ErP**							
Air/water heat pump: yes							
Water/water heat pump: no							
Brine/water heat pump: no							
Low temperature heat pump: no							
With additional central heating device: no							
Mixed central heating device with heat pump: no							
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application							
The parameters are declared for hotter climatic conditions							
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	12.5	kW		**Room central heating seasonal energy efficiency**	η_s	149	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*		kW		T_j = – 7 °C	*COPd*		–
T_j = + 2 °C	*Pdh*	12.5	kW		T_j = + 2 °C	*COPd*	2.48	–
T_j = + 7 °C	*Pdh*	7.66	kW		T_j = + 7 °C	*COPd*	3.32	–
T_j = + 12 °C	*Pdh*	3.78	kW		T_j = + 12 °C	*COPd*	4.67	–
T_j = bivalent temperature	*Pdh*	12.50	kW		T_j = bivalent temperature	*COPd*	2.48	–
T_j = temperature operating limit	*Pdh*	12.50	kW		T_j = temperature operating limit	*COPd*	2.48	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	2	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	60	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	0.00	kW
Thermostat mode off	P_{TO}	0.044	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 71	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	4.383	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							



Low temperature (30/35)

Parameter	Value	Colder zones	Average zones	Hotter zones
Annual energy consumption for the central heating function (Q_{HE})	kWh/year	19,152	9,625	5,764
Room central heating seasonal efficiency (η_s)	ηs %	117	139	192
Nominal heat output	kW	24.47	16.64	21.06

Average temperature (47/55)

Parameter	Value	Colder zones	Average zones	Hotter zones
Annual energy consumption for the central heating function (Q_{HE})	kWh/year	22,602	10,889	5,983
Room central heating seasonal efficiency (η_s)	ηs %	92	111	143
Nominal heat output	kW	22.77	15.07	16.37

For proper installation of the appliance refer to chapter 1 of this booklet (for the installer) and current installation regulations. For proper maintenance refer to chapter 3 of this booklet (for the maintenance technician) and adhere to the frequencies and methods set out herein.

Low temperature table (30/35) colder zones

Model: **Audax TOP 21 ErP**								
Air/water heat pump: yes								
Water/water heat pump: no								
Brine/water heat pump: no								
Low temperature heat pump: no								
With additional central heating device: no								
Mixed central heating device with heat pump: no								
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application								
The parameters are declared for colder climatic conditions								
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	24.47	kW		**Room central heating seasonal energy efficiency**	η_s	117	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*	14.81	kW		T_j = – 7 °C	*COPd*	2.39	–
T_j = + 2 °C	*Pdh*	9.12	kW		T_j = + 2 °C	*COPd*	3.62	–
T_j = + 7 °C	*Pdh*	9.36	kW		T_j = + 7 °C	*COPd*	6.00	–
T_j = + 12 °C	*Pdh*	9.21	kW		T_j = + 12 °C	*COPd*	7.14	–
T_j = bivalent temperature	*Pdh*	14.81	kW		T_j = bivalent temperature	*COPd*	2.39	–
T_j = temperature operating limit	*Pdh*	5.89	kW		T_j = temperature operating limit	*COPd*	1.78	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	-7	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	57	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	17.29	kW
Thermostat mode off	P_{TO}	0.054	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 74	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	19,152	kWh					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

Low temperature table (30/35) average zones

Model: **Audax TOP 21 ErP**							
Air/water heat pump: yes							
Water/water heat pump: no							
Brine/water heat pump: no							
Low temperature heat pump: no							
With additional central heating device: no							
Mixed central heating device with heat pump: no							
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application							
The parameters are declared for average climatic conditions							
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	16.64	kW		**Room central heating seasonal energy efficiency**	η_s	139	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*	14.72	kW		T_j = – 7 °C	*COPd*	2.26	–
T_j = + 2 °C	*Pdh*	8.97	kW		T_j = + 2 °C	*COPd*	3.33	–
T_j = + 7 °C	*Pdh*	9.40	kW		T_j = + 7 °C	*COPd*	5.53	–
T_j = + 12 °C	*Pdh*	10.96	kW		T_j = + 12 °C	*COPd*	7,36	–
T_j = bivalent temperature	*Pdh*	14.72	kW		T_j = bivalent temperature	*COPd*	2.26	–
T_j = temperature operating limit	*Pdh*	10.13	kW		T_j = temperature operating limit	*COPd*	2.22	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	-7	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	57	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	6.51	kW
Thermostat mode off	P_{TO}	0.054	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 74	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	9,625	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

Low temperature table (30/35) hotter zones

Model: **Audax TOP 21 ErP**							
Air/water heat pump: yes							
Water/water heat pump: no							
Brine/water heat pump: no							
Low temperature heat pump: no							
With additional central heating device: no							
Mixed central heating device with heat pump: no							
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application							
The parameters are declared for hotter climatic conditions							
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	21.06	kW		**Room central heating seasonal energy efficiency**	η_s	192	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*		kW		T_j = – 7 °C	*COPd*		–
T_j = + 2 °C	*Pdh*	21.06	kW		T_j = + 2 °C	*COPd*	2.57	–
T_j = + 7 °C	*Pdh*	13.40	kW		T_j = + 7 °C	*COPd*	4.70	–
T_j = + 12 °C	*Pdh*	5.70	kW		T_j = + 12 °C	*COPd*	5.59	–
T_j = bivalent temperature	*Pdh*	21.06	kW		T_j = bivalent temperature	*COPd*	2.57	–
T_j = temperature operating limit	*Pdh*	21.06	kW		T_j = temperature operating limit	*COPd*	2.57	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	2	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	57	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	0.00	kW
Thermostat mode off	P_{TO}	0.054	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 74	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	5,764	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

Average temperature table (47/55) colder zones

Model: **Audax TOP 21 ErP**							
Air/water heat pump: yes							
Water/water heat pump: no							
Brine/water heat pump: no							
Low temperature heat pump: no							
With additional central heating device: no							
Mixed central heating device with heat pump: no							
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application							
The parameters are declared for colder climatic conditions							
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	22.77	kW		**Room central heating seasonal energy efficiency**	η_s	92	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*	13.78	kW		T_j = – 7 °C	*COPd*	1.80	–
T_j = + 2 °C	*Pdh*	8.90	kW		T_j = + 2 °C	*COPd*	2.80	–
T_j = + 7 °C	*Pdh*	8.93	kW		T_j = + 7 °C	*COPd*	4.88	–
T_j = + 12 °C	*Pdh*	9.23	kW		T_j = + 12 °C	*COPd*	6.69	–
T_j = bivalent temperature	*Pdh*	13.78	kW		T_j = bivalent temperature	*COPd*	1.80	–
T_j = temperature operating limit	*Pdh*	4.82	kW		T_j = temperature operating limit	*COPd*	1.23	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	-7	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	57	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	16,75	kW
Thermostat mode off	P_{TO}	0.024	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 74	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	22,602	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

Average temperature table (47/55) average zones

Model: **Audax TOP 21 ErP**							
Air/water heat pump: yes							
Water/water heat pump: no							
Brine/water heat pump: no							
Low temperature heat pump: no							
With additional central heating device: no							
Mixed central heating device with heat pump: no							
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application							
The parameters are declared for average climatic conditions							
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	15.07	kW		**Room central heating seasonal energy efficiency**	η_s	111	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*	13.33	kW		T_j = – 7 °C	*COPd*	1.56	–
T_j = + 2 °C	*Pdh*	8.56	kW		T_j = + 2 °C	*COPd*	2.91	–
T_j = + 7 °C	*Pdh*	8.94	kW		T_j = + 7 °C	*COPd*	4.38	–
T_j = + 12 °C	*Pdh*	9.97	kW		T_j = + 12 °C	*COPd*	4.66	–
T_j = bivalent temperature	*Pdh*	13.33	kW		T_j = bivalent temperature	*COPd*	1.56	–
T_j = temperature operating limit	*Pdh*	8.95	kW		T_j = temperature operating limit	*COPd*	1.57	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	-7	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	57	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	6.12	kW
Thermostat mode off	P_{TO}	0.024	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 74	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	10,889	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

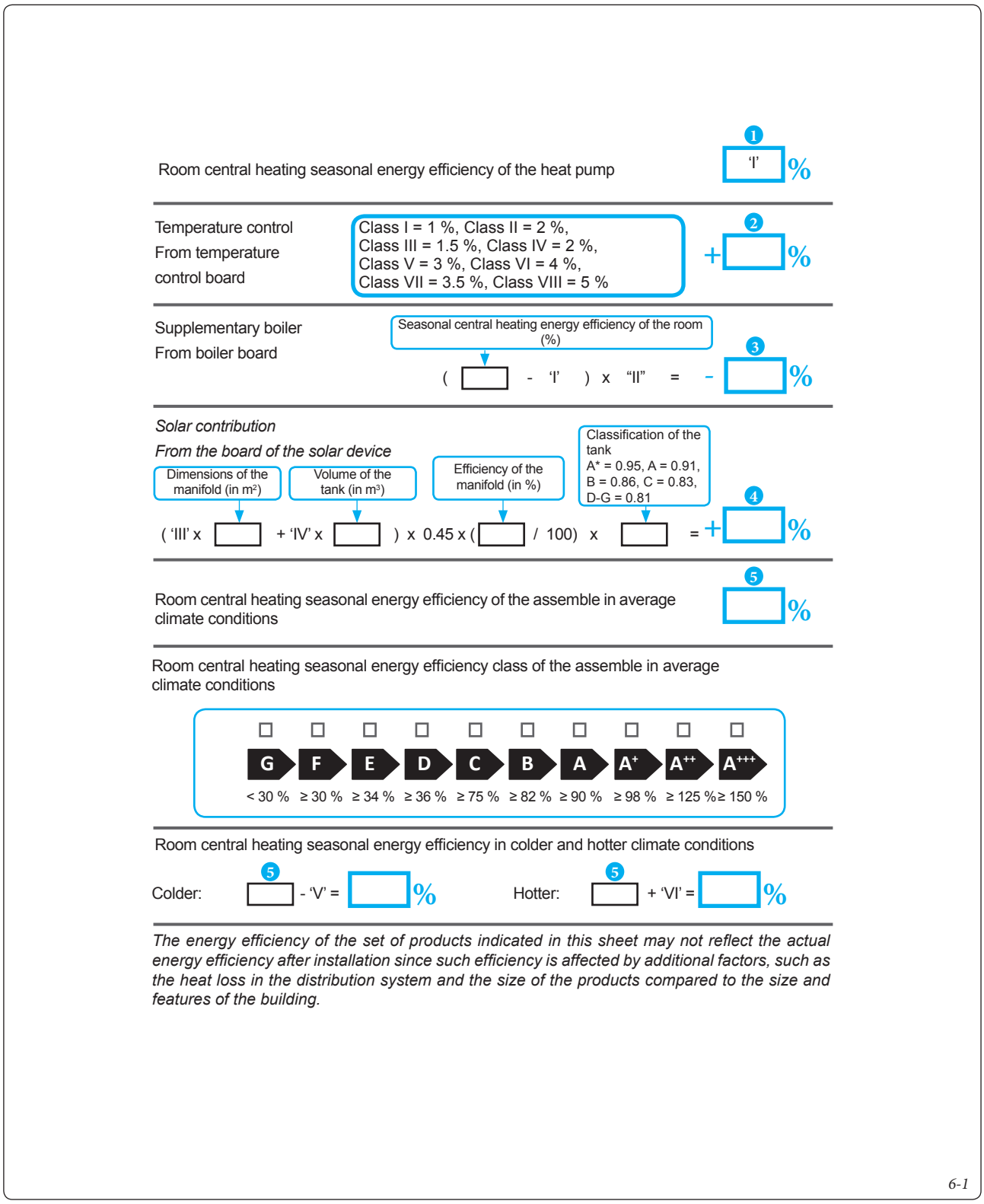
Average temperature table (47/55) hotter zones

Model: **Audax TOP 21 ErP**							
Air/water heat pump: yes							
Water/water heat pump: no							
Brine/water heat pump: no							
Low temperature heat pump: no							
With additional central heating device: no							
Mixed central heating device with heat pump: no							
The parameters are declared for average temperature application, except for low temperature heat pumps. The parameters for low temperature heat pumps are declared for low temperature application							
The parameters are declared for hotter climatic conditions							
Element	**Symbol**	**Value**	**Unit**		**Element**	**Symbol**	**Value**	**Unit**
Nominal heat output	*Nominal output*	16.37	kW		**Room central heating seasonal energy efficiency**	η_s	143	%
Central heating capacity declared with a partial load and indoor temperature equivalent to 20°C and outdoor temperature Tj					Performance coefficient declared with indoor temperature equivalent to 20°C and outdoor temperature TJ			
T_j = – 7 °C	*Pdh*		kW		T_j = – 7 °C	*COPd*		–
T_j = + 2 °C	*Pdh*	16.37	kW		T_j = + 2 °C	*COPd*	1.85	–
T_j = + 7 °C	*Pdh*	9.47	kW		T_j = + 7 °C	*COPd*	2.93	–
T_j = + 12 °C	*Pdh*	9.19	kW		T_j = + 12 °C	*COPd*	5.60	–
T_j = bivalent temperature	*Pdh*	16.37	kW		T_j = bivalent temperature	*COPd*	1.85	–
T_j = temperature operating limit	*Pdh*	16.37	kW		T_j = temperature operating limit	*COPd*	1.85	–
for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*Pdh*		kW		for air/water heat pumps: Tj = – 15 °C (if TOL < – 20 °C)	*COPd*		–
Bivalent temperature	T_{biv}	2	°C		for air/water heat pumps: temperature operating limit	*TOL*	-20	°C
Central heating capacity cycle intervals	*Pcych*		kW		Cycle intervals efficiency	*COPcyc or PERcyc*		–
Degradation coefficient	*Cdh*	0.9	—		Water heating temperature operating limit	*WTOL*	57	°C
Different mode of energy consumption from the active mode					Additional heating appliance			
OFF mode	P_{OFF}	0.000	kW		Nominal heat output	*Psup*	0.00	kW
Thermostat mode off	P_{TO}	0.024	kW		Type of energy supply voltage	integration		
Standby mode	P_{SB}	0.024	kW					
Guard heating mode	P_{CK}	0.024	kW					
Other items								
Capacity control	Variable				For air/water heat pumps: nominal air output to outside	—		m^3/h
Indoor/outdoor sound level	L_{WA}	x / 74	dB		For water or brine/water heat pumps: nominal flow of brine or water, outdoor heat exchanger	—		m^3/h
Annual energy consumption	Q_{HE}	5,983	kWh or GJ					
For mixed central heating appliances with a heat pump								
Stated load profile					**Water central heating energy efficiency**	η_{wh}		%
Daily electrical power consumption	Q_{elec}		kWh		Daily fuel consumption	Q_{fuel}		kWh
annual energy consumption	*AEC*		kWh		Annual fuel consumption	*AFC*		GJ
Contact information	Immergas s.p.a via Cisa Ligure n.95							

6.6 PARAMETERS FOR FILLING THE PACKAGE FICHE.

Should you wish to install an assembly, starting from the Audax TOP heat pump, use the package fiche in Fig. 6-4.
To complete it properly, fill the relevant spaces (as shown in the assembly sheet facsimile Fig. 6-1) with the values shown in tables Fig. 6-2 and 6-3.
The remaining values must be obtained from the technical data sheets of the products used to make up the assembly (e.g. solar devices, integration boiler, temperature controllers).
Use board Fig. 6-4 for "assemblies" related to the central heating function (e.g.: heat pump + temperature controller).
N.B.: since the product is supplied by default with a temperature controller, the package fiche must always be filled in.

Facsimile for filling in the package fiche for preferential boiler space heaters.



6-1

Parameters to fill in the low temperature package fiche (30/35).

Parameter	Audax TOP 18 ErP		
	Colder zones	Average zones	Hotter zones
'I'	120	141	194
'II'	*	*	*
'III'	3.44	5.43	6.58
'IV'	1.34	2.12	2.57

**to be established by means of table 6 of Regulation 811/2013 in case of an "assembly" including a boiler to integrate with the heat pump. In this case, the heat pump must be considered as the main appliance of the assembly.*

Parameter	**Audax TOP ErP**
'VI'	Remote control class supplied by default

6-2

Parameters to fill in the average temperature package fiche (47/55).

Parameter	Audax TOP 21 ErP		
	Colder zones	Average zones	Hotter zones
'I'	112	132	181
'II'	*	*	*
'III'	4.02	6.33	7.05
'IV'	1.57	2.47	2.75

**to be established by means of table 6 of Regulation 811/2013 in case of an "assembly" including a boiler to integrate with the heat pump. In this case, the heat pump must be considered as the main appliance of the assembly.*

Parameter	**Audax TOP ErP**
'VI'	Remote control class supplied by default

6-3

Room heating system package fiche.

Room central heating seasonal energy efficiency of the heat pump — 1 ___ %

Temperature control
From temperature control board
Class I = 1 %, Class II = 2 %, Class III = 1.5 %, Class IV = 2 %, Class V = 3 %, Class VI = 4 %, Class VII = 3.5 %, Class VIII = 5 %
+ 2 ___ %

Supplementary boiler
From boiler board
Seasonal central heating energy efficiency of the room (%)
(___ - _____) x _____ = - 3 ___ %

Solar contribution
From the board of the solar device
Dimensions of the manifold (in m^2) — Volume of the tank (in m^3) — Efficiency of the manifold (in %) — Classification of the tank: A* = 0.95, A = 0.91, B = 0.86, C = 0.83, D-G = 0.81
(___ x ___ + ___ x ___) x 0.45 x (___ / 100) x ___ = + 4 ___ %

Room central heating seasonal energy efficiency of the assemble in average climate conditions — 5 ___ %

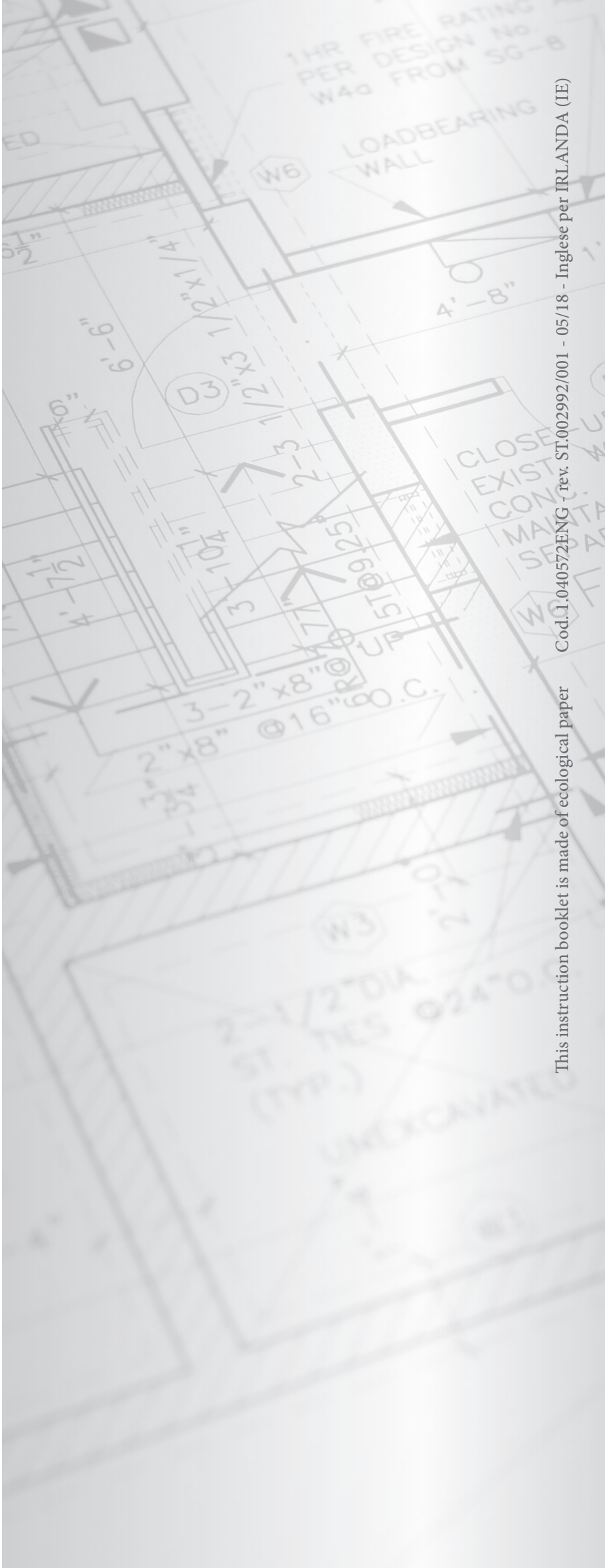
Room central heating seasonal energy efficiency class of the assemble in average climate conditions

G	F	E	D	C	B	A	A^+	A^{++}	A^{+++}
< 30 %	≥ 30 %	≥ 34 %	≥ 36 %	≥ 75 %	≥ 82 %	≥ 90 %	≥ 98 %	≥ 125 %	≥ 150 %

Room central heating seasonal energy efficiency in colder and hotter climate conditions

Colder: 5 ___ - __ = ___ % Hotter: 5 ___ + ___ = ___ %

The energy efficiency of the set of products indicated in this sheet may not reflect the actual energy efficiency after installation since such efficiency is affected by additional factors, such as the heat loss in the distribution system and the size of the products compared to the size and features of the building.



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