Product presentation
CLIVET Pack2
Packaged air conditioner  cooling only/heat pump air to air – rooftop type
CLIVETPack2: is the state of the art on rooftop

**The advanced package**

Almost all plant components are packed into the unit

Each CLIVETPACK is factory tested before shipment

On-site operation and first cost are dramatically reduced

**Specialised by application**

From 0 to 100% fresh air to best serve different applications

Developers and consultants can industrialise HVAC design and realisation

**High efficiency and reliability**

Low consumption solutions on both thermal energy production and ventilation

De-centralised design to operate only when and where needed
CLIVETPack2: specialized on application

Fresh air is the driver for different series

**MEDIUM ATTENDANCE**
- Air source
- Water source

**HIGH ATTENDANCE**

**FULL FRESH AIR**
CLIVETPACK 2 at a glance

XHE packages:

Are designed for **outdoor** installation

Perform **Ventilation, Filtration, Cooling** or **Heating**

Can do **Make-up air** and **Thermodynamic energy recovery**

Fully suit with **Commercial** and **Industrial** applications
The complete series

- **MID ATTENDANCE**
  - CLIVETPACK2
  - CSRT/CSRN-XHE2
  - Ti--
  - N- HSE

- **HIGH ATTENDANCE**
  - SMARTPACK
  - OX/ON-XHE
  - Ti--
  - N--

- **FULL FRESH AIR**
  - CLIVETPACK2
  - CSRN-XHE2/IFA
  - N--

Supply Airflow m³/h

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<th>2000</th>
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<th>4000</th>
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CLIVETPack2
CLIVETPack2
Medium Attendance application
The series for medium attendance

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<tr>
<th>MID ATTENDANCE</th>
<th>2 CIRCUITS</th>
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<td>N -- HSE</td>
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| 1 CIRCUIT |
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Supply Airflow m³/h

- 2000
- 3000
- 4000
- 9000
- 20000
- 9000
- 25000
- 60000

CLIVETPack2

CSRN-XHE2

CSRT/XHE2

SMARTPACK

CKT/CKN-XHE2

CLIVETPACK

CSNX-XHE2

R-410A
Main features

- Exhaust section
- Fresh air
- Air handling
- High efficiency supply fans
- Electrical panel
- Double refrigeration circuit
- Thermodynamic recovery ThOR
Features: total recirculation, fresh air
Features: Freecooling and energy recovery

![Diagram showing supply air, fresh air, return air, and exhaust air connections.]

- Supply air
- ThOR (optional)
- Fresh air
- Return air
- Exhaust air
Automatic air management

Main ventilation section win the pressure drop of supply and return

Fresh air damper + exhaust ventilation section, realize:
- renewal air
- thermal freecooling (enthalpy in option)
ThOR Thermodynamic Overboost Recovery

Thermodynamic energy recovery is based on reversible heat pump technology. The heating and cooling capacity production circuit employs exhaust air as a source of heat, which is favorable both in the winter and summer operating mode.

For this matter:

- the seasonal efficiency of capacity production is greater than a conventional refrigeration circuit, which employs outdoor air as a source of heat;
- the capacity output is much more stable compared with passive exchangers as the outdoor conditions vary,
- does not employ passive exchangers and therefore also eliminates higher consumption due to ventilation;
- it is integrated in the unit, which has an extremely compact design.
ThOR: benefits

Great energy saving

This means that during the annual operation cycle, the power absorbed by the thermodynamic recovery unit is less compared to the rooftop unit with the enthalpy wheel recovery unit based on both selection criteria adopted (type 1 compact enthalpy wheel and type 2 enthalpy wheel with low front speed).
Ventilation full control

- Plug-fan with electronic control (EC)
- **Brushless** technology = max efficiency
- Single fan section for air supply and return
- Smaller fan, simplifies maintenance and doesn’t stop ventilation
- Fan speed control = simple start-up on site
- Costant supply airflow or **variable airflow rate**
- High static pressure electric fans
High efficiency EC brushless plug-fan

Keeping the same airflow / pressure, the ventilation system **saves 30% energy** than traditional solutions.

Electric motor absorbed capacity, manufacturer data
Example referred to a flow of 7,800 m³/h with external static pressure of 500 Pa.
Very high efficiency filtrations

- G4 filters on first stage
- F7 filters or Electronic filters on second stage

Electronic filters =15% of energy saving for lower drop pressure than traditional
Effective air flow rate management

- **ECO mode**: airflow supply remains constant at varied thermal loads and is shutdown when the load is fulfilled.

- **Constant airflow rate**: fan varies speed also with progressive filter clogging.

- **Variable airflow rate**: supply airflow varies depending on the thermal load up to a minimum compatible value with distribution system. 40% of Airflow reduction $\rightarrow$ 70% energy savings.
High efficiency external axial fans

ECOBREEZE brushless motor with electronic commutation. Managed with condensation pressure:
- Increase the efficiency
- Increase the working life
- Reduction in the electrical consumption by the system

Innovative Winglet able to increase aerodynamic efficiency and reduce the sound emission than traditional fans.
High efficiency on heating

Heat pump is the main solution for heating:

Suitable for cold climates, up to –12°C

Reduced defrosting, thanks to:

- Thermodynamic recovery, active where coils would start freezing
- Ice protection system / Predictive defrost logic

Optimal energy efficiency

- Primary energy consumption is much lower than for gas heaters

Optimal investment

- The Heat pump option has a minimum price impact
- Operation cost is as lower as COP is higher than 1,9
High efficiency in defrosting

Heat Pump versions includes:

**Ice Protection System** and **Predictive** logic

Optimal defrost, only when needed

**Two** independent circuits for alternate Defrost
High efficiency on heating

Three further options are available for heating:

1) **Electric** heaters
2) **Hot water** coil with 3-way valve
3) Condensing **Gas** heater
4) Energy recovery from food refrigeration (water coil)
High efficiency on heating

**Electric** heaters

1) Keep the unit packaged (no gas, no water connections)
2) Integrate the HP capacity
3) Can work as pre-heating, before the HP coil

**FULL ELECTRIC PACKAGE**

**NO GAS REQUIRED**

**-12°C OPERATION**
High efficiency on heating

**Hot water** coil

1) Provides Integration / Pre-heating
2) Can work as the sole heater below a set temperature
3) Replaces the HP in case of emergency
4) Includes the modulating 3-way valve
High efficiency on heating

**Gas** heater, **condensing** type with **modulating** regulation

1) High efficiency, up to 105%
2) Full package, including valves and chimney
3) Provides Integration / Full heating / Emergency
4) No water → No pumps / No freezing

FOR VERY LOW AMBIENT TEMPERATURE

-30°C OPERATION
Heat pump and gas burner module

Hibryd or bivalent operation, criteria to determine the capacity:

1. Bivalent function
2. Hybrid function
3. Heat pump
4. Thermal load line
New gas burner

1. **Condensation technology with modulating control**
   - High efficiency > 105% Pci
   - Accurate control capacity

2. **Standard burner with 2-stage control**
   - Robust and low capital cost
   - Efficiency < 93% PCI

Both with vertical development
Application for very cold climate

Out door temperature from -10°C to -30°C

Besides auxiliary heating options:

A) Heater thermostatically controlled
B) Air damper in special execution
C) Motorised actuator suitable for low temperature
Winter comfort with humidification

Immersed electrodes steam humidifier
- Available in various sizes
- Automatic modulating control
- With automatic drain for inactivity

Water to waste evaporating wet-deck humidifier
- Fast and effective humidification
- Continuous renewal of water
- Automatic washing cycle
More flexibility on air distribution
Roof curb for supply and return on downflow

Simplify the connection to the ducts and the roof insulation

Adjustable to adapt roof slope
Smart electronic control

- Management by microprocessor
- Control development from Clivet
- Remote control is a standard
- Easy to use by not specialized personnel
- Communication protocol: ModBus, Lonworks, BACnet-IP
- Supervisor: Clivet Master System
The rooftop range with water source

Wide range of market reference

Ready for WLHP and Geothermal applications Geotermici

Thermodynamic heat recovery available

Specific options (strainer = kit) for water source:

- Hydraulic package for constant water flow
- Hydraulic package for variable water flow
- Hydraulic package for well water
CLIVETPack2
High Attendance application
The HIGH ATTENDANCE range

Wherever:

• High attendance is the driver (people/sqm)
• It means High fresh air volume (and higher capacity!)

Main applications:

• Cinema
• Theatres
• Restaurants
• Meeting rooms
• Leisure / Disco / Casino
The HIGH ATTENDANCE range

Main figures:
CSNX-XHE units, air-to-air heat pump with built-in heat recovery
More than 1,000 units sold
Up to **80% fresh air** management
Refrigerant circuit ➔ larger than MID ATTENDANCE units
Further options for the specific application
The HIGH ATTENDANCE range

**Main** CSNX-XHE individual standard features:

- Airflow control as standard

**Other** CSNX-XHE individual optional features:

- Hot-gas reheating for summer humidity control
- Silencers on the return side
- IAQ management (variable fresh air) by either CO\textsubscript{2} or VOC control
- Electric heaters / Hot water coil (below –5°C ambient)
- Steam humidification
- Modbus RS485 gateway
CLIVETPack2
Full Fresh Air application
The FULL FRESH AIR range

Some specific applications need full fresh air HVAC:

- Commercial and Industrial *kitchens*
  - To balance the hood exhaust

- Projection rooms in Multiplex cinemas
  - To balance the cooling exhaust fans on projectors

- **Smoking** rooms and Chemical *laboratories*
The FULL FRESH AIR range

CLIVETPACK2 FFA is the solution:

- **Industrialised**
- Based on the **Heat pump** technology, 100% fresh air
- **Highly efficient**, to reduce running cost and CO$_2$ footprint
- Available in **Supply only** / **Supply and Exhaust** versions
CBFFA configuration with air supply only

1. Filtration G4 + F7 or Electronic
2. Heating with water coil or electric heaters
3. Exchanger for air handling
4. Hot gas post-heating
5. Supply fan section
6. External exchanger
7. Electrical panel
8. External fan section

FA = fresh air
S = supply air
CCFFA configuration with air supply and air extraction

1. Filtration G4 + F7 or Electronic
2. Heating with water coil or electric heaters
3. Exchanger for air handling
4. Hot gas post-heating
5. Supply fan section
6. External exchanger
7. Electrical panel
8. External fan section
9. Exhaust fan section

FA = fresh air
S = supply air
R = return air
EX = exhaust air
Functional features

- **Two** independent refrigeration circuit
- Variable capacity with Digital scroll and on/off compressors (sizes 12.2-16.2); **Tandem Scroll compressors** (gr. 20.4-24.4) for seasonal high efficiency
- Radial plug fan with **EC brushless motor**
- Electronic expansion valve (EEV)
- **Microprocessor** management, time scheduling and set point
High compactness

- Fresh air damper
- Expulsion fans
- External axial fans
- External exchangers
- Electrical panel
- Filters and air handling section
- Supply fans
- Tandem Compressors
- Supply fans
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