Ferroli

# RFA

## SINGLE PACKAGED ROOFTOP UNITS
## ROOF-TOP

34.4÷109.8 kW in cooling mode
38.6÷117.8 kW in heating mode

OZONE SAVED R410A

CE

**Mod.**
**35.1**
**45.1**
**55.1**
**70.2**
**90.2**
**110.2**

TECHNICAL MANUAL

# TABLE OF CONTENTS

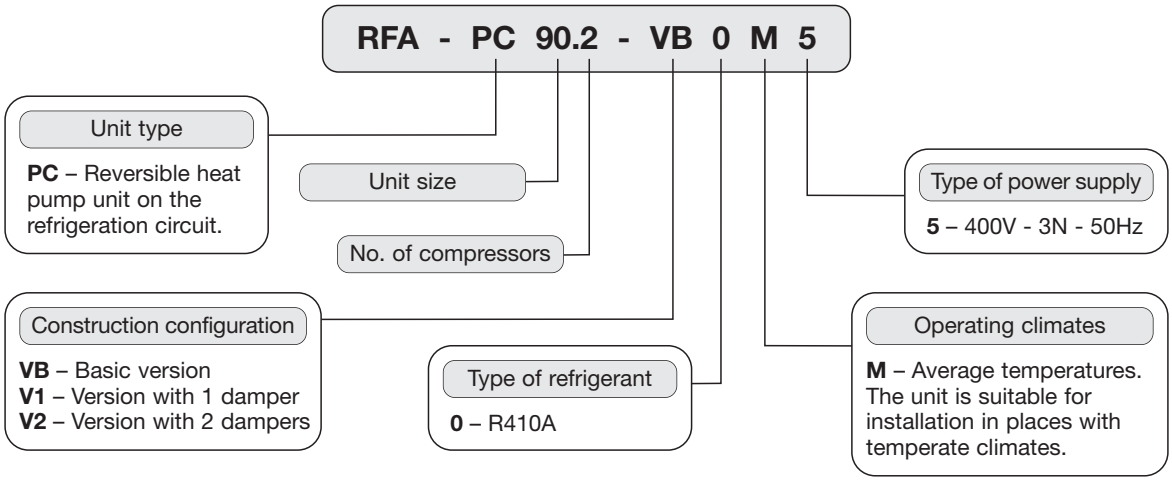
# GENERAL FEATURES

## Presentation of the unit

The air/air units of the RFA series are able to satisfy the air conditioning requirements of medium large spaces (shopping centers, hypermarkets, movie theaters, offices, cafeterias, restaurants, etc.) and allow functioning in heating mode by means of the inversion of the refrigeration circuit.
They are ideal for installation in any outside environment. The load-bearing structure and the paneling are constructed of galvanized and painted sheet metal, the fastening components are made of stainless steel or have been electrolytically galvanized, and the cabinet containing the electrical equipment and all the components exposed to the elements have a minimum protection rating of IP 54. The zone in contact with the treated air, which is easily accessible, is comprised of metal surfaces that can be easily cleaned and that are externally insulated to reduce heat loss to a minimum and to prevent the formation of condensate both inside and outside the structure.
Each size can be equipped with a large range of accessories and built in various configurations to adapt to various installation requirements.
The series is installed on two construction frames equipped with **scroll** compressors, each of which is placed on an independent refrigeration circuit. This makes it possible to maintain a constant ratio between total and sensible cooling capacity even with partial loads and guarantees better treatment of the air as well as greater reliability.
Each refrigeration circuit is equipped with a double thermostatic valve to optimize the two operating modes and with ball valves upline and downline from the external coils.
The units are equipped (standard features) with a variable speed switch for the external fans which permits operation in cooling mode with low outside temperatures and in heating mode with high outside temperatures and makes it possible to reduce the noise emissions under said operating conditions. The electric motors of the internal fan with power greater than or equal to 4 kW are equipped with starting by means of a star-triangle switching to reduce the surge starting current.
The units function with refrigerant gas **R410A**.
All the versions are supplied as self-contained units assembled and tested at the factory.

## Unit identification code

The following is a description of the nomenclature for identifying the units and the meaning of the letters used.



## Standard unit description

**Structure**
The load-bearing structure, the base, and the external paneling are constructed of hot galvanized steel sheet that has been painted with epoxy powders (color RAL 7035) to ensure total resistance to the elements. The inspection panels are all easily removable by means of $^1/_4$-turn closures to allow complete access to the internal components. The zone in contact with the treated air is constructed of galvanized sheet metal to guarantee proper cleaning, in conformity with Italian Legislative Decree no. 626/94, and is externally insulated with foam panels and double panels with class 1 soundproofing and heat insulation placed between them.

**External fan section**
The external fan section is comprised of axial fans with sickle shaped aluminum blades, housed in an inlet cone constructed of galvanized and painted sheet metal and equipped with a protective safety screen. They are directly coupled to 6-pole single-phase motors (900 RPM max.), with external rotor, complete with internal overheating protection and firmly attached to the insulated sheet metal panels with rubber anti-vibration mounts.
The speed of rotation of the fans is continuously regulated by a phase cutting device that makes it possible to check the condensation pressure (in the cooling mode) and the evaporation pressure (in the heating mode) as a function of the value read from the temperature probe located on the liquid line.

**Internal fan section**
The internal fan section is comprised of a pair of double inlet centrifugal fans with blades curved forward, balanced both statically and dynamically in conformity with ISO 1940 standards, grade 6.3. The screw, the impeller, and the frame are constructed of galvanized sheet metal, while the shaft is built of C40 steel.
By means of a belt and pulleys the fan is coupled to a three-phase, 4-pole asynchronous electric motor attached to an appropriate belt tightening slide, with an IP55 protection rating, F insulation class, and suitable for continuous service (S1) with sufficient heating margins in case of an overload of limited duration. Starting by means of star-triangle switching is standard for powers greater than or equal to 4 kW to reduce the surge starting current and to ensure longer duration of the transmission.
The pulley installed on the motor is a variable diameter type pulley, and it makes it possible, within certain limits, to regulate the fan's rotation speed to obtain the desired air flow values and available head.
All the units can be configured with a front or downward outlet.

**Filter section**
All the units are equipped with corrugated type filter cells comprised of a frame made of galvanized sheet metal, a protective screen made of electrically welded galvanized steel wire and a reusable filter element made of polyester fiber stiffened with synthetic resins. G4 class efficiency according to standard CEN-EN 779 (Eurovent EU4 classification - 90% average weighted efficiency) and class 1 flame resistance.
The filter cells are easily accessible for the periodic cleaning and inspection operations. Once the advised final pressure drop has been reached, the synthetic fiber can be partially reused after treating with lukewarm water and detergents.

**Compressors**
These compressors are orbiting hermetic spiral scroll compressors, complete with overtemperature and over-current protection of the motor. A device for verifying the presence and the correct sequence of the power supply phases is contained in the electrical board to prevent the reverse rotation of the compressor.
They are anchored to the base by means of rubber anti-vibration mounts and are installed in a compartment separated from the air flow for better accessibility. They are also equipped with "belt" type electric elements that are activated when the compressor turns off, and their job is to maintain the oil at a sufficiently high temperature to prevent the migration of refrigerant during the stoppages and to cause to be evaporated any liquid that may be present in the casing to prevent any liquid impacts during startup.

**Internal heat exchangers**
Louvered coils constructed with copper tubes arranged equilaterally with aluminum louvers with grooved profile for increasing the heat exchange coefficient. To prevent condensate from being picked up, the frontal air speed does not exceed 2.7 m/s, even in the configuration with the maximum flow rate and under the most unfavorable thermohygrometric conditions. To collect the condensate there is a stainless steel drain pan with an inclined bottom, complete with threaded connector for the discharge.

**External heat exchangers**
Louvered coils constructed with copper tubes arranged equilaterally with aluminum louvers with grooved profile.

**Thermostatic expansion valve**
Thermostatic valves equipped with an external equalizer. These valves make it possible to adjust to various operating conditions while maintaining constant the set degree of overheating. The presence of two valves (one for cooling mode operation and one for heating mode operation) in each refrigeration circuit makes it possible to optimize the calibration to obtain maximum efficiency.

**Dehydrator filters**
Solid cartridge hermetic filters able to retain residues of impurities and any traces of humidity present in the circuit. There are two filters per circuit, placed upline from the thermostatic valves.

**Pressure switches**
Each refrigeration circuit is equipped with three pressure switches with fixed calibration to prevent the operation of the unit outside of the allowed operating range.
- high pressure: placed on the outlet tubes.
- low pressure for cooling mode operation: placed between the internal exchanger and the reverse valve.
- low pressure for heating mode operation: placed between the liquid separator and the compressor.

The activation of the pressure switch results in the turning off of the compressor of the circuit involved. The reset is manual (by means of the user interface) for the high pressure switch and automatic for the low pressure switches (they become manual only in the case of frequent activation).

**Cocks**
These devices are placed before and after each external coil to make it possible to stock all the refrigerant inside the coils so that maintenance or replacement operations can be carried out on all the components of the refrigeration circuit, without any need to dispose of them.

**Liquid separator**
Placed on the intake tubing of each compressor to protect it from backflow.

**Reverse cycle valve**
Makes it possible to switch the operating mode by reversing the refrigerant flow.

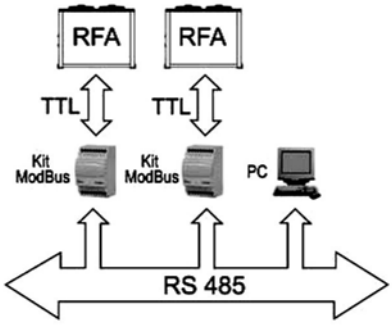
**Sight glass**
This device indicates the presence of liquid upline from each thermostatic valve and makes it possible to verify the subcooling and the correct refrigerant charge. It also indicates the refrigerant's humidity content by means of a change in its color.

**Access fitting**
The access fitting valves allow to create a loading or draining point rapidly at four points for each refrigeration circuit: compressor intake, compressor outlet, and upline from each thermostatic valve.
They are SAE 5/16" (equivalent to UNF 1/2" - 20) type valves, complete with valve core, and cup with gasket , as is required for the use of the refrigerant R410A.

**Electrical board**
The electrical board, placed inside the unit and protected by easily removed panels, is manufactured in conformity with the CEI EN 60204-1 standard and contains all the power, regulation, and safety components necessary to guarantee the unit's proper functioning.
The power section contains:
- General cutoff switch's door blocking mechanism
- Compressor control contactors
- Internal fan control contactors
- Compressor protection
- External fan protection
- Internal fan protection with magnetothermic switch
- External fan phase cutting cards

The control section contains:
- Electronic microprocessor controller
- Auxiliary circuit power supply transformer
- Auxiliary circuit protection
- Phase sequence and presence control device

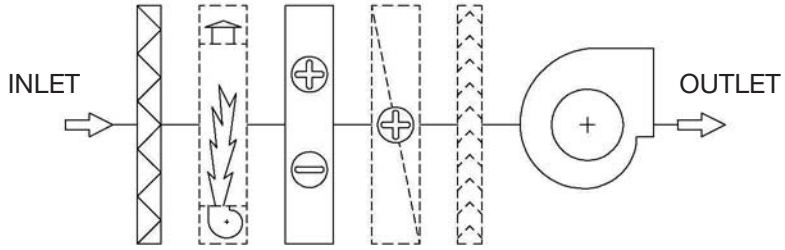
**Regulation and control system**
The unit is managed by a microprocessor controller comprised of a card, located inside the electrical board, to which are connected all the pressures and the control devices, and a user interface that can be accessed by removing the electrical board's protection panel. It is possible to connect another interface to the board to remotely control the machine (refer to "Remote control" and "Remote thermostat" accessories).
The following are the main functions that are available: treated air temperature regulation, thermal free cooling, treated air humidity regulation (only with the enthalpic free cooling accessory), active alarms display, remote on-off, remote cooling and heating, recording the hours of operation, and serial communication by mean of the Modbus protocol.



# CONFIGURATIONS

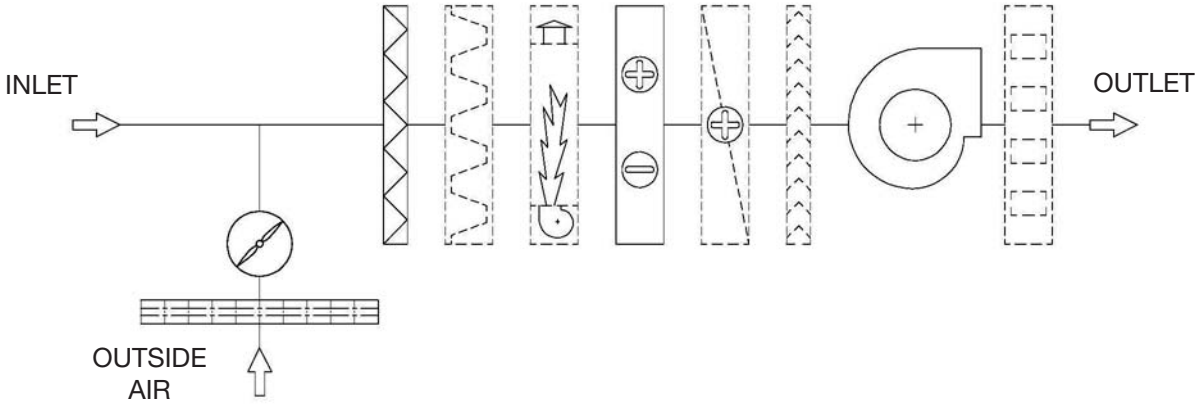
Each unit can be supplied to the client with different configurations to satisfy the requirements of the systems. The various versions that can be obtained by combining additional modules with the basic version are always supplied already assembled, wired, and tested at the factory.
All the versions can be configured with a front or downward outlet.
The components outlined with dashes are accessories.

**Basic version - VB**



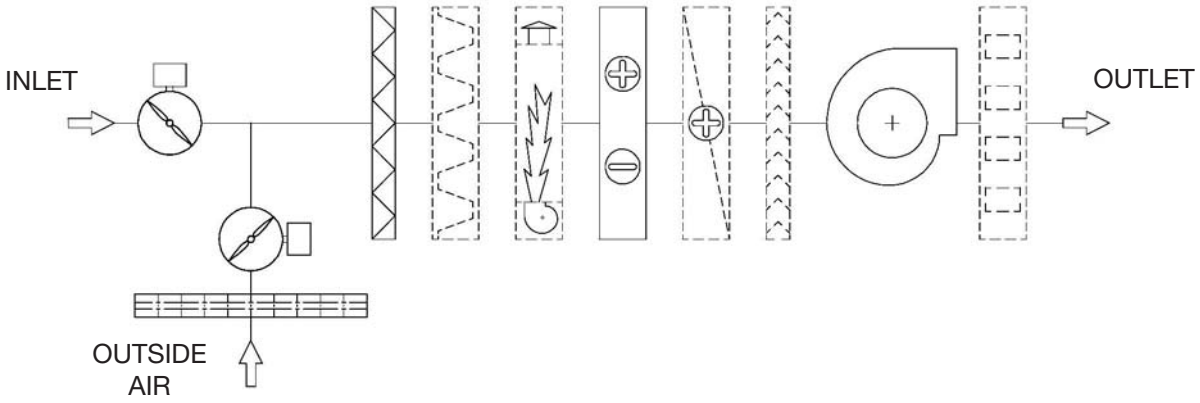

This version allows operation with 100% inlet air. It contains the standard filter section and the air-refrigerant coil that makes possible the heating or cooling and dehumidification treatments.
It is possible to add a further heating section (a water coil or a series of electric heaters) and a droplet separator. As an alternative to this heating section it is possible to add a condensation gas thermal module, positioning it between the filter section and the air-refrigerant coil.

**Version with 1 damper – V1**




This version allows operation with a percentage of outside air that can be set by manually adjusting the damper installed on the additional module. The outside air intake comes complete with a rainproof cover and a protective metal mesh. The discharge from the climate-controlled room of an air flow rate equal to the fresh air flow rate must occur independently from the unit through the overpressure openings or the removal devices.
Various types of special filters can be inserted in the additional module to complete the standard filter section. Also in this version it is possible to add a further heating section (a water coil or a electric heaters) and a droplet separator. As an alternative to this heating section it is possible to add a condensation gas thermal module, positioning it between the filter section and the air-refrigerant coil. Sound attenuator can be installed downline from the outlet fan to reduce the noise transmitted in the rooms to be climate-controlled by means of air ducts.

**Version with 2 dampers – V2**




Two motorized dampers managed by the unit controller make possible operation with a minimum percentage of fresh outside air (which can be set by means of the user interface) and the implementation of thermal free cooling. The outside air intake, which comes complete with a rainproof cover and a protective metal mesh, is sized for 100% of the total flow rate and, therefore, makes possible operation in the free cooling mode with 100% outside air. The discharge from the climate-controlled room of an air flow rate equal to the fresh air flow rate must occur independently from the unit through the overpressure openings or the removal devices.
Various types of special filters can be inserted in the additional module to complete the standard filter section. Also in this version it is possible to add a further heating section (a water coil or electric heaters) and a droplet separator. As an alternative to this heating section it is possible to add a condensation gas thermal module, positioning it between the filter section and the air-refrigerant coil.
It is also possible to implement enthalpic free cooling by means of the installation of the appropriate humidity probes.
Sound attenuator can be installed downline from the outlet fan to reduce the noise transmitted in the rooms to be climate-controlled by means of air ducts.

# OPTIONS AND ACCESSORIES

In this section are described all the components that can be installed on the unit. For further details consult the sections on technical data, overall dimensions, and connections. Always verify the possibility of combining each accessory with the configuration you have selected (according to the table below).

| | Configuration | | |
|---|---|---|---|
| | VB | V1 | V2 |
| Protection grills for the external coils | M | M | M |
| High and low pressure gauges | M | M | M |
| Spring vibration dampers | F | F | F |
| Internal fan with nonstandard motor and transmission | M | M | M |
| Droplet separator | M | M | M |
| Refrigeration circuit housing silencing kit | M | M | M |
| Outlet Sound attenuator | – | M | M |
| Filters differential pressure switch | M | M | M |
| Special filters | – | M | M |
| Air quality monitoring | – | – | M |
| Enthalpic Free cooling | – | – | M |
| Remote control | F | F | F |
| Remote thermostat | F | F | F |
| Clock controller | F | F | F |
| Modbus serial interface on RS485 | F | F | F |
| 2- or 3-row water coil for post-heating only | M | M | M |
| Heating coil with electric heaters | M | M | M |
| Gas thermal module | M | M | M |
| Downward outlet | M | M | M |
| Roof curb | F | F | F |

*M: Accessory assembled at the factory.*
*F: Supplied accessory (installation is the responsibility of the client).*

### Protection grills for the external coils

The external coils are protected by metal grills that have undergone black cataphoresis treatment.

### High and low pressure gauges

Each refrigeration circuit is equipped with two analog gauges, located inside the refrigeration circuit housing, which measure the pressures in the compressors' intake and outlet tubes.

### Spring vibration dampers

These mounts reduce the transmission to the unit's support surface of the mechanical vibrations generated by the compressor and by the fans during their normal operation. To maintain a degree of insulation of greater than 90%, the number and properties of the anti-vibration mounts change depending on the size of the unit, the construction configuration chosen, and the accessories installed. Different anti-vibration mounts may be necessary on the same unit due to the nonuniform distribution of the weights on the support points.
The choice of this accessory requires the use of anti-vibration joints on all the aeraulic and hydraulic connections. Furthermore, the height of the supports placed between the base of the unit and the support surface must be taken into account to properly arrange the air ducts. (H = 79 mm at rest and average deflection under pressure is approx. 20 mm).

### Internal fan with nonstandard belt drive

To adjust the performance of the internal centrifugal fan to the effective air flow rate values and required available head, for each size there are three transmissions (standard, High capacity, and reduced) that are differentiated by the pulleys used and by the rated electric motor power. The pulley installed on the electric motor is a variable diameter type pulley and, therefore, it makes it possible, within certain limits, to modify the fan's curve to adapt it to the system's characteristic curve.

### Droplet separator

It is advisable to use this component in the case of units that require air flow rates that are particularly high in comparison to the expected standard flow rate, i.e., high enough to generate an average air through speed of 2.7 m/s.
It prevents the picking up of condensate droplets that form on the exchange coil during cooling mode operation. It comes complete with a stainless steel condensate collection drain pan with an inclined bottom and a threaded connector for the discharge. It is never required if the water coil for post-heating only is installed.

**Low noise kit**

To reduce the noise emissions produced by the unit, it is possible to insulate the walls of the refrigeration circuit housing and wrap the compressors in special soundproofing enclosures.

**Outlet sound attenuator**

This accessory is comprised of soundproofing elements made of mineral wool covered with an anti-erosion film made of fiberglass placed downline from the centrifugal outlet fan. They make it possible to reduce the noise emissions transmitted in the rooms to be climate-controlled by means of air ducts. It is not available when the downward outlet is selected.

**Filters differential pressure switch**

This accessory measures the difference in pressure before and after the filter section. When the pressure dropes exceed the maximum permitted value (set at the factory according to the type of filter installed on the unit), the pressure switch acts to prevent the machine from operating with an air flow rate that is excessively low in comparison to that required.

**Special filters**

To complete the standard filter section it is possible to insert, inside the additional modules, rigid bag filters of various efficiencies (F6, F7, F8, and F9: according to the EN 779 standard) or activated carbon filters class F7. The filter holder guide was designed to guarantee a perfect seal and easy lateral removal of the filters for the maintenance operations.

**Air quality monitoring ($CO_2$)**

In the versions that require a motorized damper on the inlet, it is possible to regulate the opening of the damper itself according to the percentage of $CO_2$ present in the rooms to be climate controlled and increase, if necessary, the percentage of fresh air. If free cooling (either thermal or enthalpic) is activated, the damper opening is determined by the combination of the two control logics.

**Enthalpic Free cooling**

Adopts the same regulation logic as thermal free cooling, but takes into consideration the enthalpies of the outside air and of the inlet instead of simply the temperatures. It makes it possible to increase the seasonal efficiency of the unit by means of a more extensive use and optimization of free cooling. The relative humidity (of the outside air and the inlet air), which is necessary for the calculation of the enthalpy, is measured by means of two capacitive humidity sensors.

**Remote control**

It is ideal for wall mounting and replicates all the functions available on the user interface that is normally installed on the unit. Therefore, it makes possible the complete remote control of the machine.

**Remote thermostat**

It is ideal for wall mounting and constitutes a remote interface that is simpler than that which is normally installed on the unit. It makes it possible to select the functioning mode, set a change with respect to the active set point, and view the functioning status and display the functioning status and the presence of active alarms.

**Clock controller**

Makes it possible to turn the unit on and off according to the set programming schedule, by using the remote on-off control found on all the units.

**Modbus serial interface on RS485**

Makes it possible to communicate with the unit's controller and to monitor the functioning conditions by means of the Modbus communication protocol. The use of the RS485 serial line ensures the signal's quality up to a distance of approximately 1200 meters (which can be further extended by means of specific repeaters).

**2- or 3-row water coil for post-heating only**

This coil, manufactured with copper tubes arranged equilaterally with aluminum louvers with grooved profile for increasing the heat exchange coefficient, is equipped with an automatic air vent and a water discharge device. The circuits allow complete emptying for normal maintenance operations. The coil includes a stainless steel drain pan with an inclined bottom and a threaded connector for the discharge of the condensate and the water contained in the hydraulic circuit. The structure allows easy lateral removal of the coil for any extraordinary maintenance operations that may be necessary. The connection between the coil's headers and the threaded hydraulic connectors on the machine is ensured by a pipes kit or a 3-way valve unit.

## Pipe kit for water coil

This kit is comprised of all the necessary components to facilitate any extraordinary maintenance operations that may be necessary: a pair of automatic air vents, inlet and outlet ON / OFF ball valves, safety valve (calibration 6 bar), various inlet and outlet openings and connectors. The hydraulic circuit is opportunely insulated and protected by two inspection panels equipped with recessed handles and $^1/_4$-turn closures separated by a support on which are attached the water inlet and outlet connectors.

## Three-way valve for water coil

The motorized three-way ball valve, which is managed by the unit's controller according to an on-off logic, makes it possible to use the water coil both for heating (together with, or as a replacement for, the heat pump) and as frost protection. The valve is equipped with all the components specified in the pipes kit.

## Heating coil with electric heaters

This component performs two functions: heating (together with, or as a replacement for, the heat pump) and frost protection. It is equipped with a safety thermostat and its over-current protection is provided by fuses inside the electrical board.

## Gas thermal module


As an alternative to traditional accessories used for heating the air to be released into the room (water coil for post-heating only or electric heaters), it is possible to use a condensation gas thermal module which was specifically designed for this purpose and is suitable as a replacement for the heat pump.
It is included in a dedicated module inside the unit and consists of a modulating premixed gas burner and a stainless steel air-flue gas exchanger. The air to be released into the room flows over the external surface of the combustion chamber and the exchanger's tubes and is heated directly without intermediate exchanges.
The combustion chamber is constructed completely of AISI 430 stainless steel and the exchangers' tubes and the flue gas headers are constructed of AISI 304L stainless steel to give even greater resistance to the condensation products and their corresponding acid compounds. All the components are sealed and guarantee complete separation between the treated air flow and the combustion products.
The modulating burner premixes air and gas according to optimal ratios, thereby making it possible to achieve infinite values of heating capacity within a wide operating range (1:3 - 1:5) and to exploit as much as possible the heat of condensation of the flue gas, even at reduced loads.
The thermal module is equipped with an electronic circuit board that is able to control all the management and regulation functions. Two safety thermostats with manual reset prevent high temperatures in the case of anomalies. A safety pressure switch controls the obstruction of the flue pipe.
The condensation technology makes it possible to reduce the loss of energy connected with the heat dispersed in the environment by means of the flue gas, lowering the discharge temperature and exploiting both the sensible heat and the latent heat (heat of condensation of the steam contained in the flue gas).
The following are its advantages in comparison with traditional air heaters:

– Considerably more compact.
– High yields due to the exploitation of the heat of condensation between 105% and 93.1% (min. and max. pressure).
– Extremely low level of pollutant emissions (absence of carbon monoxide and emissions of NOx of less than 30 ppm).

Methane gas is to be used with this accessory. Unless different instructions are specified at the time of the order, the modules will be tested and prepared for operation with G20 natural gas and a supply pressure of 20 mbar.
It can be supplied with a rapid conversion kit to use Liquefied Petroleum Gas (LPG). The module is built in accordance with UNI, UNICIG, and CEI standards, is in compliance with the Gas Directive 90/396/EEC, and is Gastec certified.

## Downward outlet

All the units can be configured with this option. In this case the outlet plenum is closed by means of specific flanges, and the choice of this configuration does not permit the installation of the outlet Sound attenuator.

## Roof curb

A metal structure to be applied to the units configured with its outlet facing downward to facilitate the installation of the machine and ensure a perfect seal between the air ducts and the unit itself. The correct positioning of the roof curb requires precise finishing of the installation zone.

# TECHNICAL DATA AND PERFORMANCE

## Nominal performance and technical data

| Model | 35.1 | 45.1 | 55.1 | 70.2 | 90.2 | 110.2 | U.M. |
|---|---|---|---|---|---|---|---|
| Electrical power supply | | | | | | | |
| **Cooling** | | | | | | | |
| Total cooling capacity | 34.4 | 45.1 | 55.8 | 69.0 | 90.4 | 109.8 | kW |
| Sensible cooling capacity | 24.0 | 31.4 | 39.1 | 47.2 | 62.2 | 76.3 | kW |
| Compressors' power input | 9.2 | 11.9 | 15.6 | 18.3 | 23.8 | 31.2 | kW |
| Total power input | 12.4 | 15.5 | 19.6 | 25.2 | 31.5 | 39.7 | kW |
| Compressor EER | 3.7 | 3.8 | 3.6 | 3.8 | 3.8 | 3.5 | – |
| Total EER | 2.8 | 2.9 | 2.8 | 2.7 | 2.9 | 2.8 | – |
| **Heating** | | | | | | | |
| Heating capacity | 38.6 | 49.8 | 59.4 | 77.2 | 99.4 | 117.8 | kW |
| Compressors power input | 9.8 | 12.4 | 15.9 | 19.6 | 24.8 | 31.8 | kW |
| Total power input | 13.0 | 16.0 | 19.9 | 26.5 | 32.5 | 40.3 | kW |
| Compressor COP | 3.9 | 4.0 | 3.7 | 3.9 | 4.0 | 3.7 | – |
| Total COP | 3.0 | 3.1 | 3.0 | 2.9 | 3.1 | 2.9 | – |
| **Compressors** | | | | | | | |
| Type | SCROLL | | | | | | – |
| Quantity | 1 | | | 2 | | | n° |
| Refrigeration circuits | 1 | | | 2 | | | n° |
| Unit steps | 0 - 100 | | | 0 - 50 - 100 | | | % |
| Compressor 1 oil quantity | 3.25 | 4.14 | 4.70 | 3.25 | 4.14 | 4.70 | l |
| Compressor 2 oil quantity | – | – | – | 3.25 | 4.14 | 4.70 | l |
| **Refrigerant** | | | | | | | |
| Type | R410A | | | | | | – |
| Quantity | 11 | 12 | 13 | 21 | 24 | 26 | kg |
| **External section fans** | | | | | | | |
| Type | AXIAL | | | | | | – |
| Quantity | 2 | | | 4 | | | n° |
| Total air flow rate in cooling mode | 18300 | 17200 | 16100 | 36700 | 34500 | 32300 | $m^3/h$ |
| Total air flow rate in heating mode | 17600 | 16200 | 15000 | 35200 | 32500 | 30100 | $m^3/h$ |
| Maximum rotation speed | 900 | 900 | 900 | 900 | 900 | 900 | rpm |
| Rated power for fan | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | kW |
| **Internal section fans (OUTLET)** | | | | | | | |
| Type | CENTRIFUGE | | | | | | – |
| Quantity | 2 | | | | | | n° |
| STANDARD air flow rate | 6200 | 8100 | 10000 | 11000 | 14500 | 17000 | $m^3/h$ |
| Available static head | 200 | 200 | 200 | 200 | 200 | 200 | Pa |
| Power input | 1.4 | 1.8 | 2.2 | 3.5 | 4.3 | 5.1 | kW |
| Rated capacity | 1.5 | 1.85 | 2.2 | 4.0 | 5.5 | 5.5 | kW |

**Standard conditions**
Unit operating with 100% inlet air. Performance in reference to the BASIC version with STANDARD internal fan.
**Cooling:** External air temperature **35° C, dry bulb** - Internal air temperature **27° C, dry bulb / 19° C, wet bulb.**
**Heating:** External air temperature **7° C, dry bulb / 6° C, wet bulb** - Internal air temperature **20° C, dry bulb.**

## Treated air flow rate (internal section fans)

| Model | 35.1 | 45.1 | 55.1 | 70.2 | 90.2 | 110.2 | U.M. |
|---|---|---|---|---|---|---|---|
| MINIMUM flow rate | 5200 | 6800 | 8400 | 9100 | 12100 | 14000 | $m^3/h$ |
| STANDARD flow rate | 6200 | 8100 | 10000 | 11000 | 14500 | 17000 | $m^3/h$ |
| MAXIMUM flow rate | 7200 | 9400 | 11700 | 13000 | 17000 | 20100 | $m^3/h$ |

**Performance in COOLING MODE – STANDARD air flow rate**

| SIZE | TA Tbs / Tbu [°C] | | OUTSIDE AIR TEMPERATURE - Tdb [°C] | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **27** | | | **31** | | | **35** | | | **39** | | | **43** | | | **47** | | |
| | | | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa |
| **35.1** | 36 | **25** | 38.5 | 21.3 | 8.2 | 37.9 | 21.6 | 8.8 | 37.1 | 21.9 | 9.5 | 36.1 | 22.3 | 10.2 | 34.9 | 22.6 | 11.1 | 33.4 | 23.0 | 12.0 |
| | 33 | **23** | 37.6 | 21.9 | 8.1 | 37.0 | 22.3 | 8.7 | 36.2 | 22.6 | 9.4 | 35.2 | 23.0 | 10.1 | 34.1 | 23.3 | 11.0 | 32.7 | 23.7 | 11.9 |
| | 30 | **21** | 36.6 | 22.6 | 8.0 | 36.0 | 23.0 | 8.6 | 35.3 | 23.3 | 9.3 | 34.4 | 23.7 | 10.0 | 33.3 | 24.0 | 10.9 | 31.9 | 24.3 | 11.8 |
| | 27 | **19** | 35.7 | 23.3 | 7.9 | 35.1 | 23.7 | 8.5 | **34.4** | **24.0** | **9.2** | 33.5 | 24.3 | 9.9 | 32.5 | 24.7 | 10.7 | 31.2 | 25.0 | 11.6 |
| | 24 | **17** | 34.8 | 24.0 | 7.8 | 34.2 | 24.3 | 8.4 | 33.5 | 24.7 | 9.1 | 32.7 | 25.0 | 9.8 | 31.7 | 25.4 | 10.6 | 30.5 | 25.7 | 11.5 |
| | 21 | **15** | 33.8 | 24.7 | 7.7 | 33.3 | 25.0 | 8.4 | 32.7 | 25.4 | 9.0 | 31.9 | 25.7 | 9.7 | 30.9 | 26.1 | 10.5 | 29.7 | 26.4 | 11.4 |
| **45.1** | 36 | **25** | 50.1 | 27.8 | 10.6 | 49.4 | 28.3 | 11.4 | 48.6 | 28.7 | 12.3 | 47.5 | 29.2 | 13.3 | 46.1 | 29.6 | 14.4 | 44.4 | 30.1 | 15.5 |
| | 33 | **23** | 48.9 | 28.7 | 10.4 | 48.2 | 29.2 | 11.3 | 47.4 | 29.6 | 12.2 | 46.4 | 30.1 | 13.2 | 45.1 | 30.5 | 14.2 | 43.5 | 31.0 | 15.4 |
| | 30 | **21** | 47.6 | 29.6 | 10.3 | 47.0 | 30.1 | 11.1 | 46.2 | 30.5 | 12.0 | 45.2 | 31.0 | 13.0 | 44.0 | 31.4 | 14.1 | 42.5 | 31.8 | 15.2 |
| | 27 | **19** | 46.4 | 30.5 | 10.2 | 45.8 | 31.0 | 11.0 | **45.1** | **31.4** | **11.9** | 44.2 | 31.8 | 12.9 | 43.0 | 32.3 | 13.9 | 41.5 | 32.7 | 15.0 |
| | 24 | **17** | 45.2 | 31.4 | 10.1 | 44.7 | 31.8 | 10.9 | 44.0 | 32.3 | 11.8 | 43.1 | 32.7 | 12.7 | 42.0 | 33.2 | 13.7 | 40.6 | 33.6 | 14.9 |
| | 21 | **15** | 44.0 | 32.3 | 10.0 | 43.5 | 32.7 | 10.8 | 42.9 | 33.2 | 11.6 | 42.0 | 33.6 | 12.6 | 40.9 | 34.1 | 13.6 | 39.6 | 34.5 | 14.7 |
| **55.1** | 36 | **25** | 62.6 | 34.6 | 14.0 | 61.6 | 35.2 | 15.0 | 60.3 | 35.7 | 16.2 | 58.9 | 36.3 | 17.5 | 57.2 | 36.9 | 19.0 | 55.3 | 37.4 | 20.6 |
| | 33 | **23** | 61.0 | 35.7 | 13.8 | 60.0 | 36.3 | 14.8 | 58.8 | 36.9 | 16.0 | 57.4 | 37.4 | 17.3 | 55.8 | 38.0 | 18.7 | 54.0 | 38.5 | 20.3 |
| | 30 | **21** | 59.4 | 36.9 | 13.6 | 58.4 | 37.4 | 14.7 | 57.3 | 38.0 | 15.8 | 56.0 | 38.5 | 17.1 | 54.4 | 39.1 | 18.5 | 52.7 | 39.7 | 20.0 |
| | 27 | **19** | 57.8 | 38.0 | 13.5 | 56.9 | 38.5 | 14.5 | **55.8** | **39.1** | **15.6** | 54.5 | 39.7 | 16.8 | 53.1 | 40.2 | 18.2 | 51.4 | 40.8 | 19.8 |
| | 24 | **17** | 56.3 | 39.1 | 13.3 | 55.4 | 39.7 | 14.3 | 54.3 | 40.2 | 15.4 | 53.1 | 40.8 | 16.6 | 51.8 | 41.3 | 18.0 | 50.2 | 41.9 | 19.5 |
| | 21 | **15** | 54.7 | 40.2 | 13.2 | 53.9 | 40.8 | 14.1 | 52.9 | 41.3 | 15.2 | 51.7 | 41.9 | 16.4 | 50.4 | 42.5 | 17.8 | 48.9 | 43.0 | 19.3 |
| **70.2** | 36 | **25** | 77.3 | 41.8 | 16.2 | 76.0 | 42.5 | 17.5 | 74.4 | 43.2 | 18.9 | 72.4 | 43.8 | 20.4 | 70.0 | 44.5 | 22.0 | 67.0 | 45.2 | 23.9 |
| | 33 | **23** | 75.4 | 43.2 | 16.1 | 74.1 | 43.8 | 17.3 | 72.6 | 44.5 | 18.7 | 70.6 | 45.2 | 20.2 | 68.3 | 45.9 | 21.8 | 65.5 | 46.5 | 23.6 |
| | 30 | **21** | 73.4 | 44.5 | 15.9 | 72.3 | 45.2 | 17.1 | 70.8 | 45.9 | 18.5 | 68.9 | 46.5 | 20.0 | 66.7 | 47.2 | 21.6 | 64.0 | 47.9 | 23.4 |
| | 27 | **19** | 71.6 | 45.9 | 15.7 | 70.4 | 46.5 | 17.0 | **69.0** | **47.2** | **18.3** | 67.2 | 47.9 | 19.8 | 65.1 | 48.5 | 21.4 | 62.6 | 49.2 | 23.1 |
| | 24 | **17** | 69.7 | 47.2 | 15.6 | 68.6 | 47.9 | 16.8 | 67.2 | 48.5 | 18.1 | 65.6 | 49.2 | 19.6 | 63.5 | 49.9 | 21.2 | 61.1 | 50.6 | 22.9 |
| | 21 | **15** | 67.9 | 48.5 | 15.4 | 66.8 | 49.2 | 16.6 | 65.5 | 49.9 | 17.9 | 63.9 | 50.6 | 19.4 | 61.9 | 51.2 | 21.0 | 59.6 | 51.9 | 22.7 |
| **90.2** | 36 | **25** | 100.4 | 55.1 | 21.1 | 99.1 | 56.0 | 22.8 | 97.4 | 56.9 | 24.6 | 95.1 | 57.8 | 26.6 | 92.4 | 58.6 | 28.7 | 89.1 | 59.5 | 31.1 |
| | 33 | **23** | 97.9 | 56.9 | 20.9 | 96.7 | 57.8 | 22.5 | 95.0 | 58.6 | 24.3 | 92.9 | 59.5 | 26.3 | 90.3 | 60.4 | 28.4 | 87.1 | 61.3 | 30.7 |
| | 30 | **21** | 95.4 | 58.6 | 20.6 | 94.3 | 59.5 | 22.3 | 92.7 | 60.4 | 24.1 | 90.7 | 61.3 | 26.0 | 88.2 | 62.2 | 28.1 | 85.2 | 63.1 | 30.4 |
| | 27 | **19** | 93.0 | 60.4 | 20.4 | 91.9 | 61.3 | 22.0 | **90.4** | **62.2** | **23.8** | 88.5 | 63.1 | 25.7 | 86.1 | 64.0 | 27.8 | 83.3 | 64.9 | 30.0 |
| | 24 | **17** | 90.6 | 62.2 | 20.2 | 89.5 | 63.1 | 21.8 | 88.1 | 64.0 | 23.5 | 86.3 | 64.9 | 25.4 | 84.1 | 65.8 | 27.5 | 81.4 | 66.6 | 29.7 |
| | 21 | **15** | 88.2 | 64.0 | 20.0 | 87.2 | 64.9 | 21.5 | 85.9 | 65.8 | 23.3 | 84.2 | 66.6 | 25.1 | 82.1 | 67.5 | 27.2 | 79.5 | 68.4 | 29.4 |
| **110.2** | 36 | **25** | 123.3 | 67.6 | 28.0 | 121.1 | 68.7 | 30.1 | 118.7 | 69.8 | 32.4 | 115.8 | 70.9 | 35.0 | 112.6 | 71.9 | 37.9 | 108.7 | 73.0 | 41.1 |
| | 33 | **23** | 120.0 | 69.8 | 27.6 | 118.0 | 70.9 | 29.7 | 115.7 | 71.9 | 32.0 | 113.0 | 73.0 | 34.6 | 109.8 | 74.1 | 37.4 | 106.2 | 75.2 | 40.6 |
| | 30 | **21** | 116.9 | 71.9 | 27.3 | 115.0 | 73.0 | 29.3 | 112.7 | 74.1 | 31.6 | 110.1 | 75.2 | 34.1 | 107.1 | 76.3 | 36.9 | 103.7 | 77.4 | 40.1 |
| | 27 | **19** | 113.8 | 74.1 | 27.0 | 111.9 | 75.2 | 29.0 | **109.8** | **76.3** | **31.2** | 107.3 | 77.4 | 33.7 | 104.5 | 78.5 | 36.5 | 101.2 | 79.6 | 39.5 |
| | 24 | **17** | 110.7 | 76.3 | 26.6 | 109.0 | 77.4 | 28.6 | 106.9 | 78.5 | 30.8 | 104.6 | 79.6 | 33.3 | 101.8 | 80.7 | 36.0 | 98.7 | 81.8 | 39.0 |
| | 21 | **15** | 107.7 | 78.5 | 26.3 | 106.0 | 79.6 | 28.3 | 104.1 | 80.7 | 30.4 | 101.8 | 81.8 | 32.8 | 99.2 | 82.8 | 35.5 | 96.2 | 83.9 | 38.5 |

**TA:** Internal coil inlet air temperature [°C]
**KWf:** Cooling capacity [kW]
**KWfs:** Sensible cooling capacity [kW]
**KWa:** Compressors power input [kW]

**Performance in HEATING MODE – STANDARD air flow rate**

| SIZE | TA Tbs [°C] | OUTSIDE AIR TEMPERATURE - Tdb / Twb [°C] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | -5 | **-6** | -1 | **-2** | 3 | **2** | 7 | **6** | 11 | **10** | 15 | **14** |
| | | kWt | kWa | kWt | kWa | kWt | kWa | kWt | kWa | kWt | kWa | kWt | kWa |
| **35.1** | **26** | 27.4 | 10.0 | 30.7 | 10.4 | 34.2 | 10.7 | 38.0 | 11.0 | 37.9 | 11.4 | 37.7 | 11.8 |
| | **23** | 27.4 | 9.5 | 30.8 | 9.8 | 34.4 | 10.1 | 38.3 | 10.4 | 38.2 | 10.7 | 38.0 | 11.1 |
| | **20** | 27.4 | 9.0 | 30.9 | 9.2 | 34.6 | 9.5 | **38.6** | **9.8** | 38.5 | 10.1 | 38.3 | 10.5 |
| | **17** | 27.4 | 8.5 | 30.2 | 9.9 | 34.8 | 9.0 | 38.9 | 9.3 | 38.7 | 9.6 | 38.6 | 9.9 |
| | **14** | 27.5 | 8.0 | 31.1 | 8.2 | 34.9 | 8.5 | 39.1 | 8.8 | 39.0 | 9.1 | 38.8 | 9.4 |
| | **11** | 27.5 | 7.6 | 31.2 | 7.8 | 35.1 | 8.0 | 39.3 | 8.3 | 39.2 | 8.6 | 39.1 | 8.9 |
| **45.1** | **26** | 35.3 | 12.0 | 39.7 | 12.6 | 44.3 | 13.2 | 49.3 | 13.8 | 49.2 | 14.3 | 49.0 | 14.7 |
| | **23** | 35.3 | 11.4 | 39.8 | 12.0 | 44.5 | 12.6 | 49.6 | 13.1 | 49.5 | 13.5 | 49.3 | 14.0 |
| | **20** | 35.4 | 10.9 | 39.9 | 11.4 | 44.7 | 11.9 | **49.8** | **12.4** | 49.7 | 12.8 | 49.6 | 13.2 |
| | **17** | 35.4 | 10.3 | 39.0 | 12.1 | 44.8 | 11.3 | 50.0 | 11.7 | 49.9 | 12.1 | 49.8 | 12.5 |
| | **14** | 35.4 | 9.8 | 39.9 | 10.3 | 44.8 | 10.7 | 50.1 | 11.1 | 50.1 | 11.5 | 50.0 | 11.9 |
| | **11** | 35.4 | 9.3 | 39.9 | 9.8 | 44.9 | 10.2 | 50.2 | 10.5 | 50.2 | 10.9 | 50.1 | 11.2 |
| **55.1** | **26** | 42.1 | 16.0 | 47.3 | 16.6 | 52.9 | 17.2 | 59.1 | 17.8 | 59.0 | 18.5 | 59.0 | 19.1 |
| | **23** | 41.9 | 15.1 | 47.2 | 15.7 | 52.9 | 16.2 | 59.2 | 16.8 | 59.2 | 17.4 | 59.1 | 18.0 |
| | **20** | 41.8 | 14.3 | 47.1 | 14.8 | 53.0 | 15.3 | **59.4** | **15.9** | 59.3 | 16.4 | 59.3 | 17.0 |
| | **17** | 41.7 | 13.5 | 46.3 | 15.8 | 53.1 | 14.5 | 59.6 | 15.0 | 59.5 | 15.5 | 59.4 | 16.1 |
| | **14** | 41.6 | 12.8 | 47.1 | 13.3 | 53.2 | 13.7 | 59.8 | 14.2 | 59.7 | 14.7 | 59.6 | 15.2 |
| | **11** | 41.5 | 12.1 | 47.1 | 12.6 | 53.3 | 13.0 | 60.0 | 13.5 | 59.9 | 13.9 | 59.8 | 14.4 |
| **70.2** | **26** | 54.7 | 20.1 | 61.4 | 20.7 | 68.4 | 21.4 | 76.0 | 22.0 | 75.7 | 22.8 | 75.4 | 23.6 |
| | **23** | 54.8 | 19.0 | 61.6 | 19.6 | 68.8 | 20.2 | 76.6 | 20.8 | 76.3 | 21.5 | 76.0 | 22.2 |
| | **20** | 54.8 | 17.9 | 61.8 | 18.5 | 69.2 | 19.0 | **77.2** | **19.6** | 76.9 | 20.3 | 76.6 | 21.0 |
| | **17** | 54.9 | 16.9 | 60.3 | 19.8 | 69.6 | 18.0 | 77.7 | 18.5 | 77.4 | 19.2 | 77.2 | 19.8 |
| | **14** | 55.0 | 16.0 | 62.1 | 16.5 | 69.9 | 17.0 | 78.2 | 17.5 | 77.9 | 18.1 | 77.7 | 18.7 |
| | **11** | 55.1 | 15.1 | 62.3 | 15.6 | 70.2 | 16.1 | 78.6 | 16.6 | 78.4 | 17.1 | 78.1 | 17.7 |
| **90.2** | **26** | 70.4 | 24.0 | 79.2 | 25.3 | 88.5 | 26.5 | 98.4 | 27.6 | 98.1 | 28.5 | 97.8 | 29.5 |
| | **23** | 70.5 | 22.8 | 79.4 | 24.0 | 88.9 | 25.1 | 98.9 | 26.2 | 98.7 | 27.0 | 98.4 | 27.9 |
| | **20** | 70.6 | 21.7 | 79.6 | 22.8 | 89.2 | 23.8 | **99.4** | **24.8** | 99.2 | 25.6 | 99.0 | 26.5 |
| | **17** | 70.7 | 20.7 | 77.9 | 24.2 | 89.4 | 22.6 | 99.8 | 23.5 | 99.6 | 24.3 | 99.4 | 25.1 |
| | **14** | 70.6 | 19.7 | 79.7 | 20.6 | 89.5 | 21.4 | 100.0 | 22.2 | 99.9 | 23.0 | 99.8 | 23.7 |
| | **11** | 70.6 | 18.7 | 79.7 | 19.5 | 89.6 | 20.3 | 100.2 | 21.1 | 100.1 | 21.8 | 100.1 | 22.5 |
| **110.2** | **26** | 83.4 | 32.1 | 93.7 | 33.2 | 104.9 | 34.4 | 117.1 | 35.7 | 117.1 | 37.0 | 117.1 | 38.3 |
| | **23** | 83.1 | 30.3 | 93.6 | 31.3 | 105.0 | 32.4 | 117.4 | 33.7 | 117.3 | 34.8 | 117.3 | 36.1 |
| | **20** | 82.8 | 28.6 | 93.5 | 29.6 | 105.1 | 30.7 | **117.8** | **31.8** | 117.7 | 32.9 | 117.5 | 34.0 |
| | **17** | 82.6 | 27.0 | 91.8 | 31.7 | 105.3 | 29.0 | 118.2 | 30.1 | 118.0 | 31.1 | 117.9 | 32.2 |
| | **14** | 82.5 | 25.6 | 93.5 | 26.5 | 105.5 | 27.5 | 118.6 | 28.5 | 118.4 | 29.4 | 118.2 | 30.4 |
| | **11** | 82.3 | 24.3 | 93.5 | 25.1 | 105.7 | 26.1 | 119.0 | 27.0 | 118.8 | 27.9 | 118.6 | 28.8 |

**TA:** Internal coil inlet air temperature [°C]
**KWt:** Heating capacity [kW]
**KWa:** Compressors power input [kW]

**Performance in COOLING MODE – MINIMUM air flow rate**

| SIZE | TA Tbs / Tbu [°C] | | OUTSIDE AIR TEMPERATURE - Tdb [°C] | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **27** | | | **31** | | | **35** | | | **39** | | | **43** | | | **47** | | |
| | | | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa |
| **35.1** | 36 | **25** | 36.8 | 18.6 | 8.1 | 36.2 | 19.0 | 8.7 | 35.4 | 19.3 | 9.4 | 34.5 | 19.6 | 10.1 | 33.4 | 20.0 | 11.0 | 32.0 | 20.3 | 11.9 |
| | 33 | **23** | 35.9 | 19.3 | 8.0 | 35.3 | 19.6 | 8.6 | 34.6 | 20.0 | 9.3 | 33.7 | 20.3 | 10.0 | 32.6 | 20.6 | 10.9 | 31.2 | 20.9 | 11.8 |
| | 30 | **21** | 34.9 | 20.0 | 7.9 | 34.4 | 20.3 | 8.5 | 33.7 | 20.6 | 9.2 | 32.8 | 20.9 | 9.9 | 31.8 | 21.3 | 10.8 | 30.5 | 21.6 | 11.6 |
| | 27 | **19** | 34.0 | 20.6 | 7.8 | 33.5 | 20.9 | 8.4 | **32.8** | **21.3** | **9.1** | 32.0 | 21.6 | 9.8 | 31.0 | 21.9 | 10.6 | 29.8 | 22.2 | 11.5 |
| | 24 | **17** | 33.1 | 21.3 | 7.7 | 32.6 | 21.6 | 8.4 | 32.0 | 21.9 | 9.0 | 31.2 | 22.2 | 9.7 | 30.2 | 22.6 | 10.5 | 29.1 | 22.9 | 11.4 |
| | 21 | **15** | 32.2 | 21.9 | 7.7 | 31.8 | 22.2 | 8.3 | 31.1 | 22.6 | 8.9 | 30.4 | 22.9 | 9.6 | 29.4 | 23.2 | 10.4 | 28.4 | 23.6 | 11.3 |
| **45.1** | 36 | **25** | 47.9 | 24.4 | 10.4 | 47.3 | 24.9 | 11.3 | 46.5 | 25.3 | 12.2 | 45.4 | 25.7 | 13.1 | 44.2 | 26.1 | 14.2 | 42.6 | 26.6 | 15.4 |
| | 33 | **23** | 46.7 | 25.3 | 10.3 | 46.1 | 25.7 | 11.1 | 45.3 | 26.1 | 12.0 | 44.3 | 26.6 | 13.0 | 43.1 | 27.0 | 14.1 | 41.6 | 27.4 | 15.2 |
| | 30 | **21** | 45.5 | 26.1 | 10.2 | 44.9 | 26.6 | 11.0 | 44.2 | 27.0 | 11.9 | 43.3 | 27.4 | 12.9 | 42.1 | 27.9 | 13.9 | 40.7 | 28.3 | 15.0 |
| | 27 | **19** | 44.3 | 27.0 | 10.1 | 43.8 | 27.4 | 10.9 | **43.1** | **27.9** | **11.8** | 42.2 | 28.3 | 12.7 | 41.1 | 28.7 | 13.7 | 39.8 | 29.1 | 14.9 |
| | 24 | **17** | 43.1 | 27.9 | 10.0 | 42.6 | 28.3 | 10.8 | 42.0 | 28.7 | 11.6 | 41.1 | 29.1 | 12.6 | 40.1 | 29.6 | 13.6 | 38.8 | 30.0 | 14.7 |
| | 21 | **15** | 42.0 | 28.7 | 9.9 | 41.5 | 29.1 | 10.7 | 40.9 | 29.6 | 11.5 | 40.1 | 30.0 | 12.4 | 39.1 | 30.4 | 13.4 | 37.9 | 30.9 | 14.5 |
| **55.1** | 36 | **25** | 59.7 | 30.3 | 13.8 | 58.7 | 30.9 | 14.8 | 57.6 | 31.4 | 16.0 | 56.2 | 31.9 | 17.3 | 54.7 | 32.5 | 18.7 | 52.8 | 33.0 | 20.3 |
| | 33 | **23** | 58.2 | 31.4 | 13.6 | 57.2 | 31.9 | 14.6 | 56.1 | 32.5 | 15.8 | 54.8 | 33.0 | 17.0 | 53.3 | 33.5 | 18.5 | 51.6 | 34.1 | 20.0 |
| | 30 | **21** | 56.6 | 32.5 | 13.5 | 55.7 | 33.0 | 14.5 | 54.6 | 33.5 | 15.6 | 53.4 | 34.1 | 16.8 | 52.0 | 34.6 | 18.2 | 50.3 | 35.1 | 19.8 |
| | 27 | **19** | 55.1 | 33.5 | 13.3 | 54.2 | 34.1 | 14.3 | **53.2** | **34.6** | **15.4** | 52.0 | 35.1 | 16.6 | 50.7 | 35.7 | 18.0 | 49.1 | 36.2 | 19.5 |
| | 24 | **17** | 53.6 | 34.6 | 13.1 | 52.7 | 35.1 | 14.1 | 51.8 | 35.7 | 15.2 | 50.6 | 36.2 | 16.4 | 49.3 | 36.7 | 17.8 | 47.9 | 37.3 | 19.3 |
| | 21 | **15** | 52.1 | 35.7 | 13.0 | 51.3 | 36.2 | 13.9 | 50.4 | 36.7 | 15.0 | 49.3 | 37.3 | 16.2 | 48.1 | 37.8 | 17.5 | 46.6 | 38.3 | 19.0 |
| **70.2** | 36 | **25** | 73.8 | 36.7 | 16.1 | 72.6 | 37.3 | 17.3 | 71.1 | 38.0 | 18.7 | 69.2 | 38.6 | 20.2 | 66.9 | 39.2 | 21.8 | 64.1 | 39.9 | 23.6 |
| | 33 | **23** | 72.0 | 38.0 | 15.9 | 70.8 | 38.6 | 17.1 | 69.3 | 39.2 | 18.5 | 67.5 | 39.9 | 20.0 | 65.3 | 40.5 | 21.6 | 62.7 | 41.2 | 23.4 |
| | 30 | **21** | 70.1 | 39.2 | 15.7 | 69.0 | 39.9 | 17.0 | 67.6 | 40.5 | 18.3 | 65.8 | 41.2 | 19.8 | 63.7 | 41.8 | 21.4 | 61.2 | 42.5 | 23.2 |
| | 27 | **19** | 68.3 | 40.5 | 15.6 | 67.2 | 41.2 | 16.8 | **65.8** | **41.8** | **18.1** | 64.2 | 42.5 | 19.6 | 62.2 | 43.1 | 21.2 | 59.8 | 43.8 | 22.9 |
| | 24 | **17** | 66.5 | 41.8 | 15.4 | 65.4 | 42.5 | 16.6 | 64.1 | 43.1 | 17.9 | 62.5 | 43.8 | 19.4 | 60.6 | 44.4 | 21.0 | 58.3 | 45.0 | 22.7 |
| | 21 | **15** | 64.7 | 43.1 | 15.2 | 63.7 | 43.8 | 16.4 | 62.4 | 44.4 | 17.8 | 60.9 | 45.0 | 19.2 | 59.1 | 45.7 | 20.8 | 56.9 | 46.3 | 22.5 |
| **90.2** | 36 | **25** | 96.0 | 48.4 | 20.9 | 94.8 | 49.2 | 22.5 | 93.1 | 50.1 | 24.3 | 91.1 | 50.9 | 26.3 | 88.5 | 51.8 | 28.4 | 85.4 | 52.6 | 30.7 |
| | 33 | **23** | 93.5 | 50.1 | 20.6 | 92.4 | 50.9 | 22.3 | 90.8 | 51.8 | 24.1 | 88.9 | 52.6 | 26.0 | 86.4 | 53.5 | 28.1 | 83.5 | 54.3 | 30.4 |
| | 30 | **21** | 91.1 | 51.8 | 20.4 | 90.0 | 52.6 | 22.0 | 88.6 | 53.5 | 23.8 | 86.7 | 54.3 | 25.7 | 84.4 | 55.2 | 27.8 | 81.6 | 56.0 | 30.0 |
| | 27 | **19** | 88.8 | 53.5 | 20.2 | 87.7 | 54.3 | 21.8 | **86.4** | **55.2** | **23.5** | 84.6 | 56.0 | 25.4 | 82.4 | 56.9 | 27.5 | 79.7 | 57.7 | 29.7 |
| | 24 | **17** | 86.4 | 55.2 | 20.0 | 85.5 | 56.0 | 21.5 | 84.2 | 56.9 | 23.3 | 82.5 | 57.7 | 25.1 | 80.4 | 58.6 | 27.2 | 77.8 | 59.4 | 29.4 |
| | 21 | **15** | 84.1 | 56.9 | 19.7 | 83.2 | 57.7 | 21.3 | 82.0 | 58.6 | 23.0 | 80.4 | 59.4 | 24.9 | 78.4 | 60.3 | 26.9 | 75.9 | 61.1 | 29.0 |
| **110.2** | 36 | **25** | 117.6 | 59.2 | 27.6 | 115.6 | 60.3 | 29.7 | 113.3 | 61.3 | 32.0 | 110.6 | 62.3 | 34.5 | 107.6 | 63.4 | 37.4 | 104.0 | 64.4 | 40.5 |
| | 33 | **23** | 114.4 | 61.3 | 27.3 | 112.6 | 62.3 | 29.3 | 110.4 | 63.4 | 31.6 | 107.8 | 64.4 | 34.1 | 104.9 | 65.5 | 36.9 | 101.5 | 66.5 | 40.0 |
| | 30 | **21** | 111.4 | 63.4 | 26.9 | 109.6 | 64.4 | 28.9 | 107.5 | 65.5 | 31.2 | 105.1 | 66.5 | 33.7 | 102.3 | 67.5 | 36.4 | 99.0 | 68.6 | 39.5 |
| | 27 | **19** | 108.4 | 65.5 | 26.6 | 106.7 | 66.5 | 28.6 | **104.7** | **67.5** | **30.8** | 102.3 | 68.6 | 33.2 | 99.7 | 69.6 | 36.0 | 96.6 | 70.6 | 39.0 |
| | 24 | **17** | 105.4 | 67.5 | 26.3 | 103.8 | 68.6 | 28.2 | 101.9 | 69.6 | 30.4 | 99.6 | 70.6 | 32.8 | 97.1 | 71.7 | 35.5 | 94.2 | 72.7 | 38.5 |
| | 21 | **15** | 102.5 | 69.6 | 26.0 | 100.9 | 70.6 | 27.9 | 99.1 | 71.7 | 30.0 | 97.0 | 72.7 | 32.4 | 94.6 | 73.8 | 35.1 | 91.8 | 74.8 | 38.0 |

**TA:** Internal coil inlet air temperature [°C]
**KWf:** Cooling capacity [kW]
**KWfs:** Sensible cooling capacity [kW]
**KWa:** Compressors power input [kW]

**Performance in HEATING MODE – MINIMUM air flow rate**

| SIZE | TA Tbs [°C] | OUTSIDE AIR TEMPERATURE - Tdb / Twb [°C] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | -5 | **-6** | -1 | **-2** | 3 | **2** | 7 | **6** | 11 | **10** | 15 | **14** |
| | | kWt | kWa | kWt | kWa | kWt | kWa | kWt | kWa | kWt | kWa | kWt | kWa |
| **35.1** | **26** | 27.3 | 10.5 | 30.6 | 10.9 | 34.1 | 11.2 | 37.8 | 11.5 | 37.6 | 11.9 | 37.5 | 12.4 |
| | **23** | 27.3 | 9.9 | 30.7 | 10.3 | 34.3 | 10.6 | 38.1 | 10.9 | 37.9 | 11.3 | 37.8 | 11.7 |
| | **20** | 27.4 | 9.4 | 30.8 | 9.7 | 34.4 | 10.0 | **38.4** | **10.3** | 38.2 | 10.6 | 38.1 | 11.0 |
| | **17** | 27.4 | 8.9 | 30.1 | 10.4 | 34.6 | 9.4 | 38.6 | 9.7 | 38.5 | 10.0 | 38.4 | 10.4 |
| | **14** | 27.4 | 8.4 | 31.0 | 8.6 | 34.8 | 8.9 | 38.9 | 9.2 | 38.8 | 9.5 | 38.6 | 9.8 |
| | **11** | 27.4 | 7.9 | 31.0 | 8.2 | 34.9 | 8.4 | 39.1 | 8.7 | 39.0 | 9.0 | 38.9 | 9.3 |
| **45.1** | **26** | 35.2 | 12.5 | 39.5 | 13.2 | 44.2 | 13.8 | 49.1 | 14.4 | 48.9 | 14.9 | 48.8 | 15.4 |
| | **23** | 35.2 | 11.9 | 39.7 | 12.5 | 44.4 | 13.1 | 49.4 | 13.7 | 49.3 | 14.1 | 49.1 | 14.6 |
| | **20** | 35.3 | 11.3 | 39.8 | 11.9 | 44.6 | 12.4 | **49.6** | **12.9** | 49.5 | 13.4 | 49.4 | 13.8 |
| | **17** | 35.3 | 10.7 | 38.9 | 12.6 | 44.7 | 11.8 | 49.8 | 12.3 | 49.7 | 12.7 | 49.6 | 13.1 |
| | **14** | 35.3 | 10.2 | 39.9 | 10.7 | 44.8 | 11.2 | 50.0 | 11.6 | 49.9 | 12.0 | 49.9 | 12.4 |
| | **11** | 35.3 | 9.7 | 39.9 | 10.2 | 44.8 | 10.6 | 50.1 | 11.0 | 50.1 | 11.4 | 50.0 | 11.7 |
| **55.1** | **26** | 42.2 | 16.8 | 47.3 | 17.4 | 52.9 | 18.0 | 59.0 | 18.7 | 59.0 | 19.4 | 59.0 | 20.1 |
| | **23** | 42.0 | 15.8 | 47.2 | 16.4 | 52.9 | 17.0 | 59.1 | 17.6 | 59.1 | 18.3 | 59.1 | 18.9 |
| | **20** | 41.8 | 15.0 | 47.1 | 15.5 | 52.9 | 16.0 | **59.3** | **16.6** | 59.2 | 17.2 | 59.2 | 17.8 |
| | **17** | 41.7 | 14.1 | 46.3 | 16.6 | 53.0 | 15.2 | 59.4 | 15.7 | 59.3 | 16.3 | 59.3 | 16.8 |
| | **14** | 41.6 | 13.4 | 47.1 | 13.8 | 53.1 | 14.3 | 59.6 | 14.9 | 59.5 | 15.4 | 59.4 | 15.9 |
| | **11** | 41.5 | 12.7 | 47.1 | 13.1 | 53.1 | 13.6 | 59.8 | 14.1 | 59.7 | 14.6 | 59.6 | 15.0 |
| **70.2** | **26** | 54.7 | 21.1 | 61.2 | 21.7 | 68.1 | 22.4 | 75.6 | 23.0 | 75.2 | 23.9 | 74.9 | 24.7 |
| | **23** | 54.7 | 19.9 | 61.4 | 20.5 | 68.5 | 21.1 | 76.2 | 21.7 | 75.9 | 22.5 | 75.6 | 23.3 |
| | **20** | 54.7 | 18.7 | 61.6 | 19.4 | 68.9 | 19.9 | **76.8** | **20.5** | 76.5 | 21.2 | 76.2 | 22.0 |
| | **17** | 54.7 | 17.7 | 60.2 | 20.8 | 69.2 | 18.8 | 77.3 | 19.4 | 77.0 | 20.1 | 76.7 | 20.8 |
| | **14** | 54.8 | 16.7 | 61.9 | 17.3 | 69.6 | 17.8 | 77.8 | 18.3 | 77.5 | 18.9 | 77.3 | 19.6 |
| | **11** | 54.9 | 15.8 | 62.1 | 16.3 | 69.9 | 16.8 | 78.2 | 17.3 | 78.0 | 17.9 | 77.7 | 18.5 |
| **90.2** | **26** | 70.2 | 24.9 | 78.9 | 26.3 | 88.2 | 27.6 | 98.0 | 28.8 | 97.7 | 29.8 | 97.3 | 30.7 |
| | **23** | 70.4 | 23.7 | 79.2 | 25.0 | 88.6 | 26.2 | 98.6 | 27.3 | 98.3 | 28.2 | 98.0 | 29.1 |
| | **20** | 70.5 | 22.6 | 79.4 | 23.8 | 88.9 | 24.9 | **99.1** | **25.9** | 98.8 | 26.7 | 98.6 | 27.6 |
| | **17** | 70.5 | 21.5 | 77.6 | 25.1 | 89.2 | 23.6 | 99.5 | 24.5 | 99.3 | 25.3 | 99.1 | 26.2 |
| | **14** | 70.6 | 20.4 | 79.6 | 21.4 | 89.4 | 22.4 | 99.8 | 23.2 | 99.7 | 24.0 | 99.5 | 24.8 |
| | **11** | 70.5 | 19.4 | 79.6 | 20.3 | 89.5 | 21.2 | 100.0 | 22.0 | 99.9 | 22.7 | 99.8 | 23.5 |
| **110.2** | **26** | 83.6 | 33.6 | 93.8 | 34.8 | 104.9 | 36.1 | 117.0 | 37.4 | 117.0 | 38.8 | 117.1 | 40.2 |
| | **23** | 83.3 | 31.7 | 93.6 | 32.8 | 104.9 | 34.0 | 117.2 | 35.2 | 117.2 | 36.5 | 117.2 | 37.8 |
| | **20** | 82.9 | 29.9 | 93.5 | 31.0 | 105.0 | 32.1 | **117.5** | **33.3** | 117.4 | 34.4 | 117.4 | 35.7 |
| | **17** | 82.7 | 28.3 | 91.9 | 33.2 | 105.1 | 30.3 | 117.8 | 31.4 | 117.7 | 32.5 | 117.6 | 33.7 |
| | **14** | 82.5 | 26.7 | 93.3 | 27.7 | 105.2 | 28.7 | 118.2 | 29.7 | 118.0 | 30.7 | 117.9 | 31.8 |
| | **11** | 82.3 | 25.3 | 93.3 | 26.2 | 105.4 | 27.2 | 118.6 | 28.2 | 118.4 | 29.1 | 118.2 | 30.1 |

**TA:** Internal coil inlet air temperature [°C]
**KWt:** Heating capacity [kW]
**KWa:** Compressors power input [kW]

**Performance in COOLING MODE – MAXIMUM air flow rate**

| SIZE | TA Tbs / Tbu [°C] | OUTSIDE AIR TEMPERATURE - Tdb [°C] | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **27** | | | **31** | | | **35** | | | **39** | | | **43** | | | **47** | | |
| | | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa | kWf | kWfs | kWa |
| **35.1** | 36 **25** | 40.3 | 24.1 | 8.3 | 39.6 | 24.4 | 8.9 | 38.8 | 24.8 | 9.6 | 37.7 | 25.1 | 10.4 | 36.4 | 25.5 | 11.2 | 34.9 | 25.8 | 12.1 |
| | 33 **23** | 39.3 | 24.8 | 8.2 | 38.7 | 25.1 | 8.8 | 37.8 | 25.5 | 9.5 | 36.8 | 25.8 | 10.2 | 35.6 | 26.2 | 11.1 | 34.1 | 26.6 | 12.0 |
| | 30 **21** | 38.3 | 25.5 | 8.1 | 37.7 | 25.8 | 8.7 | 36.9 | 26.2 | 9.4 | 36.0 | 26.6 | 10.1 | 34.8 | 26.9 | 11.0 | 33.4 | 27.3 | 11.9 |
| | 27 **19** | 37.4 | 26.2 | 8.0 | 36.8 | 26.6 | 8.6 | **36.0** | **26.9** | **9.3** | 35.1 | 27.3 | 10.0 | 34.0 | 27.6 | 10.9 | 32.6 | 28.0 | 11.7 |
| | 24 **17** | 36.4 | 26.9 | 7.9 | 35.9 | 27.3 | 8.5 | 35.1 | 27.6 | 9.2 | 34.2 | 28.0 | 9.9 | 33.2 | 28.4 | 10.7 | 31.9 | 28.7 | 11.6 |
| | 21 **15** | 35.5 | 27.6 | 7.8 | 34.9 | 28.0 | 8.4 | 34.2 | 28.4 | 9.1 | 33.4 | 28.7 | 9.8 | 32.4 | 29.1 | 10.6 | 31.1 | 29.4 | 11.5 |
| **45.1** | 36 **25** | 52.4 | 31.4 | 10.7 | 51.7 | 31.9 | 11.5 | 50.7 | 32.4 | 12.4 | 49.6 | 32.9 | 13.4 | 48.1 | 33.3 | 14.5 | 46.3 | 33.8 | 15.7 |
| | 33 **23** | 51.1 | 32.4 | 10.6 | 50.4 | 32.9 | 11.4 | 49.5 | 33.3 | 12.3 | 48.4 | 33.8 | 13.3 | 47.0 | 34.3 | 14.4 | 45.4 | 34.7 | 15.5 |
| | 30 **21** | 49.8 | 33.3 | 10.4 | 49.2 | 33.8 | 11.3 | 48.4 | 34.3 | 12.2 | 47.3 | 34.7 | 13.2 | 46.0 | 35.2 | 14.2 | 44.4 | 35.7 | 15.4 |
| | 27 **19** | 48.6 | 34.3 | 10.3 | 48.0 | 34.7 | 11.1 | **47.2** | **35.2** | **12.0** | 46.2 | 35.7 | 13.0 | 44.9 | 36.1 | 14.1 | 43.4 | 36.6 | 15.2 |
| | 24 **17** | 47.4 | 35.2 | 10.2 | 46.8 | 35.7 | 11.0 | 46.0 | 36.1 | 11.9 | 45.1 | 36.6 | 12.9 | 43.9 | 37.1 | 13.9 | 42.4 | 37.5 | 15.0 |
| | 21 **15** | 46.1 | 36.1 | 10.1 | 45.6 | 36.6 | 10.9 | 44.9 | 37.1 | 11.8 | 44.0 | 37.5 | 12.7 | 42.8 | 38.0 | 13.7 | 41.4 | 38.5 | 14.9 |
| **55.1** | 36 **25** | 65.6 | 39.2 | 14.2 | 64.5 | 39.8 | 15.3 | 63.1 | 40.4 | 16.4 | 61.6 | 41.0 | 17.8 | 59.8 | 41.6 | 19.2 | 57.8 | 42.2 | 20.9 |
| | 33 **23** | 63.9 | 40.4 | 14.0 | 62.8 | 41.0 | 15.1 | 61.6 | 41.6 | 16.2 | 60.1 | 42.2 | 17.5 | 58.4 | 42.7 | 19.0 | 56.4 | 43.3 | 20.6 |
| | 30 **21** | 62.3 | 41.6 | 13.8 | 61.2 | 42.2 | 14.9 | 60.0 | 42.7 | 16.0 | 58.6 | 43.3 | 17.3 | 57.0 | 43.9 | 18.7 | 55.1 | 44.5 | 20.3 |
| | 27 **19** | 60.7 | 42.7 | 13.7 | 59.7 | 43.3 | 14.7 | **58.5** | **43.9** | **15.8** | 57.2 | 44.5 | 17.1 | 55.6 | 45.1 | 18.5 | 53.8 | 45.7 | 20.0 |
| | 24 **17** | 59.1 | 43.9 | 13.5 | 58.1 | 44.5 | 14.5 | 57.0 | 45.1 | 15.6 | 55.7 | 45.7 | 16.9 | 54.2 | 46.3 | 18.2 | 52.5 | 46.8 | 19.8 |
| | 21 **15** | 57.5 | 45.1 | 13.3 | 56.6 | 45.7 | 14.3 | 55.5 | 46.3 | 15.4 | 54.3 | 46.8 | 16.6 | 52.9 | 47.4 | 18.0 | 51.3 | 48.0 | 19.5 |
| **70.2** | 36 **25** | 80.9 | 47.3 | 16.4 | 79.5 | 48.0 | 17.7 | 77.8 | 48.7 | 19.1 | 75.6 | 49.4 | 20.6 | 73.1 | 50.1 | 22.3 | 70.0 | 50.8 | 24.1 |
| | 33 **23** | 78.9 | 48.7 | 16.2 | 77.6 | 49.4 | 17.5 | 75.9 | 50.1 | 18.9 | 73.9 | 50.8 | 20.4 | 71.4 | 51.5 | 22.0 | 68.5 | 52.2 | 23.8 |
| | 30 **21** | 76.9 | 50.1 | 16.1 | 75.7 | 50.8 | 17.3 | 74.1 | 51.5 | 18.7 | 72.1 | 52.2 | 20.2 | 69.8 | 53.0 | 21.8 | 67.0 | 53.7 | 23.6 |
| | 27 **19** | 75.0 | 51.5 | 15.9 | 73.8 | 52.2 | 17.1 | **72.3** | **53.0** | **18.5** | 70.4 | 53.7 | 20.0 | 68.1 | 54.4 | 21.6 | 65.4 | 55.1 | 23.4 |
| | 24 **17** | 73.1 | 53.0 | 15.7 | 71.9 | 53.7 | 17.0 | 70.5 | 54.4 | 18.3 | 68.7 | 55.1 | 19.8 | 66.5 | 55.8 | 21.4 | 63.9 | 56.5 | 23.1 |
| | 21 **15** | 71.2 | 54.4 | 15.6 | 70.1 | 55.1 | 16.8 | 68.7 | 55.8 | 18.1 | 67.0 | 56.5 | 19.6 | 64.9 | 57.2 | 21.2 | 62.4 | 57.9 | 22.9 |
| **90.2** | 36 **25** | 105.0 | 62.3 | 21.4 | 103.6 | 63.2 | 23.1 | 101.7 | 64.1 | 24.9 | 99.4 | 65.1 | 26.9 | 96.4 | 66.0 | 29.1 | 92.9 | 66.9 | 31.4 |
| | 33 **23** | 102.5 | 64.1 | 21.1 | 101.1 | 65.1 | 22.8 | 99.3 | 66.0 | 24.6 | 97.1 | 66.9 | 26.6 | 94.3 | 67.9 | 28.7 | 90.9 | 68.8 | 31.1 |
| | 30 **21** | 99.9 | 66.0 | 20.9 | 98.6 | 66.9 | 22.5 | 96.9 | 67.9 | 24.3 | 94.8 | 68.8 | 26.3 | 92.2 | 69.7 | 28.4 | 88.9 | 70.7 | 30.7 |
| | 27 **19** | 97.4 | 67.9 | 20.7 | 96.2 | 68.8 | 22.3 | **94.6** | **69.7** | **24.1** | 92.5 | 70.7 | 26.0 | 90.0 | 71.6 | 28.1 | 87.0 | 72.5 | 30.4 |
| | 24 **17** | 94.9 | 69.7 | 20.4 | 93.8 | 70.7 | 22.0 | 92.3 | 71.6 | 23.8 | 90.3 | 72.5 | 25.7 | 87.9 | 73.4 | 27.8 | 85.0 | 74.4 | 30.0 |
| | 21 **15** | 92.5 | 71.6 | 20.2 | 91.4 | 72.5 | 21.8 | 90.0 | 73.4 | 23.5 | 88.1 | 74.4 | 25.4 | 85.8 | 75.3 | 27.5 | 83.1 | 76.2 | 29.7 |
| **110.2** | 36 **25** | 129.1 | 76.6 | 28.4 | 126.8 | 77.7 | 30.5 | 124.2 | 78.8 | 32.9 | 121.2 | 80.0 | 35.5 | 117.7 | 81.1 | 38.4 | 113.7 | 82.3 | 41.7 |
| | 33 **23** | 125.8 | 78.8 | 28.0 | 123.7 | 80.0 | 30.1 | 121.1 | 81.1 | 32.5 | 118.2 | 82.3 | 35.1 | 114.9 | 83.4 | 37.9 | 111.1 | 84.6 | 41.2 |
| | 30 **21** | 122.6 | 81.1 | 27.7 | 120.5 | 82.3 | 29.7 | 118.1 | 83.4 | 32.0 | 115.3 | 84.6 | 34.6 | 112.2 | 85.7 | 37.5 | 108.5 | 86.8 | 40.6 |
| | 27 **19** | 119.4 | 83.4 | 27.3 | 117.4 | 84.6 | 29.4 | **115.1** | **85.7** | **31.6** | 112.5 | 86.8 | 34.2 | 109.4 | 88.0 | 37.0 | 105.9 | 89.1 | 40.1 |
| | 24 **17** | 116.2 | 85.7 | 27.0 | 114.3 | 86.8 | 29.0 | 112.2 | 88.0 | 31.2 | 109.6 | 89.1 | 33.7 | 106.7 | 90.3 | 36.5 | 103.4 | 91.4 | 39.6 |
| | 21 **15** | 113.1 | 88.0 | 26.7 | 111.3 | 89.1 | 28.6 | 109.2 | 90.3 | 30.8 | 106.8 | 91.4 | 33.3 | 104.0 | 92.6 | 36.0 | 100.9 | 93.7 | 39.1 |

**TA:** Internal coil inlet air temperature [°C]
**KWf:** Cooling capacity [kW]
**KWfs:** Sensible cooling capacity [kW]
**KWa:** Compressors power input [kW]

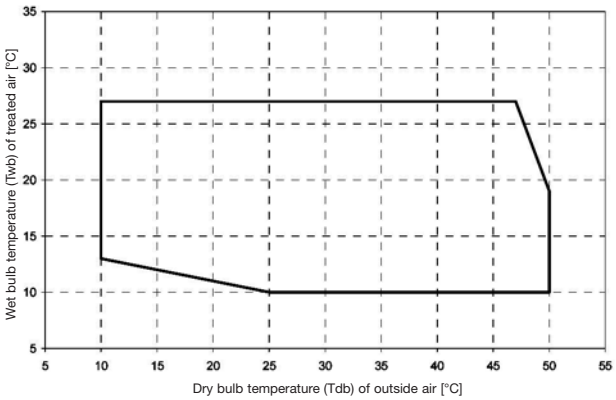
**Performance in HEATING MODE – MAXIMUM air flow rate**

| SIZE | TA Tbs [°C] | OUTSIDE AIR TEMPERATURE - Tdb / Twb [°C] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | -5 | **-6** | -1 | **-2** | 3 | **2** | 7 | **6** | 11 | **10** | 15 | **14** |
| | | kWt | kWa | kWt | kWa | kWt | kWa | kWt | kWa | kWt | kWa | kWt | kWa |
| **35.1** | **26** | 27.4 | 9.6 | 30.8 | 9.9 | 34.4 | 10.2 | 38.2 | 10.5 | 38.1 | 10.9 | 37.9 | 11.2 |
| | **23** | 27.4 | 9.1 | 30.9 | 9.3 | 34.6 | 9.6 | 38.5 | 9.9 | 38.4 | 10.3 | 38.2 | 10.6 |
| | **20** | 27.5 | 8.6 | 31.0 | 8.8 | 34.8 | 9.1 | **38.8** | **9.4** | 38.7 | 9.7 | 38.5 | 10.0 |
| | **17** | 27.5 | 8.1 | 30.3 | 9.5 | 34.9 | 8.6 | 39.1 | 8.8 | 38.9 | 9.2 | 38.8 | 9.5 |
| | **14** | 27.6 | 7.6 | 31.2 | 7.9 | 35.1 | 8.1 | 39.3 | 8.4 | 39.2 | 8.7 | 39.0 | 8.9 |
| | **11** | 27.6 | 7.2 | 31.3 | 7.5 | 35.2 | 7.7 | 39.5 | 7.9 | 39.4 | 8.2 | 39.3 | 8.5 |
| **45.1** | **26** | 35.4 | 11.6 | 39.8 | 12.2 | 44.5 | 12.7 | 49.5 | 13.2 | 49.4 | 13.7 | 49.2 | 14.1 |
| | **23** | 35.4 | 11.0 | 39.9 | 11.5 | 44.7 | 12.1 | 49.7 | 12.5 | 49.6 | 13.0 | 49.5 | 13.4 |
| | **20** | 35.5 | 10.5 | 40.0 | 11.0 | 44.8 | 11.4 | **49.9** | **11.9** | 49.9 | 12.3 | 49.8 | 12.7 |
| | **17** | 35.5 | 9.9 | 39.1 | 11.6 | 44.9 | 10.8 | 50.1 | 11.2 | 50.0 | 11.6 | 50.0 | 12.0 |
| | **14** | 35.4 | 9.4 | 40.0 | 9.9 | 44.9 | 10.3 | 50.2 | 10.7 | 50.2 | 11.0 | 50.1 | 11.4 |
| | **11** | 35.4 | 9.0 | 40.0 | 9.4 | 44.9 | 9.7 | 50.3 | 10.1 | 50.3 | 10.4 | 50.2 | 10.8 |
| **55.1** | **26** | 42.0 | 15.3 | 47.2 | 15.8 | 53.0 | 16.4 | 59.2 | 17.0 | 59.1 | 17.6 | 59.1 | 18.3 |
| | **23** | 41.9 | 14.4 | 47.2 | 15.0 | 53.0 | 15.5 | 59.4 | 16.1 | 59.3 | 16.6 | 59.2 | 17.2 |
| | **20** | 41.8 | 13.7 | 47.2 | 14.1 | 53.1 | 14.7 | **59.6** | **15.2** | 59.5 | 15.7 | 59.4 | 16.3 |
| | **17** | 41.7 | 12.9 | 46.3 | 15.1 | 53.2 | 13.9 | 59.8 | 14.4 | 59.7 | 14.9 | 59.6 | 15.4 |
| | **14** | 41.6 | 12.3 | 47.2 | 12.7 | 53.3 | 13.2 | 60.0 | 13.7 | 59.9 | 14.1 | 59.8 | 14.6 |
| | **11** | 41.5 | 11.6 | 47.2 | 12.1 | 53.4 | 12.5 | 60.2 | 13.0 | 60.1 | 13.4 | 60.0 | 13.8 |
| **70.2** | **26** | 54.8 | 19.2 | 61.6 | 19.8 | 68.8 | 20.4 | 76.5 | 21.0 | 76.2 | 21.7 | 75.9 | 22.5 |
| | **23** | 54.9 | 18.1 | 61.8 | 18.7 | 69.2 | 19.3 | 77.1 | 19.8 | 76.8 | 20.5 | 76.5 | 21.2 |
| | **20** | 55.0 | 17.1 | 62.0 | 17.7 | 69.5 | 18.2 | **77.6** | **18.7** | 77.4 | 19.4 | 77.1 | 20.0 |
| | **17** | 55.1 | 16.2 | 60.5 | 18.9 | 69.9 | 17.2 | 78.1 | 17.7 | 77.9 | 18.3 | 77.6 | 18.9 |
| | **14** | 55.1 | 15.3 | 62.4 | 15.8 | 70.2 | 16.3 | 78.6 | 16.7 | 78.3 | 17.3 | 78.1 | 17.9 |
| | **11** | 55.2 | 14.4 | 62.5 | 14.9 | 70.4 | 15.4 | 79.0 | 15.8 | 78.7 | 16.4 | 78.5 | 16.9 |
| **90.2** | **26** | 70.6 | 23.1 | 79.4 | 24.3 | 88.8 | 25.4 | 98.8 | 26.5 | 98.5 | 27.3 | 98.3 | 28.2 |
| | **23** | 70.7 | 22.0 | 79.6 | 23.1 | 89.1 | 24.1 | 99.3 | 25.1 | 99.1 | 25.9 | 98.8 | 26.8 |
| | **20** | 70.8 | 20.9 | 79.8 | 21.9 | 89.4 | 22.9 | **99.7** | **23.8** | 99.5 | 24.5 | 99.3 | 25.4 |
| | **17** | 70.8 | 19.9 | 78.0 | 23.2 | 89.5 | 21.7 | 100.0 | 22.5 | 99.9 | 23.2 | 99.7 | 24.0 |
| | **14** | 70.7 | 18.9 | 79.8 | 19.7 | 89.6 | 20.5 | 100.2 | 21.3 | 100.1 | 22.0 | 100.0 | 22.7 |
| | **11** | 70.6 | 17.9 | 79.7 | 18.7 | 89.6 | 19.5 | 100.4 | 20.2 | 100.3 | 20.8 | 100.3 | 21.5 |
| **110.2** | **26** | 83.2 | 30.6 | 93.7 | 31.7 | 105.0 | 32.8 | 117.4 | 34.1 | 117.3 | 35.3 | 117.2 | 36.5 |
| | **23** | 83.0 | 28.9 | 93.6 | 29.9 | 105.2 | 31.0 | 117.7 | 32.2 | 117.6 | 33.3 | 117.5 | 34.4 |
| | **20** | 82.8 | 27.3 | 93.6 | 28.3 | 105.3 | 29.3 | **118.2** | **30.4** | 118.0 | 31.5 | 117.8 | 32.5 |
| | **17** | 82.6 | 25.9 | 91.7 | 30.3 | 105.5 | 27.8 | 118.6 | 28.8 | 118.4 | 29.8 | 118.2 | 30.8 |
| | **14** | 82.5 | 24.5 | 93.6 | 25.4 | 105.8 | 26.3 | 119.0 | 27.3 | 118.8 | 28.2 | 118.6 | 29.1 |
| | **11** | 82.4 | 23.3 | 93.6 | 24.1 | 106.0 | 25.0 | 119.5 | 25.9 | 119.2 | 26.8 | 119.0 | 27.6 |

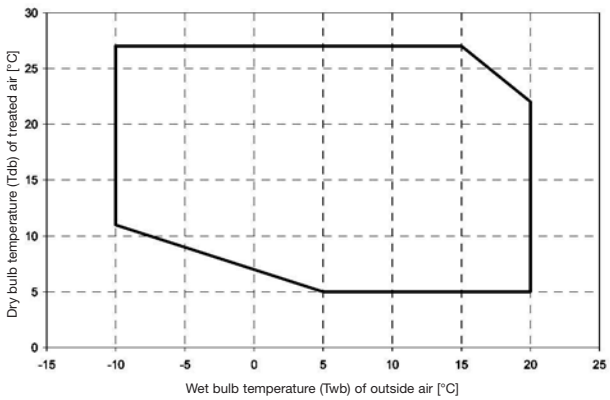
**TA:** Internal coil inlet air temperature [°C]
**KWt:** Heating capacity [kW]
**KWa:** Compressors power input [kW]

## Operational limits

### Functioning in COOLING MODE




### Functioning in HEATING MODE




*The above limits are indicative and refer to the STANDARD treated air flow rate.*

## Electrical data

| Model | | 35.1 | 45.1 | 55.1 | 70.2 | 90.2 | 110.2 | U.M. |
|---|---|---|---|---|---|---|---|---|
| Electrical power supply | | 400V - 3ph+N - 50Hz | | | | | | V-ph-Hz |
| **F.L.A. - Maximum current requirement** | | | | | | | | |
| Compressor 1 | | 23.0 | 28.0 | 37.0 | 23.0 | 28.0 | 37.0 | A |
| Compressor 2 | | – | – | – | 23.0 | 28.0 | 37.0 | A |
| Individual external fan | | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | A |
| Internal fan | *Reduced* | 2.7 | 3.6 | 4.2 | 6.4 | 6.4 | 8.6 | A |
| | *Standard* | 3.6 | 4.2 | 4.9 | 8.6 | 11.4 | 11.4 | A |
| | *High capacity* | 4.9 | 6.4 | 6.4 | 11.4 | 17.1 | 17.1 | A |
| Electric heaters | *Standard* | 13.0 | 13.0 | 13.0 | 26.0 | 26.0 | 26.0 | A |
| | *High capacity* | 26.0 | 26.0 | 26.0 | 45.5 | 45.5 | 45.5 | A |
| **F.L.I. - Maximum power input** | | | | | | | | |
| Compressor 1 | | 13.4 | 16.9 | 22.6 | 13.4 | 16.9 | 22.6 | kW |
| Compressor 2 | | – | – | – | 13.4 | 16.9 | 22.6 | kW |
| Individual external fan | | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | kW |
| Internal fan | *Reduced* | 1.4 | 1.9 | 2.3 | 3.6 | 3.6 | 4.8 | kW |
| | *Standard* | 1.9 | 2.3 | 2.7 | 4.8 | 6.4 | 6.4 | kW |
| | *High capacity* | 2.7 | 3.6 | 3.6 | 6.4 | 9.5 | 9.5 | kW |
| Electric heaters | *Standard* | 9.0 | 9.0 | 9.0 | 18.0 | 18.0 | 18.0 | kW |
| | *High capacity* | 18.0 | 18.0 | 18.0 | 31.5 | 31.5 | 31.5 | kW |
| **L.R.A. - Surge starting current** | | | | | | | | |
| Compressor 1 | | 118.0 | 198.0 | 225.0 | 118.0 | 198.0 | 225.0 | A |
| Compressor 2 | | – | – | – | 118.0 | 198.0 | 225.0 | A |
| Individual external fan | | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | A |
| Internal fan | *Reduced* | 11.1 | 16.6 | 20.2 | 33.3 | 33.3 | 33.7 | A |
| | *Standard* | 16.6 | 20.2 | 25.0 | 33.7 | 49.5 | 49.5 | A |
| | *High capacity* | 25.0 | 33.3 | 33.3 | 49.5 | 67.4 | 67.4 | A |
| **TOTAL*** | | | | | | | | |
| F.L.A. - Total maximum current requirement | | 34 | 39 | 49 | 69 | 81 | 99 | A |
| F.L.I. - Total maximum power input | | 17 | 21 | 27 | 35 | 43 | 55 | kW |
| M.I.C. - Total maximum surge starting current | | 125 | 206 | 233 | 153 | 241 | 277 | A |

** BASIC version with STANDARD internal fan and without any accessories.*

**Performance of water coil for post-heating only**

| 2 ROWS | | Air flow rate | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Water: 80 - 60 °C | | Minimum | | | Standard | | | Maximum | | |
| Model | Inlet air temperature | Capacity | Water flow rate | Water pressure drop | Capacity | Water flow rate | Water pressure drop | Capacity | Water flow rate | Water pressure drop |
| | [°C] | [kW] | [l/h] | [kPa] | [kW] | [l/h] | [kPa] | [kW] | [l/h] | [kPa] |
| **35.1** | 10 | 65.3 | 2867 | 8 | 73.1 | 3212 | 10 | 80.4 | 3532 | 12 |
| | 15 | 59.2 | 2599 | 7 | 66.3 | 2912 | 8 | 72.9 | 3202 | 10 |
| | 20 | 53.2 | 2335 | 6 | **59.5** | 2616 | 7 | 65.5 | 2875 | 8 |
| **45.1** | 10 | 84.7 | 3722 | 8 | 94.9 | 4167 | 10 | 104.2 | 4578 | 11 |
| | 15 | 76.8 | 3374 | 6 | 86.0 | 3777 | 8 | 94.5 | 4150 | 10 |
| | 20 | 69.0 | 3031 | 6 | **77.2** | 3392 | 7 | 84.8 | 3726 | 8 |
| **55.1** | 10 | 104.2 | 4577 | 7 | 116.6 | 5121 | 10 | 128.1 | 5625 | 11 |
| | 15 | 94.5 | 4149 | 6 | 105.7 | 4642 | 8 | 116.1 | 5099 | 10 |
| | 20 | 84.8 | 3727 | 5 | **94.9** | 4169 | 6 | 104.2 | 4578 | 7 |
| **70.2** | 10 | 110.7 | 4864 | 29 | 125.9 | 5531 | 36 | 139.8 | 6141 | 43 |
| | 15 | 100.6 | 4419 | 24 | 114.4 | 5025 | 30 | 127.0 | 5579 | 36 |
| | 20 | 90.6 | 3979 | 20 | **103.0** | 4524 | 25 | 114.3 | 5023 | 30 |
| **90.2** | 10 | 145.6 | 6396 | 29 | 164.3 | 7217 | 35 | 181.5 | 7972 | 42 |
| | 15 | 132.3 | 5811 | 24 | 149.3 | 6556 | 30 | 164.9 | 7242 | 35 |
| | 20 | 119.1 | 5231 | 20 | **134.4** | 5902 | 25 | 148.4 | 6518 | 30 |
| **110.2** | 10 | 172.6 | 7581 | 26 | 195.5 | 8587 | 32 | 216.5 | 9510 | 38 |
| | 15 | 156.8 | 6887 | 22 | 177.6 | 7800 | 28 | 196.7 | 8638 | 32 |
| | 20 | 141.2 | 6200 | 18 | **159.8** | 7021 | 23 | 177.0 | 7775 | 28 |

| 2 ROWS | | Air flow rate | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Water: 80 - 60 °C | | Minimum | | | Standard | | | Maximum | | |
| Model | Inlet air temperature | Capacity | Water flow rate | Water pressure drop | Capacity | Water flow rate | Water pressure drop | Capacity | Water flow rate | Water pressure drop |
| | [°C] | [kW] | [l/h] | [kPa] | [kW] | [l/h] | [kPa] | [kW] | [l/h] | [kPa] |
| **35.1** | 10 | 40.8 | 1771 | 4 | 45.7 | 1985 | 5 | 50.1 | 2176 | 6 |
| | 15 | 33.3 | 1448 | 2 | 38.3 | 1664 | 4 | 42.7 | 1855 | 4 |
| | 20 | 25.4 | 1102 | 1 | **29.4** | 1279 | 2 | 33.3 | 1448 | 2 |
| **45.1** | 10 | 52.7 | 2292 | 4 | 59.2 | 2571 | 5 | 64.8 | 2817 | 5 |
| | 15 | 43.0 | 1869 | 2 | 49.4 | 2147 | 4 | 55.2 | 2400 | 4 |
| | 20 | 32.6 | 1417 | 1 | **37.8** | 1644 | 2 | 42.8 | 1861 | 2 |
| **55.1** | 10 | 64.7 | 2812 | 4 | 72.7 | 3157 | 5 | 79.6 | 3457 | 5 |
| | 15 | 52.7 | 2290 | 2 | 60.5 | 2631 | 4 | 67.8 | 2946 | 4 |
| | 20 | 39.8 | 1731 | 1 | **46.2** | 2008 | 2 | 52.3 | 2274 | 2 |
| **70.2** | 10 | 70.8 | 3075 | 14 | 80.2 | 3484 | 18 | 88.8 | 3858 | 20 |
| | 15 | 60.8 | 2641 | 11 | 68.8 | 2991 | 13 | 76.2 | 3309 | 16 |
| | 20 | 50.8 | 2208 | 8 | **57.5** | 2498 | 10 | 63.6 | 2762 | 12 |
| **90.2** | 10 | 92.9 | 4038 | 14 | 104.5 | 4541 | 17 | 115.1 | 5003 | 20 |
| | 15 | 79.8 | 3467 | 11 | 89.7 | 3896 | 13 | 98.7 | 4290 | 16 |
| | 20 | 66.7 | 2898 | 8 | **74.9** | 3253 | 10 | 82.4 | 3579 | 11 |
| **110.2** | 10 | 110.2 | 4788 | 13 | 124.4 | 5404 | 16 | 137.4 | 5969 | 19 |
| | 15 | 94.6 | 4111 | 10 | 106.7 | 4637 | 12 | 117.8 | 5118 | 14 |
| | 20 | 79.1 | 3436 | 7 | **89.1** | 3871 | 8 | 98.3 | 4269 | 11 |

| 3 ROWS | | Air flow rate | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Water: 80 - 60 °C | | Minimum | | | Standard | | | Maximum | | |
| Model | Inlet air temperature | Capacity | Water flow rate | Water pressure drop | Capacity | Water flow rate | Water pressure drop | Capacity | Water flow rate | Water pressure drop |
| | [°C] | [kW] | [l/h] | [kPa] | [kW] | [l/h] | [kPa] | [kW] | [l/h] | [kPa] |
| **35.1** | 10 | 85.7 | 3765 | 19 | 97.7 | 4293 | 24 | 109.1 | 4791 | 30 |
| | 15 | 77.8 | 3419 | 17 | 88.8 | 3899 | 20 | 99.1 | 4351 | 25 |
| | 20 | 70.1 | 3080 | 13 | **79.9** | 3511 | 17 | 89.2 | 3918 | 20 |
| **45.1** | 10 | 111.5 | 4899 | 19 | 127.1 | 5581 | 24 | 141.7 | 6224 | 29 |
| | 15 | 101.3 | 4449 | 16 | 115.4 | 5068 | 20 | 128.7 | 5652 | 24 |
| | 20 | 91.2 | 4007 | 13 | **103.9** | 4564 | 17 | 115.8 | 5088 | 20 |
| **55.1** | 10 | 137.3 | 6032 | 19 | 156.4 | 6868 | 24 | 174.3 | 7656 | 29 |
| | 15 | 124.7 | 5478 | 16 | 142.0 | 6237 | 19 | 158.3 | 6952 | 24 |
| | 20 | 112.3 | 4934 | 13 | **127.8** | 5616 | 17 | 142.5 | 6259 | 20 |
| **70.2** | 10 | 146.0 | 6413 | 70 | 169.4 | 7440 | 90 | 191.2 | 8399 | 112 |
| | 15 | 132.8 | 5833 | 59 | 154.0 | 6766 | 77 | 173.9 | 7638 | 95 |
| | 20 | 119.8 | 5261 | 49 | **138.9** | 6102 | 64 | 156.8 | 6888 | 79 |
| **90.2** | 10 | 192.8 | 8468 | 70 | 221.6 | 9736 | 89 | 248.7 | 10924 | 109 |
| | 15 | 175.3 | 7701 | 59 | 201.6 | 8854 | 76 | 226.1 | 9934 | 92 |
| | 20 | 158.1 | 6945 | 49 | **181.8** | 7984 | 62 | 203.9 | 8957 | 77 |
| **110.2** | 10 | 227.5 | 9992 | 64 | 262.7 | 11538 | 82 | 295.6 | 12984 | 101 |
| | 15 | 206.9 | 9087 | 54 | 238.9 | 10492 | 70 | 268.8 | 11807 | 85 |
| | 20 | 186.6 | 8196 | 46 | **215.4** | 9462 | 58 | 242.4 | 10646 | 71 |

| 3 ROWS | | Air flow rate | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Water: 80 - 60 °C | | Minimum | | | Standard | | | Maximum | | |
| Model | Inlet air temperature | Capacity | Water flow rate | Water pressure drop | Capacity | Water flow rate | Water pressure drop | Capacity | Water flow rate | Water pressure drop |
| | [°C] | [kW] | [l/h] | [kPa] | [kW] | [l/h] | [kPa] | [kW] | [l/h] | [kPa] |
| **35.1** | 10 | 55.6 | 2417 | 10 | 63.2 | 2745 | 12 | 70.3 | 3054 | 14 |
| | 15 | 47.9 | 2081 | 7 | 54.4 | 2362 | 10 | 60.4 | 2626 | 11 |
| | 20 | 40.0 | 1737 | 6 | **45.6** | 1982 | 7 | 50.6 | 2201 | 8 |
| **45.1** | 10 | 72.3 | 3141 | 10 | 82.0 | 3564 | 12 | 91.2 | 3962 | 14 |
| | 15 | 62.2 | 2705 | 7 | 70.6 | 3067 | 10 | 78.4 | 3407 | 11 |
| | 20 | 51.9 | 2253 | 5 | **59.2** | 2572 | 7 | 65.7 | 2854 | 8 |
| **55.1** | 10 | 88.9 | 3865 | 10 | 100.9 | 4384 | 12 | 112.1 | 4871 | 14 |
| | 15 | 76.6 | 3328 | 7 | 86.8 | 3771 | 8 | 96.4 | 4187 | 11 |
| | 20 | 63.7 | 2769 | 5 | **72.8** | 3161 | 7 | 80.7 | 3506 | 8 |
| **70.2** | 10 | 95.8 | 4164 | 36 | 110.7 | 4812 | 47 | 124.6 | 5416 | 56 |
| | 15 | 82.8 | 3599 | 28 | 95.7 | 4156 | 36 | 107.6 | 4675 | 44 |
| | 20 | 69.9 | 3039 | 20 | **80.6** | 3504 | 26 | 90.6 | 3937 | 32 |
| **90.2** | 10 | 126.4 | 5491 | 36 | 144.8 | 6291 | 46 | 162.0 | 7038 | 55 |
| | 15 | 109.2 | 4745 | 28 | 125.0 | 5432 | 35 | 139.8 | 6074 | 43 |
| | 20 | 92.1 | 4004 | 20 | **105.4** | 4578 | 26 | 117.7 | 5114 | 31 |
| **110.2** | 10 | 149.2 | 6484 | 32 | 171.7 | 7458 | 42 | 192.6 | 8369 | 52 |
| | 15 | 129.0 | 5603 | 25 | 148.2 | 6441 | 32 | 166.2 | 7223 | 40 |
| | 20 | 108.8 | 4729 | 19 | **124.9** | 5429 | 24 | 140.0 | 6082 | 29 |

**Electric heaters performance**

| Model | 35.1 - 45.1 - 55.1 | 70.2 - 90.2 - 110.2 | U.M. |
|---|---|---|---|
| Standard coil | 9.0 | 18.0 | kW |
| High capacity coil | 18.0 | 31.5 | kW |

**Performance of gas thermal module**

| Model | | 35.1 - 45.1 - 55.1 | | 70.2 - 90.2 - 110.2 | | U.M. |
|---|---|---|---|---|---|---|
| | | *Standard* | *High capacity* | *Standard* | *High capacity* | |
| Rated heating capacity | *max* | 44.8 | 54.0 | 93.4 | 145.0 | kW |
| | *min* | 15.5 | 16.3 | 31.5 | 46.3 | kW |
| Yield | *max* | 94.3 | 93.1 | 95.3 | 93.5 | % |
| | *min* | 105.0 | 105.0 | 105.0 | 105.2 | % |
| Gas consumption | *max* | 5.03 | 6.14 | 10.37 | 16.40 | $m^3/h$ |
| *(15°C – 1013 mbar)* | *min* | 1.57 | 1.64 | 3.17 | 4.66 | $m^3/h$ |
| Condensate produced | | 1.45 | 1.45 | 2.60 | 3.87 | l/h |
| Flue gas discharge pressure available | | 120 | 120 | 120 | 100 | Pa |

*The listed data refer to the use of the module with G20 natural gas and a supply pressure of 20 mbar.*

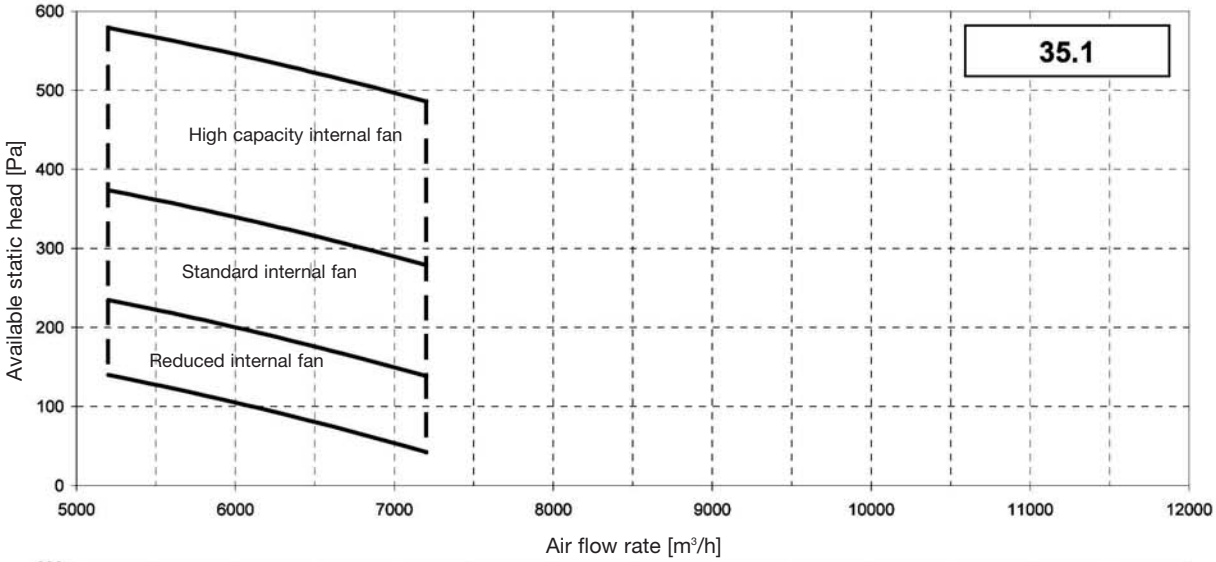
**Aeraulic performance of the internal fan section**

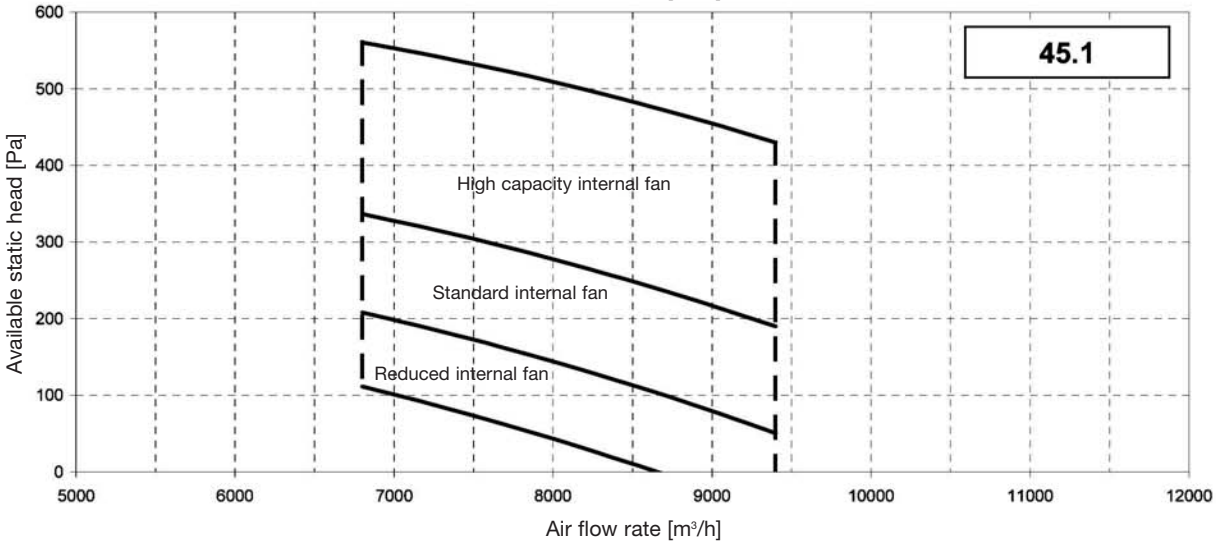
To select the internal fan, carry out the following procedure:

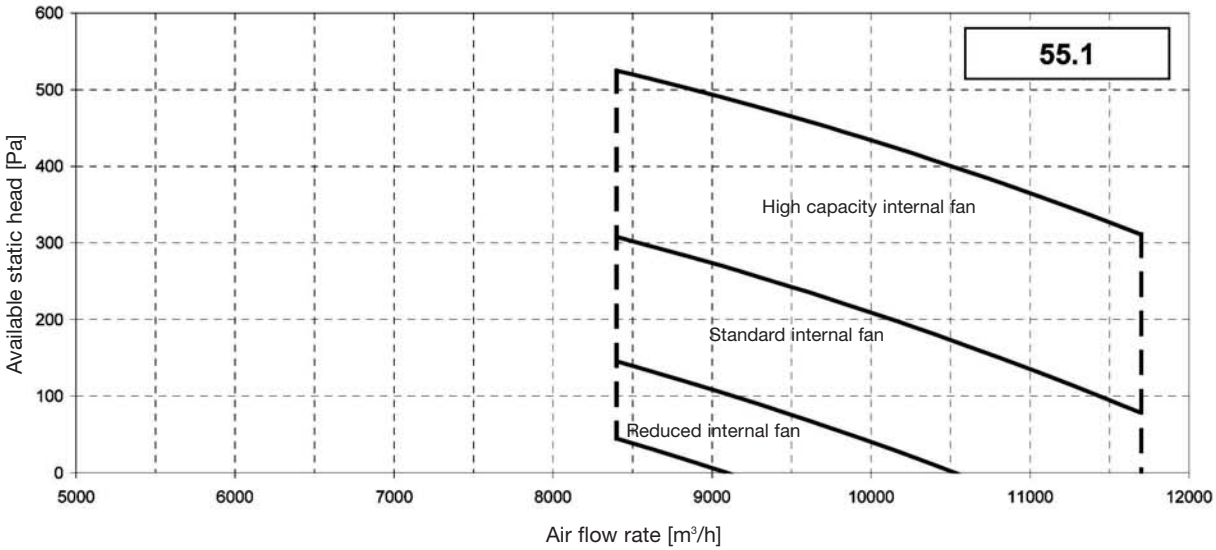
- Define the required treated air flow rate.
- Define the available head required by the unit.
- Calculate the air side pressure drop of all the accessories selected according to the air flow rate and the unit model (refer to the diagrams in the section on air side pressure drop.
- Calculate the total head required by the unit as the sum of the available head and the pressure drop of the accessories.
- Select the internal fan according to the unit model, the air flow rate, and the total head required (refer to the diagrams below).

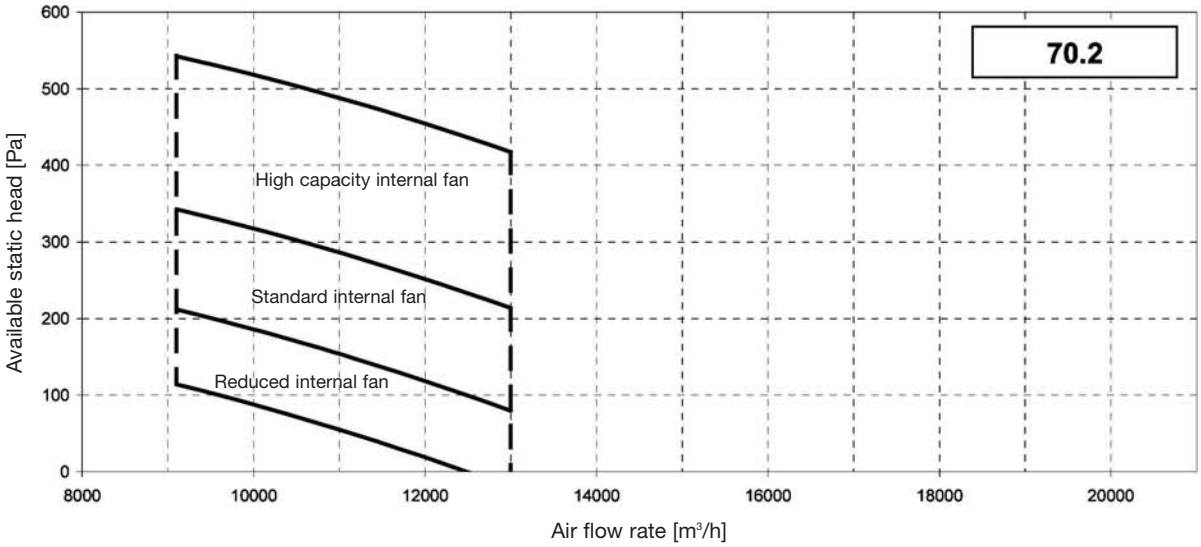
The following diagrams illustrate the characteristic aeraulic curves of all the models. These curves are obtained by subtracting the pressure drop of the standard G4 filters, the pressure drop of the internal coil, and the unit's own pressure drop from the head provided by the internal fan.

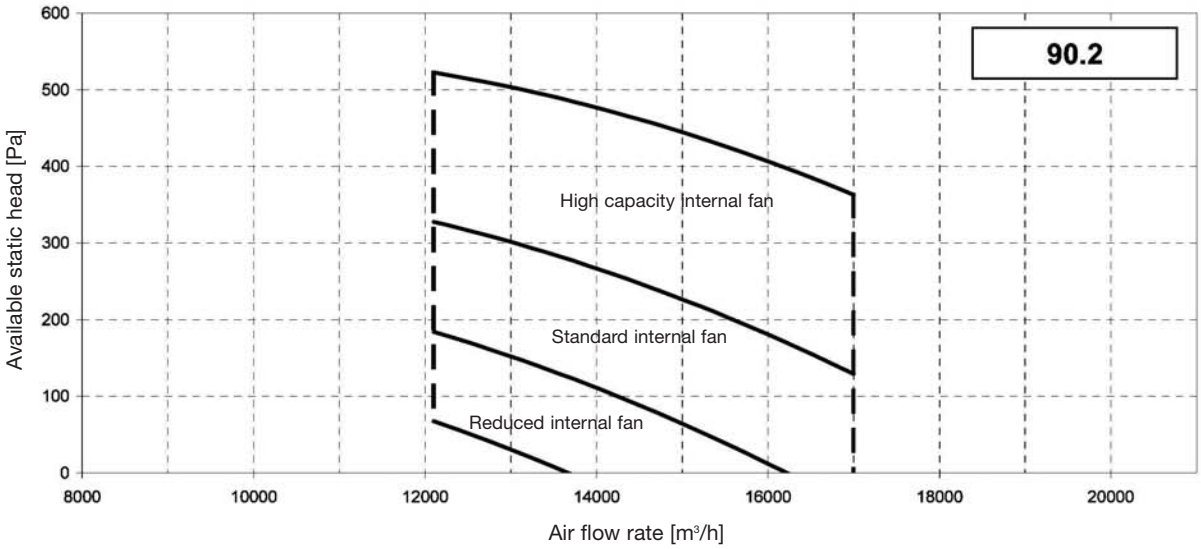
**N.B.** The curves refer to the BASIC version with a dry internal coil, but without accessories.

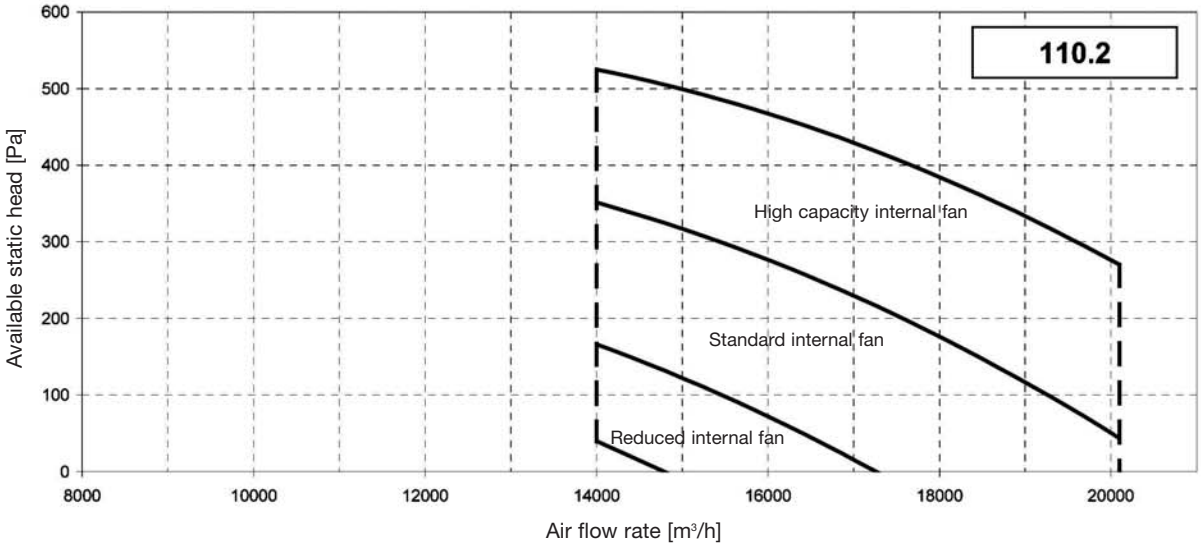

35.1
High capacity internal fan
Standard internal fan
Reduced internal fan
Available static head [Pa]
600
500
400
300
200
100
0
5000
6000
7000
8000
9000
10000
11000
12000
Air flow rate [m³/h]


45.1
High capacity internal fan
Standard internal fan
Reduced internal fan
Available static head [Pa]
600
500
400
300
200
100
0
5000
6000
7000
8000
9000
10000
11000
12000
Air flow rate [m³/h]


55.1
High capacity internal fan
Standard internal fan
Reduced internal fan
Available static head [Pa]
600
500
400
300
200
100
0
5000
6000
7000
8000
9000
10000
11000
12000
Air flow rate [m³/h]

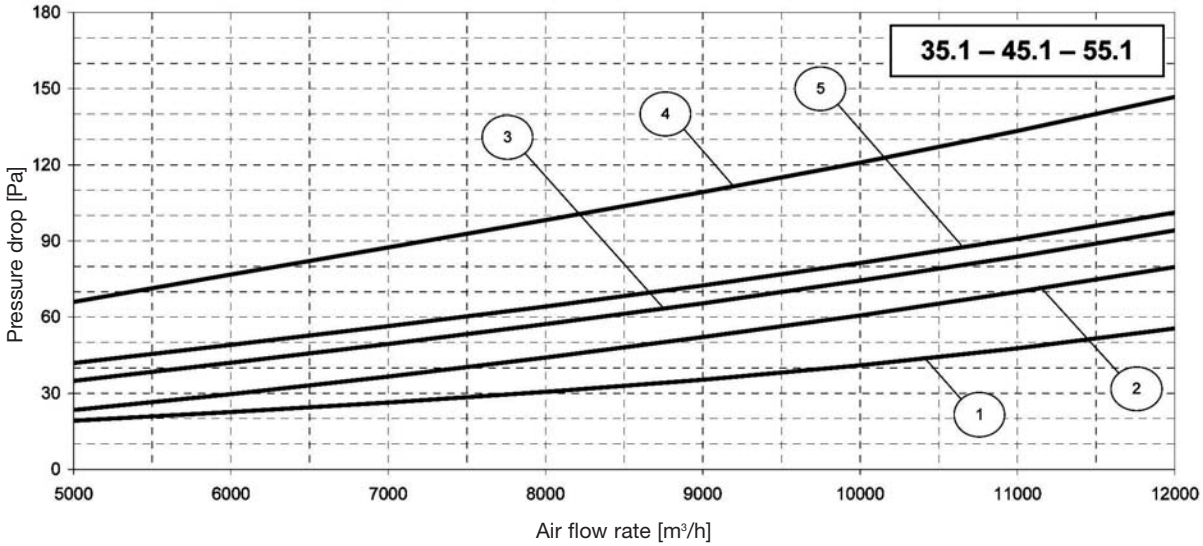

70.2
Available static head [Pa]
600
500
400
300
200
100
0
High capacity internal fan
Standard internal fan
Reduced internal fan
8000
10000
12000
14000
16000
18000
20000
Air flow rate [m³/h]

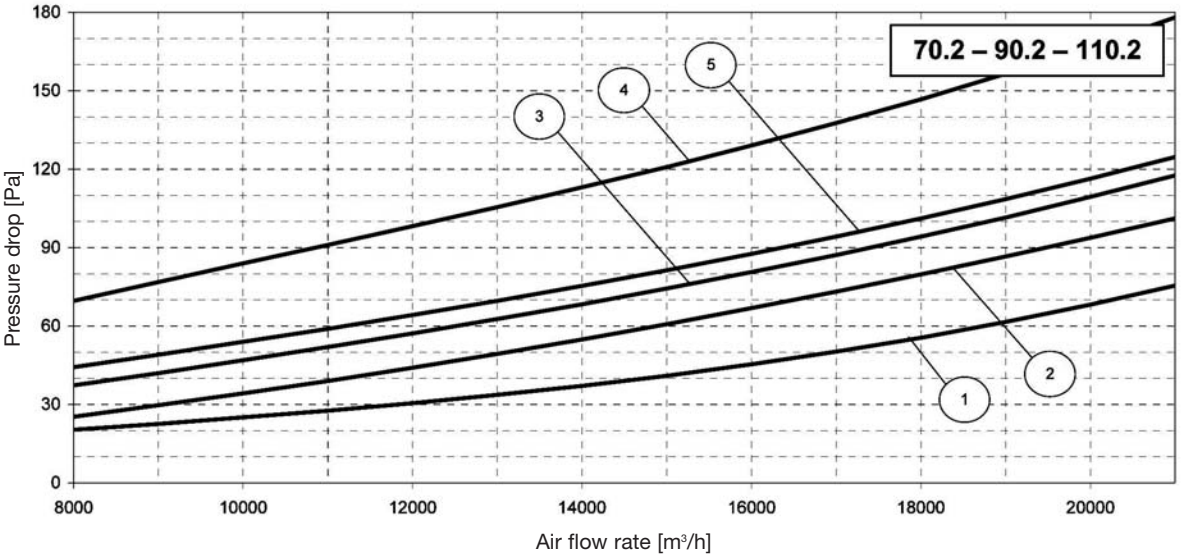

90.2
Available static head [Pa]
600
500
400
300
200
100
0
High capacity internal fan
Standard internal fan
Reduced internal fan
8000
10000
12000
14000
16000
18000
20000
Air flow rate [m³/h]


110.2
Available static head [Pa]
600
500
400
300
200
100
0
High capacity internal fan
Standard internal fan
Reduced internal fan
8000
10000
12000
14000
16000
18000
20000
Air flow rate [m³/h]

## Air side pressure drop

### Air filters

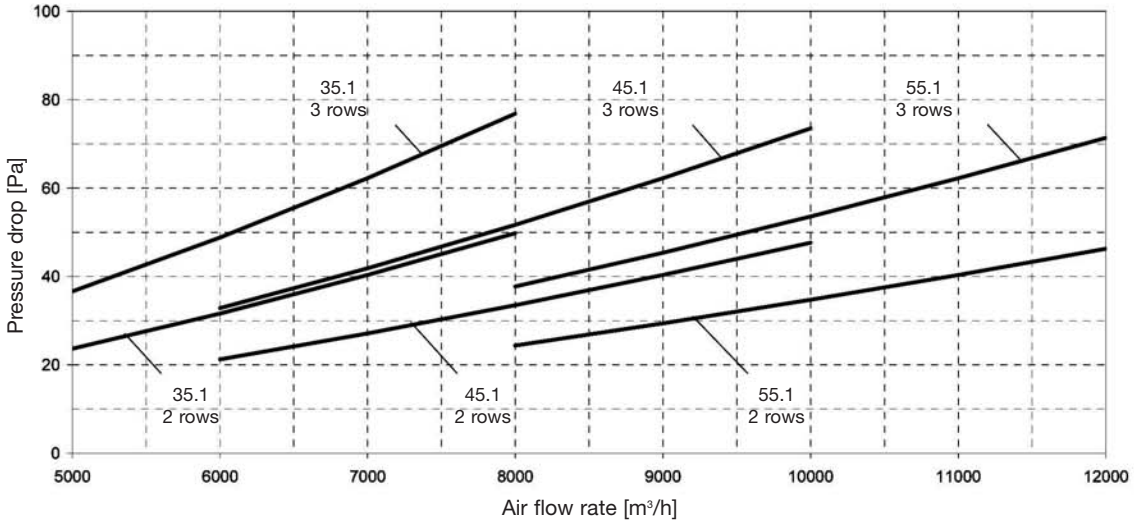


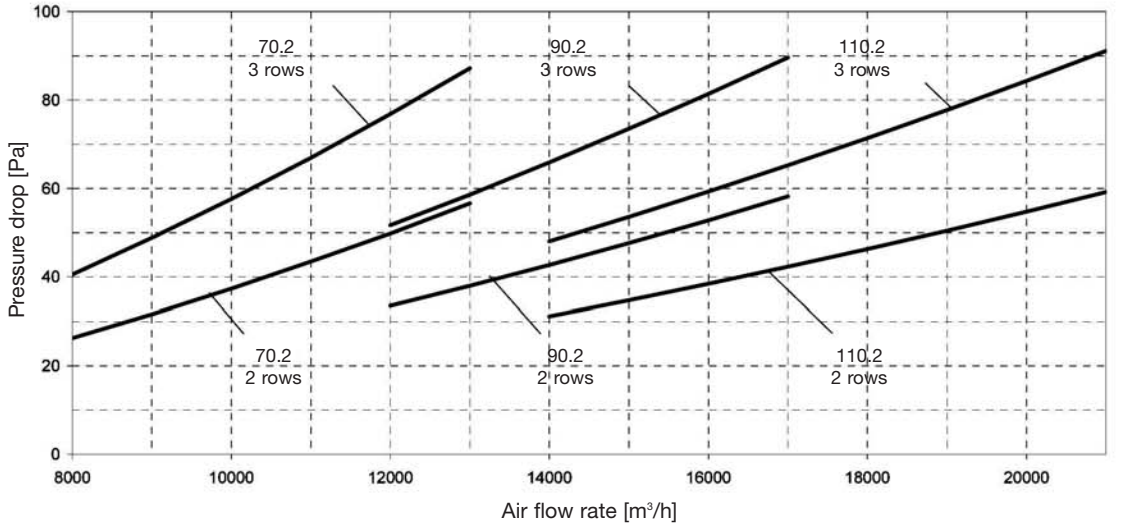




| | Filter type | EN 779 efficiency | Em average efficiency [%] *(for particles of 0.4 Ïm)* | Eurovent classification |
|---|---|---|---|---|
| **1** | Rigid bag filter | F 6 | 60 ≤ Em < 80 | EU 6 |
| **2** | Rigid bag filter | F 7 | 80 ≤ Em < 90 | EU 7 |
| **3** | Rigid bag filter | F 8 | 90 ≤ Em < 95 | EU 8 |
| **4** | Rigid bag filter | F 9 | 95 ≤ Em | EU 9 |
| **5** | Rigid bag filter with activated charcoal | F 7 | 80 ≤ Em < 90 | EU 7 |

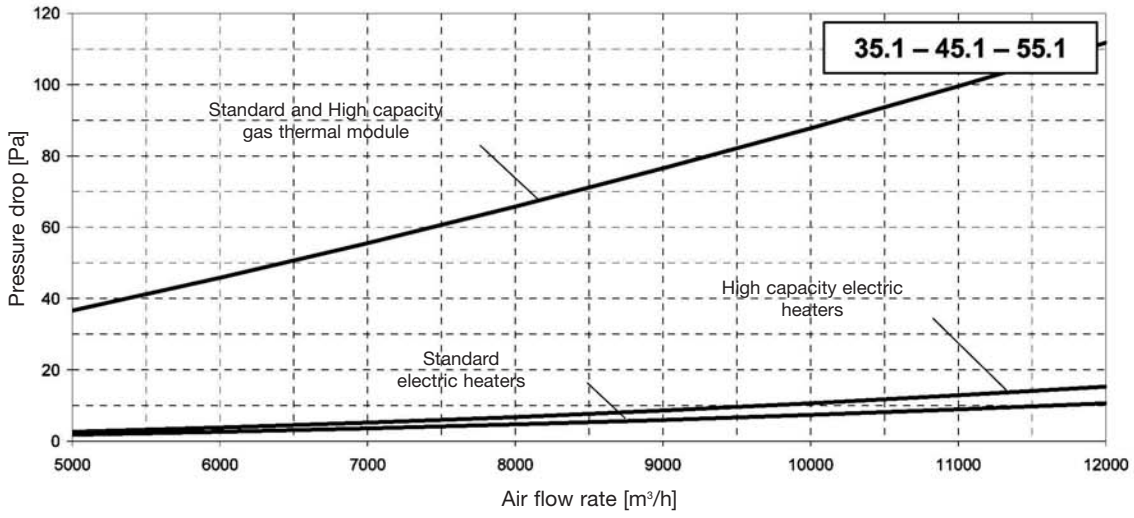
The specified pressure drop refers to clean filters. It is recommended to clean or replace the filters when the pressure drop exceeds 600 Pa.

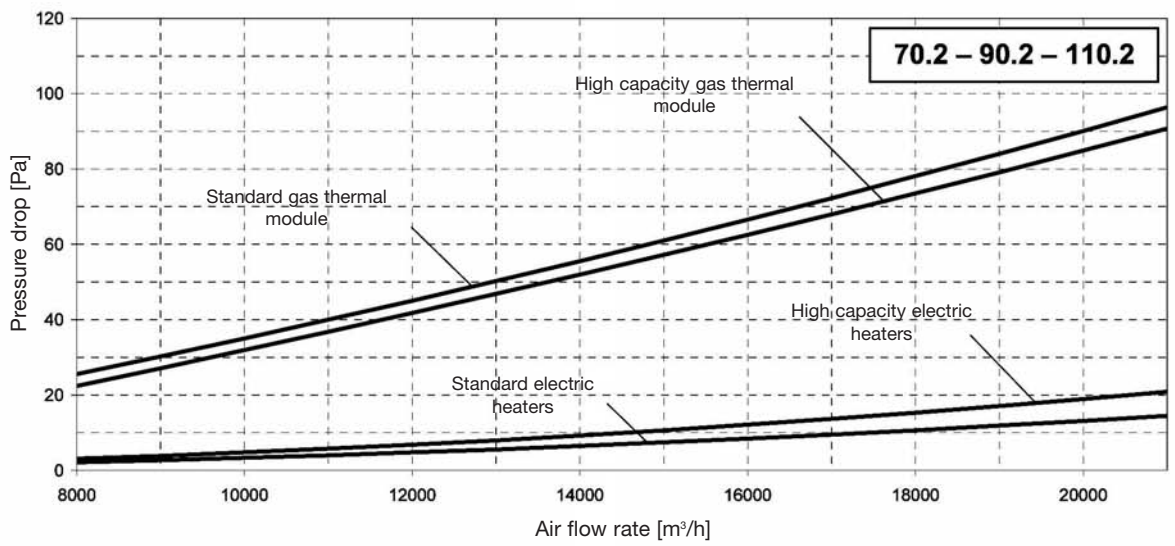
**Water coil for post-heating only**



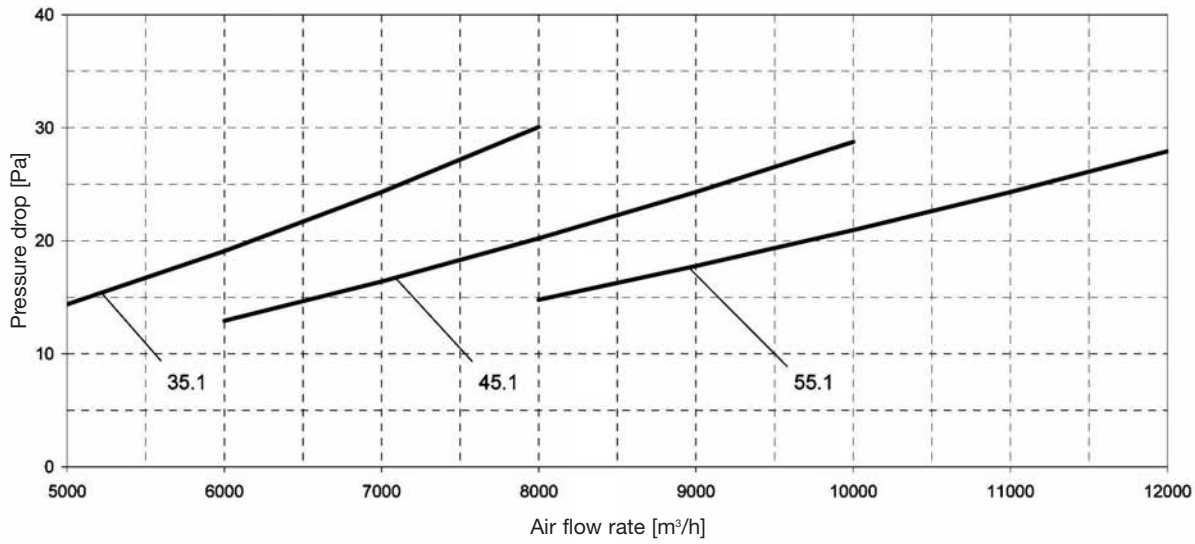



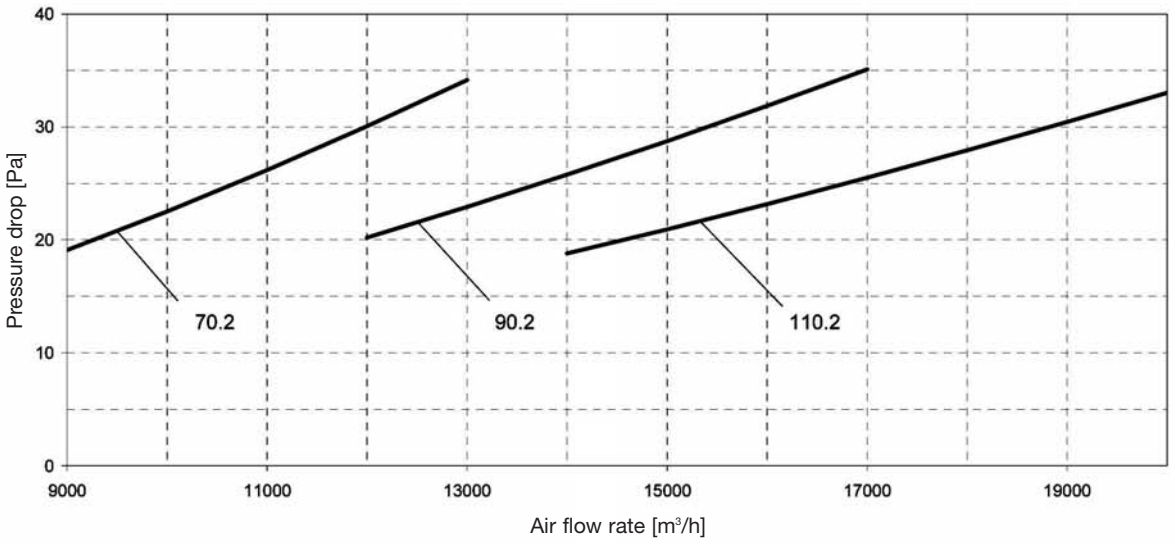

**Electric heaters – Gas thermal module**



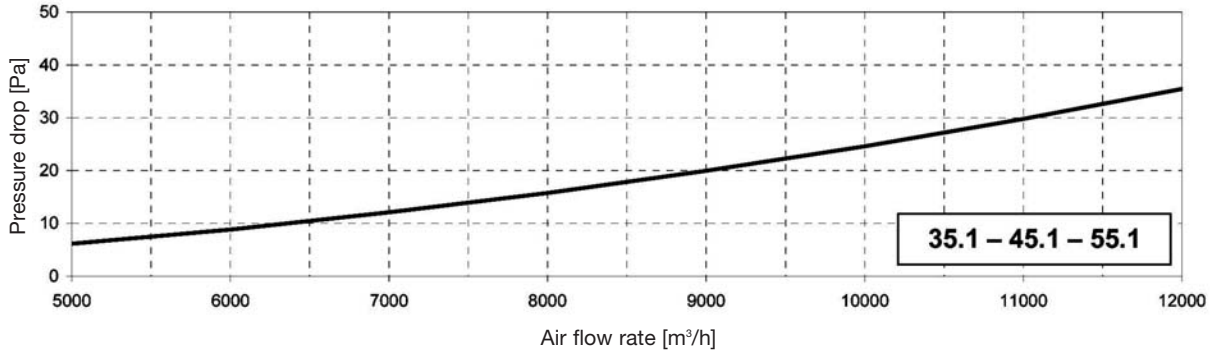


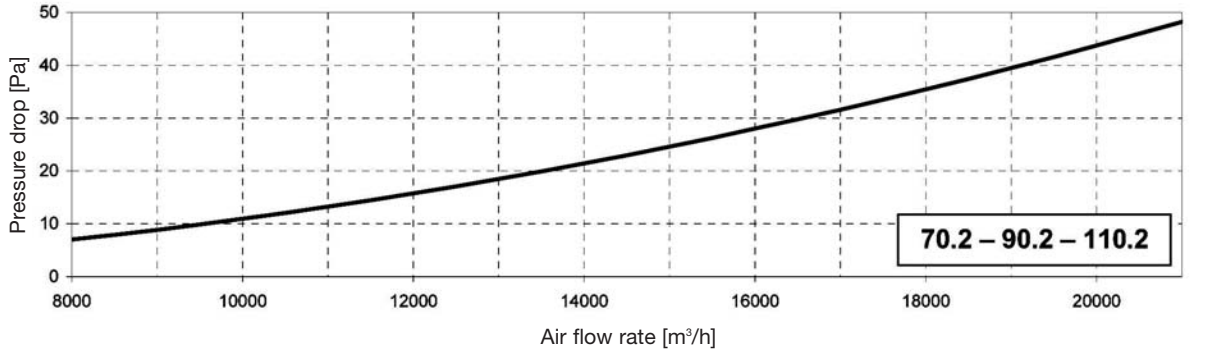

**Internal coil: Additional pressure drop due to the formation of condensate**



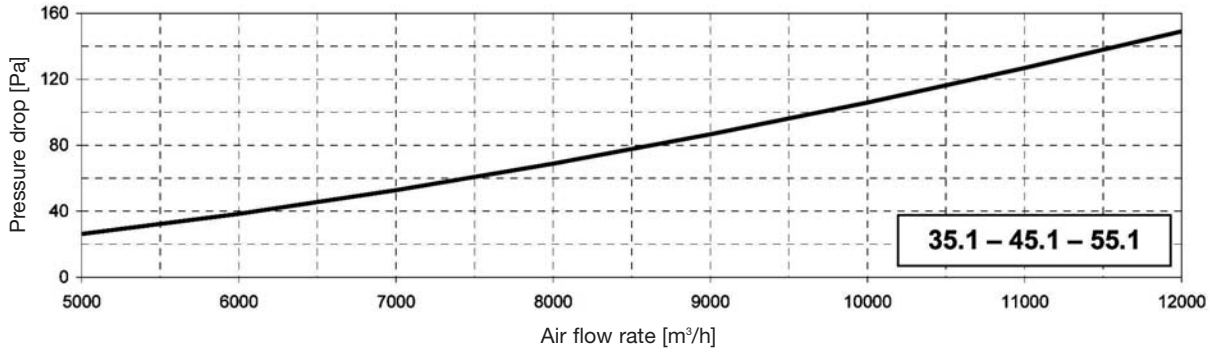



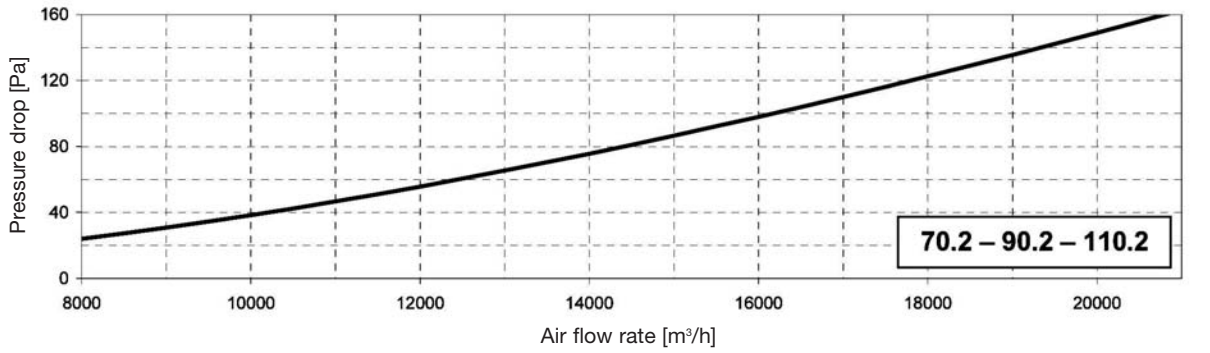
**Droplet separator**




**Outlet Sound attenuator**



## Noise levels

### Noise levels of the unit

| Model | Level of sound power SPL [dB] for octave bands [Hz] | | | | | | | | Level of sound power | | Sound pressure level at 1 meter |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | [dB] | [dB(A)] | [dB(A)] |
| **35.1** | 88.6 | 87.7 | 89.7 | 84.9 | 85.6 | 81.5 | 74.7 | 67.4 | 95 | **89** | 72 |
| **45.1** | 91.6 | 88.4 | 90.2 | 85.4 | 85.9 | 81.9 | 75.6 | 68.4 | 96 | **90** | 72 |
| **55.1** | 93.2 | 89.2 | 90.7 | 86.0 | 86.2 | 82.4 | 76.6 | 69.3 | 97 | **90** | 73 |
| **70.2** | 91.2 | 90.4 | 92.6 | 87.7 | 88.5 | 84.3 | 77.3 | 70.2 | 98 | **92** | 74 |
| **90.2** | 94.3 | 91.1 | 93.1 | 88.3 | 88.8 | 84.7 | 78.3 | 71.2 | 99 | **93** | 75 |
| **110.2** | 96.0 | 91.7 | 93.5 | 88.8 | 89.0 | 85.2 | 79.1 | 72.0 | 100 | **93** | 75 |

Standard conditions
*Performance in reference to the BASIC version operating in the cooling mode under NOMINAL conditions with STANDARD available static head and air flow rate.*
*Unit placed in free-field conditions on a reflective surface (a directionality factor of 2) with intake and outlet openings ducted for 2 meters.*
*The level of sound power is measured according to Standard ISO 3744. The sound pressure level is calculated according to Standard ISO 3744 (Eurovent 8/1) at a distance of 1 meter from the unit's external surface.*

### Noise levels of the unit

| Model | Level of sound power SPL [dB] for octave bands [Hz] | | | | | | | | Level of sound power | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | [dB] | [dB(A)] |
| **35.1** | 84.4 | 82.8 | 83.0 | 76.2 | 76.0 | 75.1 | 72.0 | 65.9 | 89 | 82 |
| **45.1** | 84.5 | 82.7 | 83.6 | 78.1 | 78.4 | 78.3 | 76.0 | 70.9 | 90 | 85 |
| **55.1** | 86.6 | 83.4 | 85.5 | 80.2 | 81.1 | 81.0 | 79.4 | 75.1 | 92 | 87 |
| **70.2** | 84.9 | 86.4 | 80.7 | 78.6 | 75.2 | 75.3 | 73.2 | 67.4 | 90 | 82 |
| **90.2** | 83.8 | 86.7 | 82.8 | 82.5 | 78.7 | 78.7 | 76.9 | 71.5 | 91 | 86 |
| **110.2** | 84.3 | 88.4 | 84.2 | 85.2 | 80.7 | 80.9 | 79.5 | 74.7 | 93 | 88 |

Standard conditions
*Performance in reference to the BASIC version operating in the cooling mode under NOMINAL conditions with STANDARD available static head and air flow rate.*
*The level of sound power is calculated beginning from the data provided by the manufacturer of the fans.*

### Noise reduction of the outlet Sound attenuator

| Model | Noise reduction [dB] for octave bands [Hz] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
| **35.1 - 45.1 - 55.1** | 3 | 4 | 16 | 19 | 25 | 24 | 16 | 12 |
| **70.2 - 90.2 - 110.2** | 3 | 2 | 15 | 14 | 16 | 18 | 13 | 9 |

## Weights

### Unit

| Model | | 35.1 | 45.1 | 55.1 | 70.2 | 90.2 | 110.2 | U.M. |
|---|---|---|---|---|---|---|---|---|
| Construction configuration | | | | | | | | |
| Basic version | **VB** | 724 | 807 | 874 | 1052 | 1220 | 1345 | kg |
| Version with 1 damper | **V1** | 916 | 999 | 1066 | 1316 | 1484 | 1609 | kg |
| Version with 2 dampers | **V2** | 927 | 1010 | 1077 | 1327 | 1495 | 1620 | kg |

### Options and accessories

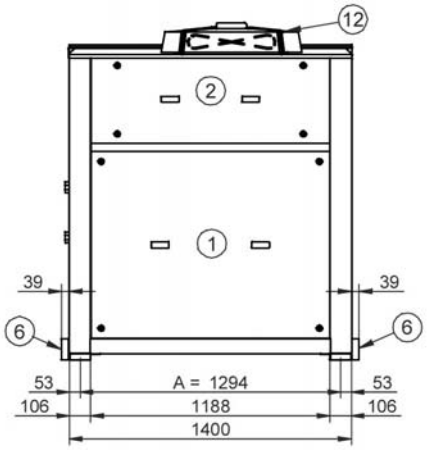
| Model | | 35.1 | 45.1 | 55.1 | 70.2 | 90.2 | 110.2 | U.M. |
|---|---|---|---|---|---|---|---|---|
| Internal fan | *Reduced* | -3 | -6 | -2 | -6 | -17 | -11 | kg |
| | *High capacity* | 9 | 7 | 7 | 11 | 49 | 49 | kg |
| Water coil for post-heating only | *2 rows with pipes kit* | 31 | 35 | 38 | 39 | 44 | 49 | kg |
| | *2 rows with 3-way valve* | 36 | 40 | 43 | 47 | 52 | 57 | kg |
| | *3 rows with pipes kit* | 36 | 41 | 46 | 46 | 53 | 61 | kg |
| | *3 rows with 3-way valve* | 41 | 46 | 51 | 54 | 61 | 69 | kg |
| Electric heaters | *Standard* | 21 | 21 | 21 | 37 | 37 | 37 | kg |
| | *High capacity* | 34 | 34 | 34 | 52 | 52 | 52 | kg |
| Gas thermal module | *Standard* | 270 | 270 | 270 | 402 | 402 | 402 | kg |
| | *High capacity* | 275 | 275 | 275 | 442 | 442 | 442 | kg |
| Protection grills for the external coils | | 8 | 8 | 8 | 16 | 16 | 16 | kg |
| Droplet separato | | 29 | 29 | 29 | 41 | 41 | 41 | kg |
| Rigid bag filters | | 21 | 21 | 21 | 31 | 31 | 31 | kg |
| Outlet Sound attenuator | | 27 | 27 | 27 | 36 | 36 | 36 | kg |

*The total weight of the unit, obtained by adding together the weight of the unit in the chosen construction configuration and the weight of any accessories selected, refers to the shipping weight.*
*The weights of accessories not included in the table above can be ignored for the purposes of the calculation of the unit's total weight.*

# OVERALL DIMENSIONS

## OVERALL DIMENSIONS FOR RFA 35.1, 45.1, 55.1
## CONSTRUCTION CONFIGURATION VB - BASIC VERSION

FRONT VIEW

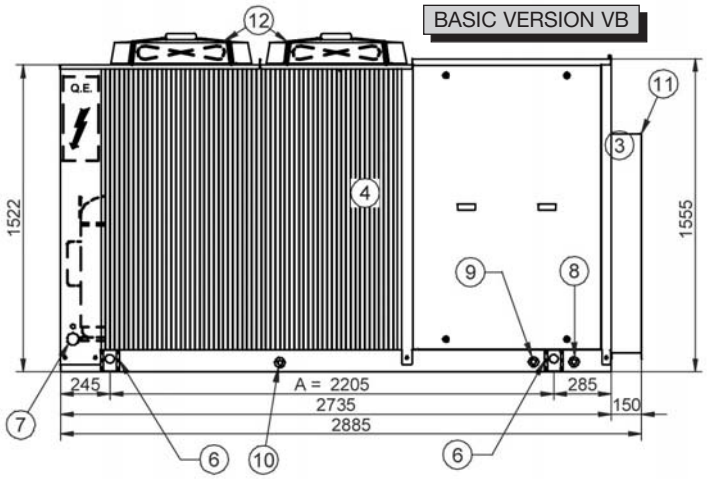



| LEGEND | |
|---|---|
| ***POS.*** | ***DESCRIPTION*** |
| 1 | COOLING CIRCUIT HOUSING INSPECTION PANEL |
| 2 | ELECTRICAL BOARD CABINET INSPECTION PANEL |
| 3 | INTERNAL FAN INSPECTION PANEL |
| 4 | EXTERNAL HEAT EXCHANGER |
| 5 | CONDENSATION GAS THERMAL MODULE |
| 6 | HOISTING BRACKETS |
| 7 | ELECTRICAL POWER SUPPLY HOLES |
| 8 | INTERNAL SECTION CONDENSATE DISCHARGE (STANDARD) |
| 9 | INTERNAL SECTION CONDENSATE DISCHARGE (OPTIONAL) |
| 10 | EXTERNAL SECTION CONDENSATE DISCHARGE |
| 11 | STANDARD FILTERS FRAME |
| 12 | EXTERNAL FANS |

A = SPRING ANTI-VIBRATION HOLES CENTER DISTANCE

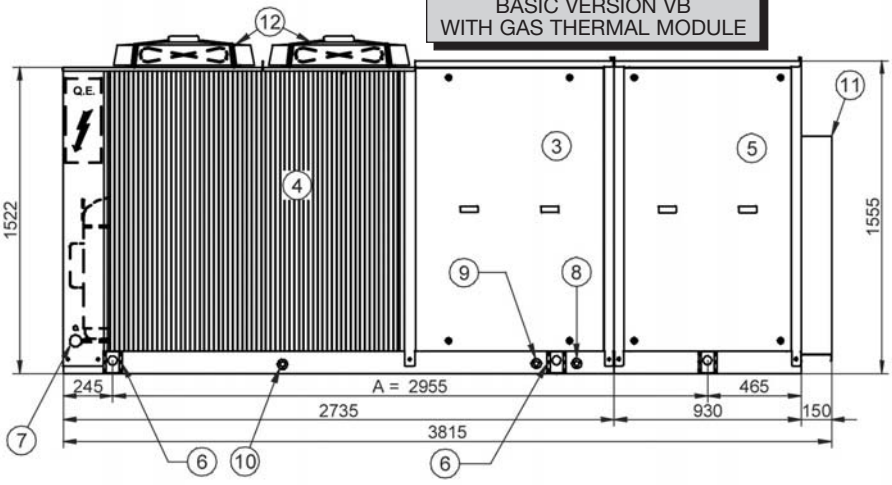
SIDE VIEW

BASIC VERSION VB



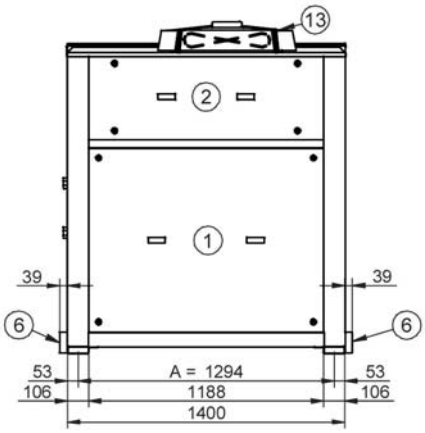

SIDE VIEW

BASIC VERSION VB
WITH GAS THERMAL MODULE



# OVERALL DIMENSIONS FOR RFA 35.1, 45.1, 55.1 CONSTRUCTION CONFIGURATION V1 - V2

## FRONT VIEW

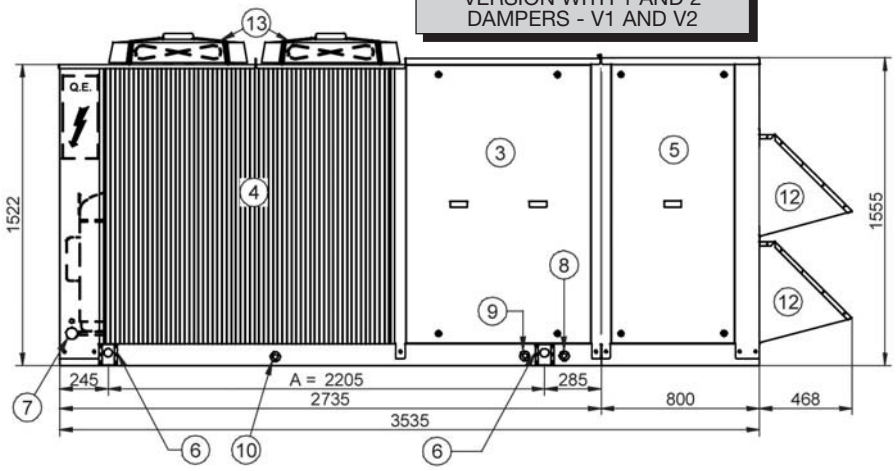



| LEGEND | |
|---|---|
| ***POS.*** | ***DESCRIPTION*** |
| 1 | COOLING CIRCUIT HOUSING INSPECTION PANEL |
| 2 | ELECTRICAL BOARD CABINET INSPECTION PANEL |
| 3 | INTERNAL FAN INSPECTION PANEL |
| 4 | EXTERNAL HEAT EXCHANGER |
| 5 | DAMPERS AND FILTER SECTION OPTIONAL MODULE |
| 6 | HOISTING BRACKETS |
| 7 | ELECTRICAL POWER SUPPLY HOLES |
| 8 | INTERNAL SECTION CONDENSATE DISCHARGE (STANDARD) |
| 9 | INTERNAL SECTION CONDENSATE DISCHARGE (OPTIONAL) |
| 10 | EXTERNAL SECTION CONDENSATE DISCHARGE |
| 11 | CONDENSATION GAS THERMAL MODULE |
| 12 | OUTSIDE AIR COVER |
| 13 | EXTERNAL FANS |

A = SPRING ANTI-VIBRATION HOLES CENTER DISTANCE

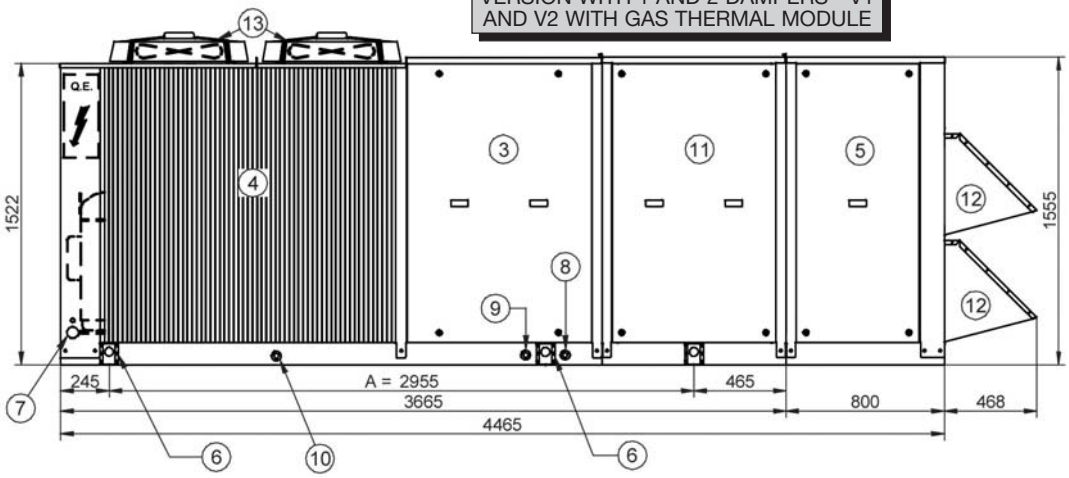
## SIDE VIEW

VERSION WITH 1 AND 2 DAMPERS - V1 AND V2



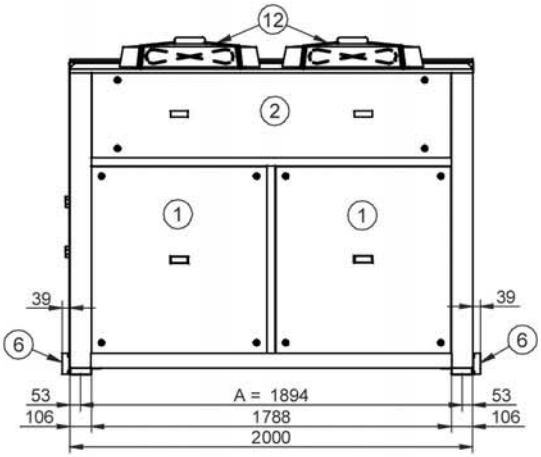

## SIDE VIEW

VERSION WITH 1 AND 2 DAMPERS - V1 AND V2 WITH GAS THERMAL MODULE



# OVERALL DIMENSIONS FOR RFA 70.2, 90.2, 110.2
# CONSTRUCTION CONFIGURATION VB - BASIC VERSION

## FRONT VIEW

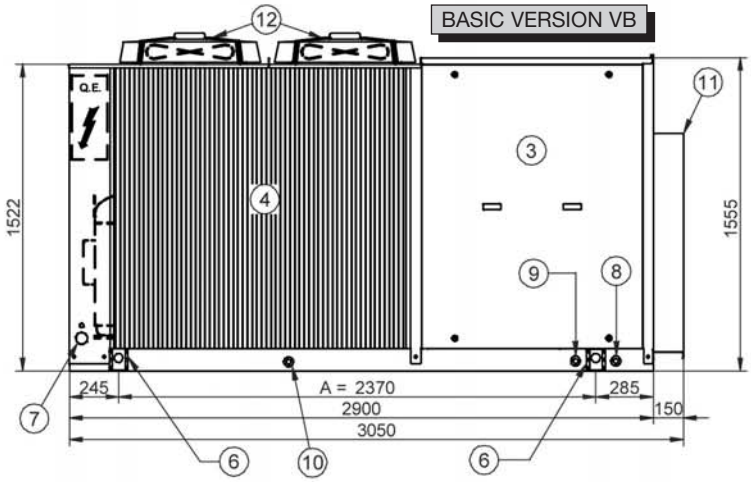



| LEGEND | |
|---|---|
| ***POS.*** | ***DESCRIPTION*** |
| 1 | COOLING CIRCUIT HOUSING INSPECTION PANEL |
| 2 | ELECTRICAL BOARD CABINET INSPECTION PANEL |
| 3 | INTERNAL FAN INSPECTION PANEL |
| 4 | EXTERNAL HEAT EXCHANGER |
| 5 | CONDENSATION GAS THERMAL MODULE |
| 6 | HOISTING BRACKETS |
| 7 | ELECTRICAL POWER SUPPLY HOLES |
| 8 | INTERNAL SECTION CONDENSATE DISCHARGE (STANDARD) |
| 9 | INTERNAL SECTION CONDENSATE DISCHARGE (OPTIONAL) |
| 10 | EXTERNAL SECTION CONDENSATE DISCHARGE |
| 11 | STANDARD FILTERS FRAME |
| 12 | EXTERNAL FANS |

A = SPRING ANTI-VIBRATION HOLES CENTER DISTANCE

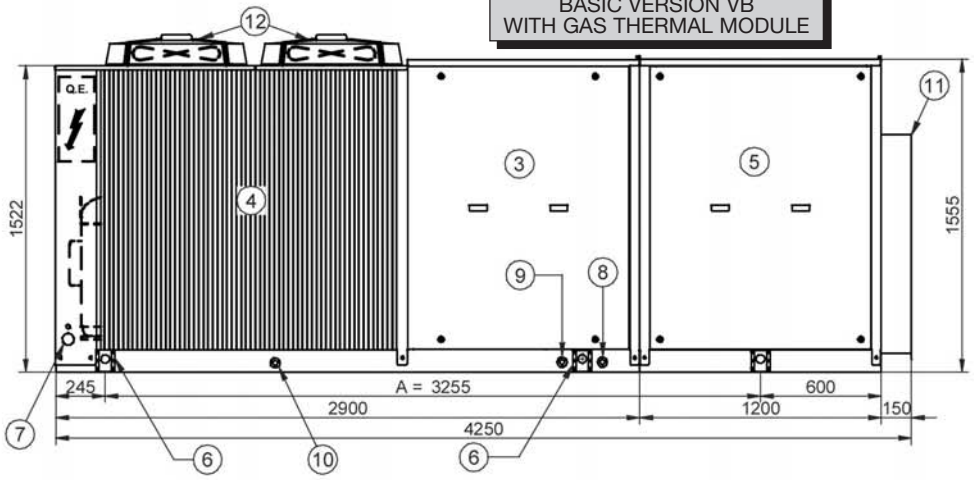
## SIDE VIEW

BASIC VERSION VB



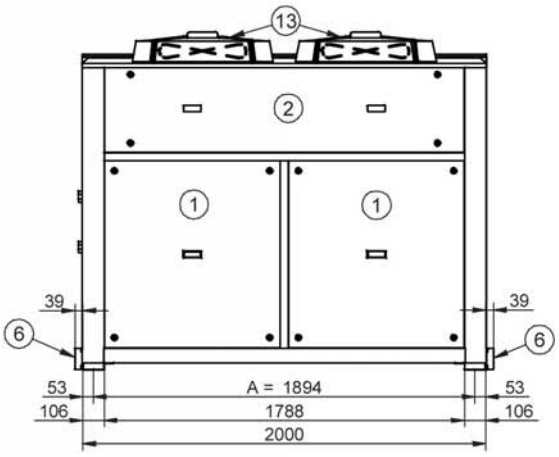

## SIDE VIEW

BASIC VERSION VB
WITH GAS THERMAL MODULE



# OVERALL DIMENSIONS FOR RFA 70.2, 90.2, 110.2
# CONSTRUCTION CONFIGURATION V1 - V2

## FRONT VIEW

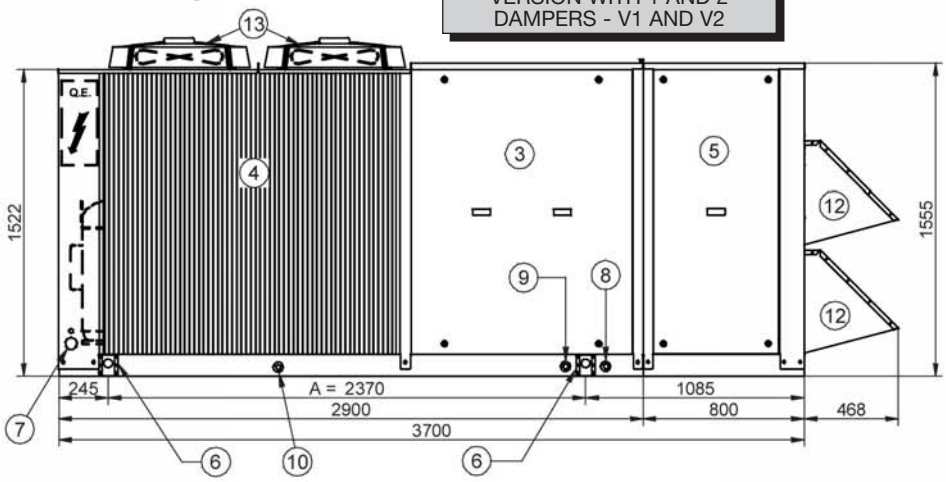



| LEGEND | |
|---|---|
| **POS.** | **DESCRIPTION** |
| 1 | COOLING CIRCUIT HOUSING INSPECTION PANEL |
| 2 | ELECTRICAL BOARD CABINET INSPECTION PANEL |
| 3 | INTERNAL FAN INSPECTION PANEL |
| 4 | EXTERNAL HEAT EXCHANGER |
| 5 | DAMPERS AND FILTER SECTION OPTIONAL MODULE |
| 6 | HOISTING BRACKETS |
| 7 | ELECTRICAL POWER SUPPLY HOLES |
| 8 | INTERNAL SECTION CONDENSATE DISCHARGE (STANDARD) |
| 9 | INTERNAL SECTION CONDENSATE DISCHARGE (OPTIONAL) |
| 10 | EXTERNAL SECTION CONDENSATE DISCHARGE |
| 11 | CONDENSATION GAS THERMAL MODULE |
| 12 | OUTSIDE AIR COVER |
| 13 | EXTERNAL FANS |

A = SPRING ANTI-VIBRATION HOLES CENTER DISTANCE

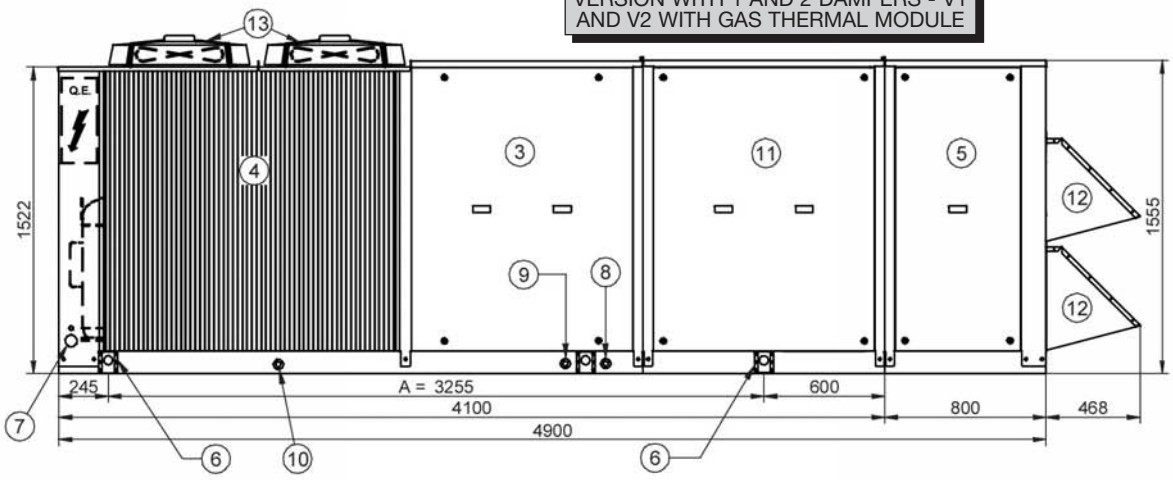
## SIDE VIEW

VERSION WITH 1 AND 2 DAMPERS - V1 AND V2




## SIDE VIEW

VERSION WITH 1 AND 2 DAMPERS - V1 AND V2 WITH GAS THERMAL MODULE



# FUNCTIONAL SPACES

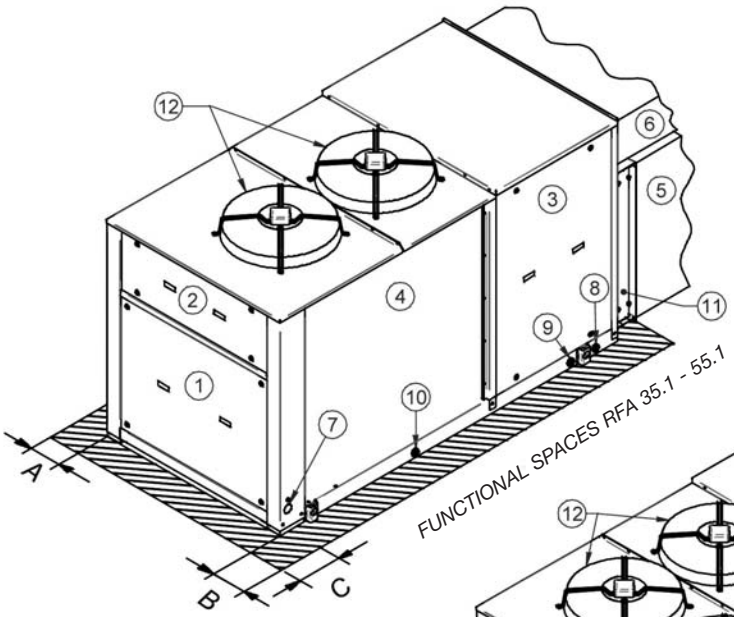
The choice of the unit's location is fundamentally important in guaranteeing its proper functioning. Obstacles to the airflow, difficulties with the air circulation, leaves or other foreign bodies that could obstruct the exchange coils, winds that blow against or excessively favor the airflow, stratification or air circulation phenomena, and nearby heat sources are all causes of anomalous functioning or machine shutdowns caused by:

- During summer operation - increases in the condensation pressure with a loss of performance and possible blockage due to high pressure.
- During winter operation - a decrease in the evaporation pressure accompanied by an increase in the number of defrosting operations and a consequent loss of performance and possible blockage due to low pressure.

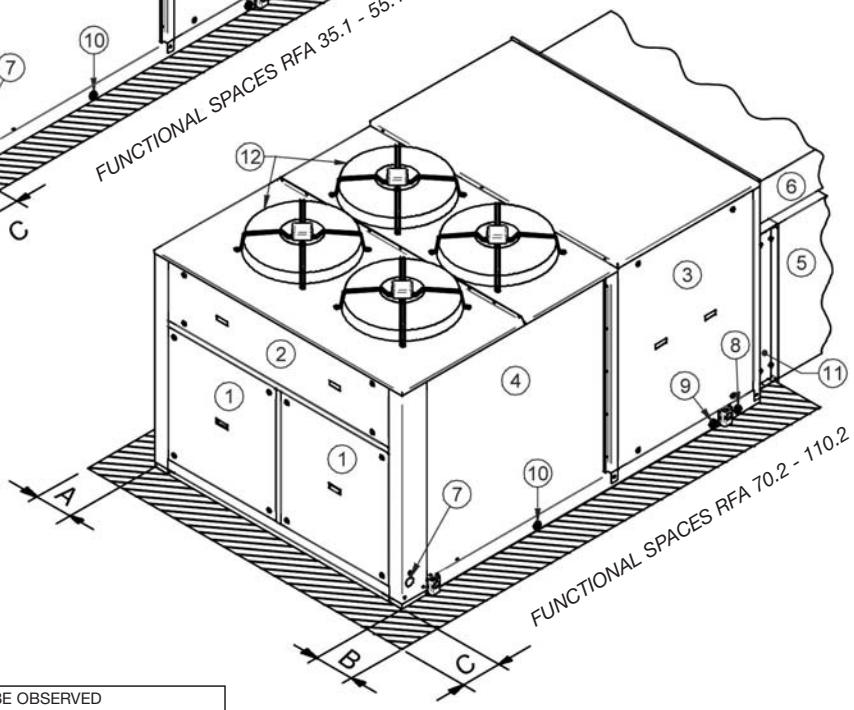
For this reason, placement under the ground level or near very high walls must be evaluated very carefully. If the heat pump operates at temperatures below freezing for extended periods of time, it is important to facilitate the discharge of the water produced by the defrosting operations to prevent the buildup of ice near the bottom of the machine. During winter operation the heat pump produces a considerable amount of water condensate; make sure that this does not cause any problems to people or property. The units require the following minimum space for their correct functioning or to permit ease of maintenance:

- External coil side: min. 1.5 m.
- Refrigeration circuit and electrical board side: min. 1 m.
- Upper side: there must not be any obstacle to the discharge.
- Intake and outlet side: guarantee that there is sufficient space to perform any maintenance on the ducts.

| *LEGEND* | |
|---|---|
| ***POS.*** | ***DESCRIPTION*** |
| 1 | COOLING CIRCUIT HOUSING INSPECTION PANEL |
| 2 | ELECTRICAL BOARD CABINET INSPECTION PANEL |
| 3 | INTERNAL FAN INSPECTION PANEL |
| 4 | EXTERNAL HEAT EXCHANGER |
| 5 | INLET DUCT |
| 6 | OUTLET DUCT |
| 7 | ELECTRICAL POWER SUPPLY HOLES |
| 8 | INTERNAL SECTION CONDENSATE DISCHARGE (STANDARD) |
| 9 | INTERNAL SECTION CONDENSATE DISCHARGE (OPTIONAL) |
| 10 | EXTERNAL SECTION CONDENSATE DISCHARGE |
| 11 | STANDARD FILTERS FRAME |
| 12 | EXTERNAL FANS |




*FUNCTIONAL SPACES RFA 35.1 - 55.1*




*FUNCTIONAL SPACES RFA 70.2 - 110.2*

| MINIMUM SPACES TO BE OBSERVED | | | |
|---|---|---|---|
| Pos. | U.M. | RFA 35.1 ÷ 55.1 | RFA 70.2 ÷ 110.2 |
| A | mm | 1000 | 1500 |
| B | mm | 1500 | 1500 |
| C | mm | 1000 | 1000 |

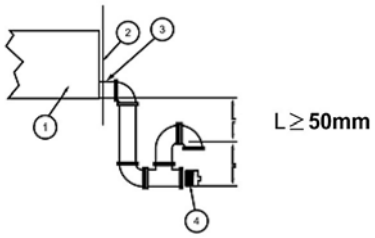
# HYDRAULIC CONNECTIONS

## Internal coil condensate discharge connection (compulsory)

It is very important that this operation be performed with particular care by specialized personnel. For the sequence follow these instructions:

- Connect the condensate discharge tube.
- Use a siphon to eliminate the negative pressure created by the fan, thereby preventing the intake of gas by the discharge tube and ensuring the regular discharge of the condensate.
- Connect the opening to a drain pipe discharge network. Do not use white water or sewage drains so as to prevent the intake of odors in case of water evaporation.
- After the first hours of operation in the cooling mode, check that the siphon is effective.

1. Condensate collection drain pan inside the unit is constructed of stainless steel and has been opportunely inclined to facilitate drainage.
2. External surface of the longitudinal member for the base.
3. Opening attached to the longitudinal member.
4. Example of a siphon made with PVC components, including a cap for cleaning (under the responsibility of the user).




**IMPORTANT:**

- Place the discharge tube so as not to cause mechanical stress on the unit's discharge connector.
- When the accessories for the water coil for post-heating only and the droplet separator are present, repeat the instructions listed above also for the second discharge outlet.
- See the drawings below for the position and dimensions of the connectors.

## External coil condensate discharge connection (optional)

The drainage of the external coil is guaranteed by a drain pan equipped with a connector.
This discharge outlet (one for each external coil) was included to make it possible to convey the external coil's runoff and condensate. This connection is optional and at the discretion of the engineer and/or installer. It is possible to use also white water or sewage drains, because no danger exists of contamination with the treated air. Use a siphon to compensate for the negative pressure created by the fan, thereby preventing the intake of outside air by the discharge tube and ensuring the regular discharge of the condensate ($\Delta$Pmax = 150 Pa). If no siphon is installed, the regular discharge of the condensate will be conditional upon the amount of water collected in the drain pan.

**IMPORTANT:**

- Place the discharge tube so as not to cause mechanical stress on the unit's discharge connector.
- See the drawings below for the position and dimensions of the connectors.
- Do not cap unless there is a connection to some type of discharge tube.

## Connection of water coil for post-heating only (optional)

The water coil for post-heating only is installed at the factory and positioned vertically in the internal fan's intake section. The connection between the coil and the water inlet and outlet openings, located on the machine, is ensured by a tubes unit or a 3-way valve unit, which is also installed at the factory. The position of the connectors for both solutions is the same. For their placement and dimensions, refer to the drawings below.
Connect the coil using the tube diameters listed in the table shown below, categorized by sizes:

| Model | Ø of tubes |
|---|---|
| 35.1 – 45.1 – 55.1 | 1" |
| 70.2 – 90.2 – 110.2 | 1 1/4" |

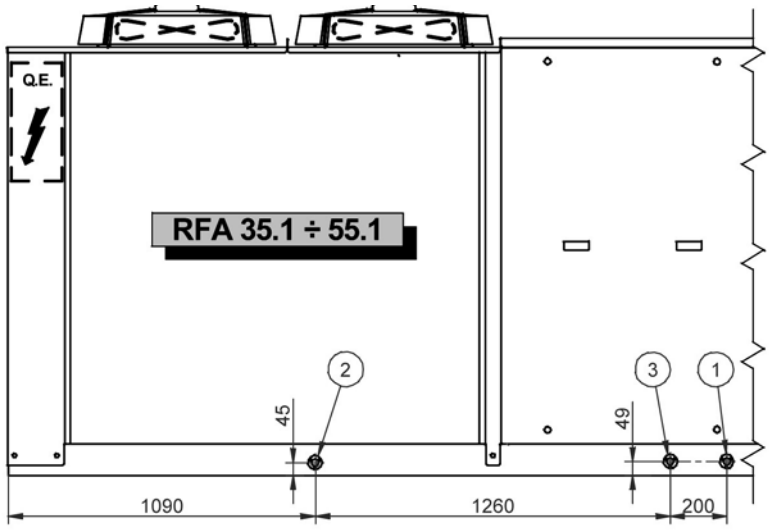
Remove the caps on the openings only immediately before making the hydraulic connections.
The connection tubes must not cause vibrations to the coils due to its own weight or due to thermal expansion. Install any necessary supports and expansion compensators. Attach suitable connectors to allow easy disconnection and removal of the coils. When making the connections, do not twist the connectors and be sure to observe the proper direction of the inlet and outlet flows.

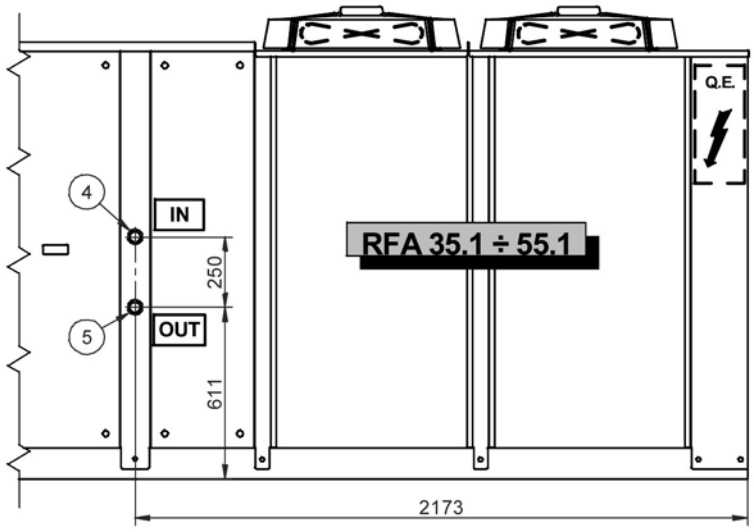
The water coil circuit can be used with water or with glycol solutions if required by the installation. If the water used causes erosion or deposits, it is advisable to engage the services of a specialist in water treatment. Insulate all the water tubes that could be exposed to freezing temperatures so as to prevent the freezing of the coil and heat loss. The water distribution network must be equipped with vents at the points in which it is probable that air could become trapped

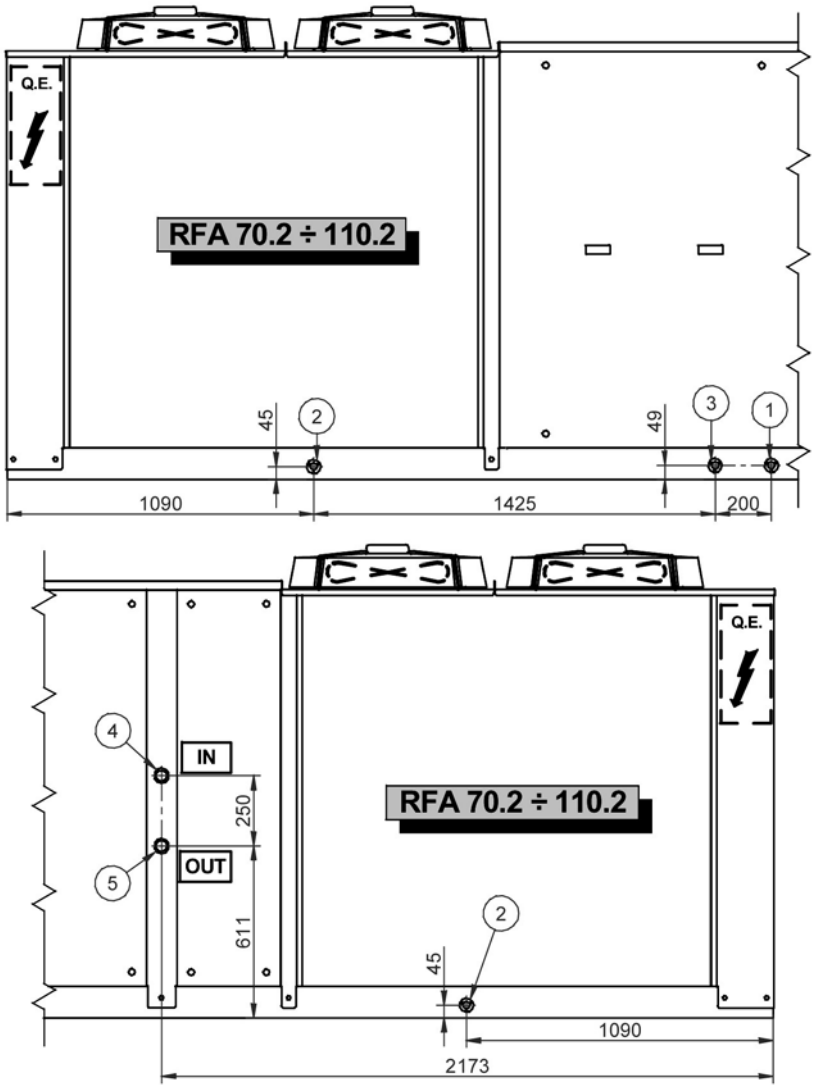
## IMPORTANT

- IF THE UNIT IS SUPPORTED BY ANTI-VIBRATION MOUNTS, TAKE PARTICULAR NOTE THAT ALSO THE WATER CONNECTIONS MUST HAVE ANTI-VIBRATION JOINTS INSTALLED.
- IT IS OBLIGATORY TO MOUNT A METAL MESH FILTER WITH A MESH OF NO MORE THAN 1 MM ON THE WATER INLET TUBE, AT THE RISK OF THE CANCELLATION OF THE WARRANTY.

| LEGEND FOR HYDRAULIC CONNECTORS RFA 35.1 - 110.2 | | | |
|---|---|---|---|
| Pos. | Description | | UNI ISO 7/1 thread |
| 1 | Internal coil condensate discharge | Standard | Gas $^3/_4$" F |
| 2 | External coil condensate discharge | Standard | Gas $^3/_4$" F |
| 3 | Droplet separator condensate discharge | Optional | Gas $^3/_4$" F |
| 4 | Water coil inlet | Optional | Gas 1 1/4" F |
| 5 | Water coil outlet | Optional | Gas 1 1/4" F |






## AERAULIC CONNECTIONS

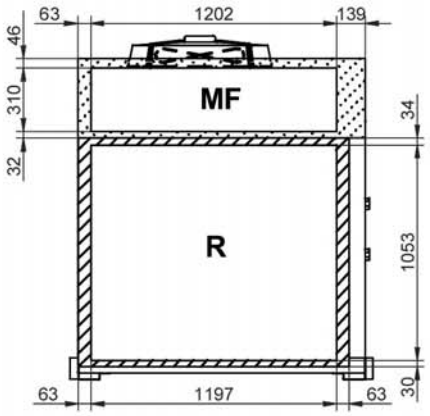
All the units, in their various configurations, are equipped with an intake that is always frontal, and an outlet that can be frontal or downward. The edges of the outlet and inlet openings are designed in such a manner as to permit the proper attachment of the ducts. The sizes of the ducts must be determined according to the required air flow rate and the corresponding static pressure available to the unit.
The heads and the flow rates that can be obtained from each model are listed in the technical data section. However, it is absolutely necessary to follow these recommendations:

- Regardless of the type of duct used, the material of which it is constructed must not be inflammable and must not generate toxic gases in the case of a fire. The inner surfaces of the ducts must be smooth and must not contaminate the air flowing through them in any way. In any case, we recommend the use of sheet metal ducts that are adequately insulated to prevent condensation and heat loss.
- It is advisable to connect the unit to the air ducts using flexible joints between them to absorb the vibrations, to prevent the generation of sounds in the ducts, and to allow easier access. These recommendations become obligatory if the unit is equipped with spring anti-vibration mounts.
- If possible, avoid curves near the unit, design them to have the largest curve radius possible, and install deflectors inside the ducts when they are of sufficient size.

**NOTE:** The size of the entire network of ducts and the entire system design must be planned by an expert.

The following is a list of the position and sizes of the flanges necessary for proper design and subsequent connection of the air ducts.

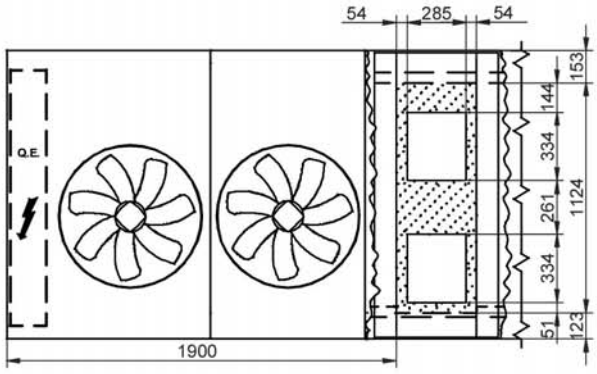
REAR VIEW
DUCT ANCHORING SIDE




## *AERAULIC CONNECTIONS RFA 35.1, 45.1, 55.1*

### *CONSTRUCTION CONFIGURATION*
### *VB - BASIC VERSION*

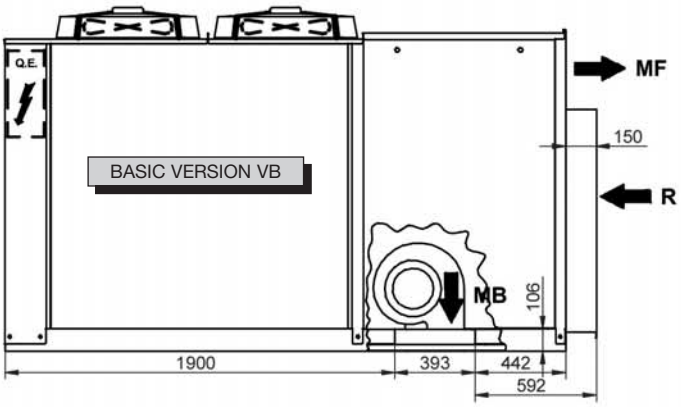
| *LEGEND* | |
|---|---|
| ***ABBREV. SYMBOL*** | ***DESCRIPTION*** |
| | = SPACE AVAILABLE FOR ANCHORING THE OUTLET DUCT |
| | = SPACE AVAILABLE FOR ANCHORING THE INLET DUCT |
| **R** | = INLET AIR |
| **MF** | = FRONT OUTLET |
| **MB** | = DOWNWARD OUTLET |

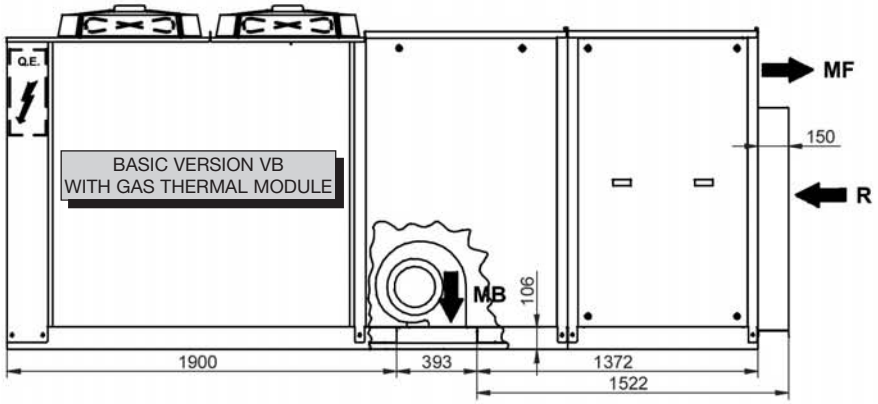



VIEW FROM ABOVE

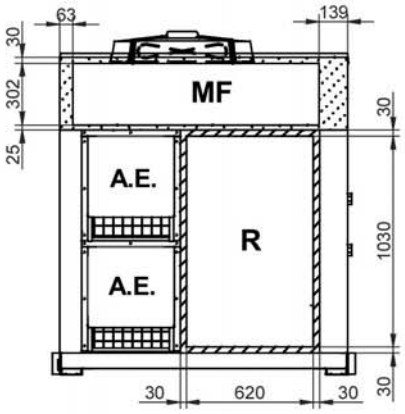
*DUCT ANCHORING*
*DOWNWARD OUTLET*

*VALID FOR:*
- *BASIC VERSION VB*
- *BASIC VERSION VB WITH GAS THERMAL MODULE*



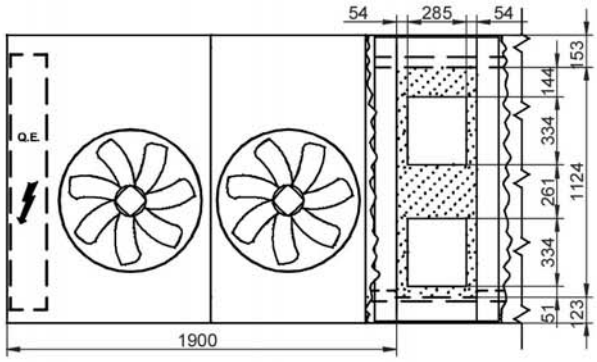
REAR VIEW
DUCT ANCHORING SIDE




## *AERAULIC CONNECTIONS RFA 35.1, 45.1, 55.1*

### *CONSTRUCTION CONFIGURATION V1 - V2*

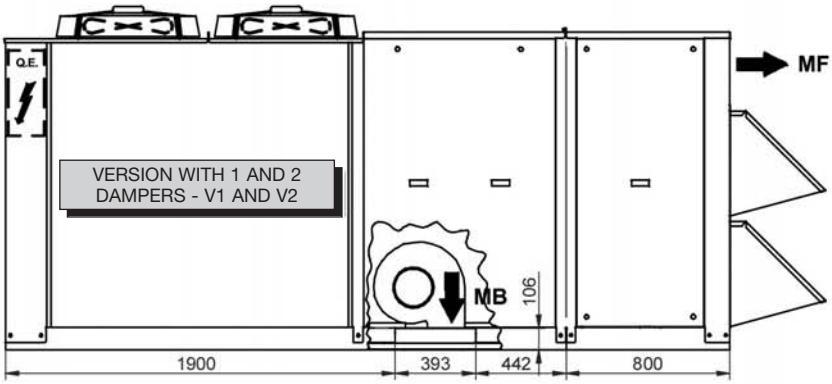
| *LEGEND* | |
|---|---|
| *ABBREV. SYMBOL* | *DESCRIPTION* |
| | = SPACE AVAILABLE FOR ANCHORING THE OUTLET DUCT |
| | = SPACE AVAILABLE FOR ANCHORING THE INLET DUCT |
| **R** | = INLET AIR |
| **MF** | = FRONT OUTLET |
| **MB** | = DOWNWARD OUTLET |
| **AE** | = OUTSIDE AIR |

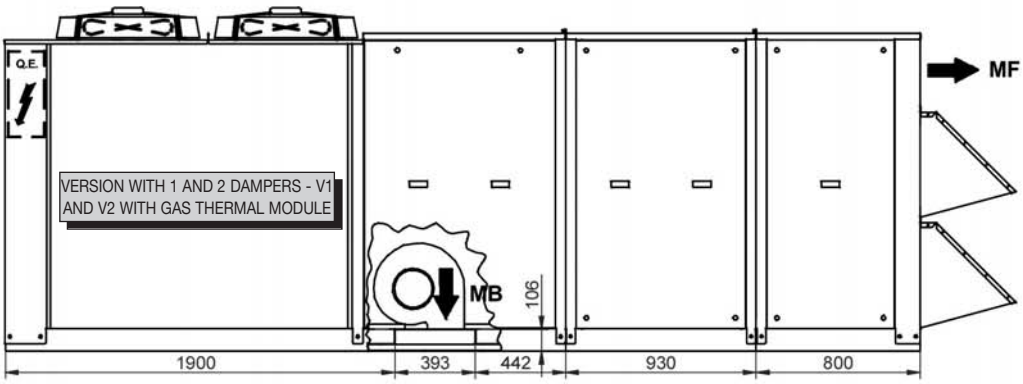



VIEW FROM ABOVE

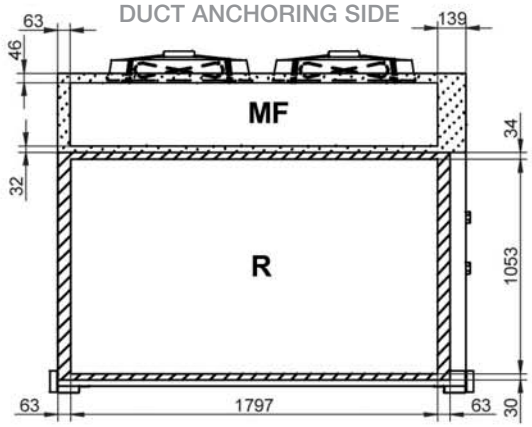
*DUCT ANCHORING*
*DOWNWARD OUTLET*

*VALID FOR:*
- *VERSION WITH 2 DAMPERS - V1 AND V2*
- *VERSION WITH 2 DAMPERS - V1 AND V2 WITH GAS THERMAL MODULE*



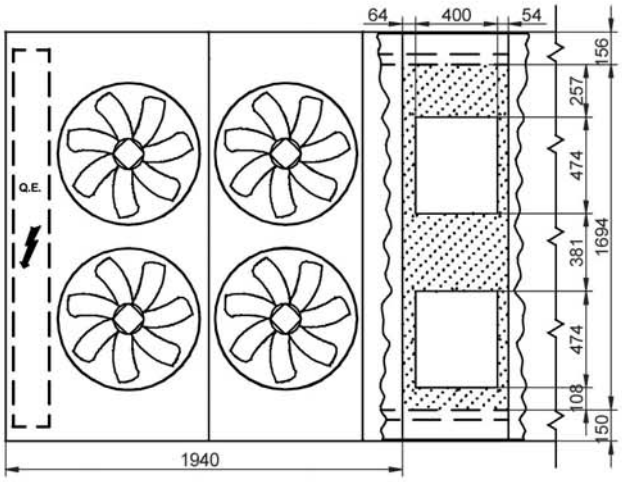
REAR VIEW
DUCT ANCHORING SIDE




## *AERAULIC CONNECTIONS RFA 70.2, 90.2, 110.2*

### *CONSTRUCTION CONFIGURATION*
### *VB - BASIC VERSION*

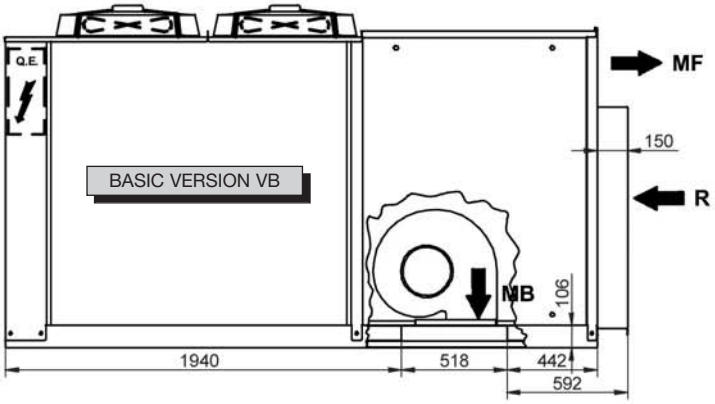
| *LEGEND* | |
|---|---|
| *ABBREV. SYMBOL* | *DESCRIPTION* |
| | = SPACE AVAILABLE FOR ANCHORING THE OUTLET DUCT |
| | = SPACE AVAILABLE FOR ANCHORING THE INLET DUCT |
| **R** | = INLET AIR |
| **MF** | = FRONT OUTLET |
| **MB** | = DOWNWARD OUTLET |

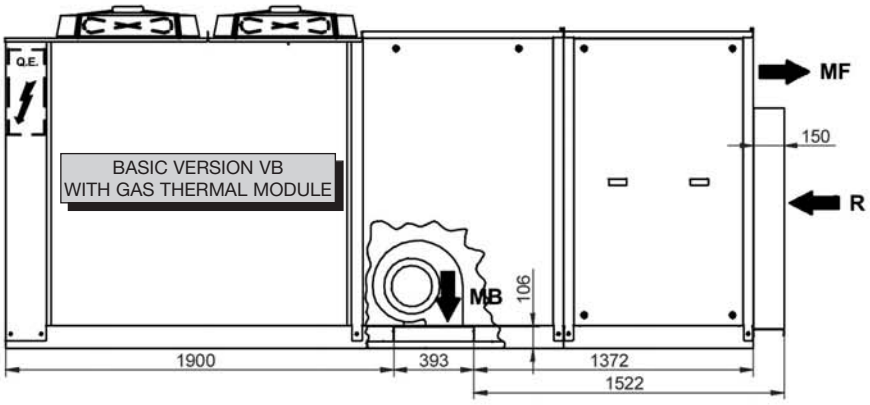



VIEW FROM ABOVE

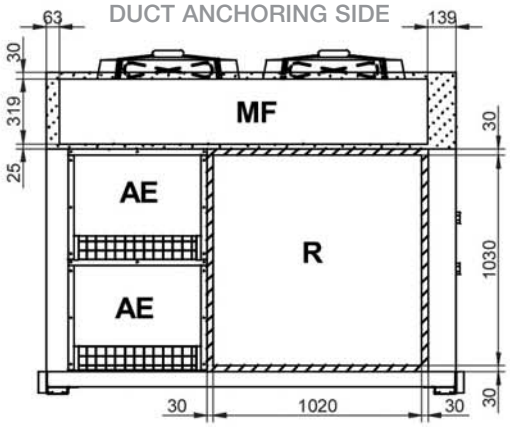
*DUCT ANCHORING*
*DOWNWARD OUTLET*

*VALID FOR:*
- *BASIC VERSION VB*
- *BASIC VERSION VB WITH GAS THERMAL MODULE*



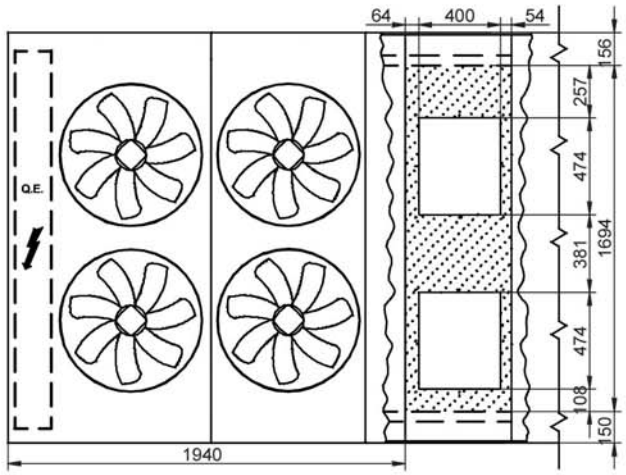
REAR VIEW
DUCT ANCHORING SIDE




## *AERAULIC CONNECTIONS RFA 70.2, 90.2, 110.2*

### *CONSTRUCTION CONFIGURATION V1 - V2*

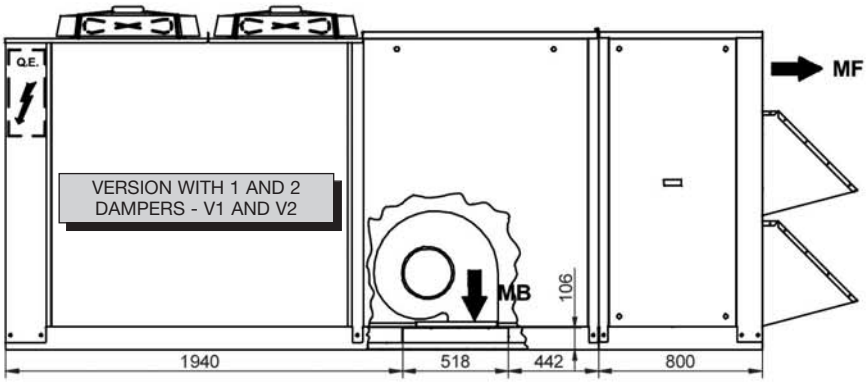
| *LEGEND* | |
|---|---|
| ***ABBREV. SYMBOL*** | ***DESCRIPTION*** |
| | = SPACE AVAILABLE FOR ANCHORING THE OUTLET DUCT |
| | = SPACE AVAILABLE FOR ANCHORING THE INLET DUCT |
| **R** | = INLET AIR |
| **MF** | = FRONT OUTLET |
| **MB** | = DOWNWARD OUTLET |
| **AE** | = OUTSIDE AIR |

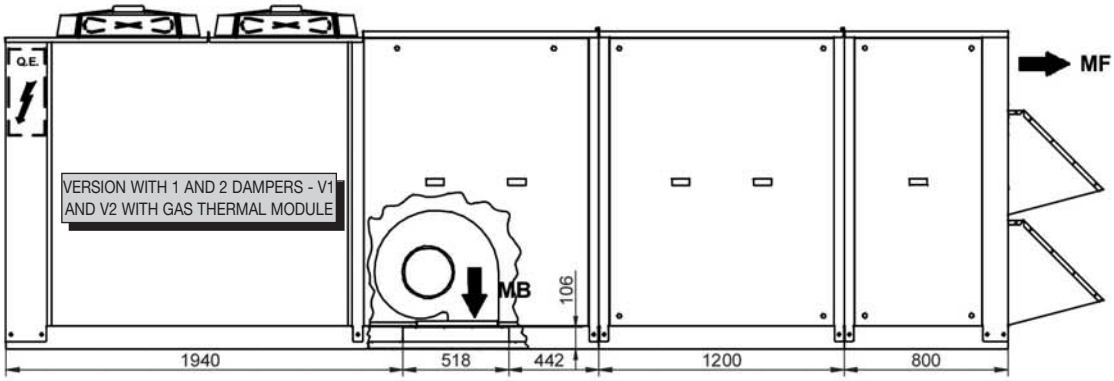



VIEW FROM ABOVE

*DUCT ANCHORING*
*DOWNWARD OUTLET*

*VALID FOR:*
- *VERSION WITH 2 DAMPERS - V1 AND V2*
- *VERSION WITH 2 DAMPERS - V1 AND V2 WITH GAS THERMAL MODULE*



# ELECTRICAL CONNECTIONS

## General standards

The electric wiring must be installed by qualified personnel according to the standards that are in force at the time of installation in the destination country. Before beginning any work on the electrical system, first make sure that the unit's power supply line is isolated at the source.
**N.B.**: Refer to the wiring diagram attached to the unit.

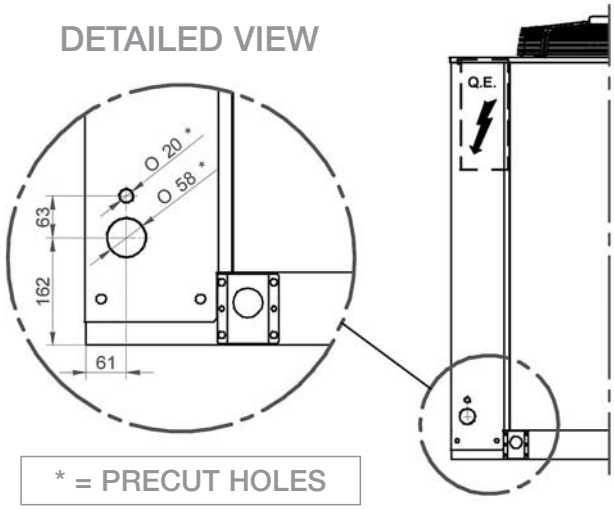
## Connection to mains power

The units have been completely wired in the factory and prepared for connection to the power supply line. The electrical board is protected by an external panel that can be removed by means of rotating a wrench for screws by _ turn and can be inspected by means of the general cutoff switch's door blocking mechanism.

**Power supply system**
The power cables of the machine's power supply line must be selected by a symmetrical 3 phase voltages system equipped with a neutral wire and separate protective ground conductor.

**V = 400 V ± 10%**
**f = 50 Hz**

The power cables must enter the unit through the precut holes located in the lower part of the support. These holes must be protected with the use of bushings of an adequate size, and it is advisable to anchor the cables firmly to the machine's structure.




The cable terminals must enter the electrical board's box through the existing holes located in the lower part of the box, and must be attached to the terminals of the general cutoff switch located inside the electrical board.
The neutral wire included in the line must be connected to the neutral terminal marked "N" corresponding to the fourth pin of the general cutoff switch.
The protective conductor, originating from the power supply line, must be connected directly to the ground screw marked "PE" so as to guarantee the equipotential connections of all the metal masses and the structural components of the machine.

**IMPORTANT**
The connection cables must have a cross-section that is suitable for the unit's power input and must be of a size that is in compliance with current regulations.
The electronic data provided in the technical documentation refer to the standard unit without accessories. To select the size of the power supply line always refer to the FLI and FLA values listed on the data plate, which can also be calculated from the input values of the standard units, taking into consideration all the nonstandard accessories and components that have been installed.

**Upline protection**
Before the above mentioned line it is necessary to install an automatic switch that is suitable for providing over-current protection and protection against indirect contacts.
The coordination between the line and switch must be executed in compliance with current regulations on electrical safety with regard to the type of installation and the environmental conditions of the installation.

**Connections that are the user's responsibility**

All'interno del quadro elettrico è prevista una morsettiera (XU) dedicata ai seguenti collegamenti:

**General alarm**
Contact free of voltage. Maximum voltage at the terminal ends: 24V. Maximum current: 5A.
Contact open: alarm not activated.
Contact closed: alarm activated.

**On-off remote**
It is possible to connect a remote device for turning the unit on and off (selector switch, clock controller, centralized monitoring device, etc.) that is equipped with a contact that is free of voltage and that is suitable for switching extremely low power loads.
Contact open: unit is turned off (OFF).
Contact closed: unit is turned on (ON).
The bridge between the terminals, which was installed at the factory, must be removed if remote control is used.

**Remote summer-winter**
It is possible to remotely switch between cooling mode operation and heating mode operation by connecting a device equipped with a contact that is free of voltage and that is suitable for switching extremely low power loads.
Contact open: heating mode operation.
Contact closed: cooling mode operation.
The bridge between the terminals is not necessary, because this function must be activated by means of a parameter (refer to the Regulation section). If this function is used, it will no longer be possible to switch the operating mode by means of the keyboard.

**Economizer**
It is possible to translate the set point (both in cooling mode and in heating mode) by means of a device equipped with a contact that is free of voltage and that is suitable for switching extremely low power loads (refer to the Regulation section for further details).
Contact open: set point translated.
Contact closed: set point unchanged.
The bridge between the terminals, which was installed at the factory, must be removed if this function is used.

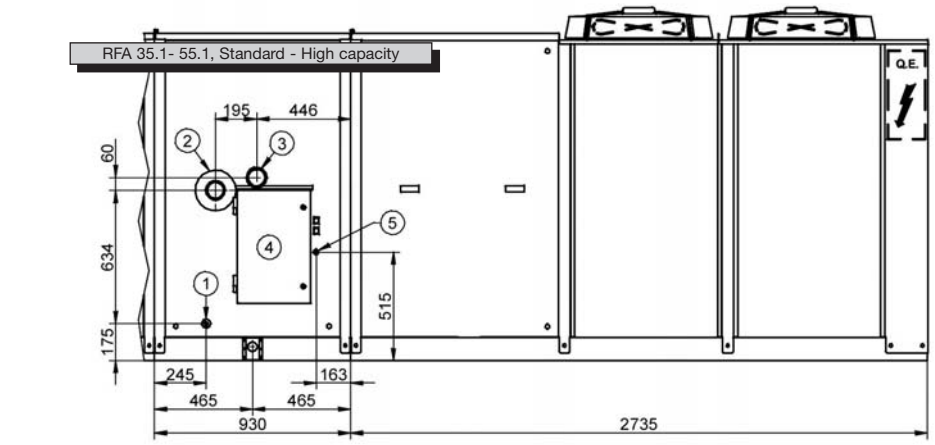
**Forcing damper open**
It is possible to force open the outside air damper by means of a device equipped with a contact that is free of voltage and that is suitable for switching extremely low power loads.
Contact open: damper open.
Contact closed: damper closed.
The bridge between the terminals, which was installed at the factory, must be removed if this function is used.

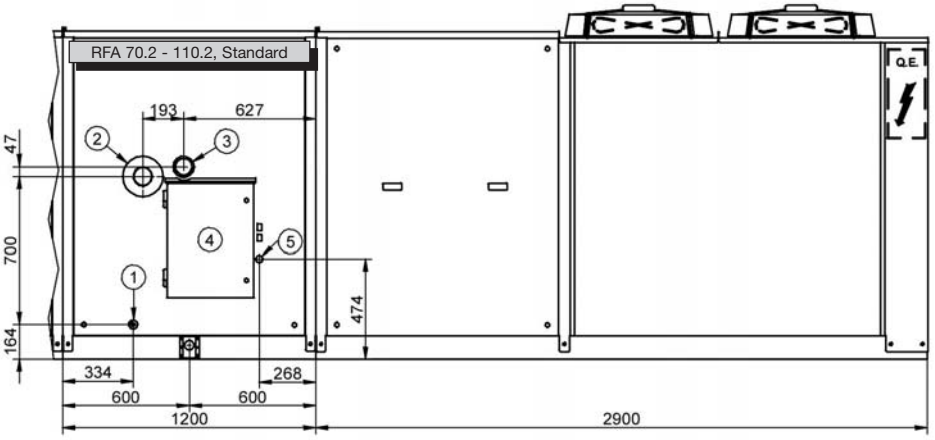
**Remote thermostat or keyboard**
It is possible to connect devices (accessories) to the unit that replicate the commands that are available on board the machine (see the Regulation section for further details).

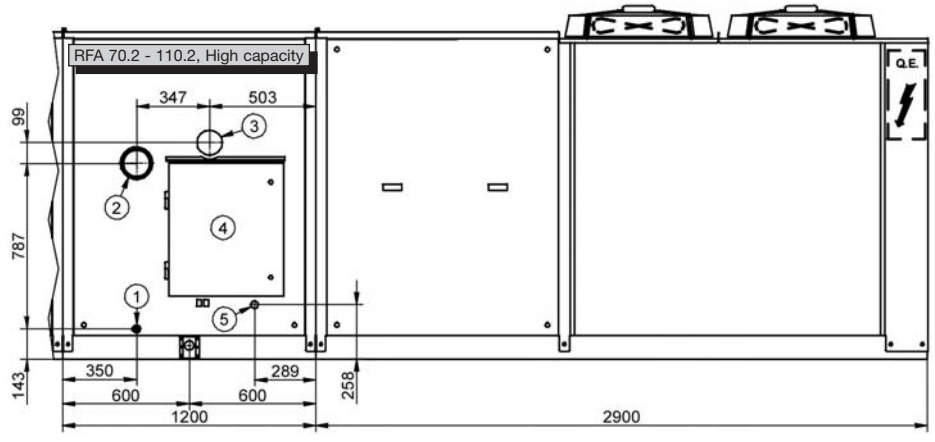
## GAS THERMAL MODULE CONNECTIONS

| | | | Condensation gas thermal module | | |
|---|---|---|---|---|---|
| | | | RFA 35.1 ÷ 55.1 | RFA 70.2 ÷ 110.2 | RFA 70.2 ÷ 110.2 |
| No. | Description | U.M. | Standard - High capacity | Standard | High capacity |
| 1 | Condensate discharge | mm | Ø 10 | Ø 18 | Ø 18 |
| 2 | Flue gas discharge | mm | Ø 80 | Ø 100 | Ø 130 |
| 3 | Intake | mm | Ø 80 | Ø 100 | Ø 130 |
| 4 | Inspection panel | – | – | – | – |
| 5 | Gas inlet | – | UNI ISO 7/1 – $^{3}/_{4}$" M | UNI ISO 7/1 – 1" M | UNI ISO 7/1 – 1" M |

**N.B.**: The modules are tested and prepared for operation with G20 natural gas and a supply pressure of 20 mbar, unless different requirements have been specified. Per ulteriori approfondimenti si rimanda al manuale d'istallazione e uso allegato all'unità.



# NOTES

## NOTE TO SALES REPRESENTATIVES

In an effort to constantly improve our range of products, with the aim of increasing the level of customer satisfaction, we would like to inform you that the appearance, dimensions, technical data, and accessories of our products may be subject to change.

Therefore, the utmost care must be taken to ensure that all technical and/or sales documents (price lists, catalogues, brochures, etc.) provided to the end client are completely up to date.

cod. 3QE2157/00 - 03.2007

GRUPPO FERROLI

**Ferroli spa** ¬ 37047 San Bonifacio (Verona) Italy ¬ Via Ritonda 78/A
tel. +39.045.6139411 ¬ fax +39.045.6100233
**www.gruppoferroli.com ¬ e-mail: export@ferroli.it**