# GAMMA
# air/air rooftop chillers and heat pumps

**Technical information manual**

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**Technical features**

**GAMMA CO: rooftop air conditioner, cooling only**

**Standard version, STD**

STRUCTURE

The unit is made of galvanized sheet metal, finished in RAL 7035 epoxy polyester powder paint and oven-hardened at 180°C to ensure optimum weatherproofing, even in marine climates.

The panels in contact with the treated air are internally insulates with soundproof coating in F1 class fireproof flexible open cell expanded polyurethane foam (density: 30 kg/m$^3$).

COMPRESSOR

Scroll type hermetically sealed compressor with a body heating system for low temperature start-up protection (excluded models 21-31) and an internal temperature sensor for motor thermal protection. The compressors are installed on rubber anti-vibration mountings in a separate compartment isolated from the air flow. Maintenance can therefore be performed in complete safety, even with the unit running. A phase sequence relay safety device prevents the compressor spiral from spinning in the wrong direction.

CONDENSER

The condenser unit comprises one copper pipe and aluminium fin pack. Clever design and accurate sizing ensure high performance heat exchange and high coil efficiency. A metal grille, which comes as standard, protects the finned pack.

CONDENSER FANS

The axial fans are directly coupled to a 6-pole single-phase electric motor. All the fans are secured to the structure with flexible rubber anti-vibration joints.

IP 54 motor protection rating. Fans come complete with a protection safety grill. A Special control reduces the number of fan revolutions, and hence the noise level, at low outside temperatures.

EVAPORATOR

The evaporator comprises a high-efficiency copper pipe and aluminium fin pack.

A stainless steel condensation drip tray is provided under the evaporator, complete with drain connection.

EVAPORATOR FANS

The evaporator fans are statically and dynamically balanced double intake centrifugal fans. Models 21 – 161 are directly coupled to an electric motor (for the basic head values, BP), whilst models 201 – 251 are driven. The fans are driven by a pulley and belt system with a V belt and a three-phase electric motor, with IP 55 protection rating, installed on a sliding base that permits belt tensioning. If the air delivery ducts are very long or a silencer is fitted, the basic head, BP, (which varies from model to model) can be increased on request.

Another two useful head ratings are available:

MH = Medium Head (up to 150 Pa useful)

AH= High head (up to 250 Pa useful)

AIR FILTER
Air is filtered before it passes through the cooling section. The standard version is fitted with a flameproof, washable, synthetic filter, with G3 filtration rating (according to EN 779). Filters are rack-mounted for easy access.

RIFRIGERANT CIRCUIT
Each refrigerant circuit consists of:
- a thermostatic expansion valve complete with external balancer and precision calibration screw;
- refrigerant flow indicator and water detector (excluding models 21-36);
- molecular freon filter; pressure relief device (safety valve).

ELECTRICAL CONTROL PANEL
The panel includes:
- main switch
- automatic thermal magnetic cutouts
- compressor contactors
- fan contactors
- evaporator fan overload cutout
- phase sequence relay (excluding models 21-31)
- pressure reducer
- automatic speed control for condenser fans
- microprocessor control
- remote control panel connection

MICROPROCESSOR CONTROL
All GAMMA series units are controlled and regulated by a powerful microprocessor, called MicroCONFORT.
The control manages the following functions:
- return air temperature reading;
- operating set-point control;
- compressor timing to prevent frequent start-ups;
- compressor hour counter;
- remote installation control panel connection

SAFETY DEVICES
- manual reset high pressure switch
- automatic reset low pressure switch
- safety valve
- fan overload cutout
- compressor overload cutout
- differential pressure switch for air flow detection

TESTING
All units are factory tested and are delivered compete with lubricating oil and refrigerant charge.

**GAMMA HP: rooftop air conditioner with reversible heat pump**

**Standard version, STD**
In addition to the components listed for the GAMMA CO, this unit also includes:

REFRIGERANT CIRCUIT
4 way reversing valve, liquid receiver, non-return valve, second thermostatic valve.

ELECTRICAL CONTROL PANEL
Microprocessor for summer/winter switching and automatic defrosting.

**OTHER VERSIONS:**

**GAMMA LN: silenced unit**
In addition to the components listed for the standard version, this unit also includes:

- compressor compartment insulated with sound-proofing padding and lead sheet;
- large capacity condenser packs and low speed fans.

**GAMMA HIT: unit for high outside temperatures**
In addition to the components for the standard version, this unit also includes larger capacity condenser coils to extend operating range and permit use with high outside temperatures.

**ACCESSORIES FOR THE MOTOR-CONDENSER SECTION:**

**Gauges for reading air intake and delivery pressures.**

**“Rotalock” Compressor intake and delivery valves.**

**Hot gas by-pass for controlling refrigerant circuit cooling capacity**

**Liquid line solenoid valve**

**Liquid receiver**

**Specially treated condenser coils**
Condenser coils are available with the following anti-corrosion treatments for installation in challenging environments:
- cataphoresis treated
- copper/copper
- copper/tinned copper

**ACCESSORIES FOR THE FAN SECTION:**

**Increased head fans**
In order to increase the useful static head up to a maximum of 250 Pa.

**F5 high-efficiency filters**

**Additional heating section**
A heating section can be installed in the unit. Choose from the following types:
- HOT WATER, HA

A copper tube coil with aluminium fins is installed. A three way control valve can be provided separately. Manifolds are fitted with a breather/drain valve.
- ELECTRIC HEATING,HR

A series of non-oxidizing low surface temperature electrical heating elements is installed.

**Three-way servo control valve**
If water heating is used in the heating section, a three-way servo control valve can also be fitted.

**Clogged filter alarm**
A low pressure differential pressure switch measures the pressure drop through the filter body and triggers an alarm if the filter is clogged.

## ELECTRICAL ACCESSORIES:

**Remote control panel**
With:
- Input status display
- Display and editing of basic operating parameters (set-point, differential bands, etc.) during operation.
- Display of all transducer values
- Alarm display
- Alarm buzzer

**Serial interface**
RS485 interface for supervision systems. Contact our sales office to check the compatibility of your communication protocols.

**Cos ϕ >0.9 power factor correction**
To be evaluated with reference to nominal operating conditions.

**Single voltage-free contact**

**Non-standard power supplies**
Units with non-standard frequencies and voltages con be supplied on request. Contact the technical office for availability.

## VARIOUS ACCESSORIES:

**Rubber anti vibration dampers**

**Compressors soundproofing**

**Other RAL paint finish**

WESTERN™ AIRCONDITIONING

# TECHNICAL DATA

| | 21 | 31 | 36 | 41 | 61 | 81 | UNIT SIZE |
|---|---|---|---|---|---|---|---|
| | | | | | | | **Cooling** (*) |
| kW | 5,6 | 8,0 | 9,1 | 11,6 | 14,4 | 17,3 | *Total nominal capacity* |
| kW | 4,6 | 5,7 | 6,6 | 8,7 | 10,6 | 12,5 | *Sensible nominal capacity* |
| | | | | | | | **Heating** (**) |
| kW | 5,9 | 8,5 | 9,6 | 12,2 | 14,5 | 17,5 | *Nominal capacity* |
| | | | | | | | **Compressors** |
| n | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | *Number/circuits* |
| % | 0 -100 | 0 -100 | 0 -100 | 0 -100 | 0 -100 | 0 -100 | *Capacity steps* |
| n | 1 | 1 | 1 | 1 | 1 | 1 | *Refrigerant circuits* |
| kW | 1,5 | 2,4 | 2,9 | 3,3 | 4,3 | 5,0 | *Cooling power input* (*) |
| kW | 1,4 | 2,3 | 2,6 | 3,1 | 3,6 | 4,2 | *Heating power input* (**) |
| | | | | | | | **Evaporator** |
| $m^3/s$ | 0,389 | 0,389 | 0,472 | 0,683 | 0,764 | 0,847 | *Air flow* |
| nxkW | 1x0,245 | 1x0,245 | 1x0,245 | 1x0,515 | 1x0,515 | 1x0,515 | *No. of fan motors x installed power* |
| Pa | 90 | 90 | 50 | 120 | 100 | 50 | *Available static pressure* |
| | | | | | | | **Condenser** |
| $m^3/s$ | 0,83 | 0,83 | 0,83 | 1,80 | 1,80 | 1,80 | *Air flow* |
| nxkW | 1x0,14 | 1x0,14 | 1x0,14 | 1x0,37 | 1x0,37 | 1x0,37 | *No. of fan motors x installed power* |

| | 91 | 101 | 141 | 161 | 201 | 251 | UNIT SIZE |
|---|---|---|---|---|---|---|---|
| | | | | | | | **Cooling** (*) |
| kW | 22,0 | 28,6 | 37,3 | 40,8 | 58,5 | 66,0 | *Total nominal capacity* |
| kW | 16,5 | 21,1 | 26,9 | 29,8 | 42,3 | 47,0 | *Sensible nominal capacity* |
| | | | | | | | **Heating** (**) |
| kW | 21,8 | 29,5 | 38,1 | 43,3 | 59,6 | 68,4 | *Nominal capacity* |
| | | | | | | | **Compressors** |
| n | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | *Number/circuits* |
| % | 0 -100 | 0 -100 | 0 -100 | 0 -100 | 0 -100 | 0 -100 | *Capacity steps* |
| n | 1 | 1 | 1 | 1 | 1 | 1 | *Refrigerant circuits* |
| kW | 7,0 | 10,1 | 11,3 | 13,8 | 17,4 | 21,4 | *Cooling power input* (*) |
| kW | 5,3 | 7,7 | 9,6 | 11,5 | 14,1 | 17,3 | *Heating power input* (**) |
| | | | | | | | **Evaporator** |
| $m^3/s$ | 1,153 | 1,486 | 1,847 | 2,111 | 2,778 | 3,056 | *Air flow* |
| nxkW | 1x1,1 | 1x1,1 | 2x1,1 | 2x1,1 | 1x3 | 1x3 | *No. of fan motors x installed power* |
| Pa | 150 | 100 | 150 | 150 | 120 | 120 | *Available static pressure* |
| | | | | | | | **Condenser** |
| $m^3/s$ | 2,12 | 2,12 | 5,0 | 5,0 | 5,4 | 5,4 | *Air flow* |
| nxkW | 1x0,54 | 1x0,54 | 2x0,54 | 2x0,54 | 3x0,54 | 3x0,54 | *No. of fan motors x installed power* |

(*) *Cooling: outdoor air temperature 35 °C; evaporator inlet air temperature 26 °C BS, 19 °C BU.*
(**) *Heating: outdoor air temperature 8.3 °C, 6.1 °C BU; condenser inlet air temperature, 20 °C BS.*
(#) *Shipment weight: increase the weight by 10% for the heat pump units*

# ELECTRICAL DATA

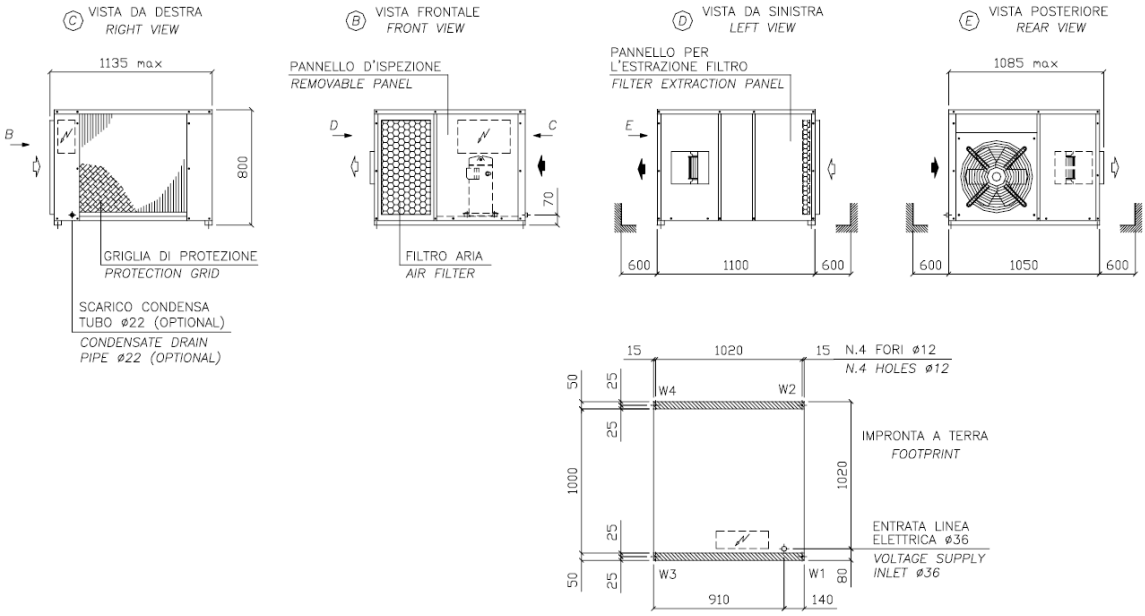
| | 21 | 31 | 36 | 41 | 61 | 81 | ELECTRICAL FEATURES |
|---|---|---|---|---|---|---|---|
| | | | | | | | **COMPRESSOR** |
| kW | 2,4 | 3,6 | 4,0 | 4,9 | 5,9 | 6,9 | *Maximum absorbed power (1)* |
| A | 47 | 76 | 46 | 50 | 66 | 74 | *Maximum starting current* |
| A | 13,5 | 19,0 | 9,0 | 11,0 | 12,4 | 14,0 | *Full load current (2)* |
| | | | | | | | **EVAPORATOR FAN** |
| kW | 0,25 | 0,25 | 0,25 | 0,52 | 0,52 | 0,52 | *Centrifugal fan motor nominal power (each one)* |
| A | 2,5 | 2,5 | 2,5 | 3,8 | 3,8 | 3,8 | *Centrifugal fan motor nominal current (each one)* |
| | | | | | | | **CONDENSER FAN** |
| n. | 1 | 1 | 1 | 1 | 1 | 1 | |
| kW | 0,14 | 0,14 | 0,14 | 0,37 | 0,37 | 0,37 | *Axial fan motor nominal power (each one)* |
| A | 0,62 | 0,62 | 0,62 | 1,7 | 1,7 | 1,7 | *Axial fan motor nominal current* |
| V/ph/Hz | 230/1/50 | 230/1/50 | 400/3 +N/50 | 400/3 +N/50 | 400/3 +N/50 | 400/3 +N/50 | *Electrical power supply* |
| V/ph/Hz | 230-24 /1/50 | 230-24 /1/50 | 230-24 /1/50 | 230-24 /1/50 | 230-24 /1/50 | 230-24 /1/50 | *Auxiliary power supply* |

| | 91 | 101 | 141 | 161 | 201 | 251 | ELECTRICAL FEATURES |
|---|---|---|---|---|---|---|---|
| | | | | | | | **COMPRESSOR** |
| kW | 8,7 | 12,4 | 15,1 | 18,7 | 24,0 | 27,3 | *Maximum absorbed power (1)* |
| A | 99 | 127 | 167 | 198 | 225 | 250 | *Maximum starting current* |
| A | 21,5 | 31,0 | 38,1 | 37,0 | 53,2 | 64,0 | *Full load current (2)* |
| | | | | | | | **EVAPORATOR FAN** |
| kW | 1,1 | 1,1 | 1,1 | 1,1 | 3 | 3 | *Centrifugal fan motor nominal power (each one)* |
| A | 4,1 | 4,1 | 4,1 | 4,1 | 6,4 | 6,4 | *Centrifugal fan motor nominal current (each one)* |
| | | | | | | | **CONDENSER FAN** |
| n. | 1 | 1 | 2 | 2 | 3 | 3 | |
| kW | 0,54 | 0,54 | 0,54 | 0,54 | 0,54 | 0,54 | *Axial fan motor nominal power (each one)* |
| A | 2,4 | 2,4 | 2,4 | 2,4 | 2,4 | 2,4 | *Axial fan motor nominal current* |
| V/ph/Hz | 400/3 +N/50 | 400/3 +N/50 | 400/3 +N/50 | 400/3 +N/50 | 400/3 +N/50 | 400/3 +N/50 | *Electrical power supply* |
| V/ph/Hz | 230-24 /1/50 | 230-24 /1/50 | 230-24 /1/50 | 230-24 /1/50 | 230-24 /1/50 | 230-24 /1/50 | *Auxiliary power supply* |

*(1) MAXIMUM ABSORBED POWER - This is the power absorbed by the compressors at the maximum conditions permitted.*
*(2) MAXIMUM ABSORBED CURRENT - This is the current absorbed by the compressors before the internal protection switches cut-in.*
*NOTE: some countries refer to the size of the electrical line and the fuses in RLA (Rating Load Amps).*
*This value is obtained by dividing the maximum absorbed current (often called MCC) by 1.33.*

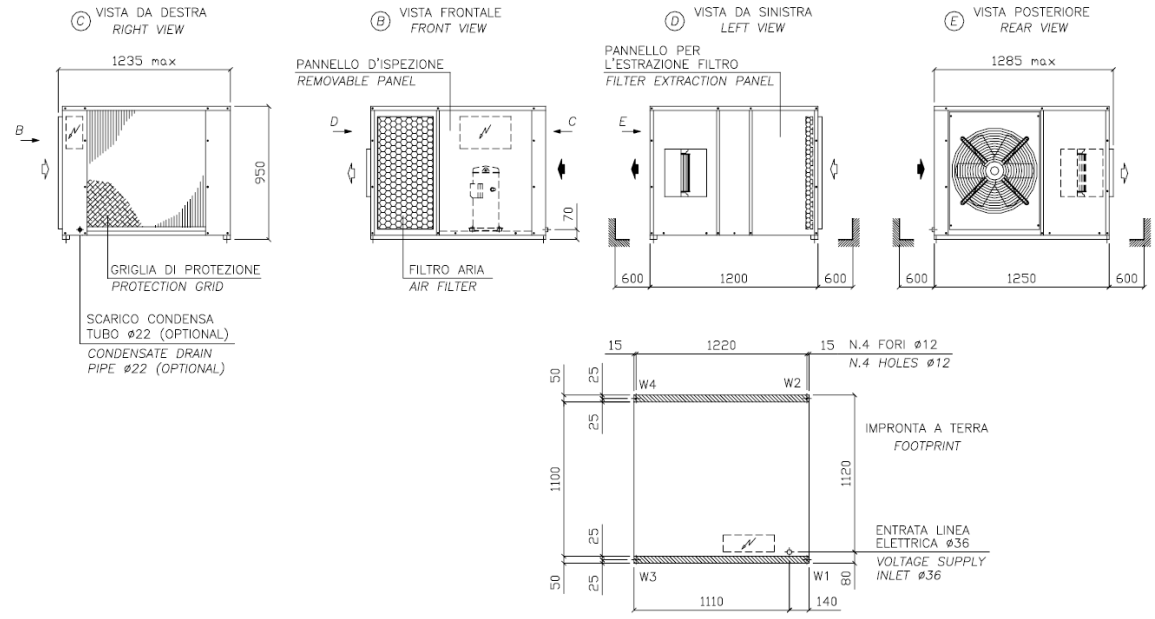
# DIMENSIONS, WEIGHTS, CLEARANCES AND FLOOR MARKING

**GAMMA 21 – 31 – 36/HP**



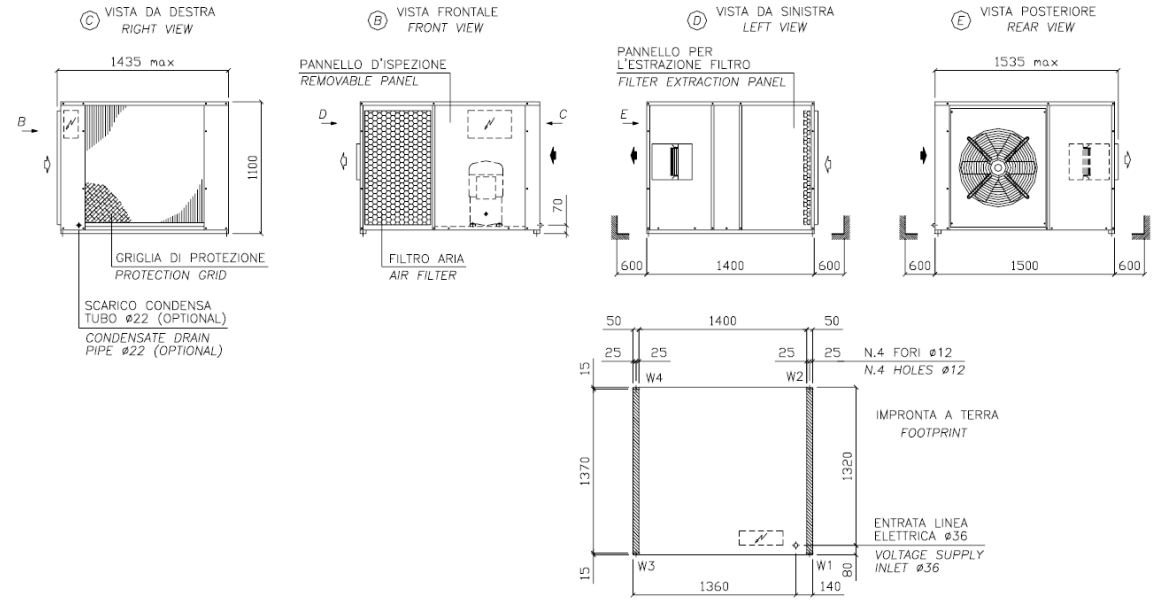
# DIMENSIONS, WEIGHTS, CLEARANCES AND FLOOR MARKING

**GAMMA 41 – 61 – 81/HP**



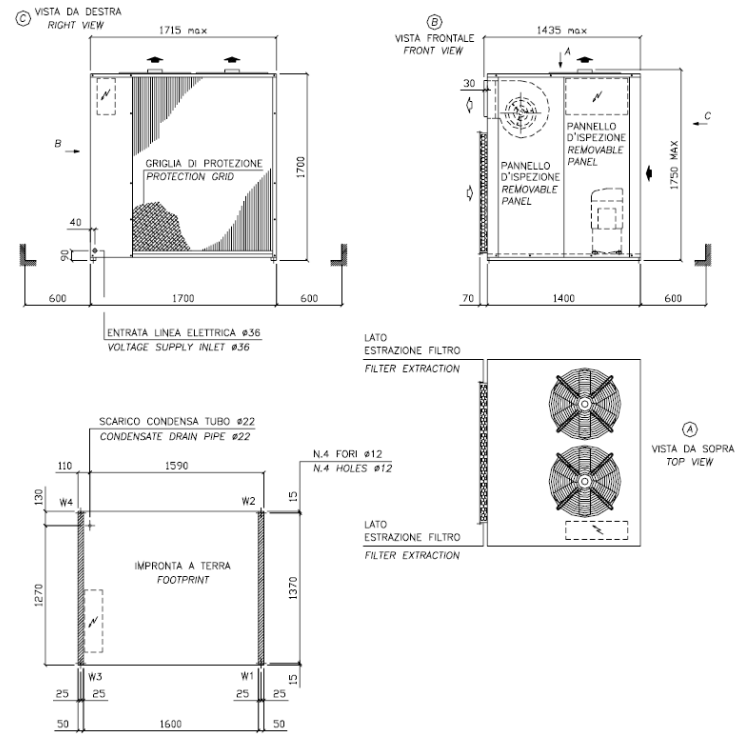
# DIMENSIONS, WEIGHTS, CLEARANCES AND FLOOR MARKING

**GAMMA 91 – 101/HP**



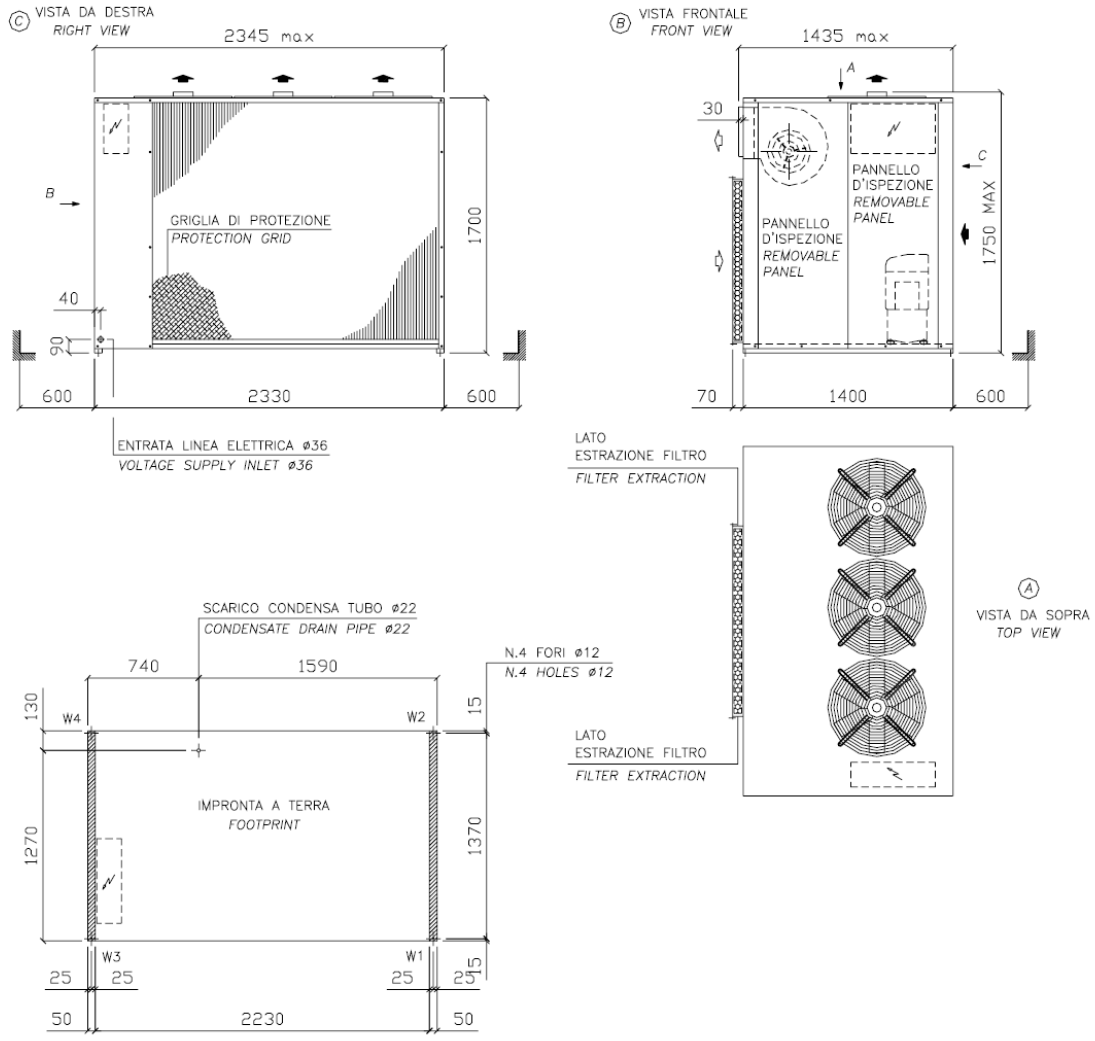
# DIMENSIONS, WEIGHTS, CLEARANCES AND FLOOR MARKING

## GAMMA 141 – 161/HP



# DIMENSIONS, WEIGHTS, CLEARANCES AND FLOOR MARKING

## GAMMA 201 – 251/HP



# INSTALLATIONS RECOMMENDATIONS

## LOCATION

- Strictly allow clearances as indicated in the catalogue.
- Please check that there isn't any obstructions on the suction of the finned coil and on the discharge of the fans.
- Locate the unit in order to be compatible with environmental requirements (sound level, integration into the site, etc.)

## ELECTRICAL CONNECTIONS

- Check the wiring diagram enclosed with the unit, in which are always present all the instructions necessary to the electrical connections.
- Supply the unit at least 12 hours before start-up, in order to turn crankcase heaters on. Do not disconnect electrical supply during temporary stop periods (i.e. weekends).
- Before opening the main switch, stop the unit by acting on the suitable running switches or, if lacking, on the remote control.
- Before servicing the inner components, disconnect electrical supply by opening the main switch.
- The electrical supply line must be equipped with an automatic circuit breaker (to be provided by the installer)

## HYDRAULIC CONNECTIONS

- Carefully vent the system with pump turned off, by acting on the vent valves. This procedure is fundamental: little air bubbles can freeze the evaporator causing the general failure of the system.
- Drain the system during seasonal stops (wintertime) or use proper mixtures with low freezing point. In case of temporary stop periods an electric heater should be installed on the evaporator and hydraulic circuit.
- Install the hydraulic circuit including all the components indicated in the recommended hydraulic circuit diagrams (expansion vessel, flow switch, strainer, storage tank, vent valves, shut off valves, flexible connections, etc.)
- Connect the flow switch, which is furnished on all units, not fitted, follow the instructions enclosed with the units.

## START UP AND MAINTENANCE OPERATIONS

- Strictly follow what reported in use and maintenance manual. All these operations must be carried on by trained personnel only.

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