



CF-V 31-41-51-71-91-101- 121-142-182-202-242

VERTICAL WATER DUCTABLE TERMINAL UNIT WITH DECORATIVE
CABINET

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UNIT IDENTIFICATION

SERIAL NUMBER LABEL

The units are identified by the serial number label shown here.

The label lists the type of unit (series and size), serial number, year of manufacture, number of electrical diagram, main technical data, logo and address of the manufacturer.

The label is placed on the unit, generally near the electrical panel and also on the external panelling.

IT MUST NEVER BE REMOVED.

SERIAL NUMBER

This provides unique identification of the machine. It makes it possible to trace the specific features of the unit and to identify the components installed in it.

Without this number, it is not possible to identify with certainty the spare parts that are specific to that unit.

When requesting assistance, always provide the type of machine and the serial number.

Write them in the space below so that they are readily available when needed.

Type of unit : _____

Serial number : _____

Wiring diagram : _____

Year of manufacture : _____

LOGO		CE
TIPO TYPE/TYP TYPE/TIPO		
NUMERO MATRICOLA SERIAL NUMBER / SERIENNUMMER NUMERO DE SERIE / NUMERO DE SERIE		
ANNO DI FABBRICAZIONE YEAR OF MANUFACTURE / BAUJAHR ANNEE DE FABRICATION / AÑO DE FABRICACIÓN		
REFRIGERANTE REFRIGERANT / KÄLTEMITTEL REFRIGERANT / REFRIGERANTE	GRUPPO (PED) GROUP / GRUPPE GROUPE / GRUPO	
CARICA REFRIGERANTE REFRIG. CHARGE / KÄLTEMITTELFÜLLUNG CHARGE REFRIG. / CARGA REFRIG.	Kg	
TENSIONE VOLTAGE / SPANNUNG TENSION / TENSION	V/Ph/Hz	
F.L.A.	A	
F.L.I.	kW	
SCHEMA ELETTRICO WIRING DIAGRAM / SCHALTPLAN SCHEMA ELECTRIQUE / ESQUEMA ELÉCTRICO	N°	
PRESSIONE MASSIMA ESERCIZIO MAX OPERATING PRESS. / MAX BETRIEBSDRUCK PRESS. DE SERVICE MAX / PRESIÓN DE EJERCICIO MÁX	bar	
CATEGORIA PED PED CATEGORY / PED KATEGORIE CATEGORIE PED / CATEGORIA PED	PS H/L bar	
TEMP. LATO BP TEMPERATURE ON LP SIDE / TEMP. ND-SEITE TEMP. COTE BP / TEMP. PARTE BP	°C	
INDIRIZZO / ADDRESS / ADRESSE / ADRESSE / DIRECCIÓN		

INSTRUCTIONS FOR THE USER

- **This is a partial syntax of the information provided in the manual; carefully read this manual**
- Carefully read this manual. Keep it with the electrical diagram. Make it available to technicians for servicing.
- Ask the installer for training on start-up, shutdown, changing set points, placing in at-rest status, maintenance, what to do or not to do in the event of a breakdown.
- Provide for scheduled maintenance by specialized technicians so as to ensure long-lasting operation of the unit.
- If you expect the machine to be shut down for long periods of time, disconnect the electrical power supply. In winter, take necessary measures to deal with possible freezing (unit and system pipes) .

GENERAL WARNINGS

MANUAL PURPOSE

This manual has been designed to enable the unit to be installed, started up and maintained correctly.

MANUAL INSTRUCTIONS

It is essential to observe these instructions.

The manufacturer declines all liability for any damage that may be caused whether directly or indirectly to persons or things if these instructions are not heeded.

MANUAL STORAGE

This manual and the unit's wiring diagram should be carefully stored so that they are readily available to the operator when required.

EXPERT PERSONAL

The unit must be installed, tested and maintained by expert personal who meet the relevant legal requirements (Italian law No. 46 of 5/3/1990).

LOCAL SAFETY REGULATION INSTALLATION

The installation must be performed observing the local safety regulations.

POWER SUPPLY

Make sure the power supply conforms to the data on the unit's rating plate, located inside the door of the main electrical panel.

PACKAGING

The packaging material (plastic bags, polystyrene foam, nails, etc.) is potentially dangerous and should therefore be kept away from children and recycled in compliance with the local regulations in force.

MAINTENANCE

Before performing any service operations, cut off the power. Perform the operations in conformity with the local regulations in force.

PERIODICAL INSPECTIONS

Perform periodical inspections to locate possible loosened or broken parts. If the repairs are not performed, there will be a higher risk for things and peoples to become damaged and injured.

FAULT – POOR OPERATION

Switch off the unit in the event of faults or poor operation.

REPAIR

Only have repairs carried out by a service centre authorised by the manufacturer, and insist on the use of original spare parts only.

Failure to comply with the above may compromise the safety of the unit.

MODIFICATIONS

The manufacturer will not accept any responsibility, and the warranty will lapse, in the event of electric and/or mechanical modifications. Any modification which is not formally authorized, and which does not respect the instructions given in this manual, will cause the warranty to lapse.

INTENDED USE

The unit must only be used for the specific purpose it was designed :

The unit is designed for civil air-conditioning within the limits defined in the technical bulletin and this manual.

Any use other than that specified does not imply any commitment or constraint by the manufacturer in any way whatsoever.

ADDITIONAL SAFETY PRECAUTIONS

This unit has been especially designed and manufactured so to prevent any risk to persons and health hazard.

For this reason, design solutions fit to eliminate (where possible) any cause of risk and sensibly reduce the probability of danger have been adopted.

Please refer to the "Residual Risks" section of this manual and strictly observe the behaviour prescriptions listed there in order to prevent any possible risk that hasn't been possible to avoid in the design stage.

DATA UPDATING

The manufacturer may be able to modify the data without prior notice as a consequence of constant improvements.

REGULATIONS AND CERTIFICATIONS

UNI EN ISO 9001 CERTIFICATION

Clivet S.p.A., in order to guarantee customer satisfaction, has chosen the ISO 9001 Quality System as the reference for all its business activities. This is demonstrated by the company's commitment to ongoing improvements in the quality and reliability of its products; its sales, design, purchasing, production and after-sales service activities are the means used to reach such purpose.

CE MARK



Clivet products bear the CE mark, in compliance with the requirements of the following EC directives, including the latest amendments, and with the corresponding national approximated legislation:

- - 98/37/CE
- - 89/336/CEE as modified by the directives 92/31/CEE and 93/68/CEE
- - 73/23/CEE as modified by the directive 93/68/CEE
- - 97/23/CE

RESIDUAL RISKS

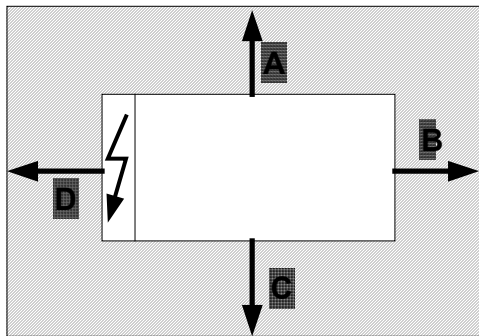
GENERAL

This section lists some of the more common situations which, being beyond the control of the manufacturer, could be a source of risk to persons or property.

DANGER AREA

The figure below highlights the area in which only authorised personnel may operate.

- **External danger zone**, identified by a precise area around the unit and its vertical projection on the ground in the case of hanging unit.
- **Internal danger zone**, identified by the area that can be entered only after having intentionally removed the protecting panels or parts of these.



A = 1000 mm

B = 1000 mm

C = 1000 mm

D = 1000 mm

HANDLING

If handling operations are undertaken without adopting all the necessary safety procedures and exercising due care, the unit can fall or topple, causing damage — possibly extremely serious — to persons and/or property, and to the unit itself.

Ensure the unit is handled and manoeuvred as directed on the packing and in the present manual, and in accordance with local regulations.

In the event of refrigerant gas escaping, refer to the “Safety datasheet” for the particular refrigerant.

INSTALLATION

Incorrect installation of the unit can result in water leaks, accumulation of condensate, escape of refrigerant, electric shocks, fire, as well as irregular operation or damage to the unit itself.

Make certain that the installation is carried out only by a qualified technician, also that the directions contained in this manual are followed and local statutory regulations observed.

In the event of the unit being installed in a site where there is even the slightest risk of inflammable gas escapes and consequently the possibility of such gases accumulating in area around the unit, the risk of explosion and fire cannot be discounted.

Take every care and precaution when selecting the installation site.

Installation on a structure not able to bear the weight and/or afford a secure anchorage of the equipment may cause the unit to fall and/or topple, resulting in damage to persons or property, or to the unit itself. Make certain that every care

and precaution is taken when positioning and securing the unit.

If the unit is easily accessible to children, unauthorized persons or animals, this is a situation that can give rise to accidents and injuries, perhaps serious. Install the unit in a place where access is allowed only to authorized persons, or install barriers or guards preventing unauthorized entry.

GENERAL RISKS

A smell of burning, smoke or other indications of serious irregularity could signal the onset of situations liable to cause damage to persons or property or to the unit itself. Isolate the unit from the electrical power supply (red-and-yellow) switch.

Contact an authorized service centre so that the source of the problem can be identified and remedied.

Accidental contact with heat exchange coils, compressors, pressure pipelines or other components can result in wounding or burns, or both.

Always wear suitable clothing, including protective gloves, when working in the danger area.

Maintenance or repairs carried out by unskilled operatives can result in harm or damage to persons and property, or to the unit itself. Always contact an authorized service centre.

Failure to close the panels of the unit, or to check that all the fixing screws of the panels are properly tightened, can result in harm or damage to persons or property, or to the unit itself.

Verify periodically that all panels are closed and made properly secure.

In the event of fire, the temperature of the refrigerant can rise to the point that pressure will exceed safety levels and perhaps cause fluid to be projected. It may also happen that parts of the circuit isolated by closed valves will explode.

Do not stand near safety valves, and never leave the valves of the refrigerant circuit closed.

ELECTRICAL SYSTEM

If the power line connecting the unit to the a.c. supply is incomplete, or if the connection is made with cables of incorrect cross section and/or with insufficiently rated protective devices, this can result in electric shock, toxicity hazard, damage to the unit or fire.

All work on the electrical system should be carried out referring to the wiring diagram and to the directions given in this manual, and the system itself must be dedicated.

Failure to secure the cover enclosing electrical components can lead to the infiltration of dust and water, ultimately causing electric shocks, damage to the unit, or fire.

Always fasten the cover securely to the unit.

If live metal parts of the unit are not connected properly to the earth system, they can cause electric shock or even death by electrocution.

Make absolutely certain that the connection to the earth system is made in accordance with correct practice.

Contact with live parts rendered accessible internally of the unit when the guards are removed can result in electric shock, burns or death by electrocution.

Before exposing these parts, make certain the isolating switch on the power line to the unit is set to the OFF position and padlocked, and post a warning sign.

Contact with parts that could become live when the unit is started up can result in electric shock, burns or death by electrocution.

When there is no need for circuits to be powered up, set the isolating switch on the power line to the OFF position, padlock it and post a warning sign.

MOVING PARTS

Contact with the fan rotors can cause injury.

Before removing the protective grilles or the fans themselves, make certain the isolating switch on the power line to the unit is set to the OFF position and padlocked, and post a warning sign.

Before removing the protective grilles or the fans themselves, make certain the isolating switch on the power line to the unit is set to the OFF position and padlocked, and post a warning sign.

WATER SYSTEM

Defects affecting pipelines, connections or valves and other control componentry can result in water being leaked or sprayed from the system, occasioning damage to property or causing short circuits in the unit.

Make certain all hydraulic connections are securely made, following the directions given in the present manual.

RECEPTION

INSPECTION UPON RECEPTION

Check on arrival that the unit has not suffered damage during transit and that it is complete in every part as specified in the order. In the event of visible damage/deficiencies being discovered, make a note immediately on the delivery document with the comment: **CONDITIONAL ACCEPTANCE — CLEAR EVIDENCE OF DEFICIENCIES/DAMAGE DURING TRANSIT**

Inform both the supplier and the carrier of the details by fax and by registered mail with advice of receipt not later than 8 days after taking consignment. Notifications sent after 8 days have elapsed will be ignored.

STORAGE

Shelter from: direct sunlight, rain, sand and wind

Temperature: maximum 60°C minimum -10°C

Maximum humidity: 90%

The respect of the instructions on the exterior side of the packaging assures the physical and functional integrity of the unit for the final user's advantage.

It is recommended to:

- Handle carefully
- Keep in a dry place
- Avoid putting other objects on top of the unit (respect the limits of levels of superimposition shown in the package)
- Avoid placing the unit with thermoretractable protection under the sun since the pressure of the circuits can assume values which activate the safety valves.

HANDLING

The operation of handling the unit must be carried out respecting the instructions of the safety norms in force (Legislative Decree 626/94 and following modifications)

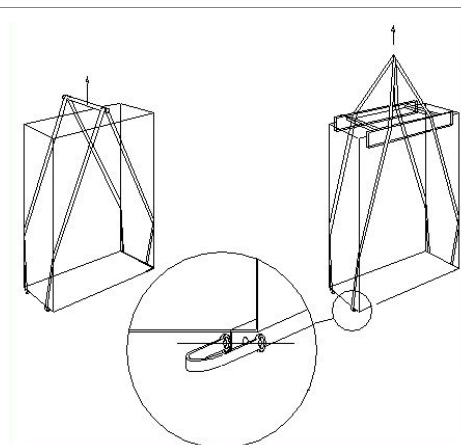
Before starting the handling operations:

- Value the critical points during handling (stairs, flights, disconnected routes, doors, etc)
- Verify that the lifting capacity of the means used is adequate to the unit weight
- Consider that the barycentre could be moved with respect to the center of the unit
- Before starting to lift, verify that the unit is at a stable balance

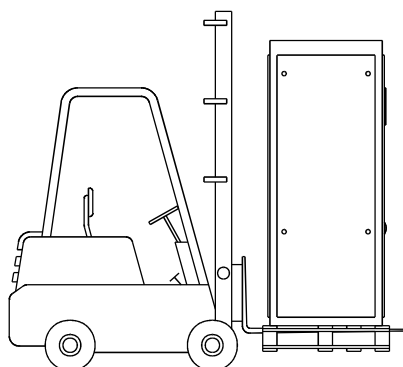
The following examples are indications; the choice of the means and of the handling modes will depend on factors, such as:

- The unit weight
- Type and overall dimensions of the unit
- Place and route for the handling (dirt yard, asphalted square, etc)
- Condition of the place of destination (roof, square, etc)
- Handling distance characteristics (distances, flights, steps, doors)

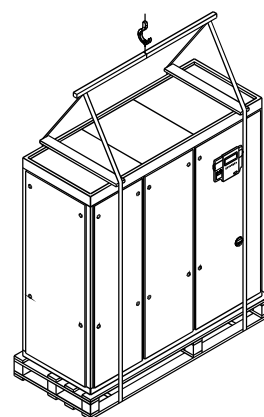
LABELS / YELLOW BRACKETS SHOW THE LIFTING POINTS



Rigid structure to prevent damage to the structure
Position U-shaped clips on base
Anchor belt to clips
Close with threaded pin.



Ensure that the unit is stable and balanced.
Keep in mind that the centre of balance may not be at the centre of the unit.



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Keep in mind that the centre of balance may not be at the centre of the unit.

REMOVING THE PACKING

For removing the packaging, use specific personal protection for the operator (gloves, glasses, etc.).

While removing the packaging, pay attention not to damage the unit.

Check for any visible damage.

Dispose of the packaging by taking it to specialist collection or recycling centres in accordance with local regulations.

POSITIONING

GENERAL

For installing air-conditioning systems, it is necessary to consider the following:

- the technical spaces necessary for the machine and system
- the place where the machine will be installed
- the transport of thermal carrier fluids and relevant connections to the unit:
 - water
 - air
 - refrigerant (unit in more sections)
- electrical connections

If these aspects are not evaluated carefully, they can affect the performances and the working life of the unit.

FUNCTIONAL CLEARANCES

When placing the unit, please respect the functional clearances indicated in DIMENSIONS section.

The functional spaces need to be observed because of the following:

- to guarantee the good operation of the unit
- to allow the performance of all maintenance operations

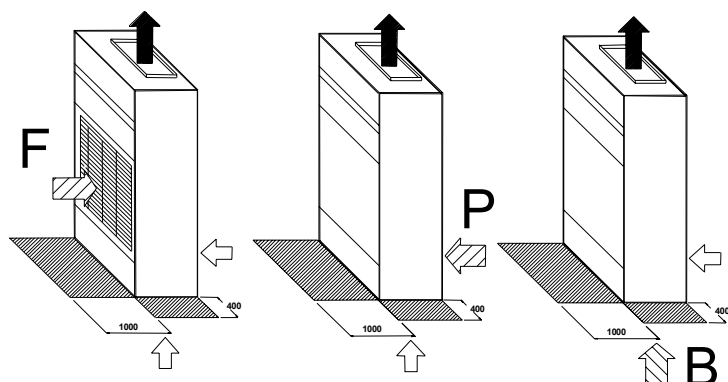
- to protect the authorized operators and exposed people

If more units are placed close to one another, the functional spaces must be doubled.

POSITIONING

1. The units are designed for **INDOOR** installations, performed in fixed positions and in areas accessible only to qualified and authorized personnel
2. **SAFETY VALVE** (only if present on the unit) : the installer is responsible for evaluating the opportunity of installing drain tubes, in conformity with the local regulations in force (EN 378)
3. Install the unit **raised** from the ground
4. avoid installations in places subject to **flooding**
5. Verify that the fixing/supporting points are level and suitable to support the **weight of the unit** (see the weight and the weights distribution)
6. to avoid noise and vibrations place a layer of rubber between the base of the unit and the floor/support

RETURN AIR RETURN CONFIGURATIONS



Possible return air configurations

- F = Front return (STD) with grille
 P = Back return with blind panel replacing the grille
 B = Bottom return with blind panel replacing the grille

Return air return

Discharge air

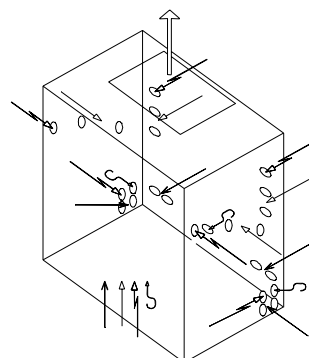
Fresh air duct

WARNING: When positioning the unit, leave enough space above to allow for the inspection of the air filters and all other components requiring service controls. Leave adequate clearance on the side for the connections and possible checks.

CONNECTION PROVISIONS

The fittings are located inside the cabinet in such a way that the connections on-site can be made from the sides or the rear. Pre-perforation featured at the positions indicated in the figure to the side for the piping inlets.

COLD WATER COIL CONNECTIONS
 HOT WATER COIL CONNECTIONS
 ELECTRICAL CONNECTIONS
 CONDENSATE DRAIN



WATER CONNECTIONS

GENERAL

Piping must be designed with the least possible number of bends and head variations. If the pressure chute of the installation is above the useful prevalence of the pump, the water delivery capacity is reduced as well as, as a consequence, the thermal exchange and the yield.

INTERCEPTING VALVES

Install on the input and output of the user parts (exchangers, coils, humidifiers, etc) So that it will be possible to carry out all the service operations and possible substitutions without emptying the installation.

PRESSURE AND TEMPERATURE INDICATOR

Install on the input and output of the user parts (exchangers, coils, humidifiers, etc) So that it will be possible to carry out all the service operations.

AUTOMATIC OR MANUAL ESCAPE VALVES

Install the highest points of tubes in a way that the air can escape form the circuit.

BLEEDING COCK

Install them at the lowest points of the circuit, so as to allow emptying.

LEAKAGE TESTS

Before performing the insulation of the tubes, carry out a leakage test.

TUBE INSULATION

All tubes of water must be insulated so that to avoid the formation of condensation and thermal dispersions along the tubes themselves. Verify that the insulation is the vapour coil type. The connections for the air escape and for the emptying must be out of the insulating thickness to assure the accessibility.

CONNECTIONS SUPPORTS

The weight of the hydraulic connections must be supported in the exterior of the unit so as not to stress the connections of user devices (exchangers, coils, humidifiers, etc) .

ANTI-VIBRATION DEVICES

In case of units with anti-vibration devices, it is necessary to assemble elastic joints, even on water connections.

RISK OF FREEZE

If the unit and the relevant water connections are subject to temperatures near 0°C:

- mix the water of the system with glycol
- protect the tubes with heating cables under the tubes insulation
- empty the system by verifying that:
 - no taps are closed so they can not trap the water, even after emptying
 - there are no low points where the water can stagnate even after emptying; blow if necessary

INSTALLATION EMPTYING

The refilling of the water present in the installation increase the oxidation phenomena and lime deposits.

If necessary empty only the interested system section and anyway empty or refill the installation if necessary .

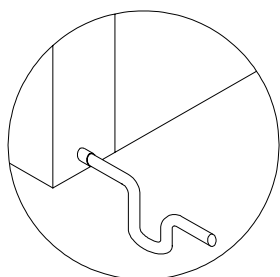
EXPANSION TANK

The installation must be kept at the right pressure by both an expansion tank and a combined valve of pressure reduction and discharge; if the components are present on the unit, they must be installed on the installation. The expansion tank must be dimensioned in function of the water in the installation.

MAX. WORKING PRESSURE =10Bar

ARIES EFFECTS AND AIR BUBBLES CAN PRODUCE THE OVERCOMING AND CAUSE WATER DROPS.

CONDENSATE DISCHARGE CONNECTION



1. The condensate must be dispersed to avoid damages to persons and property.
2. Unit discharge fitting : the connection must avoid the transmission of mechanical stresses and must be performed paying attention to avoid the damaging of the unit discharge fitting
3. Make a trap that, eliminating the depression caused by the fan, stops the return of gas from the discharge pipe (see the figure).
4. Connect the condensate discharge to a rainwater drain. Do NOT use sewerage drains, so as to avoid the return of odours if the water contained in the trap evaporates.
5. Finally, check that the condensate will drain correctly by pouring water into the tray stud.
6. RISK OF FREEZE : If the unit operates in cooling with outside temperatures lower than 0°C, value the possibility that the condensate can freeze blocking the downflow and provoking flooding. Use heat cables or other devices to guarantee the disposal.

WATER HEATING COIL

OPTIONAL - The position of the connections is shown on the dimensional drawing of the unit.

The air valve is placed on the top of the coil manifold, it is used to eliminate possible air bubbles on the circuit.

The discharge valve is placed on the bottom of the manifold, it is used to empty the coil if it is unused for a long period.

TO AVOID THE FREEZE FORMING INSIDE THE COIL

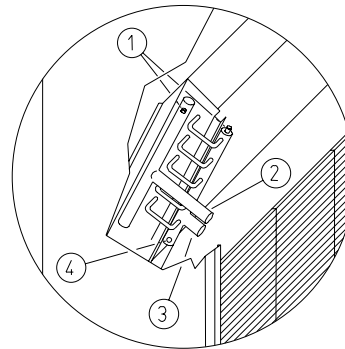
1. If the unit or the relevant water connection are subjects to temperatures next to 0°C see RISK OF FREEZE in the GENERAL WARNINGS paragraph.
2. The freeze forming is possible also in summer in abnormal operating conditions (ex. Insufficient air flow-rate for clogged filters). It is so recommended to glycolate or empty also in summer

Key:

- 1 – Air bleed valve
- 2 – Water input
- 3 – Water supply
- 4 – Discharge valve

WATER CONNECTIONS

Sizes	Ø GAS
31-41-51-71	1"
91-101-121	1" ¼
142-182	1" ½
202-242	2"



AIR CONNECTIONS

Proper execution and sizing of air connections are essential for ensuring correct operation of the unit and an acceptable level of silence in the room.

When designing and creating ducts, consider PRESSURE DROPS, FLOW RATE and AIR SPEED which need to be compatible with the characteristics of the unit. Special consideration needs to be made for pressure drops that are greater than the unit's static pressure, which would lead to a reduction in flow rate resulting in unit shutdown.

- the weight of the ducts must not be supported by the connection flanges
- place anti-vibration joints between the ducts and the unit
- the connection to the flanges and between the various sections of the ducts must ensure an airtight seal, preventing leakage in delivery and return which would compromise overall system efficiency.
- limit pressure drops by optimizing the path, the type and number of curves and the branches
- use curves with a wide radius. Consider whether it might be useful to equip them with deflectors (especially if the air speed is high or if curves are tight)

FEATURES FOR DUCTS FOR TREATED AIR

1. The inner surface of the duct must be smooth and washable. It must not contaminate the air.
2. Thermally insulate the ducts and the flanges so as to prevent loss of energy and condensation build-up.

Proper distribution of air in the room is essential for ensuring comfort levels.

In the selection and positioning of grilles, outlets and diffusers, the following are to be avoided:

3. excessive air speed
4. formation of stagnant zones and layering
5. entry of cold air into the room
6. formation of localized currents (due to uneven air distribution)
7. excessive variations in ambient temperature in the vertical and horizontal planes
8. short circuiting of delivery air towards return air

For purposes of comfort, the following things need to be considered:

9. air diffusers must be selected by checking the sound power generated at nominal flow rate conditions
10. the disconnections to the diffusers are to be made using flexible elements
11. the return grilles must be amply sized

ELECTRICAL CONNECTION

GENERAL

The characteristics of the electrical lines and relevant components must be determined by SPECIALIZED PERSONNEL ABLE TO DESIGN ELECTRICAL INSTALLATIONS; moreover, the lines must be in conformity with professional procedures and the regulations in force.

All electrical operations should be performed by trained PERSONNEL HAVING THE NECESSARY REQUISITES UNDER LAW and being informed about the risks relevant to these activities.

Before performing any operation on the electrical system, make sure that the unit supply line is SELECTED AT START.

The earth connection must be made prior to other electrical connections.

For all electrical type operations, REFER TO THE ELECTRICAL DIAGRAM ATTACHED TO THE UNIT; the number of the diagram is shown on the registration plate positioned on the electrical board or next to it.

The electrical diagram should be carefully kept together with this manual and should be AVAILABLE FOR FUTURE INTERVENTION ON THE UNIT.

LINE OF UNIT POWER SUPPLY

The ELECTRICAL DATA OF THE UNIT are shown in the technical chart of this manual and on the unit registration plate. The presence of accessories can vary according to

the unit; the electrical data shown in the technical chart refer to standard units. In the event of differences between the data of the registration plate and the data shown in this manual, as well as in the technical chart, please refer to the DATA SHOWN IN THE REGISTRATION PLATE.

The protection device of the unit power supply line should break off the short circuit power whose value should be determined according to the plant features.

The section of supply cables and protection cable must be seized according to the characteristics of the protections used.

SIGNALS / DATA LINES

Do not overpass the maximum power allowed, which varies, according to the type of signal.

Lay the cables far from power cables or cables having a different tension and that are able to emit electromagnetic disturbances.

Do not lay the cable near devices which can generate electromagnetic interferences.

Do not lay the cables parallel to other cables; cable crossings are possible, only if laid at 90°.

Connect the screen to the ground, only if there are no disturbances

Assure the continuity of the screen during the entire extension of the cable.

Observe, if any, the requirements about impendence, capacity, attenuation

STANDARD UNIT ELECTRICAL DATA

VOLTAGE 230/1/50

Sizes		31	41	51	71
F.L.A. FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS					
F.L.A. - Total	A	2,1	3,6	4,5	5,7
F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION					
F.L.I. - Total	kW	0,25	0,25	0,52	0,6

Voltage unbalance: max $\pm 2\%$ with an admitted tolerance: $\pm 6\%$

VOLTAGE 400/3/50

Sizes		91	101	121	142	182	202	242
F.L.A. FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS								
F.L.A. - Total	A	2,2	3,1	4	4	5,5	5,5	7,5
F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION								
F.L.I. - Total	kW	0,75	1,1	1,5	1,5	2,2	2,2	3

Voltage unbalance: max $\pm 2\%$ with an admitted tolerance: $\pm 6\%$

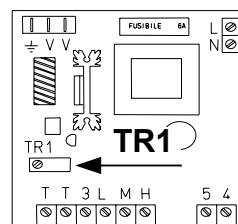
CONNECTION TO THE MAINS

1. Make sure that the sectioning device at the beginning of the unit's power line is opened, locked and equipped with a signal.
2. Open the general line disconnecting switch (if present)
3. Verify that the net is in conformity with the data shown in the registration plate placed on the electrical board.
4. Check the dimensional drawing for the input of the electrical lines
5. Take away the closing plate placed on the electric board (ONLY IF PRESENT) and drill a hole through it to pass the cables through)
6. Protect the cables, using the fairlead of an adequate size.
7. Using the layout of the electrical diagram, single out the connecting terminals of the electrical supply cables, of the neutral (if foreseen) and the PE protection cable
8. Connect the cables to the relevant terminal boards
9. Before supplying power to the unit, make sure that all the safety devices that were removed during electrical connections are positioned again.

FUNCTIONAL CONNECTIONS

UNIT WITH 3-SPEED BOARD (only sizes 31-41-51-71)

FOR ALL THE CONNECTIONS MAKE REFERENCE TO THE ELECTRICAL PANEL SUPPLIED WITH UNIT



The module allows to control the fan speed.

The speed, according to the user interface, can be:

- 3 speed with appropriate selector (not supplied)
- modulating control of the speed from min. to max. by potentiometer (not supplied)

SELECTOR	POTENTIOMETER 2200 ohm
<ul style="list-style-type: none"> ○ low speed control input to term. 3 L ○ medium speed control input to term. 3 M ○ high speed control input to term. 3 H 	<ul style="list-style-type: none"> ○ Fan control of the continuous control ○ Potentiometer supply to terminal (positive pole) ○ Potentiometer supply to terminal 5 (negative pole)

Terminals T T: remote ON – OFF

TR1: ADJUSTMENT TRIMMER OF FAN SPEED

The factory calibration of the fan speed is equal to 220V AC.

Depending on the pressure drops of the ducts the air flow rate of the unit may have to be reduced at maximum speed. By acting on trimmer TR1 anticlockwise the control power of the motor and consequently the flow rate of the unit are reduced (1/4 turn is equal to approximately -40 AC). By acting on the trimmer clockwise the flow rate at minimum speed can be increased. Check that the air flow rate is the unit nominal one (see general technical data).

ATTENTION: by changing one of the 3 possible speed modes of the motor the other two are automatically altered. We therefore recommend checking that voltage and minimum speed do not fall below 110V AC. The air flow rate at minimum speed must not be less than the one shown in the table.

These operations must be performed when the unit has been permanently installed (with all the system accessories, filter, grilles, ducts, etc.) and with the aid of instruments suitable for the measurement of flow rate and voltage (anemometer and multimeter).

Size	21-25	31	41	51	71
Flow rate	800 m ³ /h 222 L/sec	1000 m ³ /h 277 L/sec	1200 m ³ /h 333 L/sec	1400 m ³ /h 388 L/sec	2000 m ³ /h 555 L/sec

The 3 speed board can be coupled to:

HID-E1 3 SPEED SELECTOR

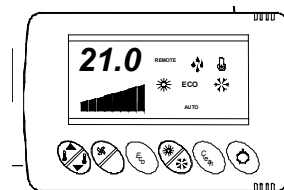
Selection of the 3 speed: MIN – MED – MAX

SUMMER / WINTER manual change



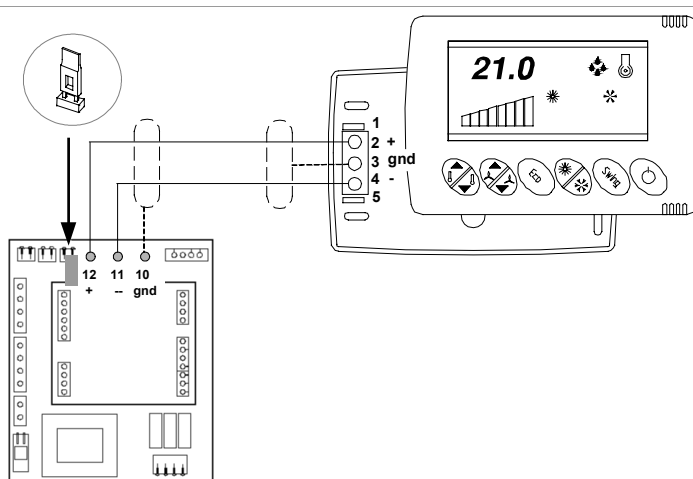
FUNCTIONAL CONNECTIONS

FOR UNIT WITH TERMINAL SPACE ELECTRONICS (unit with CTS option) HID-T2, HID-T3 or HID-TI2 THERMOSTAT

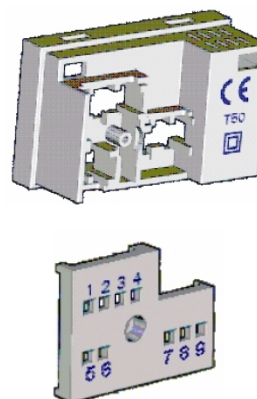
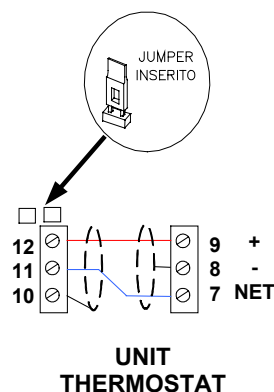


The TERMINAL SPACE electronics can be coupled to the ambient controls below indicated.
In both cases the type of cable used must be $2 \times 0.35 \text{ mm}^2$ with shield on the gnd.
Max distance: 15m

HID-T2 electronic ambient control TEMPERATURE probe management (HID-T2) OR TEMPERATURE + HUMIDITY (HID-T3)



Built-in electronic ambient control HID-TI2



The recessed room control is supplied with a series of supports that make it possible to adapt it to the main civil series of plates: refer to the instructions provided with the thermostat.

POSITIONING OF THE ROOM THERMOSTAT

The selection of the place of installation is decisive for room comfort and energy consumption.
The thermostat must be positioned:

- in a room with average temperature and humidity that are representative of other rooms
- at a height of 150 cm
- preferably on an internal wall

Positions to avoid:

- near sources of heat (lamps, computers, etc.)
- exposed to direct sunlight
- in a position in the direct flow of air from outlets of diffusers
- behind curtains or pieces of furniture
- near doors and windows to the outside
- on walls where there are chimneys or heating pipes
- on external walls

ELECTRICAL CONNECTIONS TO BE HANDLED BY THE CLIENT

For all connections refer to the electrical diagram supplied with the unit.

- REMOTE ON – OFF
- Modulating valve H2O (power supply 24V to be provided for by the client).
It is possible to control one valve only (2-pipe-systems) or two different valves for heating and cooling (4-pipe-systems)
- Fresh air Shutter
- Room thermostat
- RS485 serial line (refer to document RS 485 NETWORK GUIDELINES)
- Electrical resistance section
If present, the electrical resistances must be enabled by modifying the following parameters:
P24 = 3 enables INPUT 2 as resistance thermal alarm
P27 = 1 main heating element
P53 = 3 signal 0-10V

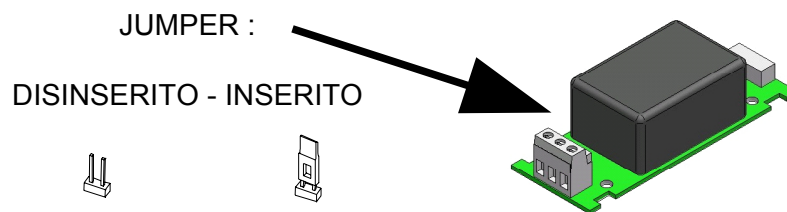
RS485 SERIAL PORT

If Clivet provides only the units with BMS communication port (installed or provided separately), it is responsible only for the units themselves and not for the units downstream. Therefore CLIVET is not responsible for operations such as choice and installation of cables, connection, serial addressing and checks on network functionality.

On request, Clivet provides the specifications for the communication protocol of its units and the necessary guidelines to connect them to RS485.

The card for RS485 serial line must be connected to the main card using the appropriate wire provided.

The network termination jumper alongside the screw terminal board for the connection of 485 must be inserted if the unit is the last one in the network.

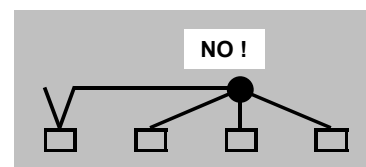
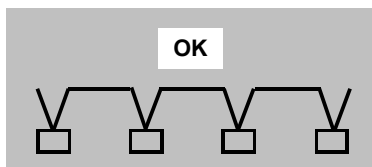


Following some indications for the serial connection ; refer anyway to the CLIVET "RS 485 NETWORKS.

- The total length of each serial line, has not to be more than 1000 metres
- The potential difference between the "earths" of two RS485 devices must be lower than 7 V
- Twisted and shielded couple of conductors
- Conductor section 0.22mm²...0,35mm²
- Nominal capacity among the conductors < 50 pF/m nominal impedance 120 Ω
- Recommended cable BELDEN 3105 A

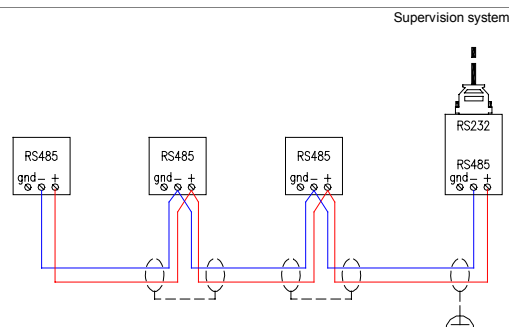
TYPE OF NETWORK

The serial lines must be connected in bus typology, i.e. nodes to more points are not admitted.



SHIELD

- It must be connected to a ground with no troubles
- Connected to the round in only one point
- The shield continuity must be kept constant during all the serial shield extension.



START-UP

ALL THE EQUIPMENT MUST BE COMMISSIONED BY AUTHORISED SERVICE CENTRES.

THIS SERVICE IS LIMITED TO START-UP OF THE UNIT ONLY AND NOT THE CONNECTIONS OR INSTALLATION OF THE SYSTEM.

ONLY QUALIFIED TECHNICIANS MUST PERFORM THE FOLLOWING OPERATIONS.

PRELIMINARY CHECKS

Before checking, please verify the following

1. the unit should be installed properly and in conformity with this manual.
2. the electrical power supply line should be sectioned at the beginning.
3. the sectioning device is locked and the proper warning "not to operate" sign is placed on the handle.
4. make sure no tension is present

AEREAULIC SYSTEM

Check that:

1. the air filters are not removed from unit and are cleaned (possible ventilation checks and the operating starting period determinate a ducting "cleaning" with consequent filter precocious clogging, filters that must be cleaned and replaced)
2. ducting are completed, connected and without obstructions
3. possible dampers are opened (for ex. fire stop dampers) and calibrated (for ex. fresh air damper, control damper, ejection damper)
4. Grilles, outlets, and diffusers must be free of obstructions (furniture, shelves, etc.), open and pre-calibrated, so as to ensure proper air distribution, which is essential to comfort in the room.

WATER SYSTEM

Ensure that the plumbing system has been washed. Drain the wash water before connecting the unit to the system.

Check that the water circuit has been filled and pressurised.

Perform a seal check at max. working pressure checking that no leaks are present.

Check that the shut-off valves in the circuit are in the "OPEN" position.

Check that there is no air in the circuit. If required, bleed it using the vent valves in the system.

Check that there are no ARIES EFFECTS in the transient (pump and / or valve activation/deactivation)

When using antifreeze solutions, make sure the glycol percentage is suitable for the type of use envisaged.

% weight of ethylene glycol	10 %	20 %	30 %	40 %
Freezing point	- 4 °C	- 9 °C	- 15 °C	- 23 °C
Safety temperature	- 2 °C	- 7 °C	- 13 °C	- 21 °C

Check that the circulating pumps are not blocked. In fact, their motor shaft may seize up, especially after long

shutdowns. Unblocking can be accomplished with a screwdriver using the purge hole.

ELECTRICAL SYSTEM

Check the proper tightening of the screws that fix the conductors to the electrical components in the board (during handling and transportation, the vibrations could have loosened them).

Verify that the unit is connected to the ground plant.

Control that all panels and protection devices of the unit are repositioned and blocked.

Charge the unit by closing the sectioning device, but leave it on OFF.

Make sure that the tension and net frequency values are within the limit of:

230 +/- 6% single phase unit; 400/3/50 +/- 6% three-phase unit

Control the unbalancing of the phases: it must be lower than 2%

Example:

$L1 - L2 = 388 \text{ V}$, $L2 - L3 = 379 \text{ V}$, $L3 - L1 = 377 \text{ V}$

average of the measured values = $(388 + 379 + 377) / 3 = 381$

maximum deviation from the average = $388 - 381 = 7 \text{ V}$

Unbalancing = $(7/381) \times 100 = 1.83\% = \text{ACCEPTABLE}$

Operating out of the indicated limits causes the loss of the guarantee as well as very serious damages.

VERIFY TENSIONS – ABSORPTIONS

Check that the temperatures of the fluids are included in the WORKING LIMITS.

If the controls of the previous paragraphs are positive, it is possible to restart the unit.

For information on the control panel, refer to the paragraph CONTROL.

While the unit is working (ATTENTION ELECTRIC RISK: WORK SAFETLY) check:

- Power supply tension
- Phase unbalance
- Total absorption of the unit
- Absorption of the single electric loads

REMOTE INPUT CONFIGURATIONS

Check used remote inputs are activated (ON-OFF etc.) as given in the instructions in the ELECTRIC WIRING chapter.

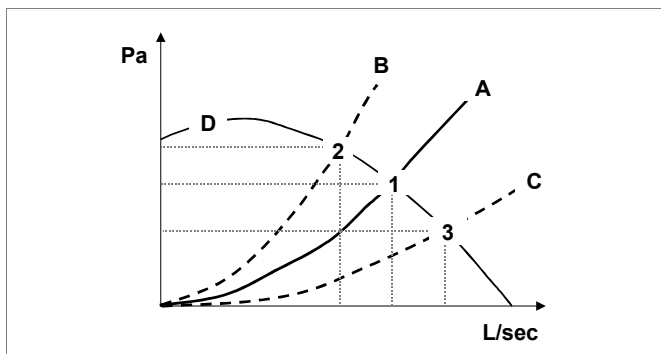
SETTING THE SET-POINT

Check if it is necessary to modify the set-points shown in the CONTROL chapter

AIR FLOW CHECK

The effective unit flow-rate is function of the aeraulic system characteristics.

It is so necessary to check the air flow-rate and eventually to proceed with the appropriate calibrations on the system (dampers, diffusers etc) and on the unit (fan speed control, pulley calibrations etc in base of the unit type and its configuration). Before performing the check, make sure that the system has been completed in all its parts (derivations, dampers, grilles, diffusers etc) .



D = unit head-flow rate curve

A = system calculated curve

1 = project theoretical working point

3 = if the system has pressure drop lower than the project ones, the working point will be the 3, with flow-rate higher that the project one

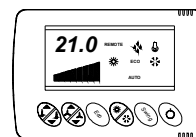
2 = if the system has pressure drop higher than the project ones, the working point will be the 2, with flow-rate lower that the project one

In the time the working point can change, for example for the operations on the system (grilles covered by furniture, closed outlets to modify the air diffusion, exclusion or addition of the distribution sections etc.) or for lacking maintenance (clogged air filters, blocked dampers etc) .

CONTROL

CONTROL

(FOR UNIT WITH CTS TERMINAL SPACE ELECTRONICS AND HID-T2 ,
HID-T3 , HID-TI2 THERMOSTAT)



LOCAL OR REMOTE MANAGEMENT

The unit can be managed locally from the thermostat or remotely through the use of a RS485 serial line with MODBUS protocol.

ON

The unit can be switching on/off:

- by thermostat
- by digital input (set by parameter)
- by net (set by parameter)

OPERATION

The unit has 2 set-points: one for heating and one for cooling. The first one is automatically kept lower than the second one with a difference of at least 1°C.

The regulation module compares ambient temperature with the set-point and tries to keep it as close as possible to it; therefore, it varies the fan speed, the water capacity or both of them according to the configuration.

The unit operating is enabled only if the water temperature:

- in WINTER is higher than 30°C
- in SUMMER is lower than 20°C

OPERATING MODES

AUTOMATIC	The modules automatically commute in cooling or heating mode. The change occurs according to the input water temperature (2-pipe unit) or return air (4-pipe unit). Set the P31 parameter = 1
MANUAL	You choose manually if activating cooling mode ❄ or heating mode ☀ using the relevant keys Set the P31 parameter= 0
ECO	Economic operation, it prefers saving energy more than comfort in cooling mode the setECO is higher than the standard set in heating mode, it is lower the deviation value is defined by P10 OffsetEco
MANUAL FAN	Fan speed is set manually; however, the unit regulates the environment temperature according to the AUTO, MANUAL or ECO modes
ANTI-TAMPERING LOCK	Any attempt to change settings is prevented: the thermostat keys are deactivated.

CHANGE OF AUTOMATIC MODE – 2-PIPE UNIT

In this mode, a neutral zone is foreseen when the unit is positioned in a CHANGE OVER status for a time sufficient to probe water temperature.

The status is displayed by a “CO” flashing.

After that time, if water temperature is out of limit, the H2O alarm is signalled.

Water temperature is detected (therefore, the cooling/heating modes are defined) only if power is demanded. In this operation type, COOLING and HEATING sets are activated simultaneously; when one of the set is bypassed, water temperature is detected and the mode is defined.

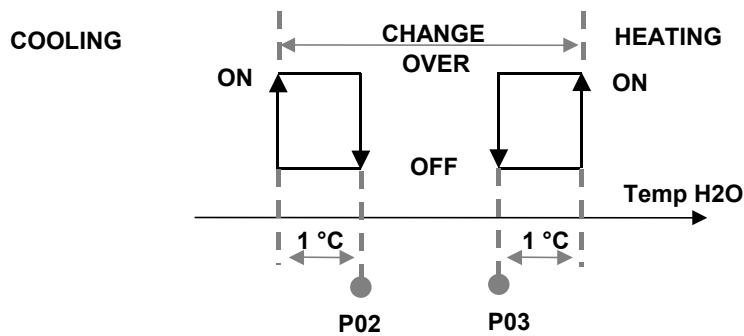
When thermo-regulator sets are met, the last operation mode is displayed.

The set that is the opposite to the actual one is determined internally by the regulator by a constant that is defined ZoneChangeOver:

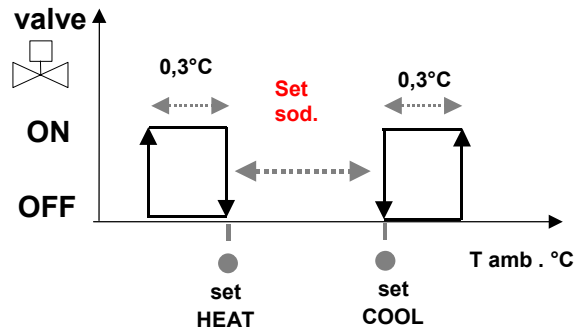
with unit in COOLING: set heating (opposite)= current set – ZonaChangeOver

with unit in HEATING: set cooling (opposite) = current set + ZonaChangeOver

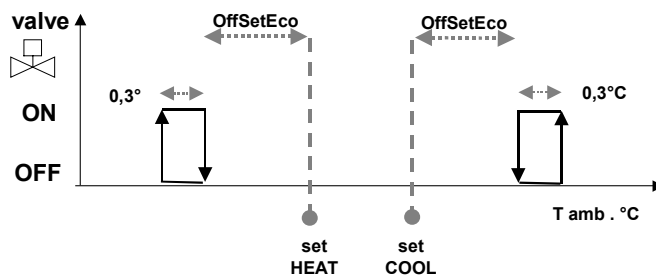
AUTOMATIC MODE CHANGE



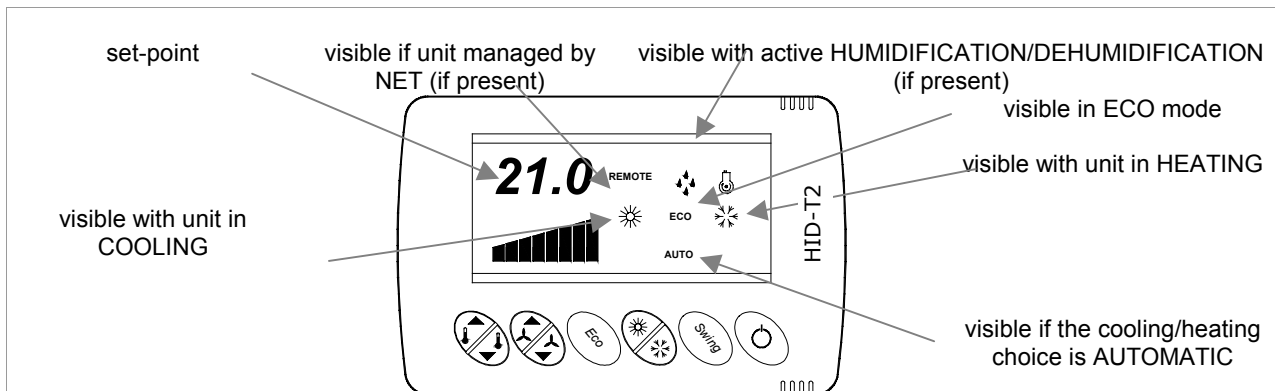
VALVE IN THE AUTOMATIC MODE



VALVE IN THE AUTOMATIC MODE IN ECO MODE



HID-T2 or HID-T3 ROOM THERMOSTAT



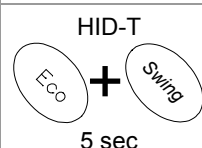
switch the thermostat on




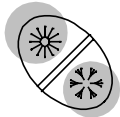



press and hold the ON OFF key for 4 seconds
If the function is managed remotely via ModBus, no modification is possible (the word REMOTE starts flashing)



Activate / deactivate the ANTI-TAMPERING LOCK

Press and hold ECO + SWING keys for 5 seconds
The lock is shown by three horizontal bars when any key is pressed.
If the function is managed remotely via ModBus, no modification is possible (the word REMOTE starts flashing)



<p>Modify the set-point Pressing on the arrows raises or lowers set-point of the actual operation (heating, ECO heat., cooling ECO cool.). The difference between the two set-points can not be less than 1°C and this value is automatically maintained. If, for example, the unit is in cooling mode and the summer set point is decreased up to the winter set value, the winter set value is also decreased. If the function is managed remotely via ModBus, no modification is possible (the word REMOTE starts flashing)</p>	
<p>Display the ambient temperature Press and hold both arrows of the SET key, and the ambient temperature will be displayed alternated to the “ t a ” writing.</p>	 HOLD PRESSED
<p>Display room humidity ONLY FOR HID-T3 THERMOSTAT WITH UR PROBE Press and hold both arrows of the SET key, and the ambient temperature will be displayed alternating with the letters “ta”.. Press and hold the Set key again to see the humidity value alternating with the letters “ur”.</p>	
<p>Switch from the HEATING mode to the COOLING mode and vice versa If the unit is in manual mode, the switch is performed by the relevant key (cooling ☼ ; heating ❄) If “AUTO” is displayed, the switch from one mode to another is managed automatically from the unit and, if this key is pressed, no change occurs. If the function is managed remotely via ModBus, no modification is possible (the word REMOTE starts flashing)</p>	cooling  heating
<p>Switch the unit to ECO mode Press the ECO key Repeat the operation to restore the standard operation The ECO summer set point is higher than the SUMMER set point; the ECO winter set point is lower than the WINTER set point. If the function is managed remotely via ModBus, no modification is possible (the word REMOTE starts flashing)</p>	
<p>Switch the unit to MANUAL VENTILATION AUTOMATIC ventilation: the fan speed is self-adjusted according to ambient temperature MANUAL ventilation: speed is increased or decreased by the user. Pressing one of the two arrow keys, the automatic ventilation is deactivated. In manual ventilation, the bar corresponding to the active speed is flashing. To restore the AUTOMATIC ventilation: Increase to maximum speed Another pressure of the key will make all 8 bars flash If no action is performed, the unit returns to automatic ventilation If the function is managed remotely via ModBus, no modification is possible (the word REMOTE starts flashing)</p>	
<p>Open / close the air supply damper (if present)</p>	

ALARMS VISIBLE BY THE DISPLAY

BEFORE RESETTING AN ALARM, IDENTIFY AND ELIMINATE THE CAUSE OF THE STOP; REPEATED RESETS CAN CAUSE IRREVERSIBLE DAMAGE.

The ALARMS show a potentially dangerous situation for the unit.

Before resetting an alarm, identify and eliminate the cause of the stop; a repeated reset can cause irreversible damage. In the event of doubt, ask for an authorized assistance centre.

The table refers to all the variables that are managed by the electronic system.

According to the unit configuration and its accessories, few alarms might not be significant.


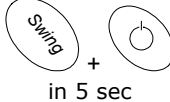




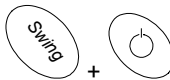
RES	Active resistance alarm
FES	Active electrostatic filter alarm
BT1	Air probe fault alarm
BT2	Water probe fault alarm
BT3	Fresh air probe fault alarm
H2O	Water temperature alarm not fit
SLF	Active level sensor alarm
CO	Mode change in progress (for the automatic mode); is not an alarm
EHH	Lack of communication/wrong thermostat connection
SYS	Fault internal to the control module
ERR	Configuration error

PARAMETERS

ACCESS TO PARAMETERS

FOR THE STANDARD USE, THE ACCESS TO PARAMETERS IS NOT NECESSARY.

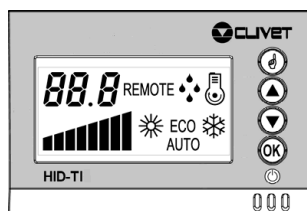
THE FOLLOWING OPERATIONS ARE NECESSARY FOR CALIBRATIONS AND CONFIGURATIONS, THEY ARE EXPRESSLY ADDRESSED TO THE AUTHORIZED ASSISTANCE CENTRES OR QUALIFIED TECHNICIANS.

Switch on and off the thermostat with the ON-OFF key and wait until the display shows the set-point.	
Within 5 seconds, press the SWING and ON-OFF keys simultaneously until the P01 code appears	
use the "UP" and "DOWN" keys to scroll along the parameters	
The value of the parameter to be modified is displayed with the ECO key	
Decrease or increase the parameter value	
The new parameter value is memorized with the ECO key	
Simultaneously press the SWING and ON-OFF keys to exit until the set-point appears	

LIST OF THE PARAMETERS ACCESSIBLE BY THE THERMOSTAT

Par	Description	range	UM	Def.
P01	BandaLavoro: Working band	0 ÷ 15.0	°C	2.0
P02	MaxH2Ocool: Water max. temperature for cooling operating	0 ÷ 30.0	°C	20.0
P03	MinH2OHeat: Water min. temperature for heating operating	0 ÷ 40.0	°C	30.0
P05	TimeOnPeriodical Defines the duration of the ON phase of the periodical	0 ÷ 999	min	2
P06	TimeOffPeriodical Defines the duration of the OFF phase of the periodical	0 ÷ 999	min	5
P10	OffsetEco	0 ÷ 4.0	°C	3.0
P11	SetUrHeat: Heat UR set point	30 ÷ 70	%	50
P12	BandUrHeat: Intervention band of the heat humidifier	0 ÷ 10	%	5
P21	FanOffCool: Fan status at "cooling" thermoregulator, satisfied. 0: stop, 1: continuous , 2: periodical	0...2	num	2
P22	FanOffHeat: Fan status at "heating" thermoregulator, satisfied. 0: stop, 1: continuous , 2: periodical	0...2	num	0
P31	ModoAuto: It enables the automatic saison change 0: Manual, 1: Auto	0...1	flag	0
P41	BT1 probe calibration	-9.9 +10.0	°C	0.0
P42	BT2 probe calibration	-9.9 +10.0	°C	0.0
P43	Thermostat temp. probe calibration	-9.9 +10.0	°C	0.0
P44	Thermostat UR probe calibration	-9.9 +10.0	%UR	0.0
S01	TESToperativa		°C	
S02	TH2Ooperativa		°C	
S03	TARIAoperativa		°C	
S04	URoperativa		Hr%	
S05	Actual mode	bitmap		
S06	CurrentSetpoint		°C	
S07	Current humidity Set		Hr%	
S08	Errors	bitmap		
S09	Active humidification		flag	
S10	Active dehumidification		flag	
S11	FanStatus : 0: off, 1: on	0...1	flag	
S12	Actual fan: 0-7 if motor 0-10 V 0-3 if 3 speed motor 0-1 if single-speed motor	0...7	num	

HID-TI2 ROOM THERMOSTAT



operating mode selection

▲ increase the selected field

▼ decrease the selected field

OK confirm the set datum / thermostat ON – OFF



Ventilation status



Active humidification



Unit in COOLING



Unit in HEATING

REMOTE

Management by ELFO CONTROL



Active compressor

ECO

Enabled ECO Setpoint

AUTO

Unit automatically chooses to cool or heat

GENERAL DESCRIPTION

The room thermostat HID-TI2/TI3 (hereafter HID) is a device for recessed installation for the remote control of the unit to which it is connected. It is therefore not a MODBUS network thermostat.

It can be connected to terminal units equipped with terminal.ROOM or terminal.SPACE electronics and makes it possible to set:

- desired humidity/temperature
- the desired type of ventilation
- a series of advanced functions for the unit to which it is connected
- display any error codes that correspond to alarms sent by the adjustment unit.
- In the HID-TI control there is also a temperature sensor that can be used as a remote sensor for the unit to which it is connected.

OPERATING MODES

"Normal" operation, HID-TI connected to CLIVET-BUS:

- the HID thermostat shows the operating status of the unit to which it is connected
- periodically measure the temperature/humidity in the room where it is installed
- it is possible to use only the 4 front keys (user programming)
- "Nolink" operation, HID-TI not connected to CLIVET-BUS:
- the thermostat is powered by auxiliary power (a battery must be present)
- it is possible to access hidden keys for installer use
- it is a temporary mode that allows "advanced programming" of the unit.

INITIAL RESET

Insert the battery (auxiliary power supply) and then press the power on key [A] [A].

All display segments will come on for about 3 seconds. Then the display will show the firmware revision of the device.

If the HID device is not connected to CLIVETBUS within one minute, it will go off.

During this time, you can only use the hidden buttons for use by the installer.

You can also use the HID device without a battery. The initial reset is carried out simply upon connection with the CLIVETBUS.

After the initial reset, upon connection to the CLIVETBUS, the device goes into normal operating mode.

USER PROGRAMMING

User programming makes it possible to:



- choose the operating mode of the unit (heating, cooling, eco, fan)
- set the adjustment set point
- manage the fan speed manually or automatically
- enable/disable the floating shutter of the air supply (swing)
- display ambient temperature
- power on/off the adjustment unit
- activate/de-activate silenced mode

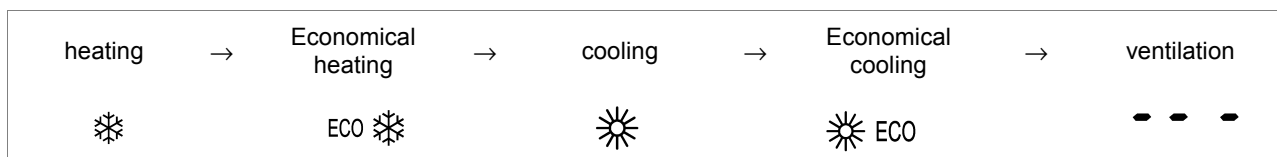
POWER ON/OFF

To power on/off the adjustment unit, press and hold the OK key.

Off status is indicated on the display by the message OFF.

SELECTION OF MODE OF OPERATION

If you press for about 3 seconds on the key  , il the display will show the symbols that define current operating mode.
if you press the key  you can select the desired operating mode in the following cyclical sequence



when you press the key **[OK]** you confirm the displayed mode. The symbols will flash during setting of the mode, and then normal operation resumes.

During programming of the operating mode, if no key is pressed for about 10 seconds, you will go back to normal operation, without modifying the operating mode.

MODIFICATION OF ADJUSTMENT SET POINT


In normal operation, for operating modes that include it, you can modify the adjustment set point using the keys **[▲]** e **[▼]** respectively to increase/decrease in steps of 0.1°.

MANAGEMENT OF FAN SPEED

VENTILATION MODE

in VENTILATION MODE, no adjustments are made to the temperature
you can change fan speed using keys **▲** and **▼**.

MODES: HEATING, ECONOMICAL HEATING, COOLING, AND ECONOMICAL COOLING

press briefly on the key  : the display will show the message "Fan" and the bar of the fans

use the keys **▲** and **▼** select the desired speed

go back to normal operation by pressing the key **OK**



During fan speed modification, if no key is pressed for about 10 seconds, normal operation will resume, preserving any modifications that have been made.

When setting fan speed, you will go from AUTOMATIC (where the speed of the fans is controlled automatically based on ambient temperature) to MANUAL operation where the user sets the speed.

To go back to automatic fan operation, repeatedly press **▲** until the entire bar is flashing.

MANUAL STATUS OF THE FANS IS INDICATED BY A FLASHING BAR

The setting of fan speeds is not cyclical.


SILENCED MODE


To activate/de-activate silenced mode briefly press the key **OK**.

Silenced mode is indicated on the display by the message **SIL**.


DISPLAY OF AMBIENT TEMPERATURE

You can display the ambient temperature as measured by the probe on the thermostat or the one on the unit. From normal operating status:

press briefly on key  : the display will show the message **Fan** and the bar of the fans.

press key  again: the display will show only the message **tA**.

press the key **[OK]** to confirm the selection: The message **tA** will flash on the display, followed by a return to normal operation in which the message **tA** will alternate with the ambient temperature for a few seconds.

You can also go back to normal operation by pressing, instead of the key **OK** the key  or you can wait about 10 seconds without pressing any key.

SWING MODE - CONTROL OF AIR SUPPLY FLOATING SHUTTER

In normal operating status, you can activate/deactivate the Swing function by simultaneously pressing the keys **[▲]** and **[▼]**.
There is no indication on the display for the activation/deactivation of this function.

BATTERY CHECK

Each time it is powered on, and whenever it is disconnected from the CLIVETBUS, the device performs a check of the battery charge, which is the source of auxiliary power. If the battery is nearly dead, the message **bAt will appear**.

BAT

The instrument also works even without an auxiliary power supply. In this case, only the functions related to the front keypad are accessible.

SIGNALLING OF ALARMS AND MALFUNCTIONS

Any alarms generated by the terminal unit are displayed by the following codes:

RES	Active resistance alarm
FES	Active electrostatic filter alarm
BT1	Air probe fault alarm
BT2	Water probe fault alarm
BT3	Fresh air probe fault alarm
H2O	Water temperature alarm not fit
SLF	Active level sensor alarm
CO	Mode change in progress (for the automatic mode); is not an alarm
EHH	Lack of communication/wrong thermostat connection
SYS	Fault internal to the control module
ERR	Configuration error
EUR	Fault humidity probe

The alarm "EHH" is shown about 30 seconds after communication problems between the device and the adjustment unit.

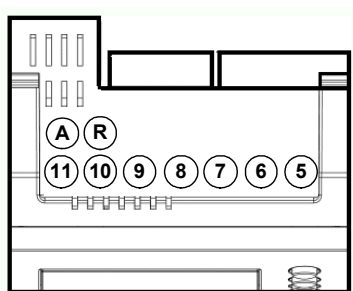
ADVANCED PROGRAMMING

Hidden buttons for use by installer: accessible by extracting the thermostat from its housing.

keys accessible only with a tool

R: thermostat reset

A: thermostat starting



5, 6: not used

7: reset of the fan funct. hours

8: it hides the dirty filters

9: self-addressing

10: access to the configuration parameters

11: keypad lock/unlock

KEYPAD LOCK

Used to disable functions related to the pressing of user keys.

Take the thermostat out of its housing, and press the key [11]. The display will show the message **bLC**

put thermostat back in place

The message **bLC** will flash until the procedure is complete (a few seconds).

From this moment on, pressing any key will not have any effect, and will instead cause the display to momentarily show the message **bLC**.

To go back to a normal situation, release the keypad lock and repeat the operation.

BLC

For further details on advanced programming see instructions provided with the room thermostat.

VENTILATION

The system can manage 2 types of ventilation, depending on the type of unit:

- ON / OFF
- 3 speed modes

For any further clarification regarding the type of ventilation refer to the unit electrical diagram.

type of ventilation	COOLING	HEATING
	The ventilation is activated if:	
	$T_{H2O} < P02 \text{ MaxH2oCool}$ If the temperature is out of these limits when the delay time is finished, the H2O alarm is activated	$T_{H2O} > P03 \text{ MinH2Oheat}$ If the temperature is out of these limits when the delay time is finished, the H2O alarm is activated
	$T_{H2O} < T_{\text{ambiente}}$	
ON / OFF Sizes 91÷242		
3 speed Sizes 31÷71		

WATER VALVE

The system can control 2 ON-OFF valves, one for heat and the other for cold; they are connected to the basic module. The valve is opened when the thermo-regulator asks for power.

Type of valve	COOLING	HEATING
0 – 10 v		

FRESH AIR DAMPER

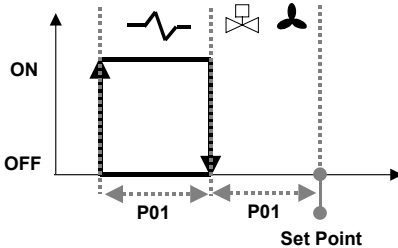
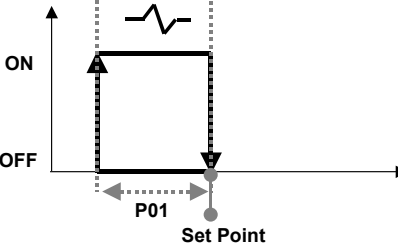
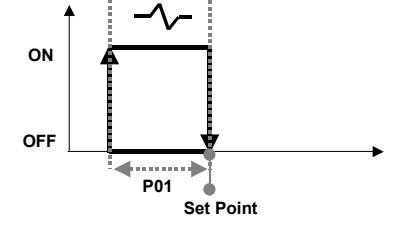
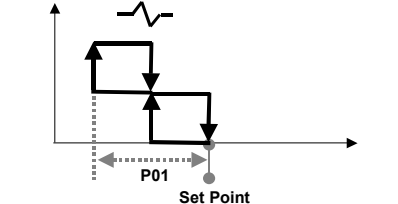
By using the proper dedicated output, it is possible to activate a damper or a fan to allow new air to enter the room.

ELECTRIC RESISTANCES

The electric resistance operating mode is defined by the following parameters:

P27 **ModeRes** = 0 integration element (ventilation forced at max.)
1 main element (manual or automatic ventilation)

P53 **OutResType** = 1 single-phase
2 two-phase
3 0 – 10 volt

INTEGRATION		
MAIN ELEMENT		<p>The water valve is opened when thermo-regulation is demanded: if the probe detects hot water, the resistors automatically become an integration body. On the contrary, if after TimeValve is over, water temperature is not suitable, the valve closes, the H2O alarm is not activated and the resistors are not activated.</p> <p>As soon as the probe detects that water temperature > MinH2oHeat, resistors become integration bodies and the valve opens. In this mode, the water temperature alarm is not managed.</p>
SINGLE-PHASE RESISTANCES		
TWO-PHASE RESISTANCES		

DEHUMIDIFICATION

The dehumidification control is managed by the network, which is an upwards system that uses one or more terminal units to dehumidify.

When the **DeumiOn** network variable is switched on 1, the unit is forced into cooling mode, even when the temperature set is met (100% opened valve and minimum ventilation speed).

This occurs to meet the humidity conditions decided by the network (detecting the relevant humidity by a room thermostat).

The dehumidification process shown by the display is stopped when the following occurs:

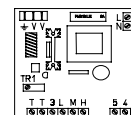
- the **DeumiOn** variable is 0 (humidity conditions are met).
- Temperature is below the **LowLimit**, value; therefore, the process can start again only if ambient temperature > set-point Temp and if there is still a demand.

The dehumidification process can not start if:

- The operation mode is the Heating mode.
- The unit is OFF.

CONTROL (FOR UNITS WITH 3 SPEED BOARD)

See ELECTRICAL CONNECTIONS section



ROUTINE MAINTENANCE

BEFORE UNDERTAKING ANY SORT OF MAINTENANCE OR CLEANING, DISCONNECT THE ELECTRICAL POWER SUPPLY TO THE UNIT, AND ENSURE THAT OTHER PEOPLE CANNOT RE-CONNECT IT .

All equipment is subjected to wear out.

The maintenance makes :

1. keeps the unit efficiency
2. the components last longer
3. keeps their efficiency and limits breakdowns

Therefore, it is fundamental to perform periodical checks: a few controls can be performed by the user (AUTONOMOUS MAINTENANCE) and they are mainly

cleaning activities; otherwise, controls have to be performed by specialized technicians (INSPECTIONS).

The machine should have a log book used to keep track of the performed controls. This will make fixing up breakdowns easier.

Take note of the date, type of control (autonomous maintenance, inspection or fixing up), description of the control, actions taken and so on.

SERVICES

Parts subject to intervention:

- **AIR FILTERS**
- **CONDENSATE DISCHARGE**
- **ROOM AIR TREATMENT COIL**
- **STRUCTURE**
- **EXTERNAL FANS**
- **DUCTING**
- **FANS WITH BELT DRIVE**
- **ELECTRIC ELEMENTS**

AIR FILTERS

It is very important for the air treatment coil to be able to offer maximum thermal exchange. Therefore, the unit must always operate with the filters installed and clean.

Cleaning and replacement of filters are very important in terms of health and hygiene.

Operation with clogged filters leads to a reduction in the air flow rate, resulting in malfunctions and unit shutdowns. It may even cause the unit to break down.

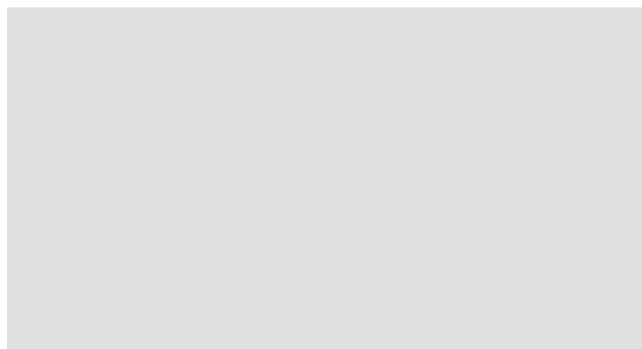
How often the filters need to be checked depends on the quality of outdoor air, unit operating hours, dust and number of persons in the rooms.

As a guideline, cleaning should ideally take place between weekly and monthly. It is advisable to start with frequent checks, and to adjust the frequency based on how much dirt is discovered.

PLEATED FILTERS

1. Remove the closing doors
2. Carefully extract the filter so that no dust reaches the parts below
3. Wash the filtering mattress in warm water with a common detergent.
4. Carefully rinse it under water while preventing to pour water in the room
5. Dry the filter
6. Reinsert it to its seat
7. Reassemble the closing doors

Old filters, washing residuals and residual parts must be disposed of, according to the law in force.



CONDENSATE DISCHARGE

Dust and deposits could cause obstructions.

Clean the tank, pour some water into the tank and check water flows normally.

ROOM AIR TREATMENT COIL

ATTENTION: accidental contact with the fins of the exchanger may cause small cuts. When performing the following steps, use protective gloves.

The finned surfaces of the cooling coils and especially the condensation collection trays are the places where micro-

organisms and moulds most easily flourish. It is therefore very important to clean regularly with suitable detergents and disinfect with appropriate products as necessary.

STRUCTURE

Check the condition of the parts making up the structure. Paint so as to eliminate or reduce oxidation at the points in the unit where this problem may occur. Check that the

panelling is fastened correctly. Poor fastening may give rise to malfunctions and abnormal noise and vibration.

DUCTING

Check the fixing screws and the operation of the anti-vibration devices in order to prevent the transmission of vibrations in the room.

ELECTRIC FANS

Make sure that the fans and the relative protection grids are well fixed.

Check, if possible, the unbalances of the electro-fan evident by noise and anomalous vibrations. Verify that the terminal protection covers are closed and the cable holders are properly positioned.

FANS WITH BELT DRIVE

BELT

The tension of the belt can be adjusted by the worm screw on the slide connected to the electric motor, using a socket wrench or spanner.

The belt is tensioned correctly when the tolerances defined in the enclosed sketch are respected.

The tension of the belt should be checked after around 10 hours of operation.

L = distance between pulleys

F = belt profile force SPA 2,8..3,6 Kg

D = elastic deviation = $L \times 0,0015$

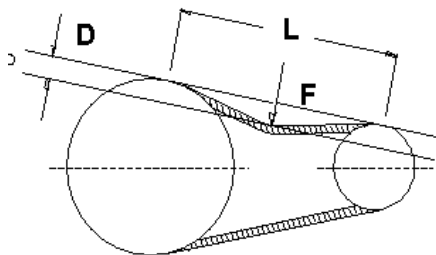
PULLEYS

Avoid the following situations:

Avoid the following situations:

1. Not sufficient tension, which causes slipping and overheating and, as a consequence, the reduction of service life.
2. Too much high tension, which subjects the belt to high stresses and, as a consequence, the reduction of unit life and an excessive stress on bearings and supports.
3. Belt lifted from the groove
4. Belt that reaches the bottom of the groove.
5. Belts of different length (only in the case of coupled belts).

1. Pulleys not aligned.
2. Pulleys not parallel.
3. dirty pulleys; dust, grease, dirt deposited between the surfaces of the belt and of the pulleys can make the system operate in anomalous conditions.
4. Pulleys not straight.
5. Pulleys too small.
6. Pulleys broken.
7. Pulleys off-centre or unstable.
8. Pulleys worn.



ELECTRIC MOTOR

The cooling air slits must be always free to let the air pass.

BEARINGS

Check regularly if unusual noises are presents.

High size fans are equipped with grease nipples where grease for bearings must be periodically added.

ANTIVIBRATION RUBBERS

Periodically check the condition to avoid situations of anomalous vibrations / noise.

ELECTRICAL HEATING ELEMENTS

The convector finned heating elements need to be checked regularly to ensure that they are clean and properly fastened to the support.

MAINTENANCE INSPECTIONS

Foresee inspection assistance carried out by authorized centers or by qualified personnel.

The inspections should be carried out at least:

- - Every year for only the cooling units
- - Every six months for the cooling and warming units

The frequency, however, depends on the use: in the event of frequent use (continuous or very intermittent use, near the operating limits, etc) or critical use (service necessary) it is recommended to plan inspections at close intervals.

The inspections to be performed are as follows:

- verify the power supply tension (when emptied or filled)
- inspect the electrical board (status of solenoid starter contacts, terminal closings, the status of wiring and relevant insulations)
- inspect the absorption of the single electrical loads
- verify the cleaning and the efficiency of the exchangers
- inspect the cleaning of the filters (air/water)

- verify the leakage from the refrigerating circuit
- Verify the protection devices (safety valves, pressure switches, thermostats, etc.), the adjustment systems, the control devices (alarm signalizations, probes, manometers, etc)
- check the operating parameters of the refrigerating circuit (see the following REFRIGERANT TABLES and the START-UP section)

For units equipped with safety valves, follow the Manufacturer's instructions.

Verify periodically the cleaning of the safety valves and that oxidative / corrosive phenomena are not present, in particular for installations near the sea, in industrial areas or in rooms with a corrosive atmosphere.

97/23 CE PED DIRECTIVE

97/23 CE PED DIRECTIVE gives instructions for installers, users and maintenance technicians as well. Refer to local actuation norms.

In Italy, refer to the Ministerial Decree of 1st December 2004 no. 329 (and following modifications) which defines the performances to be executed; the units of 1st category and those defined by the art. 3.3 97/23/EC are not included in this regulation (see the serial number plate on the unit) .

Briefly and as an example, see the following :

1. COMPULSORY VERIFICATION OF THE FIRST INSTALLATION only for units assembled on the installer's building site (for ex. Condensing circuit + direct expansion unit)
2. CERTIFICATION OF SETTING IN SERVICE for all the units
3. PERIODICAL VERIFICATIONS to be executed with the frequency indicated by the Manufacturer (see the MAINTENANCE INSPECTIONS paragraph)

PUT AT REST

If a long period of inactivity is foreseen, for example the winter for the cooling unit, the following is recommended:

- to turn the power off in order to avoid electrical risks or damages by lightning strike
- to avoid the risk of frosts as shown in the HYDRAULIC CONNECTIONS section, and, in particular
 - to empty or add glycole in the plant sections subjected to temperatures below zero
 - to empty or add glycole in the water heating coils, also in summer
 - to power antifreeze resistances if present

If the period of inactivity is particularly long or in the event of extremely low temperatures, the external fans can be blocked temporarily; therefore, it is recommended to switch them on every month in order to avoid seizures or electrical overloads when the unit will be switched on.

The restarting of the unit has to be carried out by qualified personnel, in particular, after the winter break for cooling units or when seasonal switching should be performed.

When restarting, refer to the SWITCHING ON section.

Schedule technical assistance in advance to avoid hitches and be able to use the installation when necessary

TROUBLESHOOTING

THE OPERATIONS MUST BE CARRIED OUT BY TECHNICAL QUALIFIED PERSONNEL HAVING THE REQUISITES UNDER LAW REQUISITES AND IN CONFORMITY WITH THE SAFETY REGULATIONS IN FORCE.

THE INTERVENTIONS WITHIN THE WARRANTY PERIOD WILL BE CARRIED OUT BY AUTHORIZED SERVICE CENTERS.

**BEFORE RESETTING AN ALARM, IDENTIFY AND ELIMINATE ITS CAUSE.
REPEATED RESETS MAY CAUSE SERIOUS DAMAGES.**

In certain machine configurations, some safeties may be placed in series and lead back to a single input on the electronic module.

Therefore, check on the electrical diagram whether the device to which the alarm corresponds has other devices or safeties connected in series.

Below is a list of the possible causes of alarms.

DECOMMISSIONING OF THE UNIT

DISCONNECTING THE UNIT

The units must be disconnected by authorised personnel, who before proceeding must first read the Residual Risks section in this manual.

Before disconnecting the unit, the following must be recovered, if present:

- the refrigerant (if the circuits cannot be isolated): the refrigerant must be removed using suction devices operating in a closed circuit, so as to ensure that none of the compound is released into the atmosphere.
- the antifreeze in the circuits: when removing this fluid, make sure that it does not leak and that it is not released into the environment. The antifreeze fluid must be stored in special containers.

When recovering the substances present in the unit, all measures must be taken to avoid damaging persons and things and polluting the surrounding area.

Awaiting dismantling and disposal, the unit can also be stored outdoors, as bad weather and rapid changes in temperature will not cause damage to the environment, if electric, cooling and hydraulic circuits of the unit are integral and closed.

DISMANTLING AND DISPOSAL

THE UNIT MUST ALWAYS BE SENT TO AUTHORISED CENTRES FOR DISMANTLING AND DISPOSAL.

When dismantling the unit, the fan, the motor and the coil, if operating, may be recovered by the specialist centres for reuse.

All the materials must be recovered or disposed of in compliance with the corresponding national standards in force.

For further information on the decommissioning of the unit, contact the manufacturer.

**2002/96/CE DIRECTIVE REV.1 DEL
29/01/07**



ATTENTION: This document contains important information for the disposal and/or recycling of the unit. Before installing the unit, carefully read the use and maintenance manual included with it. Carefully conserve all of the documentation for the entire life cycle of the unit.

With the aim of protecting the environment, all of our units are produced in compliance with Direttiva 2002/96/EC on waste electrical and electronic equipment (WEEE).

The potential effects on the environment and on human health due to the presence of hazardous substances are shown in the use and maintenance manual in the section on residual risks.

Information in addition to that indicated below, if required, can be obtained from the manufacturer/distributor/importer, who are responsible for the collection/handling of waste originating from equipment covered by 2002/96/EC. This information is also available from the retailer who sold this appliance or from the local authorities who handle waste.

The 2002/96/EC directive is applicable only in the European Community and must always be complied with unless otherwise directed by the legislation of single nations.

In all member states, there are fines for violation of the contents and requirements of this directive.

If the equipment is sold outside the European Community, only local standards need to be complied with.

Directive 2002/96/EC requires disposal and recycling of electrical and electronic equipment as described therein to be handled through appropriate collection, in suitable

centres, separate from collection for the disposal of mixed urban waste.

This type of separate management aims to reduce the waste composed of electrical and electronic equipment by providing for it during the design phase and by promoting re-use and recycling.

The 2002/96/EC directive also includes as objectives the reduction in use of hazardous substances in electronic and electrical equipment and the improvement of participation, as far as the environment is concerned, of individuals involved in the life cycle of said equipment.

To distinguish the units that are covered by the 2002/96/EC directive, they are marked by a symbol which indicates separate collection. This symbol shows a waste bin on wheels with a bar through it (as shown in attachment 4 of the directive).



The user must not dispose of the unit at the end of its life cycle as urban waste. It must instead be handed over to appropriate collection centres as set forth by current standards or as instructed by the distributor. If disposal takes place at the same time as delivery of a new electrical or electronic equipment for the same family, the product may be collected directly by the distributor.

TECHNICAL DATA

Sizes			31	41	51	71	91	101	121	142	182	202	242
Cooling													
Cooling capacity	1	kW	13,6	19,1	21,6	27,9	36,9	44,0	48,7	65,5	75,4	83,6	89
Sensible capacity	1	kW	9,82	13,7	15,7	20,3	26,5	31,8	35,6	47,1	54,9	60,2	64,9
Total power input	1	kW	0,3	0,3	0,5	0,6	0,8	1,1	1,5	1,5	2,2	2,2	3
HEATING													
Heat output	2	kW	26,6	36,7	42,4	53,1	72,4	86	94,7	125,9	143,8	159,1	174
INTERNAL EXCHANGER													
Front surface		m ²	0,3	0,4	0,4	0,6	0,8	0,9	0,9	1,4	1,4	1,6	1,6
Water content		l	4	5,39	5,39	6,78	9,22	11,1	11,1	16,7	16,7	18,5	18,5
Water flow-rate		l/s	0,6	0,85	0,97	1,2	1,75	1,97	2,16	2,83	3,23	3,60	3,88
Pressure drop		kPa	24	29	36	24	38	26	30	20	25	33	38
AIR HANDLING SECTION FANS (SUPPLY)													
Type of fans	3		CGF										
Number of fans			1	1	1	2	1	1	1	2	2	2	2
Standard air flow	4	l/s	569	778	944	1166	1597	1889	2167	2638	3194	3472	3888
Installed unit power	5	kW	0,25	0,25	0,52	0,6	0,75	1,1	1,5	1,5	2,2	2,2	3
Max outside static pressure	6	Pa	85	93	80	70	140	170	180	140	115	1450	180
CONNECTIONS													
Water fittings			1"				1"1/4			1"1/2		2"	
Condensate discharge		mm	25										
POWER SUPPLY													
Standard power supply			230/1/50				400/3/50						
DIMENSIONS													
Length		mm	650	850	850	1050	1050	1250	1250	1870	1870	2070	2070
Depth		mm	500	500	500	500	670	670	670	670	670	670	670
Height		mm	1700	1700	1700	1700	2000	2000	2000	2000	2000	2000	2000
STANDARD UNIT WEIGHTS													
Shipping weight		kg	96	117	123	140	185	210	215	250	260	290	295

(1) water return 7°C and supply 12°C

Ambient temperature 27°C/19.5 WB

relative humidity 50%

(2) water return 70°C and supply 60°C

ambient temperature 20°C DB

relative humidity 50%

(3) CFG = centrifugal fan

(4) Max outside static pressure

(5) Standard motor

(6) rated flow, maximum speed, including the air filter

OPERATING LIMITS

Sizes			31	41	51	71	91	101	121	142	182	202	242
Cooling													
Min air return temperature (W.B.)	°C		2										
Max. air temperature return (D.B.)	°C		40										
Max water return temperature	°C		80										
Min. water supply temperature	°C		6										
Heating													
Max water return temperature	°C		80										
Min. water return temperature	°C		30										
Max. air temperature return (D.B.)	°C		40										
Min. air temperature return (D.B.)	°C		2										

DB = dry bulb

WB = wet bulb

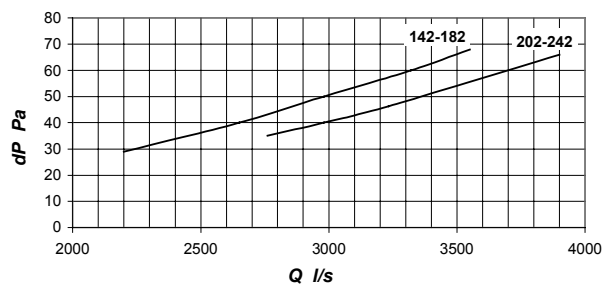
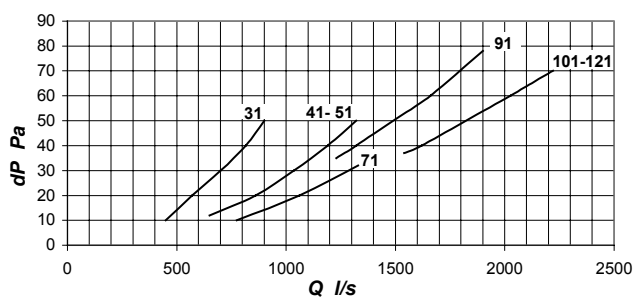
16 bar water side high head-pressure

SOUND LEVELS

	Sound Power Level (dB)								Sound pressur e level dB(A)	Sound power level dB(A)
	Octave band (Hz)									
Size	63	125	250	500	1000	2000	4000	8000		
31	75	70	59	61	56	56	47	36	48	63
41	73	74	62	62	57	57	49	38	49	65
51	74	75	62	63	59	59	52	41	50	66
71	76	73	66	63	62	56	57	53	51	67
91	81	78	69	66	62	61	53	44	53	69
101	84	80	72	68	65	65	57	48	56	72
121	87	82	74	70	67	67	60	51	58	74
142	85	86	71	70	67	66	58	48	58	75
182	87	87	73	73	70	69	62	53	60	77
202	89	89	76	75	72	71	64	55	62	79
242	92	92	78	77	74	74	66	58	64	81

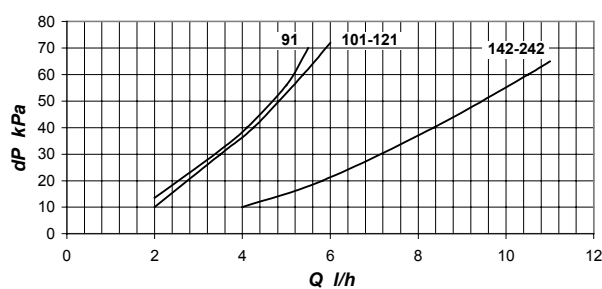
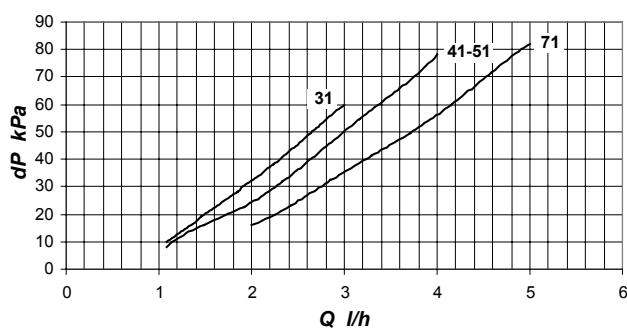
The sound levels refer to the unit at full load, in the rated test conditions and with available head of 30Pa. The sound pressure level refers to unit with ductable supply and it is measured at a distance of 1m from the external surface of the units.

Hot water coil pressure drop: AIR side



Q = AIR FLOW
DP = PRESSURE DROP

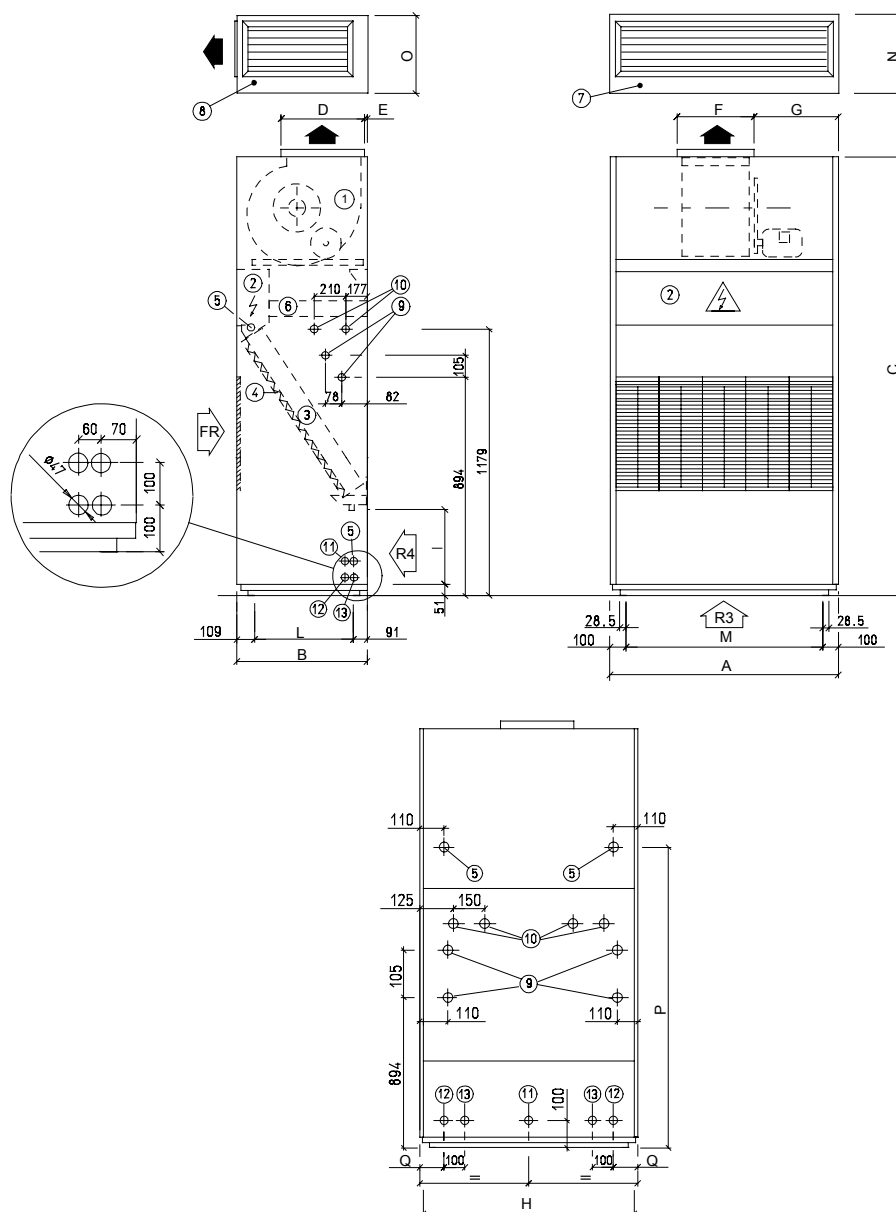
Hot water coil pressure drop: WATER side



Q = AIR FLOW
DP = PRESSURE DROP

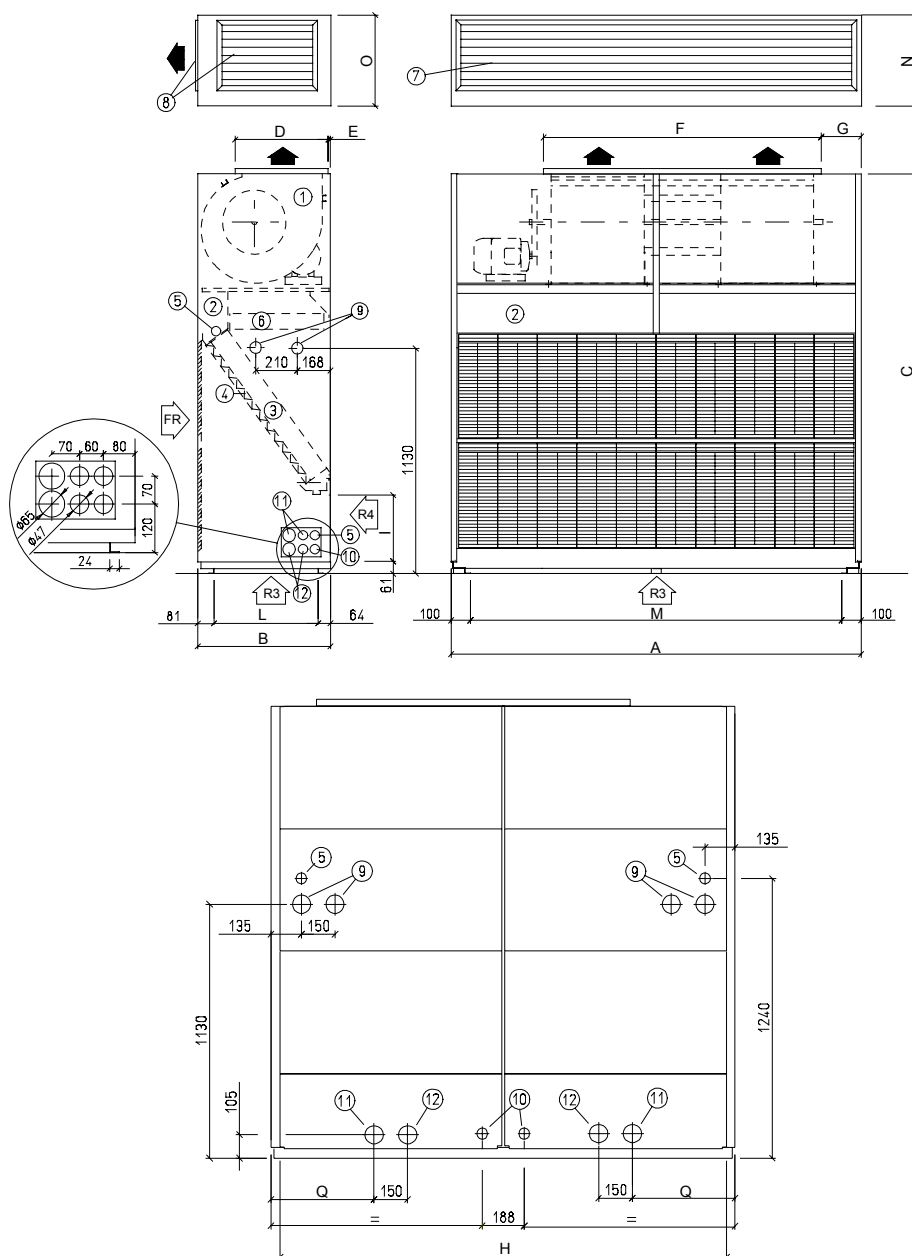
DIMENSIONS

Sizes 31-121

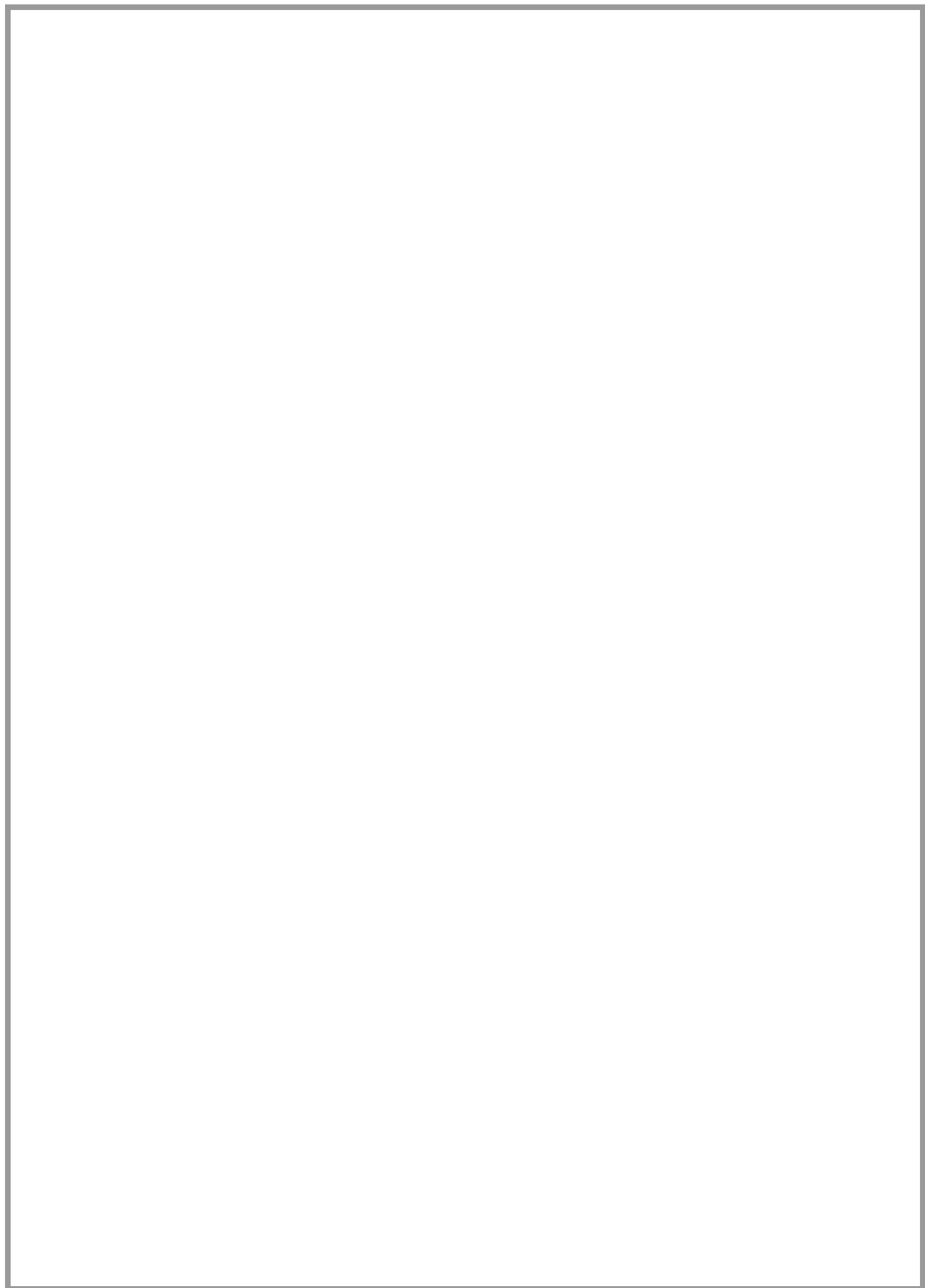


Sizes		31	41	51	71	91	101	121	Key:
Length	mm	650	850	850	1050	1050	1250	1250	(1) SUPPLY CENTRIFUGAL FAN
Depth	mm	500	500	500	500	670	670	670	(2) ELECTRICAL PANEL
Height	mm	1700	1700	1700	1700	2000	2000	2000	(3) MAIN WATER COIL
A	mm	650	850	850	1050	1050	1250	1250	(4) AIR FILTER
B	mm	500	500	500	500	670	670	670	(5) POWER INPUT
C	mm	1700	1700	1700	1700	2000	2000	2000	(6) ELECTRIC RESISTANCES OR HOT WATER COIL (OPT)
D	mm	326	353	353	260	470	470	470	(7) AIR SUPPLY PLENUM SUPPLIED SEPARATELY
E	mm	28	12	12	12	10	10	10	(8) SUPPLY PLENUM ON THREE SIDES SUPPLIED SEPARATELY
F	mm	362	395	395	900	535	535	535	(9) WATER FITTINGS (SIZES 31-41-51-71)
G	mm	144	227	227	75	357	457	457	(10) WATER FITTINGS (SIZES 91-101-121)
H	mm	551	754	754	954	954	1154	1154	(11) CONDENSATE DISCHARGE
I	mm	310	310	310	310	315	315	315	(12) WATER RETURN (STANDARD UNIT)
L	mm	300	300	300	300	470	470	470	(13) WATER SUPPLY (STANDARD UNIT)
M	mm	450	650	650	850	850	1050	1050	(H) REAR INTAKE DIMENSION
N	mm	500	500	500	500	630	630	630	
O	mm	350	350	350	350	450	450	450	
P	mm	1290	1290	1290	1290	1490	1490	1490	
Q	mm	100	100	100	100	100	100	100	

Sizes 142-242



	Sizes	142	182	202	242	Key:
Length	mm	1870	1870	2070	2070	(1) SUPPLY CENTRIFUGAL FAN
Depth	mm	670	670	670	670	(2) ELECTRICAL PANEL
Height	mm	2000	2000	2000	2000	(3) MAIN WATER COIL
A	mm	1870	1870	2070	2070	(4) AIR FILTER
B	mm	670	670	670	670	(5) POWER INPUT
C	mm	2000	2000	2000	2000	(6) ELECTRIC RESISTANCES OR HOT WATER COIL (OPT)
D	mm	410	410	470	470	(7) AIR SUPPLY PLENUM SUPPLIED SEPARATELY
E	mm	12	12	12	12	(8) SUPPLY PLENUM ON THREE SIDES SUPPLIED SEPARATELY
F	mm	1200	1200	1400	1400	(9) WATER FITTINGS
G	mm	180	180	202	202	(10) CONDENSATE DISCHARGE
H	mm	1754	1754	1954	1954	(11) WATER RETURN (STANDARD UNIT)
I	mm	315	315	315	315	(12) WATER SUPPLY (STANDARD UNIT)
L	mm	525	525	525	525	(H) REAR INTAKE DIMENSION
M	mm	1670	1670	1870	1870	
N	mm	630	630	630	630	
O	mm	450	450	450	450	
P	mm	1130	1130	1240	1240	
Q	mm	359	359	459	459	



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