ISPV

Vertical autonomous heat pumps

Package and split versions
High adaptability
Flexibility of configuration
Scroll compressors in tandem
Plug-fans with EC HEE motor

Cooling & heating

Air filtration

Free-cooling

R-410A

ErP READY 2021

Cooling capacity: *21 to 116 kW*
Heating capacity: *20 to 116 kW*

Description

ISPV reversible heat pumps are vertical air-to-air units consisting of two modules (indoor and outdoor), which can be supplied in Package or Split version.

These units are designed for indoor installation with their two modules attached to a network of air distribution ducts. Its cabinet design has a great adaptability, and allows the cooling and heating of premises where the installation on the roof is too complex or it is necessary to respect the architecture of the building.

A vast number of options makes it possible to meet many operating requirements.

These units are equipped with hermetic scroll-type compressors in tandem design, as well as electronic plug-fans for the outdoor and indoor modules, achieving a high seasonal performance.

Range

Ten models are available:

- 1 circuit and 2 compressors:
  models 090, 120, 140 and 180.
- 2 circuits and 4 compressors:
  models 260, 280, 340, 360, 420 and 490.

Operating limits

Inlet air conditions		Cooling	Heating
Indoor coil	Minimum temperature	10°C WB	10°C
	Maximum temperature	24°C WB	27°C
Outdoor coil	Minimum temperature	-10°C ①	-15°C WB
	Maximum temperature	48°C	15°C WB

① If the condensation pressure control (standard) is disabled, the minimum temperature will be 12°C.

Compliance

- Machinery Directive 2006/42/EC (MD)
- Electromagnetic Compatibility Directive 2014/30/EU (EMC)
- Pressure Equipment Directive 2014/68/EU (PED):

Category by model	090	120 to 360	420 to 490
Package version	1	1	2
Split version	1	2	2

- Eco-design Directive 2009/125/EC (Eco-design)
- Regulation (EU) 2016/2281 SEER/SEPR HT
- Harmonised Standard: EN 378-2:2016 (Refrigerating systems and heat pumps - Safety and environmental requirements. Part 2: Design, construction, testing, marking and documentation)

CUSTOMER BENEFITS

High energy efficiency & environmental responsibility

CIAT concentrates its efforts on making its units more efficient and more environmentally responsible.

The **ISPV** range goes beyond 2021 Ecodesign requirements. Up to 30% savings.

SEER up to 4,59

SCOP up to 3,41

ErP READY 2021

We have designed the **ISPV** range with specific features to reduce energy consumption to the minimum for each application: variable ventilation, low pressure drop filters and free-cooling.

Full reliability

CIAT designs and manufactures reliable products to meet the highest expectations and facilitate maintenance.

The robust qualification process guarantees the highest standards.

Configuration flexibility

The **ISPV** range offers a wide range of options to address the most specific requirements to be the **perfect solution for every application** with maximum comfort, energy efficiency and indoor air quality in mind.

SHOPING CENTERS

LOGISTICS

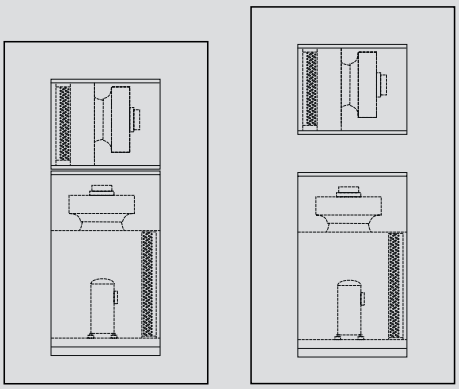
OFFICES

ADMINSTRATION

- Package and Split versions
- Fresh air
- Free-cooling
- Quality sensors
- Air filtration
- Heating back-up
- Heat recovery coil
- All seasons operation
- Multi zone control
- Energy meter
- Smoke detector
- "Lead / Lag" and "Backup"
- Supervision
- Communication

Adaptability

- **Package and Split versions** fit perfectly all types of buildings. Ideal for urban environments where installation on the roof is too complex.



Package version **Split version**

- Reduced height (< 2,200 mm) in the Package version.
- Long distance refrigerant connections between the condensing unit and the air treatment unit in the Split version.

Healthier indoor environment

#CIAT4life

Enhanced solutions to contribute to a healthier indoor environment:

- **Air flow control.** It ensures proper comfort in spaces:
  - temperature,
  - humidity,
  - air flow,
  - overpressure.
- **Air filtration**. It is an efficient way to reduce particles that can harm our health. The filter fouling detector determines when the filter needs to be replaced.
- **CO_2 sensors** that allow ventilation based on the comparison of CO_2 levels between indoor and outdoor sources.
- **Ventilation** of spaces with outdoor air. It reduces indoor pollutants to maintain indoor air quality.

CUSTOMER BENEFITS

Energy savings

We develop energy-efficient solutions that provide substantial savings.

The **ISPV** range has been designed to reduce energy consumption with advanced features:

- Variable ventilation with electronic plug-fans.

  In tertiary sector installation, a high percentage of the annual air conditioning energy consumption comes from the use of fans for transporting air. Using fans which are more efficient has a direct impact on reducing consumption.
- Low pressure drop filters.
- Free-cooling allows make the best use of outdoor air conditions when these are more favorable than the return air conditions. This allows the cooling capacity to be reduced. Up to 30% energy savings due to the cooling capacity reduction.

Acoustic comfort

We guarantee **low noise level** during operation to meet the highest requirements thanks to the design optimization and the use of latest technology for fans and compressors.

- Up to 70% of the operation time below half-load. Sound level reduction in partial load operation.
- Night operation mode available with free-cooling and disabling compressors.

Extensive scope

- **Heat recovery coil** using energy extracted from the cooling system
- **Air zoning** to control up to 4 zones or in case of large surfaces with high thermal dispersion.
- **Constant supply pressure** by controlling the supply air flow. This function allows multi-zone control without zone limits.

Advanced system control

VECTIC control is dedicated to optimizing the performance at part load conditions, increases the seasonal efficiency and operational limits in all seasons.

Simplicity

We guarantee an easy installation and integration in the building management system.

- **Plug & play solution** fully programmed and set-up from factory.
- **Communication** with all building management system protocols through Modbus RTU, TCP/IP, BACnet™ Ethernet and BACnet™ MSTP..
- Wide **supervision** offer from 1 to 300 units.
- **Remote supervision** solution ABOUND HVAC Performance.

  It is an advanced monitoring solution that enables customers for all applications to track and monitor their CIAT equipment.
  - 24/7 remote monitoring.
  - Proactivity to anticipate breakdowns.
  - Real-time data.
  - Reports with analysis and recommendations from BluEdge CIAT experts.
  - Email alert for any event concerning the equipment.

BluEdge® service platform

Our qualified and responsive BluEdge teams of technicians are available to implement actions on site and ensure optimal operation of your equipment.

We have a choice of service levels, enabling you to tailor the level of cover exactly to your needs and budget.

From preventative to full coverage, our **CORE, ENHANCE, ELITE** tiers are designed to fit your needs.

CORE ENHANCE ELITE

Main features

Package and Split versions

EC plug-fans

High efficiency refrigerant circuits

Extension of limits, outdoor temperature from -15ºC to 48ºC

Simple and small-size assembly with mixing box for free-cooling

New options:
Zoning
Heat recovery coil

Vectic smart control system

Reduced height < 2.2 m in Package version

Unit components

Outdoor module

Casing

- Casing made of galvanised steel metal. Most parts protected with polyester paint finished in white color, RAL 7035. Self-supporting frame.
- Transport skids and guides to accommodate the forklift truck.

Outdoor air circuit

- Coil(s) with copper pipes and aluminium fins.
- EC electronic supply plug-fan(s) with variable control speed and flow rate controller.

  In tertiary sector installation, a high percentage of the annual air conditioning energy consumption comes from the use of fans for transporting air. Using fans which are more efficient has a direct impact on reducing consumption.
- Condensate drain pan.

Refrigerant circuit

- Hermetic scroll-type compressors in tandem design that improves the management of stages and the part load efficiencies, assembled over antivibration mounts. Relay for phase-sequence monitoring and phase loss protection.
- Crankcase heater.
- Thermostatic expansion valve(s) with external equalisation.
- Four-way cycle reversing valve(s).
- Acid-resistant filter(s) dryer.
- Suction accumulator(s) (Split version).
- Refrigerant connections for welding when the unit is supplied in Split version. Optionally, the module can be supplied with service valves and refrigerant precharge.

Electrical cabinet

- Complete and fully wired electrical cabinet. Insulated access door to prevent condensation. Protection IP55.
- Numeration of wired and identification of components in the electrical cabinet. It permits easy tracing and diagnostics.
- Hinges + quarter-turn latches on the removable access door.
- Electrical power supply with neutral.
- Main ground connection.
- Compressor(s) and fan(s) motor contacts.

Protections

- High pressure switch(es).
- High and low pressure transducers.
- Refrigerant leak control (by low-pressure alarm).
- Compressor discharge temperature control.
- Main door switch.
- Protection for power lines of compressors with manual motor starters and power lines of fan motors with magnetothermic switches. These devices provide protection against overload, short circuit, phase failure and undervoltage.
- Automatic switch in the control circuit.

Unit components

Indoor module

Casing

- Casing made of galvanised steel metal. Most parts protected with polyester paint finished in white colour, RAL 7035. Self-supporting frame.
- Support feet for transport with Split version.

Indoor air circuit

- Coil(s) with copper pipes and aluminium fins.
- EC electronic supply plug-fan(s) with variable control speed and flow rate controller.

  The fans are factory configured with nominal air flow. Consult for any special configuration.
- Reusable G4 gravimetric filters, mounted on a frame attached to the air return.
- Condensate drain pan.

Refrigerant circuit

- Thermostatic expansion valve(s) with external equalisation and retainer.
- Refrigerant connections for welding when the unit is supplied in Split version.

Electrical cabinet

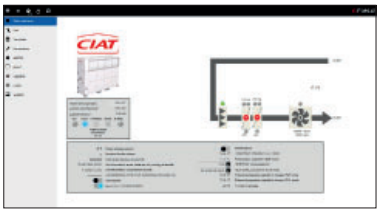
- Complete and fully wired electrical cabinet. Insulated access door to prevent condensation. Protection IP55.

  This cabinet is foldable to allow access to the interior of the module.
- Fan(s) motor contact(s).

Vectic electronic control

The Vectic control consist of a control board, sensors, a VecticGD graphic terminal and a TCO user terminal (optional).

The control board comes equipped with a web tool, **C.FIELD**, which enables users to monitor the status of the unit at all times. By navigating through various menus, users can view the variables that are controlled by the Vectic control.



It also includes two communication ports, one RS485 and one Ethernet, allowing connection with a BMS centralized technical management system using Modbus and BACnet protocols. These ports allow integration of the unit with our local supervision solutions: **BOSSmini** (50 units) and **BOSS** (300 units), as well as with the remote solution: **ABOUND HVAC Performance**.

With this control, it is also possible to connect to a **SHRD shared network** for a maximum of 15 units, with one unit configured as "Lead" and the other units as "Lags". This network allows the exchange of data and information between the units. It is also possible to configure one unit as a "Backup", for activation in case of malfunction of the other unit.

A communication card (optional) can also be connected to the control board for the following protocols: BACnet™ Ethernet and BACnet™ MSTP.

Main functions

- Selection of setpoint and operating mode: HEATING / COOLING / AUTO / VENTILATION.
- Continuous control of the operating parameters.
- Display of the values measured by the sensors.
- Compressors time delays.
- Defrosting management.
- Control of the supply air temperature.
- All-seasons operation via the condensation and evaporation pressure control.

  The management of the unit in cooling mode is based on the principle of a high floating pressure. The condensation pressure setpoint is continually calculated depending on the outdoor temperature. This pressure is regulated by adjusting the air flow on the outdoor fans.
- Setpoint compensation based on the outdoor temperature.
- Hourly and weekly schedule.
- Fire protection.
- Diagnosis of faults and general alarm.
- Management of all the optional components available for the unit: dampers and mixing boxes, auxiliary heating, air quality sensors, air zoning...

VecticGD graphic terminal

This terminal, fitted as standard on the electrical cabinet, is very easy to use. It provides detailed explanations of control in easy to understand English. No decoding is required.

Only 6, large, easy-to-use buttons are required to maneuver through the entire menus.

This terminal is used to:

- Carry out initial programming of the unit.
- Modify operating parameters.
- Switch the unit ON / OFF.
- Select the operating mode and adjust the setpoints.
- Display the variables controlled and sensor values measured.
- Display the current alarms and their historical record.

Note: multiple units can share a single terminal, if they are integrated into a pLAN local network (for up to 15 units).

TCO user terminal (optional)

This terminal can be installed on the electrical cabinet, instead of the VecticGD graphic terminal. In this case, the remote connection of the VecticGD terminal is possible. Please consult the chapter "Options".

This terminal is used to:

- Switch the unit ON / OFF.
- Select the operating mode and adjust the setpoints.
- Display the installation's temperatures and humidity, outdoor temperature, supply air temperature, CO_2 sensor and opening of the outdoor damper.
- Display alarms codes.

NOMENCLATURE OF THE MODEL NUMBER

ISPV	090	C	00	A	4	A	C0	AA	000	0	N	A	N	0	000	0000	0	0	0000	00	000	00	0	000	00
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

Group 1: Range

- ISPV: air/air heat pump

Group 2: Unit model

- 1 circuit: 090 / 120 / 140 / 180
- 2 circuits: 260 / 280 / 340 / 360 / 420 / 490

Group 3: Unit type

- C: Package
- P: Split

Group 4: Air direction: Indoor circuit - Outdoor circuit

- 00: Lateral supply - Lateral supply
- 01: Lateral supply - Upper supply
- 10: Upper supply - Lateral supply
- 11: Upper supply - Upper supply

Group 5: Version of the series

Group 6: Electrical power

- 3: 400 V / 3 ph + N / 50 Hz
- 4: 400 V / 3 ph / 50 Hz

Group 7: Type of refrigerant

- U: R410A

Group 8: Assembly

- C0: Standard assembly
- CS: Assembly with 2 dampers mixing box

Group 9: Coil coating : Indoor circuit - Outdoor circuit

- AA: Aluminium - Aluminium
- AC: Aluminium - Inera®
- CC: Inera® - Inera®

Group 10: Auxiliary heating

- 000: Without auxiliary heating
- E0x: Electrical heaters, 3 power outputs: Low (L) / Nominal (N) / High (H)

Group 11: Protection for low temperature

- 0: Without protection

Group 12: Available pressure of the indoor fan

- N: Nominal available pressure
- H: High available pressure

Group 13: Air filtration + stop-drop

- A: G4
- B: G4+ stop-drop
- C: G4 low pressure drop
- D: G4 low pressure drop + stop-drop
- G: G4 + F7
- H: G4 + F7 + stop-drop
- K: G4 low pressure drop + F7
- L: G4 low pressure drop + F7 + stop-drop

Group 14: Available pressure of the outdoor fan

- N: Nominal available pressure

Group 15: Insulation

- 0: Standard insulation
- 1: Insulation Euroclass A2-s1, d0 (M0)

Group 16: Indoor circuit configuration

000 — Without options
- Unused
- A: Compressor insulation
- A: Clogged filters pressostat

Group 17: Outdoor circuit configuration

0000 – Without options
- A: Service valves and refrigerant precharge
- 0: Unused
- A: Antivibration mounts
- 1: Long distance

Group 18: Extra heating

- 0: Without extra heating
- C: Heat recovery coil

Group 19: Special applications

- 0: Without special applications
- Z: Air zoning
- I: Low return temperature application
- K: Low return temperature application + Air zoning
- P: Constant supply pressure
- R: Constant supply pressure + Low return temperature application

Group 20: Sensors

0000 – Without options
- H: Smoke detector sensor
- A: Air quality sensor for environment
- C: Air quality sensor duct-mounted
- D: Double quality sensor: environment + environment
- E: Double quality sensor: environment + outdoor
- F: Double quality sensor: duct-mounted + outdoor
- P: Air quality sensor on the SHRD network
- 1: 1 sensor RS485
- 2: 2 sensors RS485
- 3: 3 sensors RS485
- 4: 4 sensors RS485
- 5: 1 sensor NTC
- T: Ambient temperature sensor
- H: Ambient temperature + humidity sensor
- P: Ambient sensor on the SHRD network

Group 21: Free-cooling / Outdoor humidity

00 — Without free-cooling + without sensor
- 1: Outdoor humidity sensor on the unit
- 2: Outdoor humidity sensor on SHRD network
- T: Thermal free-cooling
- M: Thermoenthalpic free-cooling
- E: Enthalpic free-cooling

Group 22: Terminal + Unit communication

000 — Without terminal + stand-alone + without card
- B: Communication card BACnet™ Ethernet
- C: Communication card BACnet™ RS485
- 0: Free-standing unit
- 1: "Lead" unit
- 2: "Lag" unit
- P: VecticGD terminal in electrical cabinet
- T: TCO user terminal in electrical cabinet
- R: VecticGD terminal in electrical cabinet + TCO terminal remote up to 100 m
- S: TCO terminal in electrical cabinet + VecticGD terminal remote up to 200 m
- N: VecticGD terminal in electrical cabinet + VecticGD terminal remote up to 200 m

Group 23: Miscellaneous item 1

00 — Without options
- E: Energy meter
- M: Energy meter and calculation of cooling and heating capacities
- 1: Tropicalization

Group 24: External mixing box

- 0: Without external mixing box
- 1: External mixing box with 3 dampers
- 2: External mixing box with 2 dampers

Group 25: Unused

000: Unused

Group 26: Special manufacturing

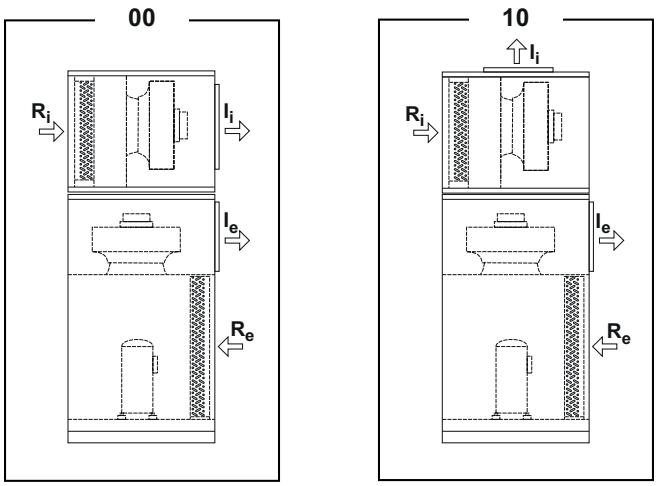
00: Without special manufacturing

FACTORY OPTIONS AND ACCESSORIES

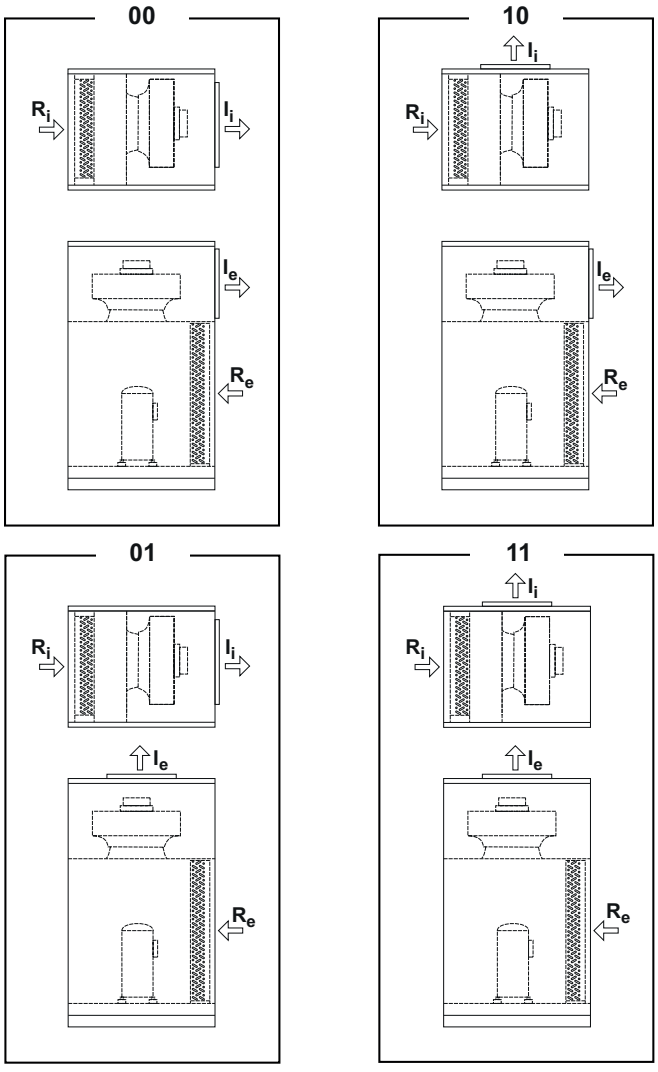
Air direction

(Indoor circuit supply - Outdoor circuit supply)

Package version (C)



Split version (P)



I_i: Indoor circuit supply	**I_e:** Outdoor circuit supply
R_i: Indoor circuit return	**R_e:** Outdoor circuit return

Electrical power

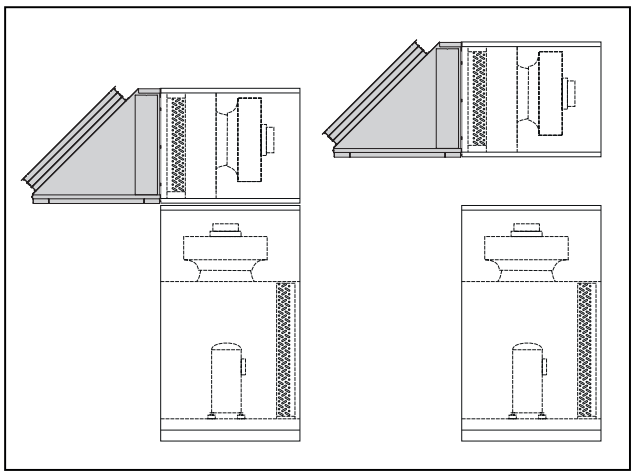
These units can be supplied for the following power supply voltages:

- 400 V / 3 ph + N / 50 Hz (standard)
- 400 V / 3 ph / 50 Hz (optional)

Assembly

- **CS assembly:** Mixing box with for air renewal and free-cooling managed by the electronic control of the unit. The box incorporates two interlocked dampers with a servomotor. Assembly and connection on site, at the return of the indoor module.

  Available in Package and Split versions:



Important: In the Package version, both the connection of the mixing box and the construction of a structural support are the responsibility of the installer.

The following image shows the positions of the return air (R) and fresh air (N) dampers:

Coils coating

- Coils with copper pipes and fins of an aluminium alloy **INERA®**. Level of corrosion protection: basic - medium. This treatment offers a resistance of more than 1000 hours (ASTM B117 NSST).

Auxiliary heating

- **Auxiliary electrical heaters**, with two power stages and on/off control. Connection and assembly on site, at the outlet of the supply fan (indoor module).

  Note: Electrical heaters with proportional control upon request.

FACTORY OPTIONS AND ACCESSORIES

Up to 3 values of total power available for each model:

ISPV	E0L (Low)	E0N (Nominal)	E0H (High)
090 to 120	9 kW	12 kW	15 kW
140 to 180	12 kW	18 kW	24 kW
260 to 360	18 kW	24 kW	36 kW
420 to 490	36 kW	45 kW	54 kW

Available pressure of the indoor fan

- By default, these units are fitted with plug-fans for a nominal available pressure (N). Optionally, aluminium fans with high available pressure (H) can be supplied.

  Note: Aluminium fans are rated A2-s1, d0 (M0) and comply with regulations for public promises in France.

  Important: the "Selection Software" will choose the supply fan with lower consumption for the available pressure required.

Air filtration + stop-drop

Options to improve indoor air quality:

- The unit is shipped as standard with G4 filters, mounted in a frame attached to the return of the indoor module.

  Note: This frame can be disassembled for space reasons during transport.

The frame can accommodate other combinations of filters:

- G4 gravimetric filters with low pressure drop (l.p.d.).
- G4 gravimetric filters standard type + F7 opacimetric filters.
- G4 gravimetric filters with low pressure drop (l.p.d.) + F7 opacimetric filters.

Classification of the filters according to the new **ISO 16890 Standard**:

- G4 → ISO Coarse 60%
- F7 → ISO ePM1 50%

- Stop-drop in the indoor air coil. Recommended in cases where a high moisture content in the air is foreseen or when the air flow is high.

Insulation

- Ceramic panel for thermal and acoustic insulation in the indoor module, with Euroclass fire classification A2-s1, d0 (M0).

Indoor circuit configuration

- Acoustic insulating cover for compressor. The sound level reduction is approximately 2 dB(A).
- Differential pressure switch to detect clogged filters as safety protection.

Outdoor circuit configuration

- Antivibration mounts made of rubber (silent-blocks). The Split version provides anti-vibration mounts for both modules. With mixing box (CS assembly) also its mounts are supplied.
- Service valves for refrigerant connections and refrigerant precharge for a maximum distance between the outdoor module and the indoor module of 7.5 meters (for Split version).
- Oil separator for long-distance (for Split version). The maximum equivalent length of the refrigerant line can be 50 meters when the outdoor module is above. For longer distances, up to 100 meters maximum, it is necessary to use an oil separator per refrigerant circuit.

Extra heating

- Heat recovery coil (HRC). The coil function is to pre-heat the air that will pass through the main indoor coil. For this, it uses the temperature of an outdoor water installation.

  The filters + coil assembly is supplied disassembled for installation on site. The kit with the 3-way valve is also supplied separately from the coil for connection on site.

  Available on 090 to 360 models.

FACTORY OPTIONS AND ACCESSORIES

Special applications

- Low return temperature application. Activation of the evaporation and condensation control of the indoor circuit as a function of the return temperature.

Multi-zone management solutions:

The Vectic control provides the greatest choice in terms of multi-zone management with two different solutions:

- Air zoning up to 4 zones.
- Constant supply pressure.

The following table provides the comparison of the two solutions to facilitate the correct selection according to the customer needs:

Characteristics	Zoning up to 4 zones	Constant supply pressure
Number of zones	Up to 4	Unlimited
Type of fan	Plug-fan	Plug-fan
Components included	4 zone terminals and a control box	Differential pressure sensor (range 0 - 1000 Pa)
Dampers and servos per zone	Not supplied	Not supplied
Control signal for dampers / servos	Supplied	Not supplied (external control required)
Control of the damper for each zone	Yes, control carried out by the electronic control	No (at customer level)
Terminal in each zone	Yes	No or just one for the main zone (see "Configurations")
Minimum air flow	35%	35% or 10% in ventilation mode (operating only the fans). There is an associated alarm in case of lower airflow. It is necessary to set the minimum damper opening per zone or provide remote stop control in case all dampers are closed
Capacity control	Based on the ambient temperature conditions of each zone terminal (by default) or the return temperature (optional)	• Based on the return conditions (by default) • Based on the environment conditions (configurable), in case of a main zone (see "Configurations")

Note: In both cases, with the enthalpic or thermoentalpic free-cooling option (T+H control), it is necessary to add a return T+H probe in the unit selection.

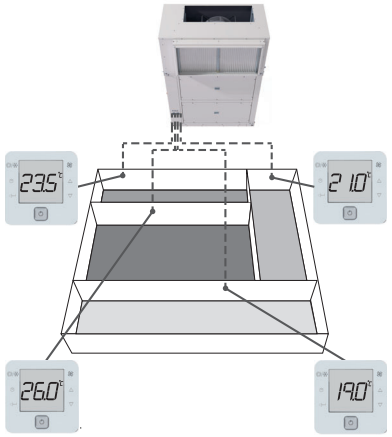
Air flow zoning up to 4 zones

This option allows the management of the air flow of the unit to condition up to 4 different zones with a minimum air flow of 35% (all of them in same operating mode: heating or cooling).

Vectic control gives the control signal to the dampers installed in each zone (dampers and servomotors for those dampers not supplied). The unit modifies the air flow and capacity depending on information coming from sensors in each zone and considering active zones in each moment.

The option includes 4 zone terminals (one for each zone) and a control board supplied in an independent box. The 4 terminals, the unit main board and also the servomotors that control dampers in each zone are connected on this board (dampers and servos not supplied).

The temperature information for each zone comes from a temperature sensor integrated inside each zone terminal. It is not needed to install any extra ambient sensor.



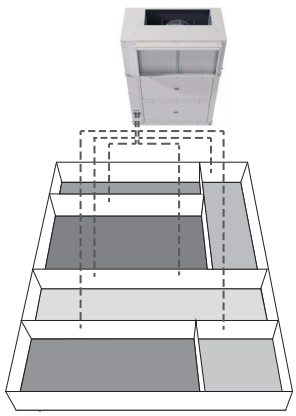
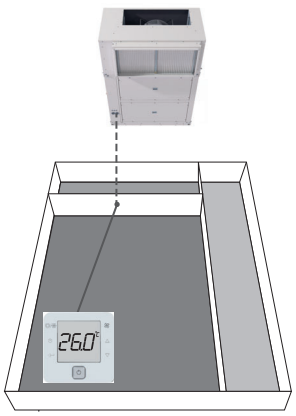
Note: If the unit additionally includes a CO_2 air quality probe, it must be a return probe and not an ambient probe.

Constant pressure supply

Using a differential pressure sensor, the air flow is controlled to maintain constant pressure in the supply duct.

This type of management eliminates the restriction of the number of zones, which facilitates a greater adaptation to the characteristics of the installation, although the customer must carry out the control of dampers in each zone.

It is also possible to choose between two different configurations:

Configurations	
Capacity control based on the return conditions (by default)	Capacity control based on the environment conditions (configurable)
Several zones	Several zones (one main zone)
Same comfort priority by zone	One main zone. Comfort of all zones depends on the demand of the main zone
	

Note: For variable management of fresh air it is necessary to select the optional return air quality probe (CO_2) (instead of the ambient probe). There is only one case in which the ambient air quality probe can be used: with constant supply pressure and capacity based on the environmental conditions of the main zone.

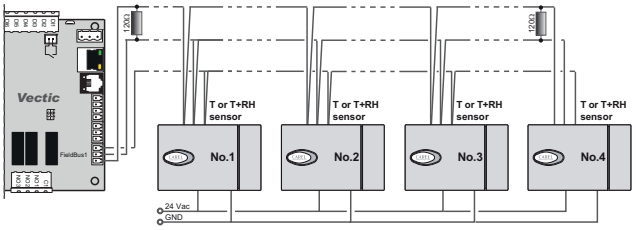
FACTORY OPTIONS AND ACCESSORIES

Sensors

- Sensor(s) of **ambient temperature**. There are 3 options:
  - One NTC sensor connected to the control board.

    Note: An ambient sensor with RS485 communication is required for installation at more than 30 meters.
  - One to four sensors with RS485 communication.
  - Sensor(s) installed on the "Lead" unit of the shared network (SHRD).
- One to four sensors of **ambient temperature + humidity**, with RS485 communication or installed on the "Lead" unit of the shared network (SHRD).

  This sensor is compulsory in units with enthalpic or thermoenthalpic free-cooling (optional). In this case, the outdoor air humidity sensor is also added.



- **Smoke detecting** sensor. Smoke detecting station in accordance with the NF S 61-961 standard, 961, that uses a LED to indicate the installation status, and if the probe detects the presence of smoke in the installation, it stops the operation of the unit and gives the order to open or close the outdoor damper (configured by parameter).

  To ensure compliance with the French regulations on Fire safety (ERP), it's possible to configure the opening of the fresh air damper and the exhaust air damper to 100% (return air damper closed).
- **Air quality** sensor to enable measuring CO_2.

  There are different options:

  - Ambient air quality sensor.
  - Return air quality sensor (duct-mounted) (attached picture).
  - Sensor installed on the "Lead" unit of the shared network (SHRD).
  - Double quality sensor:
    - two ambient air sensors;
    - one ambient air sensor and one outdoor air sensor;
    - one return air sensor (duct-mounted) and one outdoor air sensor.

    Advantages of installing two ambient air quality sensor:

    This installation is interesting in large premises, so that ventilation can be done based on the maximum, minimum or average value measured by the two sensors.

    Advantages of installing an outdoor CO2 air quality sensor:

    This sensor gives the option to manage fresh air depending on real difference of CO_2 concentration indoor and outdoor[1]. It gives the chance to really answer to the request of indirect method for ventilation,without need of estimating outdoor air quality, but measuring it.

    [1] Outdoor sensor will be supplied not mounted. It has to be located outdoor, but protected from rain and external agents. For any doubt, please ask.

Options recommended for fresh air management:

Room	Outdoor	Recommendation
Constant occupation	Applied to all locations	Constant fresh air (fresh air % fixed by regulation). No additional option required.
Variable occupation	Locations where outdoor CO_2 is well known	Variable fresh air (considering indoor CO2 concentration): • Ambient air quality sensor • Return air quality sensor • Double ambient sensor (in large scale premises)
	Locations where outdoor CO_2 is not well known or variable	Variable fresh air (considering indoor and outdoor CO2 concentration): • Double air quality sensor: ambient and outdoor • Double air quality sensor: return and outdoor

Methodologies fresh air ratio calculation:

The categories of indoor air quality (IEQ) are defined in EN16798:1 based on the level of expectation that the occupants may have.

- A normal level would be a "medium" level.
- A higher level can be selected by occupants with special needs (children, elderly, people with disabilities, etc).
- A lower level does not mean any risk for health, but it can affect to comfort level.

Category IEQ	DIRECT METHOD: Fresh air ratio by person	INDIRECT METHOD: CO_2 concentration above outdoor CO_2 concentration
	dm³/s by person	ppm
I: High level of expectation	20	550
II: Medium level of expectation	12,5	800
III: Moderate level of expectation	8	1.350
IV: Low level of expectation	5	1.350

References: EN 16798-3:2017 and EN 16798-1:2019: Energy performance of buildings - Ventilation for buildings, replacing EN 13779:2007.

Free-cooling + outdoor humidity

- **Outdoor air humidity** sensor (compulsory in units with optional enthalpic or thermoenthalpic free-cooling).

  When the unit needs the outdoor humidity probe, this one is connected on the board in place of the NTC ambient temperature probe. In this case, an RS485 ambient temperature probe connected to the Field-bus is used.

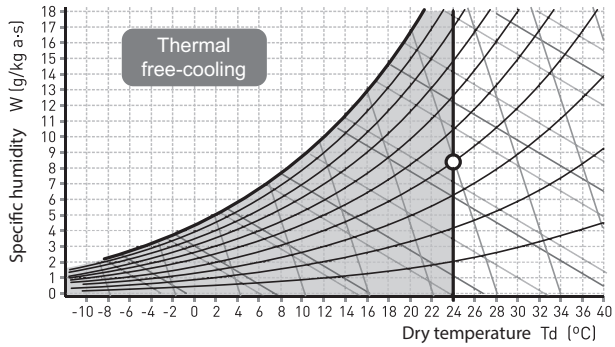
  There are 2 options:
  - Sensor supplied with the unit (for duct installation).
  - Sensor installed on the "Lead" unit of the shared network (SHRD).

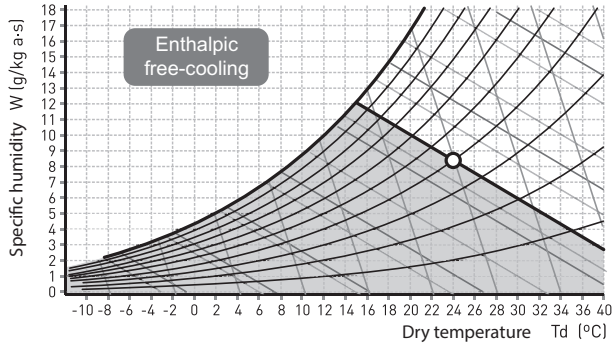
FACTORY OPTIONS AND ACCESSORIES

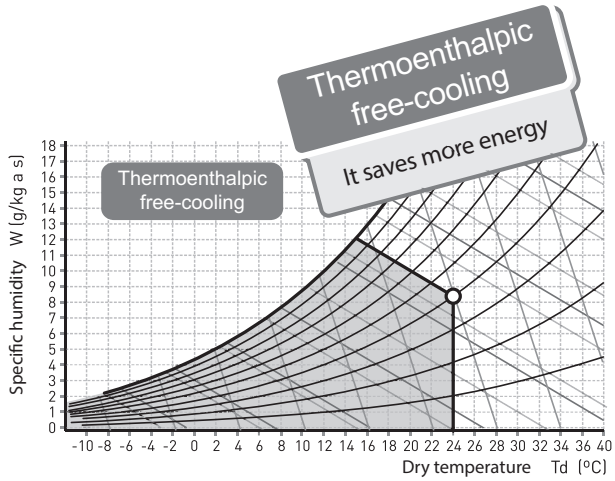
- **Free-cooling management:** Running the unit in free-cooling mode allows it to make best use of outdoor air conditions when these are more favourable than the return air conditions. This allows the cooling capacity to be reduced. The percentage of outdoor air can vary between 0% and 100%.

  There are three options for free-cooling management:

  - Thermal, by comparing the temperatures.
  - Enthalpic, by comparing the enthalpies. Recommended in cases where a high moisture content in the air is foreseen.
  - Thermoenthalpic, by comparing the enthalpies and correcting for temperature. This is the optimum solution as it takes the variability of the climate into account.







One function that helps improve energy management is **nocturnal free-cooling**. This feature allows the compressors to be disabled in summer with programming, the unit works providing free-cooling at night, when the outdoor conditions are favourable. This allows the cooling demand to decrease significantly early in the day.

Terminal + unit communication

- **Terminal for Vectic electronic control**

  By default, the electronic control Vectic is supplied with a graphic terminal installed in the electrical cabinet of the unit, but these other configurations also are available:

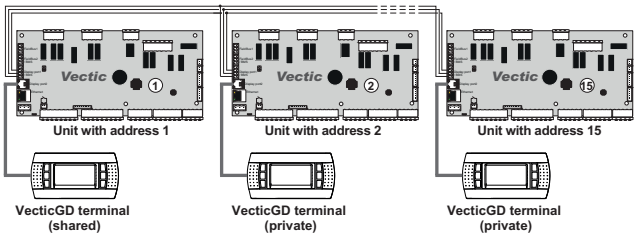
VecticGD graphic terminal

TCO user terminal

  - TCO user terminal installed in the electrical cabinet, instead of the VecticGD graphic terminal.
  - VecticGD graphic terminal installed in the electrical cabinet and TCO user terminal remote up to 100 meters.
  - TCO user terminal installed in the electrical cabinet and VecticGD graphic terminal remote up to 200 meters (two TCONN bypass cards must be used from 50 to 200 meters).
  - VecticGD terminal installed in the electrical cabinet and VecticGD terminal remote up to 200 meters (two TCONN bypass cards must be used from 50 to 200 meters).
  - Control without terminal (for units with shared terminal in a pLAN local network).

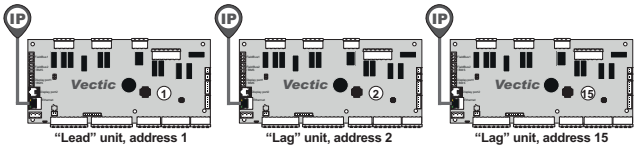
    Note: Multiple units can share a terminal if they are integrated into a local pLAN network (for up to 15 units).

    This is not possible in units configured as "Backup", since the two units must be fully autonomous in their operation.



- **Stand-alone or networked unit**

  By default, the electronic control is configured for a stand-alone unit, but it is also possible to include it in a SHRD shared network as "Lead", "Lag" or Backup. The maximum number of units that can be integrated into an "Lead/Lag" shared network is 15, and in the case of "Backup" it is 2 units.



  Important: to use any of the following functionalities it is necessary to configure in the "Selection Program" a unit as "Lead" and all other units as "Lags" (including the Backup unit).

  The specific functionality will be configured on site (according to the Vectic regulation manual).

FACTORY OPTIONS AND ACCESSORIES

The shared network (SHRD) allows to have the following functionalities depending on the parametrized configuration:

- **Lead/Lag:**

  It allows the sharing of some of the probes installed in the "Lead" unit: ambient temperature or ambient temperature + humidity, outdoor temperature, outdoor humidity and CO_2 air quality.

  Important: These probes can only be shared if installation features allow it.

- **Extended Lead/Lag:**

  It includes "Lead/Lag" functionalities and the "Lead" unit provides ambient temperature setpoints to the other units.

- **Lead/Lag with the same operating mode:**

  It includes the "Extended Lead/Lag" functionalities and the "Lead" unit also provides the status (Cooling- Heating - Ventilation) to the other units.

- **Backup in case of alarm:**

  One unit is configured as a Backup unit, for activation in case of malfunction of the other unit.

- **Extended Backup:**

  It includes the "Backup in case of alarm" functionalities and also, the control manages the automatic switching between the two units weekly, to compensate the operation times of both units.

  Note: In the case of installations with Backup units, it is not possible to share the probes, since both units must be fully autonomous in their operation. If both units are connected to the same supply duct network, it is imperative that the installation consists of non-return dampers (installer responsibility).

Communication of the unit

The control board includes two communication ports, one RS485 and one Ethernet, allowing connection with a BMS centralized technical management system using Modbus and BACnet protocols. These ports allow integration of the unit with our local supervision solutions: **BOSSmini** (50 units) and **BOSS** (300 units), as well as with the remote solution: **ABOUND HVAC Performance**.

A communication card (optional) can also be connected to the board for the following protocols:

- BACnet™ Ethernet (B: BACnet™ Ethernet card),
- BACnet™ MSTP (C: BACnet™ RS485 card).

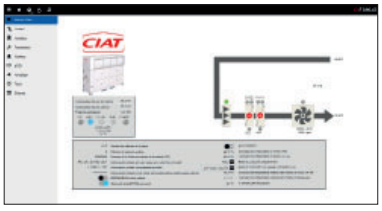
Note: refer to the electronic control manual for more complete information.

Local supervision

Different solutions of supervision are available based on the dimensions of the installation:

C.FIELD

The control board includes a web tool for managing the operation of the unit.



C.FIELD facilitates unit setup, commissioning, maintenance and software version updates. By navigating through various menus, users can view the variables that are controlled by the Vectic control.

To access C.FIELD it is only necessary to know the IP address of the board.

BOSSmini

It is the solution for the management and supervision of small or medium-sized air conditioning installations. Up to 10 units with 50 variables per unit or 50 units with 10 variables maximum per unit.

The control board allows for communication through its built-in Ethernet port.

Its main advantages are:

- Integrated WIFI Hotspot for direct access without any extra infrastructure.
- Smartphone compatibility.
- Secure supervisor control from remote through a simple browser.

BOSSmini allows commissioning and daily access for system maintenance. It also includes advanced monitoring functions and allows for the creation of areas and groups to simplify installation management.

This solution also allows the integration of energy meters for monitoring the electrical consumption of the installation.

BOSSmini is shipped from the factory with pre-configured settings and customizations that are based on the specific needs and specifications of each customer.

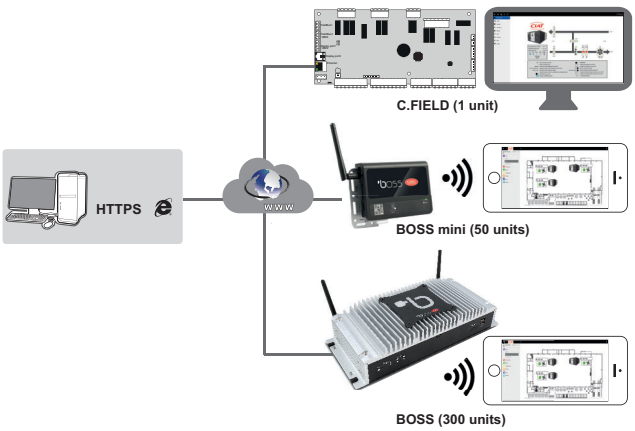
Available in two versions:

- CPU device.
- CPU device, monitor, mouse and keyboard.

BOSS

It is the solution for the management and supervision of large air conditioning installations, up to 300 units and 3500 variables.

The control board also allows for communication through its built-in Ethernet port. It has the same features as BOSSmini.



BOSSmini and BOSS enable remote system management. A simple Internet connection provides access to all the information on the system (Router LAN o 3G/4G). The Web interface, the same that is available to the local user, allows the monitoring and complete configuration of the installation: from the office or any other current location of the user.

FACTORY OPTIONS AND ACCESSORIES

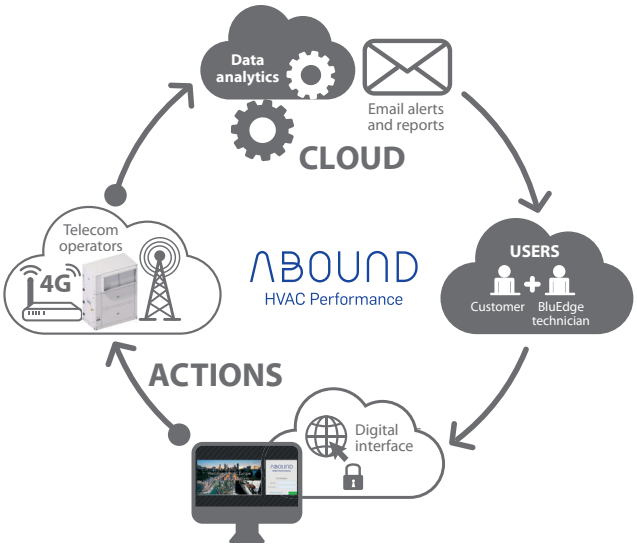
Remote supervision

ABOUND HVAC Performance

This is the remote supervision solution dedicated to monitoring and controlling several CIAT machines in real time.

Its main advantages are:

- Improved energy performance. European regulations encourage buildings to install control and supervision systems to achieve the 2030 energy efficiency target of ≥ 27%.
- Access to the operating trend curves for analysis.
- Improved availability rate for the machines.



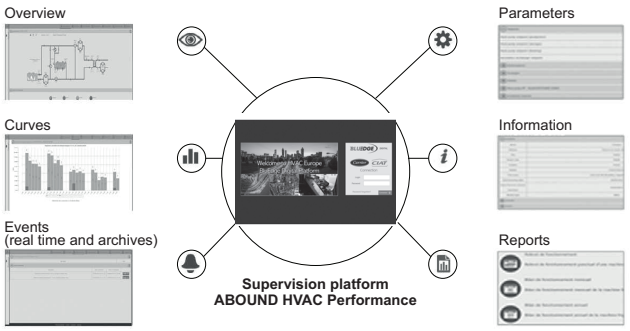
Equipment required:

A transportable box that can be used on both, machines which are already in use (existing inventory) and on new machines.

One box can manage up to 5 units connected in series via the Modbus RS485 port of each control board.

Features:

ABOUND HVAC Performance will send data in real time to the supervision website. The machine operating data can be accessed from any PC, smartphone or tablet. Any event can configured to trigger a mail alert.



- Parameters monitored: overview, control panel for the controllers, events, temperature curves.
- Monthly and annual reports are available to analyse :
  - The performance and operation of the machine.
    Example: operating curves and time, number of compressor start-ups, events, preventive maintenance actions to be performed, etc.
- Incidents such as a drift in the measurements on a temperature sensor, incorrectly set control parameters, or even incorrect settings between one compressor stage and the other are immediately detected, and the corrective actions put in place.

Maintenance service BLUEDGE

With your **BluEdge** service agreement, enabled by Abound HVAC Performance supervision solution, both you and our highly trained team will gain visibility, access expert advice and effectively optimise the lifecycle outcomes of your installation.

Miscellaneous item 1

- **Energy meter** for monitoring of the power consumption of the installation.
- **Energy meter and calculation** of the cooling and heating capacities. In addition to the energy meter, the unit incorporates mixing and supply enthalpic sensors with RS485 communication that enable cooling and heating capacities to be calculated.
- **Tropicalization**: tropicalized components on the electrical cabinet with protective varnish: control board, cards and terminals.

External mixing box

Note: The recommendation is to select CS assembly instead C0 for fresh air and free-cooling management. But if for any reason the mixing box supplied with CS assembly does not fit the need of the installation, this option for external mixing box can be selected.

- **External mixing box with 2 dampers**. Management of the dampers of an external mixing box not supplied (to manage fresh air and free-cooling).

  This option is only available with C0 assembly. In this case, it is possible to choose the "Group 21" sensors (free-cooling / outdoor humidity).
- **External mixing box with 3 dampers.** Management of the signal control for dampers and fans of an external mixing box not supplied (to manage fresh air and free-cooling).

  In this case, in addition to the sensors of the previous option, the electrical cabinet incorporates two terminals with 230Vac output for activation of the contactor that the customer must install to power its return fan. This output is activated simultaneously with the ISPV unit supply fan.

FACTORY OPTIONS AND ACCESSORIES (SUMMARY)

Family	Group	Description	Installation in factory	Installation on site
Unit type	3	Package (C) or Split (P)	✔	
Air direction	4	00: Lateral - Lateral	✔	
		01: Lateral - Upper	✔	
		10: Upper - Lateral	✔	
		11: Upper - Upper	✔	
Electrical power	6	400 V / 3 ph / 50 (without neutral)	✔	
Assembly	8	CS: Assembly with 2 dampers mixing box		✔
Coil coating	9	Coil with copper pipes and fins of an aluminium alloy (INERA®)	✔	
Auxiliary heating	10	Auxiliary electrical heaters	✔ (*)	
Indoor fan	12	Supply plug-fan of high available pressure	✔	
Air filtration + Stop-drop	13	Stop-drop in the indoor air coil	✔	✔
		G4 gravimetric filters with low pressure drop	✔	✔
		G4 gravimetric filters + F7 opacimetric filters	✔	✔
		G4 gravimetric filters with low pressure drop + F7 opacimetric filters	✔	✔
insulation	15	Thermal and acoustic insulation, Euroclass A2-s1, d0 (M0)	✔	
Indoor circuit	16	Compressor insulation	✔	✔
		Differential pressure switch to detect clogged filters	✔	
Outdoor circuit	17	Service valves and refrigerant precharge (Split version)	✔	
		Long distance (Split version)		✔
		Antivibration mounts made of rubber		✔
Extra heating	18	Heat recovery coil (models 90 to 360)	✔ (*)	
Special applications	19	Air zoning	✔ (*)	
		Constant supply pressure	✔ (*)	
		Low return temperature application	✔	
Sensors	20	Ambient temperature sensor: 1 NTC sensor connected to the control board or 1 to 4 RS485 sensors	✔	✔
		Ambient temperature + humidity sensor: 1 to 4 sensors with RS485 communication	✔	✔
		Air quality sensor environment installed, duct-mounted, on a shared network (SHRD) or double sensor (environment + environment; environment + outdoor; duct-mounted + outdoor)	✔	✔
		Smoke detecting station in accordance with the NF S 61-961 standard	✔	✔
Free-cooling + Outdoor humidity	21	Type of free-cooling: thermal, enthalpic or thermoenthalpic	✔	✔
		Outdoor air humidity sensor: supplied with the unit or installed on a shared network (SHRD)	✔	✔
Terminal + Unit communication	22	TCO terminal installed in the electrical cabinet	✔	✔
		VecticGD terminal installed in the electrical cabinet + TCO terminal remote up to 100m	✔	✔
		TCO terminal installed in the electrical cabinet + VecticGD terminal remote up to 200m	✔	✔
		VecticGD terminal installed in the electrical cabinet + VecticGD terminal remote up to 200m	✔	✔
		Unit configuration: Free-standing, Lead or Lag	✔	✔
		Communication cards: BACnet™ Ethernet; BACnet™ RS485	✔	✔
Miscellaneous item 1	23	Energy meter	✔	
		Energy meter and calculation of the cooling and heating capacities	✔	
		Tropicalised components on the electrical cabinet: control board, cards and terminals	✔	
External mixing box	24	External mixing box with 2 dampers		✔
		External mixing box with 3 dampers		✔

(*) Part of this option must be installed on-site.

ADDITIONAL FACTORY OPTIONS UPON REQUEST

This chapter contains other options available upon request, in addition to those indicated in the table above:

- **Activation of the remote COOLING / HEATING operating mode.** The electronic control allows the operating mode switching by a digital input of an input/output expansion module.
- **General alarm signalling.** The Vectic control allows the management of a relay for remote alarm signalling.

  The output for general alarm signal is not compatible with the heat recovery coil. In this case, upon request, it would be possible to have a general alarm output in an input/output expansion module.
- **Ventilation with differential air pressure sensor.** In installations with this differential pressure sensor, the percentage of air renewal is adjusted according to the pressure in the room. This option allows dynamic control of the damper opening by measuring the pressure differential between inside and outside.
- **Mechanical disconnection of stages** of compressor and/or electrical heaters using digital inputs. This is especially useful in the following cases:
  - To reduce electricity consumption in certain time slots.
  - When electricity consumption is limited.
- **Control of supply and return dampers.** This function allows the management of external supply and return dampers located in the ducts, so that the closure of the ducts can be controlled after the unit is stopped. This option can also be useful in installations with Back-up units.

Description of options upon request	Installation in factory	Installation on site
Activation of the remote COOLING / HEATING mode	✔	
General alarm signalling by relay	✔	
Ventilation with differential air pressure sensor		✔
Mechanical disconnection of stages	✔	
Control of supply and return dampers		✔

TECHNICAL CHARACTERISTICS (EN-14511-2022)

ISPV series		090	120	140	180	260	280	340	360	420	490
Cooling capacities	Cooling capacity ① (kW)	20,5	25,5	34,3	39,8	56,8	62,1	70,4	81,5	101	116
	Power input ③ (kW)	7,7	11,0	13,1	16,6	19,0	21,8	26,8	34,1	38,4	47,6
	EER performance	2,68	2,32	2,62	2,39	2,99	2,85	2,63	2,39	2,64	2,43
	SEER	4,37	4,20	4,13	3,95	4,59	4,37	4,14	4,03	4,06	3,96
	ns	172%	165%	162%	155%	180%	172%	162%	158%	159%	156%
Heating capacities	Heating capacity ② (kW)	20,0	26,0	34,4	40,4	54,7	62,2	71,2	83,4	102	116
	Power input ③ (kW)	7,0	10,1	11,5	14,2	16,9	19,9	23,1	28,4	31,6	40,0
	COP performance	2,86	2,58	2,98	2,85	3,24	3,12	3,08	2,94	3,21	2,96
	SCOP	3,31	3,31	3,41	3,27	3,30	3,27	3,26	3,25	3,40	3,28
	ns	129%	129%	133%	128%	129%	128%	127%	127%	133%	128%
Outdoor module fan	Type	Electronic plug-fan									
	Nominal air flow (m^3/h)	7.300	10.400	14.000	14.500	27.300	27.300	29.500	29.500	29.000	37.000
	Nominal available static pressure (Pa)	100	100	150	150	100	100	100	100	200	200
	Number / Diameter (mm)	1 / 500	1 / 500	1 / 560	1 / 560	2 / 560	2 / 560	2 / 560	2 / 560	2 / 500	4 / 500
	Maximum speed (r.p.m.)	1.800	1.800	1.495	1.495	1.495	1.495	1.495	1.495	2.100	2.140
	Motor output (kW)	1 x 3,0	1 x 3,0	1 x 3,1	1 x 3,1	2 x 3,1	2 x 3,1	2 x 3,1	2 x 3,1	2 x 4,8	4 x 3,1
	Maximum absorbed current (A)	1 x 4,7	1 x 4,7	1 x 4,6	1 x 4,6	2 x 4,6	2 x 4,6	2 x 4,6	2 x 4,6	2 x 7,3	4 x 4,7
Indoor module fan	Type	Electronic plug-fan									
	Nominal air flow (m^3/h)	4.000	5.400	7.000	7.400	11.000	12.600	14.400	15.200	20.000	20.000
	Nominal available static pressure (Pa)	120	120	150	150	150	200	200	200	200	200
	Number / Diameter (mm)	1 / 500	1 / 500	1 / 500	1 / 500	2 / 500	2 / 500	2 / 500	2 / 500	2 / 500	2 / 500
	Maximum speed (r.p.m.)	1.350	1.350	1.800	1.800	1.800	1.800	1.800	1.800	1.750	1.750
	Motor output (kW)	1 x 1,33	1 x 1,33	1 x 3,04	1 x 3,04	2 x 3,04	2 x 3,04	2 x 3,04	2 x 3,04	2 x 3,08	2 x 3,08
	Maximum absorbed current (A)	1 x 2,1	1 x 2,1	1 x 4,7	1 x 4,7	2 x 4,7	2 x 4,7	2 x 4,7	2 x 4,7	2 x 4,8	2 x 4,8
Compressor	Type	Scroll									
	No. compressors / stages / circuits	2 / 2 / 1				4 / 4 / 2					
	Oil type	Copeland 3MAF 32cST, Danfoss POE 160SZ, ICI Emkarate RL 32CF, Mobil EAL Artic 22CC									
	Volume of oil (l)	2,5	2,5	3,5	3,6	5,0	6,8	7,0	7,2	10,0	10,0
Electrical characteristics	Mains voltage	400 V / III ph / 50 Hz (±10%)									
	Power supply	3 Wires + Ground + Neutral									
	Maximum absorbed current (A)	20,3	25,6	33,4	38,0	56,2	59,2	66,8	76,0	94,4	110,6
	Starting current (A)	57,0	68,2	96,8	125,1	98,8	116,6	130,2	163,1	205,3	229,5
Refrigerant connections (Split version)	Circuit 1: Liquid line	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	7/8"	7/8"
	Circuit 1: Gas line	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 3/8"	1 3/8"
	Circuit 2: Liquid line	-	-	-	-	5/8"	5/8"	5/8"	5/8"	7/8"	7/8"
	Circuit 2: Gas line	-	-	-	-	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 3/8"	1 3/8"
Refrigerant	Type	R-410A									
	Global warming potential (GWP) ④	2.088									
	Charge in Package version (kg)	6,0	6,6	8,6	9,4	11,3	14,9	15,5	15,8	25,6	26,4
	Environment impact (tCO2 e)	12,5	13,8	17,9	19,6	23,5	31,1	32,4	33,1	53,4	55,2
	Charge up to 7,5 m in Split version (kg)	6,5	7,1	9,2	10,1	12,5	16,2	16,8	17,1	27,0	28,0
	Environment impact (tCO2 e)	13,6	14,8	19,3	21,0	26,1	33,7	35,0	35,7	56,4	58,4

① Cooling capacity calculated in accordance with the EN-14511-2022 standard given for indoor temperature conditions 27ºC, 19ºC WB and 35ºC outdoor temperature.

② Heating capacity calculated in accordance with the EN-14511-2022 standard given for indoor temperature conditions 20ºC and 6ºC WB outdoor temperature.

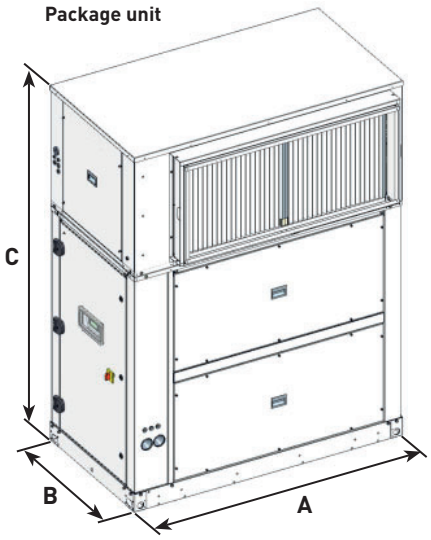
③ Total power input by compressors and motorised fans under nominal conditions, calculated in accordance with the EN-14511-2022 standard.

④ Climatic warming potential of a kilogram of fluorinated greenhouse gas in relation to a kilogram of carbon dioxide over a period of 100 years.

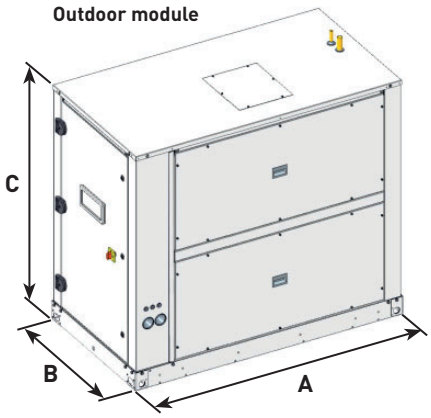
Overall dimensions

ISPV series	Package unit			Split unit: Outdoor module			Split unit: Indoor module			Mixing box (CS assembly)		
	A (mm)	B (mm)	C (mm)	A (mm)	B (mm)	C (mm)	A (mm)	B (mm)	C (mm)	A (mm)	B (mm)	C (mm)
090 to 120	1.340	930	2.175	1.340	795	1.440	1.340	930	735	1.340	890	735
140 to 180	1.640	1.030	2.175	1.640	895	1.440	1.640	1.030	735	1.640	890	735
260 to 360	2.900	1.030	2.175	2.900	895	1.440	2.900	1.030	735	2.900	890	735
420 to 490	3.720	1.130	2.175	3.720	995	1.440	3.720	1.130	735	3.720	890	735

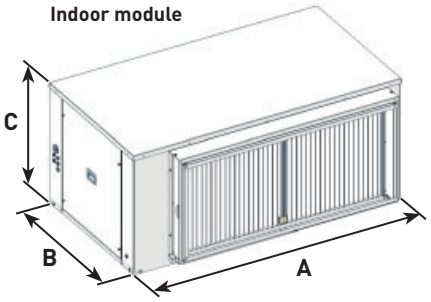
Package unit



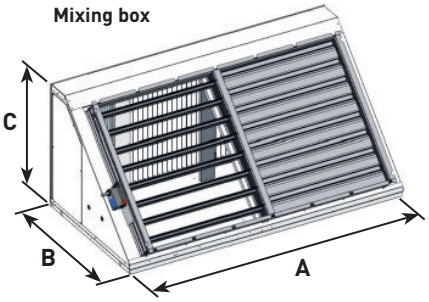
Outdoor module



Indoor module



Mixing box



Weight overview

ISPV series	090	120	140	180	260	280	340	360	420	490
Package unit (kg)	506	520	638	643	1.069	1.098	1.109	1.116	1.573	1.633
Split unit: Outdoor module (kg)	355	372	444	447	758	781	789	796	924	984
Split unit: Indoor module (kg)	158	158	203	203	330	330	364	364	643	643

Weight supplement from the main options (kg)

ISPV series		090	120	140	180	260	280	340	360	420	490
Mixing box (CS assembly)		62	61	71	71	108	108	108	108	172	172
Supply fan	High pressure (H)	7	7	2	2	5	5	5	5	34	34
Filters	G4 l.p.d.	2	2	1	1	2	2	2	2	2	2
	G4 + F7	5	5	5	5	10	10	10	10	13	13
	G4 l.p.d. + F7	5	5	6	6	12	12	12	12	15	15
Stop-drop	Indoor coil	14	14	17	17	35	35	35	35	51	51
Electrical heaters	E0L (Low)	16	16	19	19	36	36	36	36	43	43
	E0N (Nominal)	17	17	22	22	38	38	38	38	48	48
	E0H (High)	19	19	25	25	43	43	43	43	52	52
Heat recovery coil	Empty	32	32	35	35	54	54	54	54	--	--
	In service	36	36	41	41	65	65	65	65	--	--
Valves and refrigerant precharge (Split version)		6	7	9	10	13	16	17	17	27	28
Long distance (Split version)		5	5	5	5	9	9	9	9	9	9

Sound levels dB(A)

Sound power level (LW)

Package unit

ISPV series	090	120	140	180	260	280	340	360	420	490
63 Hz	46	60	57	60	62	62	59	69	68	69
125 Hz	60	66	66	75	72	72	74	72	75	75
250 Hz	74	73	74	74	79	78	76	77	82	85
500 Hz	76	80	81	81	83	84	82	82	85	87
1000 Hz	80	84	84	84	85	85	86	86	86	89
2000 Hz	79	83	84	84	82	83	84	84	84	86
4000 Hz	73	77	77	77	78	78	77	78	80	80
8000 Hz	64	69	68	72	72	72	69	73	72	73
Total dB(A)	84	88	88	89	89	89	90	90	91	93

Split unit: Outdoor module

ISPV series	090	120	140	180	260	280	340	360	420	490
63 Hz	43	57	54	57	59	59	56	66	65	66
125 Hz	56	64	63	72	69	69	71	69	72	72
250 Hz	71	70	71	71	76	75	73	74	79	82
500 Hz	74	78	78	78	80	81	79	79	82	84
1000 Hz	78	81	81	81	82	82	83	83	83	86
2000 Hz	77	80	81	81	79	80	81	81	81	83
4000 Hz	70	74	74	74	75	75	74	75	77	77
8000 Hz	61	66	65	69	69	69	66	70	69	70
Total dB(A)	79	82	83	83	86	86	87	87	88	90

Split unit: Indoor module

Sound power level in the indoor fan supply to be taken into account for the silencer calculation:

ISPV series	090	120	140	180	260	280	340	360	420	490
63 Hz	63	65	72	75	71	70	72	76	68	68
125 Hz	64	66	68	71	67	67	69	72	75	75
250 Hz	63	66	69	72	69	70	71	75	75	75
500 Hz	61	64	73	76	73	73	77	78	70	70
1000 Hz	57	62	73	76	73	74	75	78	70	70
2000 Hz	56	60	69	72	69	70	72	75	71	71
4000 Hz	52	57	63	66	63	64	66	69	80	80
8000 Hz	48	54	56	59	55	57	60	63	66	66
Total dB(A)	63	67	79	82	79	79	82	84	82	82

Sound pressure level (LP)

Measurement conditions: in a clear field, measured at a distance of 10 metres, directivity 2 and at 1,5 metres from the ground.

Note: The sound pressure level depends on the installation conditions and, as such, it only indicated as a guide. Values obtained according to the ISO 3744 standard.

ISPV series	090	120	140	180	260	280	340	360	420	490
Total dB(A)	51	54	55	55	56	57	57	57	58	60

Split unit: Outdoor module

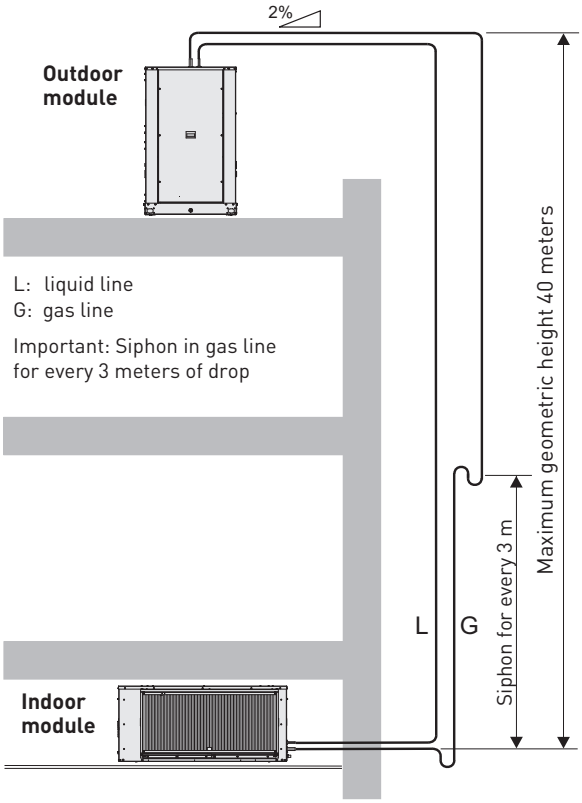
ISPV series	090	120	140	180	260	280	340	360	420	490
Total dB(A)	50	52	53	53	55	55	55	55	56	58

Refrigerant connections (Split version)

In the case of separate installation of the outdoor and indoor modules the following recommendations should be followed:

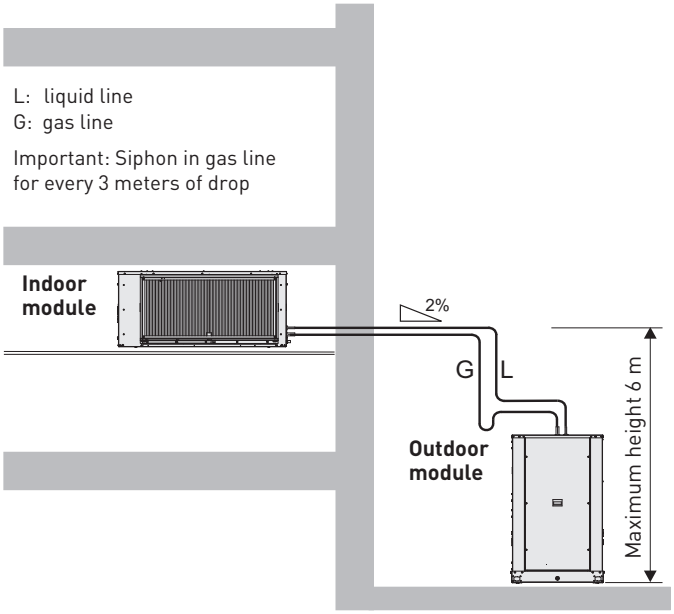
Outdoor module top

Maximum equivalent length of the refrigerant line: 50 metres



Outdoor module bottom

Maximum equivalent length of the refrigerant line: 30 metros



- The maximum equivalent length of the refrigerant line is 50 meters, with a maximum geometric height of 40 meters when the outdoor module is above. For longer distances, up to 100 meters maximum, it is necessary to use an oil separator per refrigerant circuit (long distance option).
- The maximum equivalent length of the refrigerant line is 30 meters, with a maximum geometric height of 6 meters when the indoor module is above.

Refrigerant connections

ISPV series		090	120	140	180	260	280	340	360	420	490
Circuit 1	Liquid line: Circuit 1	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	7/8"	7/8"
	Gas line: Circuit 1	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 3/8"	1 3/8"
	Charge up to 7.5 m (optional) (kg)	6,0	6,6	9,20	10,10	6,25	8,10	8,40	8,55	13,5	14,0
Circuit 2	Liquid line: Circuit 2	--	--	--	--	5/8"	5/8"	5/8"	5/8"	7/8"	7/8"
	Gas line: Circuit 2	--	--	--	--	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 3/8"	1 3/8"
	Charge up to 7.5 m (optional) (kg)	--	--	--	--	6,25	8,10	8,40	8,55	13,5	14,0

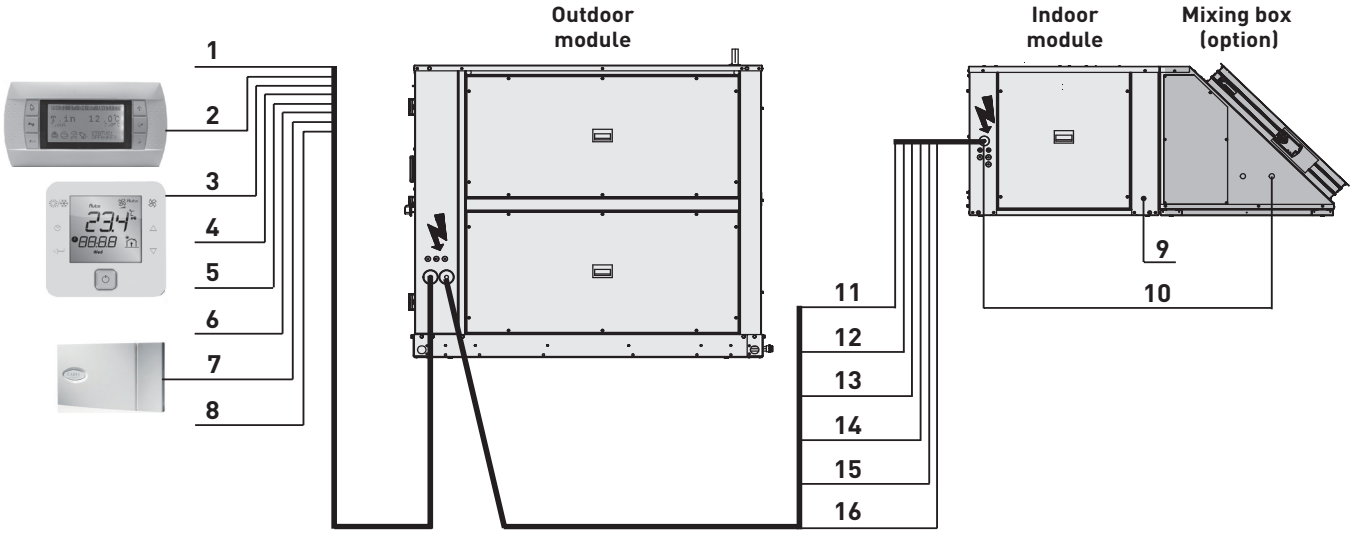
R-410A refrigerant charge

- As an option, the unit can be supplied service valves for refrigerant connections and refrigerant precharge for a maximum distance between the outdoor module and the indoor module of 7.5 meters.
- If the equivalent length of the refrigerant lines is greater than 7.5 meters, an additional charge per metre must be carried out according to the following table:

Nominal diameter (inches)	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"	1 3/8"
Interior section (cm^2)	0,2	0,5	1,0	1,6	2,4	3,3	4,4	5,6	8,5
Liquid line charge (g/m)	17,5	48,1	93,9	154,8	229,6	318,9	422,2	539,3	814,9
Gas line charge (g/m)	-	0,2	0,3	0,6	0,8	1,2	1,5	2,0	3,0

ELECTRICAL CONNECTIONS

The following connections must be made on site by the customer:



ISPV	No.	Connections		090 to 120	140 to 180	260 to 360	420 to 490
Package and Split versions	1	Main power supply 400 III (±10%)	Standard unit	5G x 4 mm²	5G x 10 mm²	5G x 25 mm²	5G x 50 mm²
			With electrical heaters (optional)	5G x 10 mm²	5G x 25 mm²	5G x 50 mm²	5G x 95 mm²
	2	Remote connection of VecticGD graphic terminal (by default installed on the electrical cabinet) ①		Telephone cable 6 wires standard (RJ12 connector)			
	3	Connection of TCO user terminal (optional) ②		2 x 1 mm² (230V) + 1 shielded cable for communication type AGW20 / 22 (1 braided pair + drainwire + shielding)			
	4	Remote off/on (optional)		2 x 1 mm²			
	5	General alarm signal (optional) ③		2 x 1 mm²			
	6	Remote Cooling/Heating (optional upon request)		2 x 1 mm²			
	7	Ambient probe ④	NTC	2 x 1 mm²			
			RS485	4 x 0,5 mm² + shielding ⑤			
	8	Air quality probe (optional)		3 x 1 mm²			Not available
	9	Heat recovery coil (optional)		3 x 1 mm²			
	10	Connection of mixing box (optional)	Standard (BOX3)	5 x 1 mm²			
			Enthalpique probe for energy measurement (BOX-ENT) (opt.)	4 x 0,5 mm² + shielding			
Split version	11	Power supply of the indoor module (W96)	Standard unit	4G x 1,5 mm²	4G x 2,5 mm²	4G x 2,5 mm²	4G x 4 mm²
			With electrical heaters (optional)	4G x 4 mm² (Nominal pressure) 4G x 10 mm² (High pressure)	4G x 10 mm²	4G x 16 mm²	4G x 35 mm²
	12	Control of the indoor module (W30)		7 x 1 mm²			
	13	Power supply of the indoor fan (230 Vac) (W5)		2 x 1 mm²			
	14	Control of the indoor fan (W90)		7 x 1 mm²			
	15	Electrical heaters (W37) (optional)		4 x 1 mm²			
	16	Heat recovery coil (W53) (optional)		4 x 1 mm²			Not available

① In this case, it´s possible to install the TCO user terminal on the electrical cabinet.
② The power supply of the electrical cabinet (230 V) must be used for terminal power.
③ The output for general alarm signal is not compatible with the heat recovery coil. With this option, possibility of general alarm upon request.
④ The outdoor humidity probe (optional) is connected in the same place as the ambient NTC probe. In this case the ambient probe RS485 connected on the Field-bus will be used.
⑤ Up to four RS485 ambient sensors can be connected in series on the field-bus of the control board.