MITSUBISHI ELECTRIC
HYDRONICS & IT COOLING SYSTEMS S.p.A.

Data Book
DB_CV_i-AV DF DX 16-22_052023_EN_rev01

i-AV DF DX

13,2 - 26,1 kW

FULL INVERTER Air conditioners for IT Cooling with DUAL FLUID system.
To be matched with remote air-cooled condenser.

The picture of the unit is indicative and may vary depending on the model

- **PERIMETER INSTALLATION**
- **FULLY HERMETIC BLDC INVERTER COMPRESSORS**
- **DUAL FLUID SYSTEM WITH ADDITIONAL COIL**
- **AIR DELIVERY FROM THE BOTTOM OR FROM THE TOP**
- **PLUG FANS WITH EC ELECTRIC MOTOR**
- **ELECTRONIC EXPANSION VALVE**
- **AIR SUCTION TEMPERATURE UP TO 40°C**

CLIMAVENETA®

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CE MARKING

CCC – CQC CERTIFICATION
(People's Republic of China)

EAC CERTIFICATION
(Russian Federation, Belarus, Kazakhstan)

GENERAL CHARACTERISTICS

UNDER
Downflow air delivery

OVER
Upflow air delivery

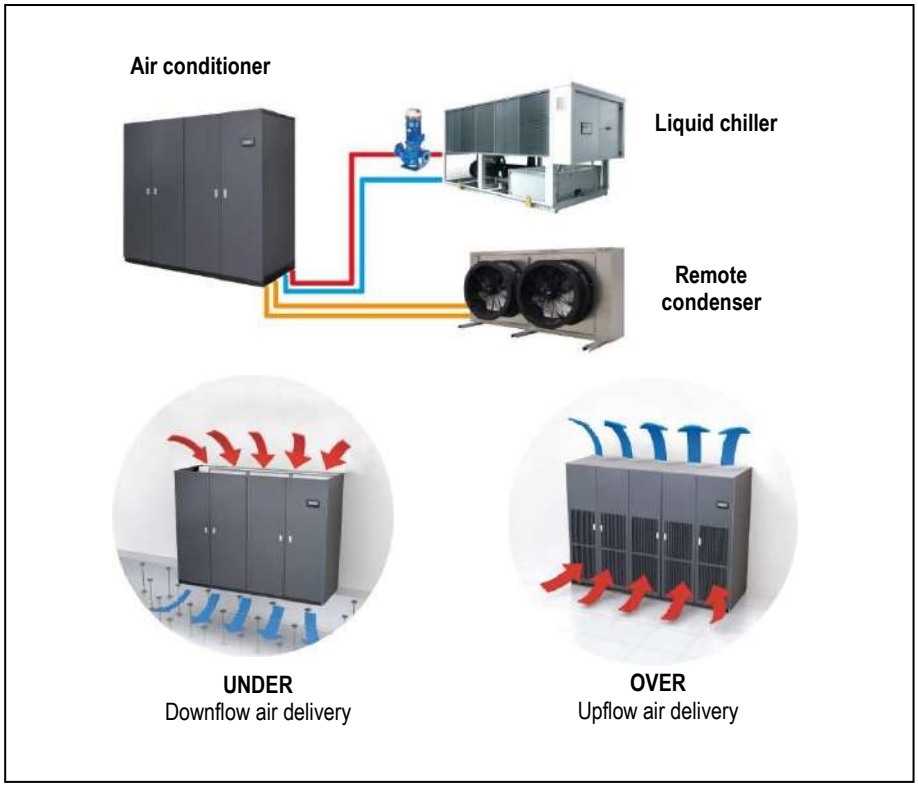
FULL INVERTER Air Conditioners for IT Cooling with Dual Fluid system.

- Direct expansion, air cooled.
- For matching with remote air-cooled condenser.
- **Two independent cooling systems.** Chilled water coil; Direct expansion coil.
- BLDC inverter compressors.
- Plug fans with EC electric motor.

This series is available in the following versions:

- The upflow version (Over) is characterized by air intake from the front through honeycomb grille and air delivery from the top of the unit.
- The downflow version (Under) is characterized by air intake from the top and air delivery from the bottom of the unit.

Cooling capacity: 13,2 - 26,1 kW



The machines are made for indoor installation.

The constructive solutions and the internal lay-out allow high application flexibility and the frontal access to the main components for the inspection and routine maintenance.

The installation requires refrigerant charge, electrical and hydraulic connections.

Final assembly on all machines before shipment including running test, reading and monitoring of operating parameters, alarms simulation and visual check.

INSTALLATION

The series is particularly suitable for installation in Data Center of medium / small size with variable load.

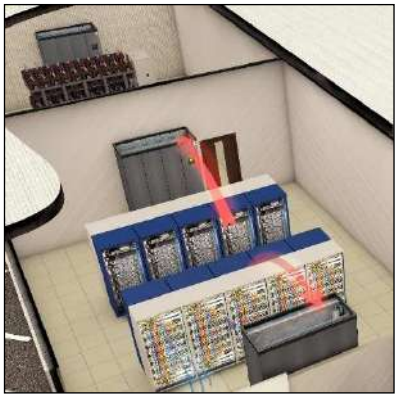
DOWNFLOW VERSION (Under)

Typical installation is on the perimeter.
The units are placed along the perimeter of the data center. Air suction from the top of the unit and air delivery in the underfloor void.
The air distribution is achieved by special tiles placed in front of the racks row, forming cold aisle for air diffusion. On the rear of the racks is expelled the hot then aspirated by the unit.
For an optimal installation is advisable to provide the cold aisle containment.

Some solutions provide a service corridor around the server rooms where to place the units. In this case it is necessary to provide the air intake plenum for each unit. With this solution all the space in the Data Center is available for the installation of racks.

UPFLOW VERSION (Over)

The type of installation is practically similar to the previous. The only difference is that for the air distribution in the Data Center is not used the raised floor but ducts in the ceiling.



The series is also suitable for installation in UPS, Batteries, Distribution rooms and in all service areas of the data center that need a service of conditioning.

OPTIONAL
An extensive list of accessories allows the unit to adapt effectively to the real needs of the system, reducing the time and cost of installation.

PRODUCT FEATURES AND BENEFITS

- **Dual Fluid System**: Two independent cooling systems: Chilled water coil; Direct expansion coil
- Single BLDC scroll inverter compressor for each refrigerant circuit in order to provide always the best efficiency;
- New plug fans with EC electric motors and impeller in composite material, which guarantees a reduction of power consumption;
- New fans electric motor that do not require maintenance;
- Total modulating, capable to follow the increasing demand of Data Center;
- Improvement of the control software with advanced control logic;
- Single or double refrigerant circuit;
- Hinged frontal panels and lateral panels fully removable to facilitate the operations of
- extraordinary maintenance;

F-GAS DIRECTIVE

The units highlighted in this publication contain <HFC R410A [GWP_{100} 2088]> fluorinated greenhouse gases.

GENERAL CHARACTERISTICS

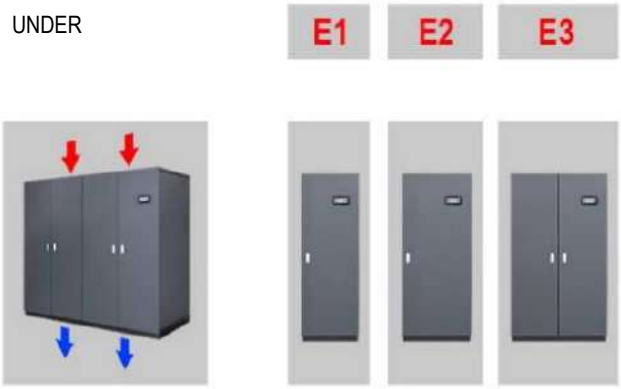
MODEL IDENTIFICATION

Air conditioners for IT Cooling
model: i-AV DF DX O 022 M1 S E3

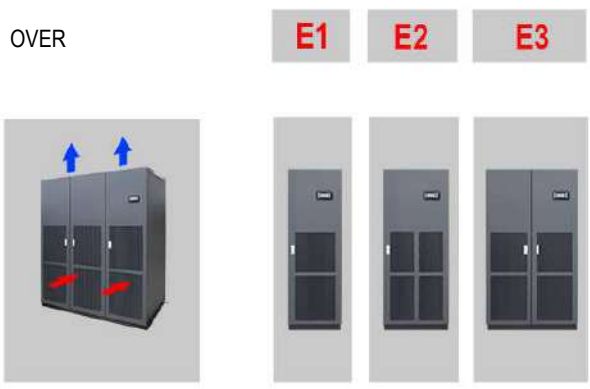
i-AV	**Series**
DF DX	**Unit type** DF – with dual fluid system Two independent cooling systems: Chilled water coil, direct expansion coil, DX – direct expansion, air cooled
O	**Air delivery** O = over – upflow air delivery U = under – downflow air delivery
022	**Model / Cooling capacity (kW) at nominal conditions**
M1	**Compressor type and number** M = BLDC inverter compressor for R410A 1 = 1 BLDC inverter compressor 2 = 1 BLDC inverter compressor for refrigerant circuit 4 = 1 BLDC inverter + 1 ON/OFF compressor for refrigerant circuit
S	**Refrigerant circuit** S = single
E3	**Size**

THE RANGE

UNDER



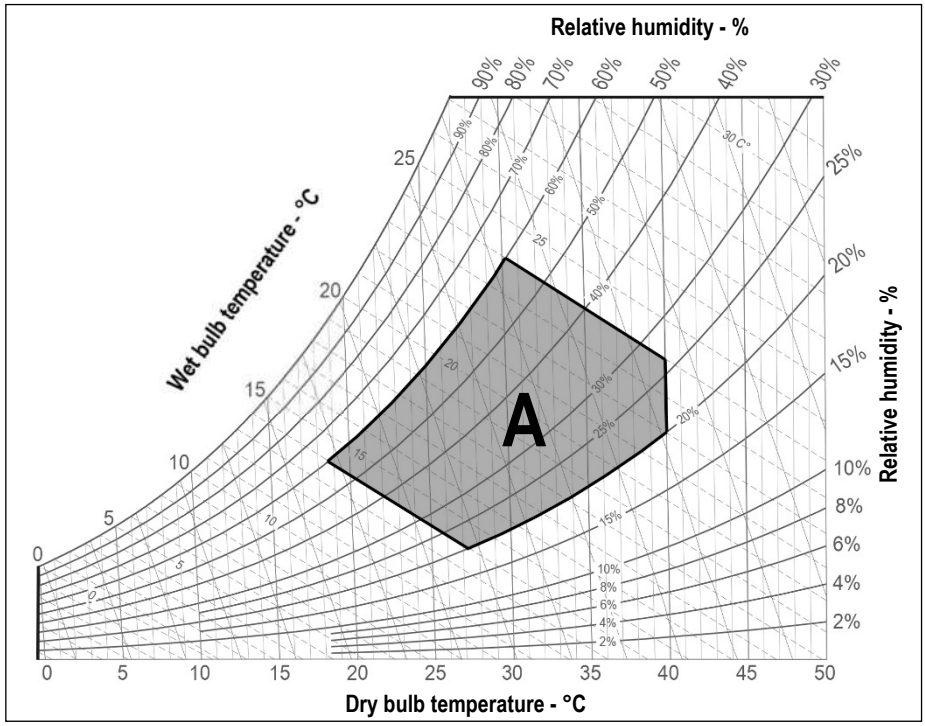
OVER



TRANSPORT AND STORAGE TEMPERATURE

During transport and if the machine is not installed at the reception, do not remove the packaging and place the machine in an enclosed, dry and protected from sunlight site at temperatures ranging between -30°C and 50°C in absence of superficial condensation.

WORKING LIMITS



ROOM AIR CONDITIONS
Room air temperature:

14°C	minimum temperature with wet bulb.
24°C	maximum temperature with wet bulb.
18°C	minimum temperature with dry bulb
40°C	maximum temperature with dry bulb.

AREA "A". Machine operating envelope.

Room air humidity:

20%RH	minimum relative humidity.
60%RH	maximum relative humidity.

AMBIENT AIR TEMPERATURE

45°C	Maximum ambient air temperature
-20°C	Minimum ambient air temperature

With "Kit for air -45°C" for low ambient temperature operation (optional)

-45°C	Minimum ambient air temperature with remote condensers with AC fans

CHILLED WATER TEMPERATURE (Dual Fluid circuit)

6-25°C	temperature range of the water entering the coil
ΔT 3°C	Minimum temperature difference between water inlet and outlet
ΔT 10°C	Maximum temperature difference between water inlet and outlet

All the values are indicative. The working temperatures are influenced by a series of variables as:

- Working conditions;
- Thermal load;
- Set of the microprocessor control.

HYDRAULIC CIRCUIT (Dual Fluid circuit)

ΔP 5-150kPa	Pressure drop range of the hydraulic circuit.
10 Bar	Maximum working pressure of the hydraulic circuit

POWER SUPPLY

± 10%	Maximum tolerance of the supply voltage (V)
± 2%	Maximum unbalancing of the phases.

MAIN COMPONENTS

FRAMEWORK

- Base in aluminium extrusion, painted with epoxy powders. Colour RAL 9005;
- Frame in aluminium profile, painted with epoxy powders. The inner frame is provided with seals for the panels. Colour RAL 9005;
- Panels in galvanized steel sheet with protective surfaces treatment in compliance with UNI ISO 9227/ASTMB117 and ISO 7253, and painted with epoxy powders. Colour RAL 7016 hammered;
- Panels insulated with polyurethane foam and seals to ensure air tight.
- Hinged front panels with quick release removal system.
- Total front access for routine maintenance.
- Removable lateral and back side panels.
- Air flow OVER version:
  - Air intake from the front through honeycomb type grille and air delivery from the top.
- Air flow UNDER version:
  - Air intake from the top and air delivery from the bottom.
- Compartment for electrical panel on unit front for direct access to control and regulation devices;

FILTER SECTION

- Washable air filters with COARSE 60% efficiency (according to ISO EN 16890), with cells in synthetic fibre and metallic frame.
- Air filters access:
  OVER version
  - Frontal access for all machines

  UNDER version
  - For machines size E1 - E2 – E3 frontal access
- Clogged filters sensor with differential pressure switch on air side.

BLDC INVERTER COMPRESSORS SECTION

Unit size E1:

- rotary BLDC inverter compressor for R410A refrigerant:

Unit size E2, E3:

- scroll BLDC inverter compressors with spiral profile optimized for R410A refrigerant:
  S version, single refrigerant circuit:
  - single BLDC inverter compressor;
- Synchronous brushless inverter driven motor.
- Inverter for modulating capacity control.
- Reactance for the reduction of electromagnetic noise and interference.

FOR ALL COMPRESSORS:

- Crankcase heater for each compressor.
- Soundproof jacket for each compressor.
- Rubber supports.

FAN SECTION

The fan section is contained within the machine and includes:

- Centrifugal fans with backward curved blades with wing profile, single suction and without scroll housings (Plug-fans), directly coupled to external rotor electric motor.
- Impeller in composite material exempt from rust formation.
- Brushless type synchronous EC motor with integrated electronic commutated system and continuous variation of the rotation speed. The motor rotation control is obtained with the EC system (Electronic Commutation) that manage the motor according to the signal coming from the microprocessor control.
- Fans control through ModBus. In case of failure, the control stops the interested fan indicating the type of fault. The machine with more than one fan is not stopped.
- Adjustable External Static Pressure (ESP).
- Fan guard with rubber support (UNDER version)

COOLING SECTION – DIRECT EXPANSION COIL

- Heat exchanger coil with internally corrugated copper tubes and high efficiency aluminium fins, specifically developed to provide high heat transfer and lower pressure drops.
- Frame in galvanized steel or peraluman.
- Condensate tray in peraluman with PVC flexible discharge pipe.
- Temperature sensor on air intake with function of temperature display.
- Temperature sensor on air delivery with function of control and regulation.
- Under floor water alarm through sensor to be placed on the floor.

COOLING SECTION – CHILLED WATER COIL

- Chilled water 4 rows cooling coil with copper tubes, aluminium fins and galvanized steel frame.
- 2-way motorized valve with 0÷10 VDC control actuator and emergency manual control.
- Temperature probe on water inlet
- Hydraulic pipes in copper with anticondensate insulation

REFRIGERANT CIRCUIT

The air conditioner is supplied with a minimum R410A refrigerant charge. Components for each refrigerant circuit:

- Electronic expansion valve. The valve allows high performance and system efficiency thanks to a timely and accurate response to changes in temperature and pressure
- Sight glass.
- Filter dryer on liquid line.
- Pressure transducers with indication, control and protection functions, on low and high refrigerant pressure.
- High pressure safety switch with manual reset.
- Liquid receiver.
- Refrigerant circuit with copper tubing with anticondensate insulation of the suction line.
- Lubricant oil charge.
- Oil separator on gas discharge.
- Valves on gas delivery and liquid return for coupling to remote air-cooled condenser.
- 0÷10V proportional signal to manage the condensing control system of the remote air-cooled condenser.
- Condensing control by continuous variation of remote condenser fan rotation speed for operations with ambient temperature down to -20°C.

ELECTRICAL PANEL

In accordance with EN60204-1 norms, suitable for indoor installation, complete with:

- Main switch with door lock safety on frontal panel.
- Magnetothermic switches for each compressor and supply fan.
- Contactors for each load. BLDC inverter compressors and supply fans equipped with EC electric motor don't require contactors.
- Transformer for auxiliary circuit and microprocessor supply.
- Numbered wirings.
- Terminals:
  OUTLETS
  - Voltage free deviating contact for General Alarm 1,2
  - Voltage free contact for supply fans status.
  - Voltage free contact for smoke / fire sensor (the sensors are accessory)

  INLETS
  - External enabling.
- Power supply 400/3+N/50.

CONTROL SYSTEM
Microprocessor control system with graphic display for control and monitor of operating and alarms status. The system includes:

- Built-in clock for alarms date and time displaying and storing;
- Built-in memory for the storing of the intervened events (up to 200 events recorded);
- Predisposition for additional connectivity board housing (MODBUS, LON, BACNET MS/TP RS485, BACNET OVER IP). The electronic cards are optional accessories.
- Main components hour-meter;
- Non-volatile “Flash” memory for data storage in case of power supply faulty;
- Menu with protection password;
- Demand Limit function;
- LAN connection (max 15 units).

REMOTE AIR-COOLED CONDENSERS

Remote air-cooled condensers for matching to air conditioners for IT Cooling.
The constructive solutions allow high application flexibility.
Horizontal air flow, from coil to fan.
The series has an independent power supply from the indoor unit.
Among the indoor unit and the condenser is necessary the refrigerant connection and electrical connection of the condensing proportional control signal and the alarms.

Is available the optional "P191 Power supply for condenser" from the indoor machine electrical board.
The optional includes magnetothermic switches for condenser fans.

Remote air-cooled condenser:
Remote air-cooled condenser in PERALUMAN aluminium alloy with microchannel condensing coil:

- with AC axial fans and standard acoustic version
- with AC axial fans and low noise acoustic version
- with EC axial fans and standard acoustic version
- with EC axial fans and low noise acoustic version

Remote air-cooled condenser with condensing coil with copper tubes and aluminium fins:

- with AC axial fans and standard acoustic version
- with AC axial fans and low noise acoustic version
- with EC axial fans and standard acoustic version
- with EC axial fans and low noise acoustic version

WARNING:
Please refer to ELCA WORLD selection program to calculate the cooling capacity of the air conditioner according to the selected remote condenser.

OPTIONAL ACCESSORIES

The descriptions of these additional components can be found in Chapter OPTIONAL ACCESSORIES.

P121 ..... **Front air intake + bottom panel**. Unit base noise insulation with special bottom panel for OVER version. Restriction: Non-compatible with “P122 Bottom air intake + blind panels” for OVER version.

P122 ..... **Bottom air intake+blind panels.** Blind frontal panel for OVER version. The accessory allows the intake air from the bottom of the machine. Restriction: Not compatible with “P121 Front air intake + bottom panel” for OVER version.

601 ..... **Solenoid valve on liquid line.**

A548 ..... **Constant prevalence**. Automatic system for the air pressure control in the aisle. The system controls the supply fans rotation speed to keep constant the air pressure via a differential pressure transmitter connected to the microprocessor control.

P091 ..... **Back-up module controller**. The system guarantees the microprocessor power supply for a few minutes, in case of supply voltage failure. (size E1 excluded).

P171 ..... **Kit for air -45°C MCH axial AC** Kit for operations with low ambient air temperature down to -45°C. For machine start up and operation with very low ambient air temperatures (between -20°C and -45°C).

P191 ..... **Power supply for condenser.** Electrical power supply for remote condenser from the indoor machine electrical board. The optional includes magneto-thermic switches for condenser fans and the control/alarm signals.

383 ..... **Numbered wirings + UK requests;**

4181 / 4182 / 4184 / 4185 ... **Serial cards**:
4181 – Serial card MODBUS;
4182 – Serial card LON;
4184 – Serial card BACNET MS/TP RS485;
4185 – Serial card BACNET OVER IP.

A492 ..... **Water leakage detector + additional sensor**. Supplied in mounting kit.

A511 ..... **Smoke detector.** Supplied in mounting kit.

A521 ..... **Fire detector.** Supplied in mounting kit.

5891 ..... **Control unit via kiplink.**

6461 ..... **HPC.**

A35B ..... **Graphic display “Evolution Touch”**

A352 ..... **No Display**

P141 ..... **Analogue set-point compensation**. - Analogue set point compensation according to an external analogue signal at Customer care.

P181 ..... **Network analyser** (standard machine) Multifunction utility for calculating and displaying the machine electrical measurements.

P182 ..... **Network analyser+optional** (full optional machine) Multifunction utility for calculating and displaying the machine electrical measurements.

P183 ..... **Kit network analyser** (standard machine) Multifunction utility for calculating and displaying the machine electrical measurements. Supplied in mounting kit.

P184 ..... **Kit network analyser+optional** (full optional machine) Multifunction utility for calculating and displaying the machine electrical measurements. Supplied in mounting kit.

P021 ..... **2 way 0-10V modulating water valve.**2-way motorized valve with 0÷10 VDC control actuator and emergency manual control for the third way (by-pass) of the chilled water hydraulic circuit. The valve is in combination with the main water flow control valve.

A812 (2) ..... **Free-cooling direct control**

A431 ..... **Electric heater.** Heating with electric heaters.

A432 ..... **Extra power electric heater.** Size E1, E2 excluded.

P051 (3) ..... **Dehumidification function**.

4301 / 4303 / 4305 (4) ..... **Humidification**: Modulating steam humidifier with immersed electrodes with electronic control.
4301 - Steam humidifier 3kg/h

A791 ..... **Air temperature control on suction air.**

P161 ..... **T/rH air intake sensor.** Combined Temperature / Humidity sensor on air intake. The optional replace the standard temperature sensor on machine air intake.

OPTIONAL ACCESSORIES

4666 ..... **External air probe.** External air temperature probe.

P071/P072/P073/P074 ..... **Remote T/rH probe.** Combined Temperature / Humidity sensor for remote installation. The optional is added to the standard temperature sensor on machine air intake.

P113 / P114 ..... **Dual power supply**. Dual power supply with automatic change-over.
P113 - Dual power supply kit. Supplied in mounting kit
P114 - Dual power supply kit + optional. Supplied in mounting kit

A381 ..... **Drain pump.** Supplied in mounting kit. The system includes pump with activation float and 10 linear meters long discharge pipe.

P084 ..... **Air filter ePM$_{10}$ 50%**. Washable high efficiency air filter (according to ISO EN 16890). Not compatible with "P017 / P018 / P019 Plenum + filter ePM$_{2.5}$ 50%, ePM$_1$ 50%, ePM$_1$ 85% (according to ISO EN 16890)".

A531 (5) ..... **On-off damper**. Non-return air damper with frame driven by electric servomotor installed on the machine air delivery.

P011 ..... **Empty plenum**.

P012 ..... **Empty plenum CL.A1**. Plenum with fire reaction in class "0" or "A1.

P013 ..... **Plenum + 3 grilles** on three sides with double adjustable row.

P014 ..... **Plenum + 3 grilles CL.A1.** Plenum with grilles on three sides with double adjustable row, with fire reaction in class "0" or "A1".

P015 ..... **Silenced plenum**. Not compatible with "P084 Air filter ePM10 50%.".

P016 ..... **Silenced plenum + 1 grille**. Grille with double adjustable row on front side and sound absorbers.

P017 ..... **Plenum + filter ePM$_{2,5}$ 50%**. Plenum with high efficiency air filter (according to ISO EN 16890). Not compatible with "P084 Air filter ePM10 50%.".

P018 ..... **Plenum + filter ePM$_1$ 50%**. Plenum with high efficiency air filter (according to ISO EN 16890). Not compatible with "P084 Air filter ePM10 50%.".

P019 ..... **Plenum + filter ePM$_1$ 85%**. Plenum with high efficiency air filter (according to ISO EN 16890). Not compatible with "P084 Air filter ePM10 50%.".

P031 (6) ..... **Empty intake plenum**.

P032 (6) ..... **Empty intake plenum CL.A1**. Plenum with fire reaction in class "0" or "A1".

P034 (7) ..... **Intake free-cooling plenum.**

P041 / P042 / P043 ..... **Support frame** with height adjusting rubber holders. Supplied in mounting kit. It is not possible to match the support frame with plenum installed under the machine.
P041 – Support frame h 255-350mm
P042 – Support frame h 355-450mm
P043 – Support frame h 400-510mm

3601 ..... **Compressor operating signal contact.** Voltage free contact for compressor status signalling.

2411 ..... **Phase sequence relay.** Phases sequence control relay for the machine.

A272 ..... **CL. 0 or A1 (EN 13501-1) insulation:** Panelling with fire reaction in class "0" or "A1;

P151 ..... **Lowered display for Under** – for UNDER units equipped with plenum under the unit.

9973 ..... **Wooden cage packing.** The machines are delivered on wooden pallet, covered with shrink wrap and packaged in wooden cage.

B912 ..... **Remote keyboard K200.** Graphic display for remote installation, the optional is added to the standard graphic display placed on machine frontal panel.

WARNING
The Manufacturers reserves the right to accept the matching of the optional installed on the machine.

MANDATORY COMBINATIONS OF ACCESSORIES

1. When optional accessory “A812 Free cooling direct control” is present, it requires mandatory accessories “P161 T/rH air intake sensor“ and “4666 External air probe”.
2. When optional accessory “P051 Dehumidification function” is present, it requires mandatory accessory “P161 T/rH air intake sensor“.
3. When optional accessories “4301 / 4303 / 4305 Steam humidifier” are present, they require mandatory accessory “P161 T/rH air intake sensor“.
4. When optional accessory “A531 On-off damper” is present, it requires mandatory accessory “9973 Wooden cage packing”.
5. When optional accessories “P031 Empty intake plenum, for OVER version” and “P032 Empty intake plenum CL.A1, for OVER version” are present, they require mandatory accessory “P122 Bottom air intake+blind panels, for OVER version only”
6. When optional accessory “P034 Intake free-cooling plenum” is present, it requires mandatory accessories “P161 T/rH air intake sensor“, “4666 External air probe”, “A812 Free-cooling direct control” and “P122 Bottom air intake+blind panels, for OVER version only”
7. When accessory A352 "NO DISPLAY" is present, it requires mandatory accessory 5891 "Unit control via Kiplink”
8. When accessory 6461 "HPC" is present, it requires mandatory accessory 5891 "Unit control via Kiplink”

TECHNICAL DATA

VERSION (1)		**U / O**					**U / O**				
MODEL		**012 M1 S**					**018 M1 S**				
SIZE		**E1**					**E2**				
COOLING CAPACITY (2)		**100%**	**80%**	**60%**	**40%**	**30%**	**100%**	**80%**	**60%**	**40%**	**30%**
Total	kW	10,4	8,32	6,24	4,16	3,04	21,8	17,4	13,1	8,72	6,39
Sensible	kW	10,4	8,29	6,24	4,16	3,04	20,2	16,4	12,3	8,26	6,39
SHR (3)		1,00	0,99	1,00	1,00	1,00	0,93	0,92	0,93	0,94	1,00
Total power input (Comp. + Fans)	kW	2,85	2,02	1,29	0,79	0,53	6,52	4,84	3,22	1,91	1,41
"EC" SUPPLY FANS	n.			1					1		
Air flow	m^3/h	2800	2433	2065	1698	1500	4100	3364	2629	1893	1500
Nominal external static pressure	Pa	20	20	20	20	20	20	20	20	20	20
Maximum external static pressure	Pa	56	--	--	--	--	302	--	--	--	--
Power input (4)	kW	0,32	0,23	0,14	0,1	0,07	0,54	0,36	0,22	0,12	0,08
COMPRESSOR				Rotary					Scroll		
BLDC compressor	n.			1					1		
On/Off compressors	n.			0					0		
Cooling Capacity Control				Modulating					Modulating		
Compressors power input	kW	2,53	1,79	1,15	0,69	0,46	5,98	4,48	3	1,79	1,33
AIR FILTERS	n.			1					1		
Filtering surface	m^2			0,6					0,8		
Efficiency (ISO EN 16890)	COARSE			60%					60%		
GAS CIRCUITS	n.			1					1		
POWER SUPPLY	V/Ph/Hz			400/3+N/50					400/3+N/50		
ENERGY EFFICIENCY INDEXES (2)											
EER - Energy Efficiency Ratio (5)	kW/kW	3,65	4,12	4,84	5,27	5,74	3,34	3,60	4,07	4,57	4,53
DIMENSIONS											
Length	mm			650					785		
Width	mm			675					675		
Height	mm			1925					1925		
NET WEIGHT Over	kg			230					263		
NET WEIGHT Under	kg			240					273		
REFRIGERANT CONNECTIONS											
Gas delivery	ODS Ø			12					16		
Liquid return	ODS Ø			12					12		
HYDRAULIC CONNECTIONS											
CONDENSATE DISCHARGE											
Rubber pipe – internal diameter	Ø mm			19					19		

THE COOLING CAPACITY DOES NOT CONSIDER THE SUPPLY FAN MOTOR THERMAL LOAD

1. U = Under, downflow / O = Over, upflow
2. Gross value. Characteristics referred to entering air at 26°C-40%UR; condensing temperature 45°C; ESP=20Pa.
3. SHR = Sensible cooling capacity / Total cooling capacity.
4. Corresponding to the nominal external static pressure.
5. The Energy Efficiency Index does not consider the remote air-cooled condenser.

The units highlighted in this publication contain <HFC R410A [GWP_{100} 2088]> fluorinated greenhouse gas.

NOTE:
Below 30% of cooling capacity, the inverter compressor enters the "cycling" area in which the compressor operates with ON / OFF cycles below the minimum modulation frequency (operation only for short periods).
SELECT THE UNIT IN THE MODULATION FIELD.

TECHNICAL DATA

VERSION (1)				**U / O**		
MODEL				**022 M1 S**		
SIZE				**E3**		
COOLING CAPACITY (2)		**100%**	**80%**	**60%**	**40%**	**30%**
Total	kW	23,9	19,1	14,3	9,56	6,73
Sensible	kW	23,9	18,9	14,3	9,16	6,73
SHR (3)		1,00	0,99	1,00	0,95	1,00
Total power input (Comp. + Fans)	kW	6,76	4,95	3,25	1,97	1,39
"EC" SUPPLY FANS	n.			1		
Air flow	m^3/h	5500	4442	3384	2326	1700
Nominal external static pressure	Pa	20	20	20	20	20
Maximum external static pressure	Pa	1000	--	--	--	--
Power input (4)	kW	0,8	0,44	0,26	0,14	0,07
COMPRESSOR				Scroll		
BLDC compressor	n.			1		
On/Off compressors	n.			0		
Cooling Capacity Control				Modulating		
Compressors power input	kW	5,96	4,51	2,99	1,83	1,32
AIR FILTERS	n.			2		
Filtering surface	m^2			1,2		
Efficiency (ISO EN 16890)	COARSE			60%		
GAS CIRCUITS	n.			1		
POWER SUPPLY	V/Ph/Hz			400/3+N/50		
ENERGY EFFICIENCY INDEXES (2)						
EER - Energy Efficiency Ratio (5)	kW/kW	3,54	3,86	4,4	4,85	4,84
DIMENSIONS						
Length	mm			1085		
Width	mm			775		
Height	mm			1925		
NET WEIGHT Over	kg			353		
NET WEIGHT Under	kg			363		
REFRIGERANT CONNECTIONS						
Gas delivery	ODS Ø			16		
Liquid return	ODS Ø			16		
HYDRAULIC CONNECTIONS						
CONDENSATE DISCHARGE						
Rubber pipe – internal diameter	Ø mm			19		

THE COOLING CAPACITY DOES NOT CONSIDER THE SUPPLY FAN MOTOR THERMAL LOAD

1. U = Under, downflow / O = Over, upflow
2. Gross value. Characteristics referred to entering air at 26°C-40%UR; condensing temperature 45°C; ESP=20Pa.
3. SHR = Sensible cooling capacity / Total cooling capacity.
4. Corresponding to the nominal external static pressure.
5. The Energy Efficiency Index does not consider the remote air-cooled condenser.

The units highlighted in this publication contain <HFC R410A [GWP_{100} 2088]> fluorinated greenhouse gas.

NOTE:
Below 30% of cooling capacity, the inverter compressor enters the "cycling" area in which the compressor operates with ON / OFF cycles below the minimum modulation frequency (operation only for short periods). SELECT THE UNIT IN THE MODULATION FIELD.

REFRIGERANT CHARGE

The air conditioner is supplied with a minimum R410A refrigerant charge. **Refrigerant must be charged.** The following table shows the refrigerant charge that must be introduced for the air conditioner only. Remote condenser, connections pipes and optional are excluded.

VERSION (1)		**U / O**	**U / O**	**U / O**
MODEL		**012 M1 S**	**018 M1 S**	**022 M1 S**
SIZE		**E1**	**E2**	**E3**
REFRIGERANT		R410A	R410A	R410A
Refrigerant circuits x Refrigerant charge (2)	n x kg	1 x 3,2	1 x 3,6	1 x 4,3
HFC R410A - F Gas - CO_2 equivalent	t	6,76	7,51	8,98

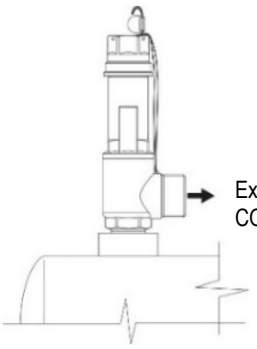
1. U = Under, downflow / O = Over, upflow
2. Refrigerant charge required for the air conditioner only operation. Remote condenser, connections pipes and optional are excluded. For air conditioners with double refrigerant circuit is indicated the number of circuits x the charge of a single circuit.

PRESSURE RELIEF VALVE

The pressure relief valve of the refrigerant circuit is installed in the machines when required by Directive 2014/68/EU.
The valve is installed on liquid receiver and oil separator of each refrigerant circuit of the machine with the purpose to protect the circuit from overpressure.

It is up to the installer to check whether the system complies with the 2014/68 / EU standard regarding the installation of the pressure relief valve. By plant we mean the complete system that includes the internal machine, the remote condenser and the connecting pipes
The installer must calculate the amount of refrigerant contained in the system and, if the refrigerant charge is higher than 10 kg, he must install the pressure relief valve.

	Factory installed components		At Installer care
	Pressure relief valve on liquid receiver	Pressure relief valve on oil separator	Possible pressure relief valve
Model	**[bar]**	**[bar]**	**[bar]**
012 M1 S	---	---	41,5
018 M1 S	---	---	41,5
022 M1 S	---	---	41,5



RECOMMENDED REFRIGERANT LINES

Diameter of the recommended refrigerant lines for connection to MEHITS S.p.A. air conditioners and referred to "EQUIVALENT LENGHT".
Please always refer to the "INSTALLATION DIAGRAM" to properly select all necessary components
Verify the need to use pressure limiting devices (safety valves) where not already provided for by Directive 2014/68 / EU.
Nominal diameter: Refrigerant connection of the indoor unit. In some cases, the diameter of the refrigerant lines may not correspond with the nominal diameter. This is completely normal. It is enough to provide a reduction fitting to adjust the diameter.

"SI" INTERNATIONAL SYSTEM PIPES DIAMETERS

SI system	Diameter	mm	6	8	10	12	16	18	22	28	35
	Thickness	mm	1	1	1	1	1	1	1	1,5	1,5

Model	Line	Nominal Diameter Ø [mm]	EQUIVALENT LENGHT [m] FOR INVERTER COMPRESSOR R410A																			
			5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
12	Gas	**12**	12	12	12	12	12	12	16	16	16	16	16	16	16	16	16	16	16	16	16	16
M1 S	Liquid	**12**	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
18	Gas	**16**	16	16	16	16	16	16	18	18	18	18	18	18	18	18	18	18	18	18	18	18
M1 S	Liquid	**12**	12	12	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
22	Gas	**16**	16	16	16	16	16	16	18	18	18	18	18	18	18	18	18	18	18	18	18	18
M1 S	Liquid	**16**	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16

For equivalent lengths over 100m, please contact the Manufacturer's Sales Office.

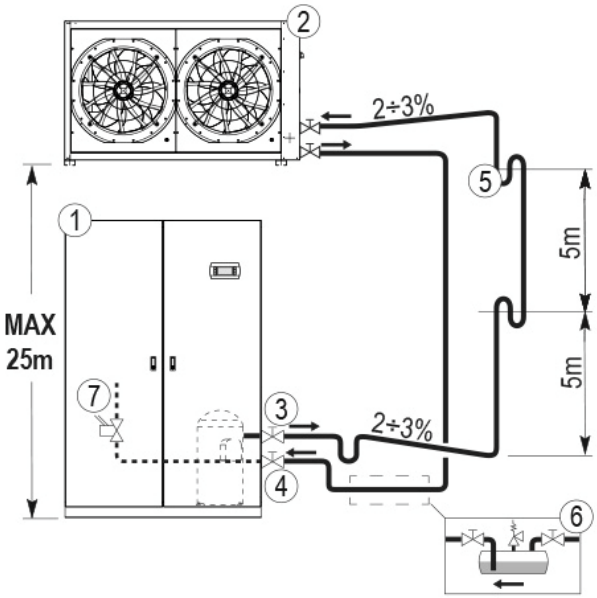
"IMPERIAL" SYSTEM PIPES DIAMETERS

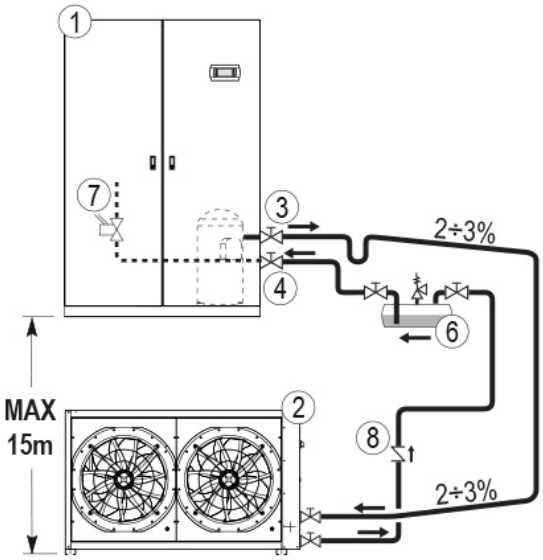
IMPERIAL system	Diameter	inch	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"	1 3/8"
		mm	6,35	9,52	12,7	15,87	19,05	22,22	25,4	28,57	34,92
	Thickness	mm	1	1	1	1	1	1	1	1,25	1,25

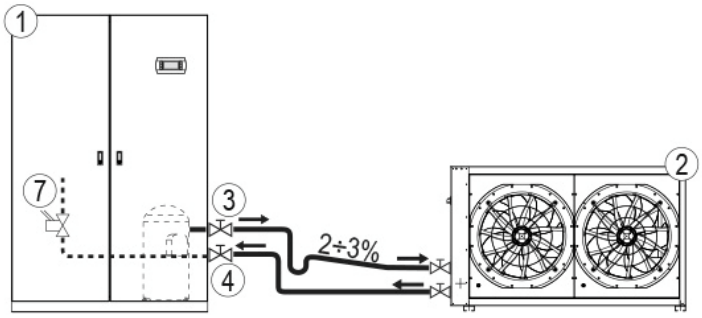
Model	Line	Nominal Diameter Ø [mm]	EQUIVALENT LENGHT [ft] FOR INVERTER COMPRESSOR R410A																			
			15	35	50	65	80	100	115	130	150	165	180	195	215	230	245	260	280	295	310	330
12	Gas	**12**	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"
M1 S	Liquido	**12**	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"
18	Gas	**16**	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
M1 S	Liquido	**12**	1/2"	1/2"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"
22	Gas	**16**	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
M1 S	Liquido	**16**	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"

For equivalent lengths over 330ft, please contact the Manufacturer's Sales Office.

INSTALLATION SCHEME







Apply the diagram to any refrigerant circuit of the machine.

Difference in height between the machines in absolute value.

Maximum equivalent length of the connecting pipes: 100m

LEGENDA

1. Air conditioner
2. Remote air-cooled condenser
3. Gas discharge line
4. Liquid return line
5. Trap. Foresee a trap every 5m of the rising pipe
6. Additional liquid receiver, external to the machine – By the Installer.
   It is suggested for:
   a. plants with refrigerant lines with an equivalent length of more than 25 meters
   b. systems with refrigerant lines of any length and operating at outdoor temperatures below 0°C.
7. Solenoid valve for liquid line. Optional accessory of the machine suggested for plants with refrigerant pipe longer than 10m.
8. Check valve – By the Installer. The valve must be installed on the liquid line close the condenser. The valve prevents the return of liquid in the condenser, particularly in the case of plant shutdown during the winter season.

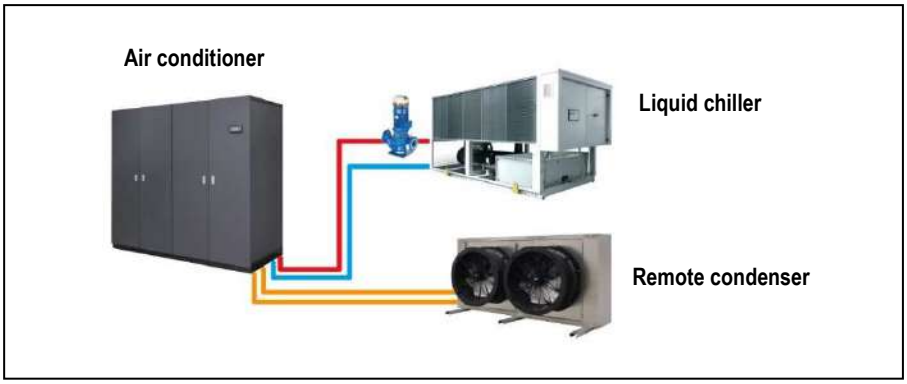
WARNING

It is necessary to provide the refrigerant charge for the connection pipes and for the remote air-cooled condenser
Charge refrigerant in the suitable quantity and lubricant oil in 10% ratio of charged refrigerant.
Lubricant oil must be the same type as the charged one as shown on the compressor plate.

DUAL FLUID SYSTEM

DUAL FLUID system on the machine allows to obtain two independent cooling systems:

- Chilled water coil
- Direct expansion coil



The microprocessor control system automatically manages the system, by activating the cooling circuit more convenient according to the parameters set.
With this system, it is possible, with a limited use of space, to solve several plant problems such as:

- Chilled water coil fed with chilled water or mains water as a stand-by of the main cooling circuit.
- Double chilled water feeding with two independent circuit. This solution is used when you need to ensure redundancy of the cooling system.

The temperature control is performed with the same logic of the main coil.

TECHNICAL DATA

VERSION (1)		U / O	U / O	U / O
MODEL		012 M1 S	018 M1 S	022 M1 S
SIZE		E1	E2	E3
COOLING CAPACITY (2)				
Total	kW	**12,3**	**18,0**	**24,6**
Sensible	kW	**12,2**	**17,8**	**24,3**
SHR (3)		0,99	0,99	0,98
COOLING COIL				
Water flow rate (2)	m^3/h	2,12	3,10	4,23
dP coil + valve (2)	kPa	16,9	37	25,2
Water volume	l	4,2	5,3	7,8
HYDRAULIC CONNECTIONS				
WATER INLET / OUTLET ISO 7/1 - R	Ø	1"	1"	1 1/4"

THE COOLING CAPACITY DOES NOT CONSIDER THE SUPPLY FAN MOTOR THERMAL LOAD

1. U = Under, downflow / O = Over, upflow
2. Characteristics referred to entering air at 26°C-40%RH with chilled water temperature 7-12°C - 0% glycol
3. SHR = Sensible cooling capacity / Total cooling capacity.

2-WAY BALL VALVE FOR CHILLED WATER FLOW CONTROL

The water flow control in the finned coil is acieved through a **2-way modulating ball valve with equal percentage flow control** ensured by the integrated characterizing disc.

This type of valve offers the following series of benefits:

- Equal percentage flow control.
- No peaks initial flow.
- Excellent stability control thanks to the integrated characterizing disc.
- Excellent characteristic in partialisation.
- Stability in control.
- Maintenance free.
- Self-cleaning.

CHARACTERISTICS OF THE 2-WAY BALL VALVE

- Closing seal with leakage rate in Class A (EN 12266-1)
- Maximum fluid pressure Ps=1600kPa
- Maximum closing pressure (Close-off) ΔPs=1400kPa

The rotative actuator is controlled by a signal 0 … 10VDC from the microprocessor controller. The actuator is equipped with an emergency button for manual operation and is maintenance-free.

WATER QUALITY OF THE HYDRAULIC CIRCUITS

The values shown in the table must be guaranteed during the entire life cycle of the machine.

	Description	Symbol	Range
1	Hydrogen Ions	pH	7.5 ÷ 9
2	Presence of calcium (Ca) and magnesium (Mg)	Hardness	4 ÷ 8.5 °D
3	Chlorine ions	Cl^-	< 150 ppm
4	Iron Ions	Fe^{3+}	< 0.5 ppm
5	Manganese Ions	Mn^{2+}	< 0.05 ppm
6	Carbon dioxide	CO_2	< 10 ppm
7	Hydrogen sulphide	H_2S	< 50 ppb
8	Oxygen	O_2	< 0.1 ppm
9	Chlorine	Cl_2	< 0.5 ppm
10	Ammonia	NH_3	< 0.5 ppm
11	Ratio between carbonates and sulphates	HCO_3-/SO_4^{2-}	> 1
12	Sulphate ions	SO_4^{--}	< 100 ppm
13	Phosphate ions	PO_4^{3-}	< 2.0 ppm

where: 1/1.78°D = 1°Fr with 1°Fr = 10 gr $CaCO_3$ / m^3
ppm = parts for millions
ppb = part for billion

Explanatory notes:

ref.1: A greater concentration of hydrogen ions (pH) than 9 implies a high risk of deposits, whereas a lower pH than 7 implies a high risk of corrosion.
ref.2: The hardness measures the amount of Ca and Mg carbonate dissolved in the water with a temperature lower than 100°C (temporary hardness). A high hardness implies a high risk of deposits.
ref.3: The concentration of chloride ions with higher values than those indicated causes corrosion.
ref. 4 - 5 - 8: The presence of iron and manganese ions and oxygen leads to corrosion.
ref.6 - 7: Carbon dioxide and hydrogen sulphide are impurities that promote corrosion.
ref.9: Usually in water from the waterworks it is a value of between 0.2 and 0.3 ppm. High values cause corrosion.
ref.10: The presence of ammonia reinforces the oxidising power of oxygen
ref.11: Below the value shown in the table, there is a risk of corrosion due to the trigger of galvanic currents between copper and other less noble metals.
ref.12: The presence of sulphates ions triggers corrosion phenomenon.
ref.13: The presence of phosphates ions triggers corrosion phenomenon.

It is necessary to carry out periodic checks, with withdrawals at different points of the hydraulic system. During the first year of operation, checks are recommended every 4 months which can be reduced every 6 months starting from the second year of operation.

WARNING:
Values of the parameters outside the indicated ranges can lead to the formation of deposits and limescale and/or favour corrosive phenomena within the plant. For operating fluids other than water (mixtures of ethylene and propylene glycol) it is recommended to use specific inhibitors, designed to offer thermal stability within the operating temperature range and protection against corrosion. It is necessary that, in the presence of dirty and / or aggressive waters, an intermediate heat exchanger is installed upstream of the heat exchangers.

ANTIFREEZE MIXTURES

In plants that are not adequately protected by heating cables, protect the hydraulic circuit with an anti-freeze mixture when the ambient air temperature can drop below 5°C.

Minimum ambient air temperature	°C	5	0	-5	-10	-15	-20	-25	-30
ETHYLENE GLYCOL (suggested % in weight)	%	0	12	20	30	35	40	45	50

Minimum ambient air temperature	°C	5	2	-3	-9	-13	-17	-23	-29
PROPYLENE GLYCOL (suggested % in weight)	%	0	10	20	30	35	40	45	50

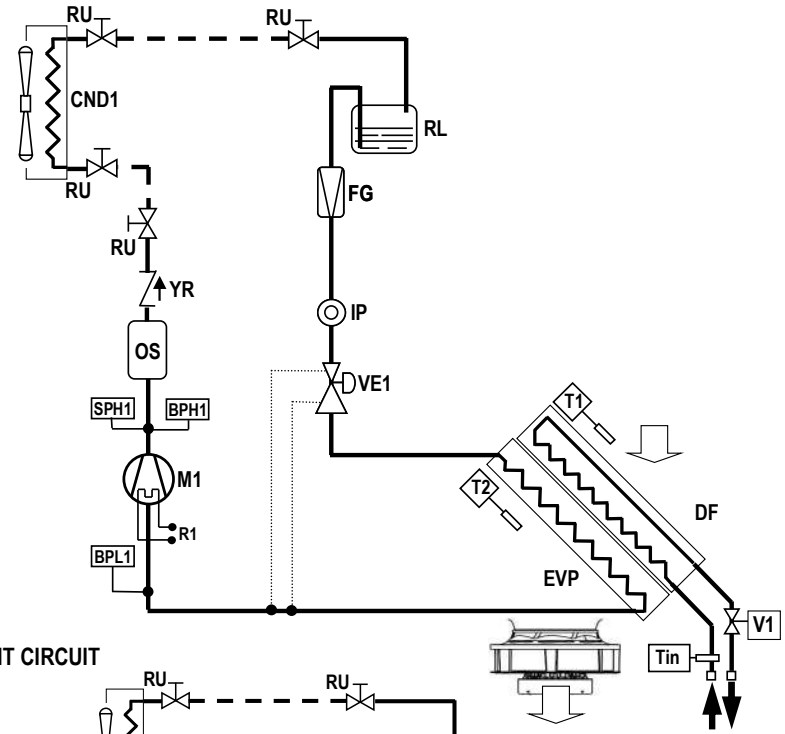
The values are indicative and may significantly vary depending on the glycol manufacturer. Refer to your glycol supplier for detail.
The values consider a precautionary difference of 5°C between the minimum ambient air temperature and the freezing temperature of the mixture.

In the hydraulic circuit do not send fluids other than water or mixtures with ethylene / propylene glycol.
If other products are provided, in addition to mixtures of water and ethylene or propylene glycol, contact the Manufacturer to check the compatibility with the machine components.

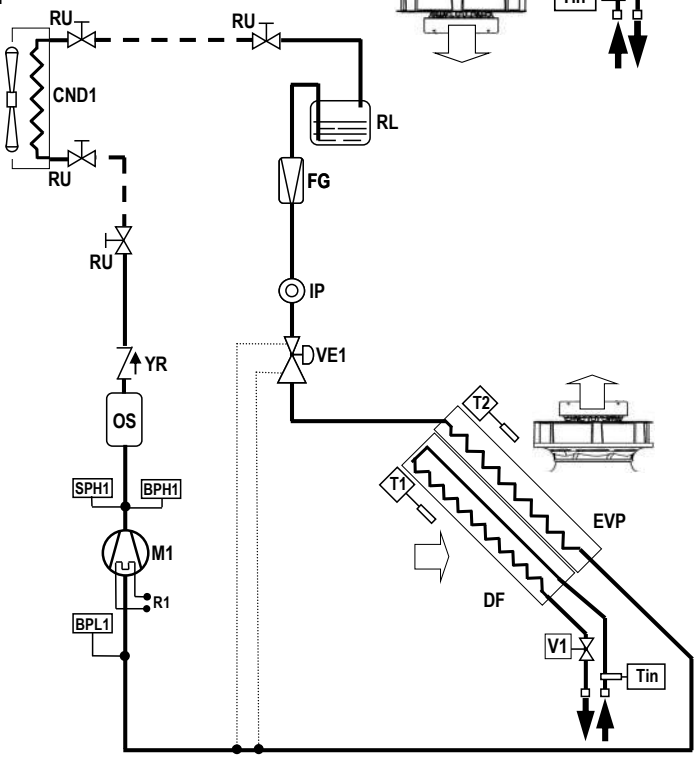
REFRIGERANT CIRCUIT

Below refrigerant diagrams for version with single refrigerant circuit. The diagrams refer to the standard configuration, without optional.

UNDER - SINGLE REFRIGERANT CIRCUIT



OVER - SINGLE REFRIGERANT CIRCUIT



LEGENDA

M1	BLDC inverter compressor	BPH	High pressure transducer.	IP	Sight glass.
R1	Crankcase heater	BPL	Low pressure transducer.	VE	Expansion valve.
CND	Condenser.	SPH	High pressure switch	T	Temperature probes.
EVP	Evaporator	V1	Dual Fluid 2-way valve	RU	Valves
EC	Dual Fluid Chilled water coil	FG	Refrigerant filter.	RL	Liquid receiver
OS	Oil separator				
YR	Check valve				

ACOUSTIC DATA

Acoustic data of the standard machine at full load working conditions.

WARNING:
In a closed room the noise produced by a sound source reaches the listener in two different ways:

- Directly
- Reflected from the surrounding walls, floor, ceiling, from furniture.

With the same sound source, the noise produced in a closed room is greater than that produced outdoors. In fact, the sound pressure level generated by the source, must be added to the one reflected from the room. Also, the shape of the room affects the sound.

MODEL		012 M1 S	018 M1 S	022 M1 S
SIZE		E1	E2	E3
COOLING CAPACITY		100%	100%	100%
SOUND LEVEL ISO 3744 (1)				
On air delivery Under	dB(A)	64,7	71,4	69,6
On air intake Under	dB(A)	55,9	57,1	55,6
On front side Under	dB(A)	47	48	46
On air delivery Over	dB(A)	64,7	71,4	69,6
On air intake Over (2)	dB(A)	53	47	49
On front side Over (3)	dB(A)	46,2	40,2	42,8

1. Noise pressure level at 1 meter in free field – ISO 3744
2. Air intake from the front
3. Air intake from the bottom

ELECTRICAL DATA

Electrical data of the system at full load working conditions.

VERSION (1)		U / O	U / O	U / O
MODEL		012 M1 S	018 M1 S	022 M1 S
SIZE		E1	E2	E3
Power supply	V/ph/Hz	400/3+N/50	400/3+N/50	400/3+N/50
Maximum current input (FLA)	A	13,2	18,7	22,6

1. U = Under, downflow / O = Over, upflow

WARNING:
The electric data indicated refer only to the indoor unit.
Optional accessory electric data are included within the dedicated chapters and must be added.
Please refer to ELCA WORLD selection program to calculate the electrical data of the air conditioner according to the requested optional accessories.
The remote air-cooled condenser is not included because it has independent power supply.

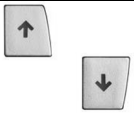
MICROPROCESSOR CONTROL SYSTEM

Controller

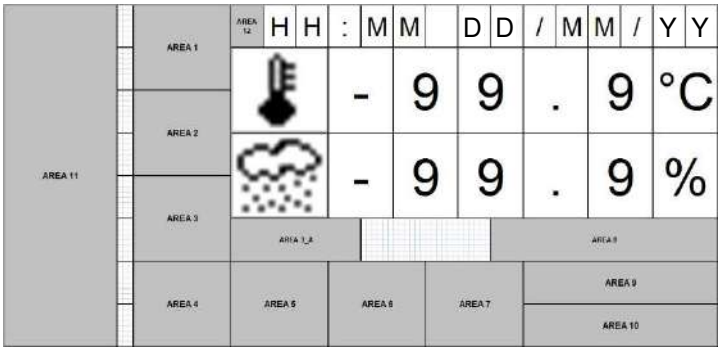
Keyboard and Display

The unit is equipped with the controller connected to a 6 keys keyboard with graphic display on which all information in English language or easily identifiable symbols are displayed.
The controller disposes of a "flash" memory that preserves the information even in absence of power supply. Part of memory is dedicated to the registration of intervened events - up to 200 events.
The system can manage up to 4 T/H probes on air intake, 4 T/H probes on air delivery, 4 remote T/H probes and a T/H probe for outdoor air.

DISPLAY – KEYBOARD FUNCTIONS

	ALARM	Alarm presence with red light. Push for alarm description. In case of more alarms scroll by UP / DOWN.
	PRG	Menu list, scrolled by UP/DOWN: **Unit; Set-point; In/Out; Clock; History; User; Service; Factory.** ENTER to execute.
	ESC	Home. Used to come back to the previous menu level or to the main screen.
	UP DOWN	Changes pages and values of sets. By pressing in HOME mask, the synoptic of the main controls is displayed.
	ENTER	Moving the cursor on adjustable Program(s) fields to confirm the changes. Press ENTER to get out the fields.

DISPLAY - MAIN MASK

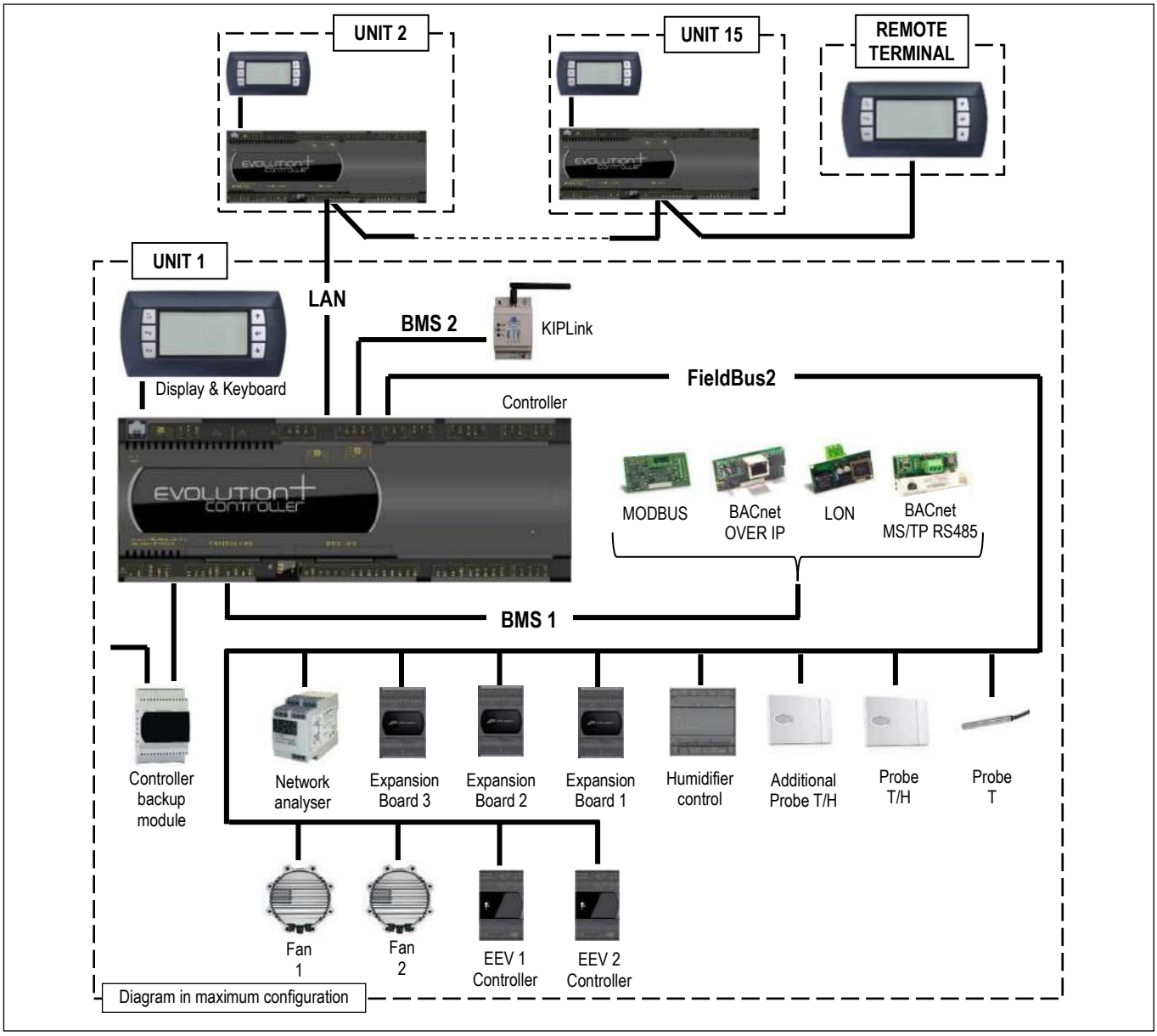


The main mask shows time, date, room temperature and humidity values (if the relative probe is present) and areas for displaying operating and alarm status with dedicated icons:

Area 1: Status of the unit: on / off
Area 2: Status detail
Area 3: Type of event (only in case of an event)
Area 3_A: Code and type of event
Area 4: Active cooling devices
Area 5: Active free-cooling devices
Area 6: Active humidity devices
Area 7: Active heating devices
Area 8: on / off parameters
Area 9: BMS address
Area 10: LAN address
Area 11: Schematic representation of units
Area 12: Active function presence icon

CONNECTIVITY
Through the optional serial port, the microprocessor control enables communication with the modern buildings BMS systems with the following protocols: MODBUS; LON; BACNET MS/TP RS485; BACNET OVER IP.

PASSWORD
Level 1: On request of the End User. Allowing to reach USER menu
Level 2: Asks to Service: Allowing to reach SERVICE menu
Level 3: Asks to Service: Allowing to reach FACTORY menu
No passwords request to enter: UNIT, SETPOINT, IN/OUT, CLOCK, HISTORY menu



LAN NETWORK

The LAN is part of the control software and it is possible to connect up to 15 units.
This type of connection allows to control the units in coherent way, moreover the units can be controlled and managed from a shared remote terminal.

LAN ADDRESS LIST

Units n.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Remote terminal
Controller address	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	---
Display & Keyboard address	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32

The unit connection to the local network (LAN) allows to perform the following functions:

- Balancing the operating hours among the different units by rotating the reserve units.
- Turning on the reserve units in case other units should turn off due to an alarm, maintenance or power feed interruption.
- Turning on reserve units to offset the excessive thermal load.
- Operating with all units based on the average temperature and humidity values read by the temperature probes only in the operating units.
- DYNAMIC MASTER function that makes the role of the Master unit dynamic. In case of alarm, shutdown, maintenance, power failure, etc. on the Master unit, the function automatically elects a new Master unit.

DEMAND LIMIT

Demand Limit function is part of the control software for machines with double refrigerant circuit. It allows to limit the absorbed current of the machine.
The function must be activated and configurated. A digital inlet on electrical panel connecting terminals allows the remote enabling of the function with an external signal without tension.
The software allows to select the resources to disable (compressors, electric heaters,…).

TEMPERATURE PROBE ON AIR RETURN / DELIVERY

Temperature probe installed on the air return and delivery of the unit.
Standard temperature control and regulation on air delivery.
Is possible to select the optional accessory A791 “Air temperature control on suction air” to realize the temperature control and regulation on suction air.
With the following optional accessories installed temperature control and regulation are exclusively on suction air:

- A431 – Electric Heater;
- A432 – Extra power electric heaters;

CLOGGED FILTERS SENSOR

The system includes a differential pressure switch installed in the electrical panel or in the front of the indoor unit and the plastic hoses for the relief of the pressure upstream and downstream the air filters.

Control range: 0.3 … 4.0 mbar (30 … 400 Pa)
Differential for intervention: 0.15 mbar (15 Pa)

FLOOD SENSOR

The system includes an electronic relay installed in the electrical panel of the machine and a water detector.
The electrical connections for the probe and the alarm contact are present in the machine's terminal board.
Sensor is supplied to be connected and installed at customer care.

COMPRESSOR SOUNDPROOF JACKET

The system includes a soundproof jacket for each compressor to obtain a reduction of the sound level of the unit.

POSSIBLE AIR INTAKE FOR OVER VERSIONS

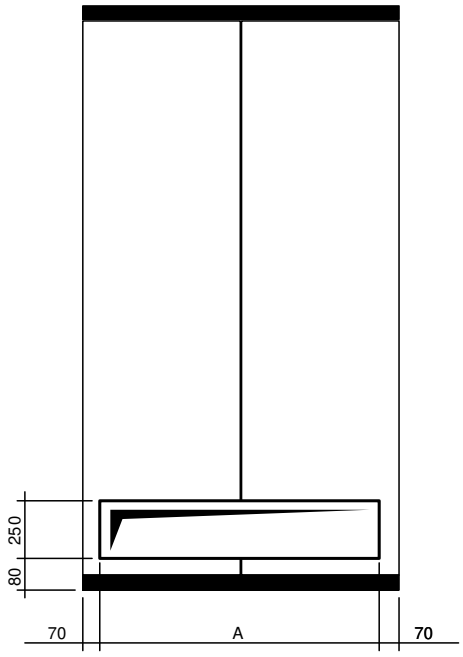
OVER VERSION - AIR INTAKE FROM THE BOTTOM
Thanks to the particular basement design, it is possible to have the intake from the bottom side. The air flow is equal to the nominal.
With this solution, it is necessary to foresee the optional blind frontal panels

OVER VERSION - AIR INTAKE FROM THE BACK SIDE
It is possible to have the unit air intake from the back side.
Due to the limited size of the air intake, the air flow is limited to the 20&% of the nominal one.
The air intake has to be made by Customer during installation.
In case the air intake is used for fresh air, it is necessary the temperature / humidity probe reposition in front of the heat exchanger, to allow for optimum reading of the values of temperature / humidity.
The electric cable of the probe has sufficient length for the repositioning.

AIR INTAKE FROM THE BACK SIDE

Back side view

OVER
E1 - E2 – E3



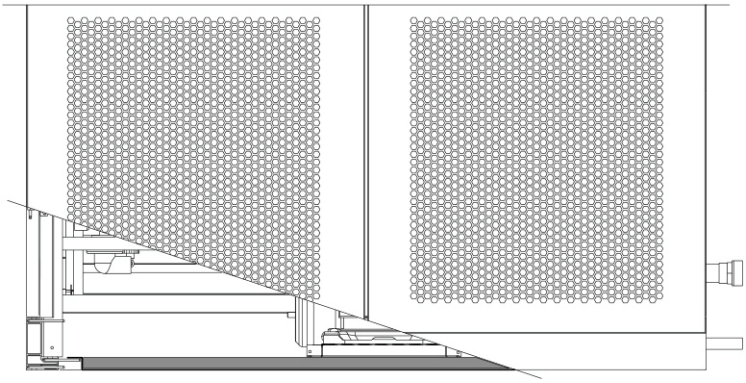
SZE		E1	E2	E3
A	mm	510	645	945
Max air flow	m^3/h	600	1000	1500

OPTIONAL ACCESSORIES: P121 – FRONT AIR INTAKE+BOTTOM PANEL

Available for OVER units.
The optional is not compatible with “P122 Bottom air intake+blind panels” for OVER units.
With this accessory, it is possible a noise insulation of the machine base, when the machine is installed directly on floor as raised floor, wood floor etc.
The accessory includes:

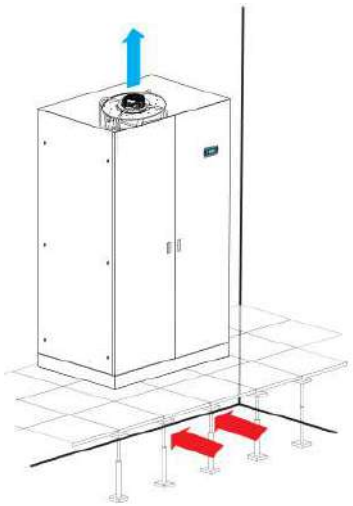
- Panel in galvanized steel sheet.
- Noise insulation with special soundproof material.

The bottom panel is supplied assembled inside the unit base and does not modify the unit dimensions.



OPTIONAL ACCESSORIES: P122 - BOTTOM AIR INTAKE+BLIND PANELS

Available for OVER units.
The optional is not compatible with “P121 Front air intake+bottom panel” for OVER units.
Thanks to the design of the basement is possible the air suction from the unit bottom. The air flow rate is the nominal one
The accessory foresees the blind frontal panels.



OPTIONAL ACCESSORIES: 601 – SOLENOID VALVE ON LIQUID LINE

The accessory has the function of closing the liquid line, in the event of the machine stopping or blackout, avoiding the risk of liquid refrigerant migration into the evaporator.
Recommended accessory for:

- Refrigerating lines greater than 10m in equivalent length.
- Machines equipped with electronic expansion valve.

OPTIONAL ACCESSORIES: A548 - CONSTANT PREVALENCE

The optional is a differential pressure sensor with a 0…20mA output signal. The device is installed in the machine.
The sensor is connected to the microprocessor control of the indoor unit and allows the control of:

A548 - CONSTANT PREVALENCE
The system controls the air pressure in the raised floor (Under version) or in the duct (Over version). Through the relief piping of the room pressure (low pressure side) and the air supply of the fan (high pressure side) the fan rotation speed is controlled to keep the air pressure constant.
Pressure control range from 0 to 100 Pa.

OPTIONAL ACCESSORIES: P091 - BACK-UP MODULE CONTROLLER

The optional is installed within the electrical panel.
The optional is not available for size E1.
The system powers the microprocessor for a few minutes in the event of a power failure or voltage surges, preventing the re-boot of the controller.

OPTIONAL ACCESSORIES: P171 – KIT FOR AIR -45°C MCH AXIAL AC

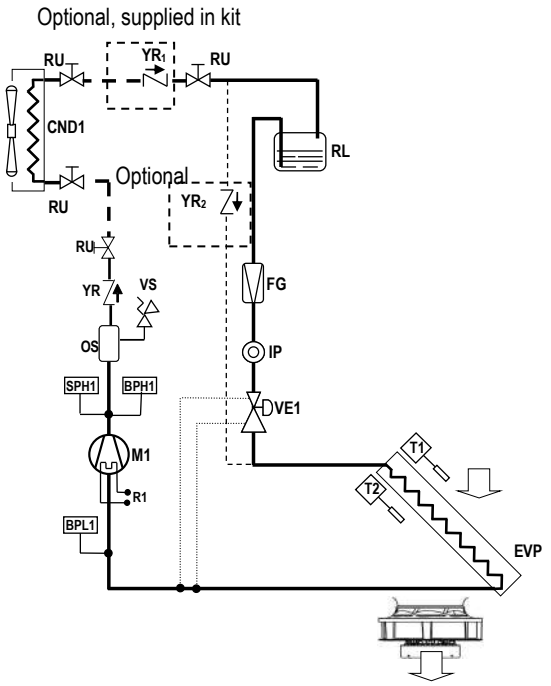
P171 – LOW TEMPERATURE KIT MCH AXIAL AC

The optional is available only for air conditioners matched with remote air-cooled condensers with axial fans with AC electric motors:

The system is necessary for the correct machine start up and operation with very low ambient air temperatures: between -20°C and -45°C.

Components for each refrigerant circuit:

- A check valve (YR_1), supplied in kit. The valve must be installed indoor, near to the air conditioner, on the liquid line on the return of the remote condenser. This valve avoids the migration of the refrigerant at liquid state in presence of very low ambient air condition.
- A check valve (YR_2), with controlled opening, installed in factory within the unit. It limits the pressure raising on the liquid pipe between the expansion valve and the check valve (YR_1).



LEGENDA

M1	Compressor
R1	Crankcase heater
CND	Condenser
EVP	Evaporator
BPH	High pressure transducer
BPL	Low pressure transducer
SPH	High pressure safety switch
OS	Oil separator
YR	Check valve
FG	Drier filter
IP	Sight glass
VE	Expansion valve
T	Temperature probe
RU	Taps.
RL	Liquid receiver
YR1	Check valve to be installed on the liquid line close to the machine inside the room
YR2	Unidirectional check valve with controlled opening that limits pressure rising on the liquid line

OPTIONAL ACCESSORIES: P191 – POWER SUPPLY FOR CONDENSER

The accessory allows the power supply of the remote condenser from the internal machine.
The electrical panel of the internal machine is set up with the electrical control components and terminal board for the electrical connection to the condenser.

OPTIONAL ACCESSORIES: 383 – NUMBERED WIRINGS + UK REQUESTS

The machine's electrical cables are all numbered for easy identification. For the power section it is possible to change the colour for the UK market.

CABLE	383 – COLOUR FOR UK
EARTH	YELLOW / GREEN
NEUTRAL	BLUE SKY
PHASE 1 (L1)	BROWN
PHASE 2 (L2)	BLACK
PHASE 3 (L3)	GREY
AUXILIARIES	RED

O
PTIONAL ACCESSORIES: 4181 – SERIAL CARD MODBUS

The card is factory installed.
Consult the Interface Manual for all technical information.

OPTIONAL ACCESSORIES: 4182 – SERIAL CARD LON

The card is factory installed.
The manufacturer will supply the serial card and .NXE file and a .XIF files necessary for LonWorks technicians to configure the network.
The board is programmed by the technician in charge of the integration.
Consult the Interface Manual for all technical information.

OPTIONAL ACCESSORIES: 4184 – SERIAL CARD BACNET MS/TP RS485

The card is factory installed.
The supervision network is set up by the technicians developing the BACnet interface.
The Modbus protocol database is used for interfacing.
Consult the Interface Manual for all technical information

OPTIONAL ACCESSORIES: 4185 – SERIAL CARD BACNET OVER IP

The card is factory installed.
The supervision network is set up by the technicians developing the BACnet interface. The Modbus protocol database is used for interfacing.
The manufacturer will supply the card and .MIB file necessary for technicians to configure the network.
The board is programmed by the technician in charge of the integration.
Consult the Interface Manual for all technical information and what is necessary for Internet connection to view and modify variables.

OPTIONAL ACCESSORIES: A492 – WATER LEACKAGE DETECTOR + ADDITIONAL DETECTOR

The system includes an electronic relay installed in the electrical panel of the indoor machine and 2 water detectors to be connected in series.
The electrical connections for the probe and the alarm contact are present in the indoor machine's terminal board.
The sensors are supplied to be connected and installed at customer care.

OPTIONAL ACCESSORIES: A511 - SMOKE DETECTORS
OPTIONAL ACCESSORIES: A521 – FIRE DETECTORS

Is possible to install one or both of the following sensors. Sensors are supplied in mounting kit.
Installation within the room at customer care.

A511 - SMOKE DETECTOR
The device in supplied in mounting kit.
The optical smoke detector senses the presence of combustion by-products (visible smoke) and activates an alarm.
The operating principle is based on the light scattering technique (Tyndall effect).
The device is in conformity to EN 54-7 standard.
Technical features:

Material	ABS		Relative humidity	<93% not-condensing
Power supply	12...28 Vdc		Index of protection	IP 20
Normal current	50µA 24 Vdc		Testing by magnet	Yes
Alarm current	25mA 24 Vdc		Relay	max. 1A 30Vdc
LED visibility	360° (double led)		Signal repeater	14mA 24 Vdc
Storage temperature	-10…+70°C		Covered area	40m^2 max.
Operating temperature	-10…+70°C		Shielded connection	Min. 0.5 mm^2
Max. speed air	0.2 m/s		Colour	White

A521 - FIRE DETECTOR
The device in supplied in mounting kit.
The fire detector has been designed to identify temperatures at which fires may start. When the temperature exceeds the set threshold or when there is a rapid variation in temperature, the relay is activated to signal an alarm. The device is in conformity to EN 54-5 standard.
Technical features:

Material	ABS		Index of protection	IP 20
Power supply	12...28 Vdc		Testing by magnet	Yes
Normal current	50µA 24 Vdc		Relay	max. 1A 30Vdc
Alarm current	25mA 24 Vdc		Signal repeater	14mA - 24 Vdc
LED visibility	360° (double LED)		Alarm temperature	62°C
Storage temperature	-10…+70°C		Covered area	40m^2 max.
Operating temperature	-10…+70°C		Shielded connection	Min. 0.5 mm^2
Relative humidity	<93% non-condensing		Colour	White

Supplied with unit to be connected and installed at customer care close to the unit.

OPTIONAL ACCESSORIES: 5891 – CONTROL UNIT VIA KIPLINK

The optional is factory installed.
KIPlink is an innovative system based on Wi-Fi technology that allows to operate on a unit directly from Smartphone or Tablet via an APP.

WI-FI MODULE:

- Standard: IEEE 802.11n – 802.11g
- Frequencies: 2.4 – 2.4835 GHz
  Output power: <20 dBm (equivalent to <100mW)
- Safety: WPA2
- Flow: < 20m

MEHITS APP

- Operating System: Android 5® or higher, IOS 8® or higher, Windows 10® or higher
- Download: Google Play®, Apple Store® e Microsoft Store®.

HOW TO USE KIPLINK

KIPlink can be used in three ways:

Proximity keyboard: Approaching the machine with a Smartphone or a Tablet with the MEHITS APP installed, you can connect to the machine via Wi-Fi and you can control it like the standard controller keyboard. It is possible to switch off / on the machine, change sets and reset alarms. Knowing the relative passwords, you access the parameters of the USER, SERVICE and MANUFACTURER menus.

Local Monitoring: Using a Smartphone, a Tablet or PC connected to the LAN of the building where the machine is also connected. Access is via WEB via a browser. The system has two access profiles: ONLY READ and READ & WRITE.
ONLY READ allows only the visualization of the parameters and it is not possible to control the unit.
READ & WRITE allows you to switch off / on the machine, change sets and reset alarms. Knowing the relative passwords, you access the parameters of the USER, SERVICE and MANUFACTURER menus.

Remote monitoring: Using a Smartphone, Tablet or PC connected to the VPN of the building where the machine is also connected, it is possible to operate and control from any geographical location where there is an internet connection. Use a secure VPN o avoid access by third parties that could compromise the operation of the machine. The cyber security is in charge of costumer.

DATA STORE

The system can store some data on a 1GB MicroSD card to be installed on the device. The data can be used for Service diagnostics. The card is not provided.

KIPLINK NETWORK

It is possible to set up mixed networks consisting of several KIPLink devices (10 maximum), to display information from different devices (called Client KIPLink) on one single device (called Master KIPLink).
The information is collected from the various Client KIPLink devices connected to EVOLUTION+ / W3000 TE/ CX-4 controllers and sent through the Wi-Fi or Ethernet network to the Master KIPLink device, which stores them and makes them available through an appropriate user interface.
The connection with the Master KIPlink can take place via Wi-Fi, via Ethernet or a combination of the two.
For complete information on the KIPlink system, please consult the relative technical documentation.

OPTIONAL ACCESSORIES: 6461 – HPC

HPC
Hydronic Plant Connect

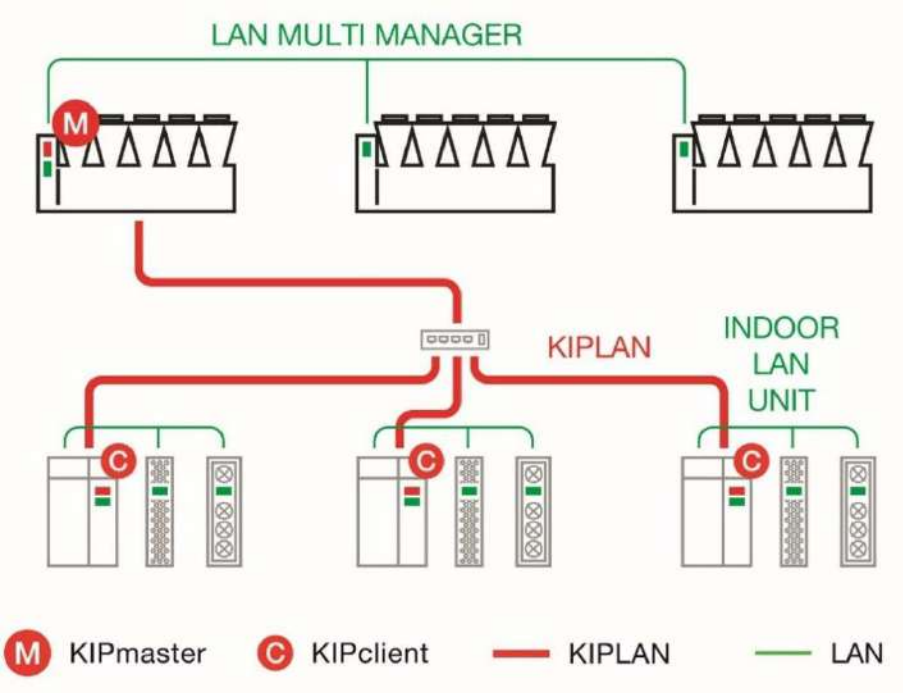
HPC is the **new advanced and fully integrated control function** designed by MEHITS for hydronic plant optimization. It connects MEHITS chillers and indoor CRAH units without any external devices.

INFRASTRUCTURE

The HPC function is based on LAN groups and the KIPlink network (KIPLAN).

- Every indoor and outdoor unit must be equipped with KIPlink.
- Every outdoor unit must be equipped with Multi Manager.
- HPC supports up to 20 LAN groups of indoor air conditioners (max 15 units per group) and 1 LAN group of outdoor chillers (max 8 units).
- HPC requires a KIPLAN (KIPlink network) made up of one unit per each LAN group. The result is a KIPLAN made of 1 chiller unit (KIP Master), and up to 20 indoor units (KIP Clients).
- KIPLAN network allows HPC data communication between the different LAN groups (indoor and outdoor).

KIPlink allows direct access to all HPC variables and parameters with devoted menus and pages. The most important parameters are also available on the Compact/Large Keyboard.



Further information is available in the dedicated Manuals (W3000+, Evolution+, KIPlink).

WORKING LOGICS

The HPC control logics enhance the system efficiency leveraging on partial loads, redundant units, and favourable ambient conditions.
HPC acts on time intervals. The time lapse between each HPC action can be set from 1 to 500 minutes. The time left until the AV action is visible in the KIPlink group interface section.
According to the instantaneous operating conditions detected in the chilled water system, HPC regulates: the chillers' set-point, the pumps' speed, and the indoor air conditioners' valves and fans.
The main variables taken into consideration are:

- Cooling demand of each indoor unit group (room temperature, fans' speed, valve opening)
- Chilled water temperature
- Pumps' speed
- Chillers' group operating status (outdoor air temperature, FC availability)

The highest benefits are achieved in systems with VSD pumps and free-cooling chillers.

IT cooling load satisfaction is paramount. HPC always gives priority to room cooling dependability. Therefore, actions are taken on the basis of the indoor unit groups' status.
There are 4 operating modes, in order of priority:

1. **Reset**
When the cooling demand of at least one group of indoor units suddenly increases.
HPC contribution is reset and suspended until the Reset message is active.
The system immediately increases the cooling capacity.

2. **Reduce**
When the cooling demand of at least one group of indoor units slightly increases.
HPC contribution is reduced. The system increases the cooling capacity.

3. **Optimization On**
When the cooling demand of all groups of indoor units remains stable or decreases.
HPC optimizes the system by increasing its contribution.

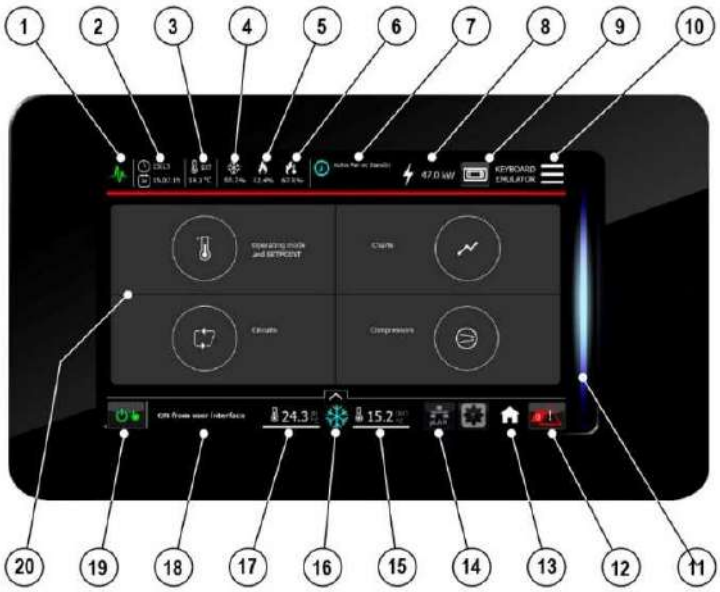
4. **No Action**
When the cooling demand of all groups of indoor units remains stable or decreases, but HPC has already pushed the system to the best performance achievable in the current conditions.
No further action is taken.

PLUS
- Fully in house developed and patent pending
- Completely integrated, no need for any external devices
- Based on proprietary logics and devices (Multi Manager, KIPlink)
- Energy simulations, comparisons, and payback analysis available on ELCA software
- Ideal to complete the package of a MEHITS chilled water system (chillers and CRAHs)

OPTIONAL ACCESSORIES: A35B – GRAPHIC DISPLAY "Evolution Touch"

The optional is factory installed.
7" touch-screen graphic display with 16.7 million colors for the management and monitoring of operating and alarm status.
The Display is equipped with a MicroUSB 2.0 port for the service connection.

The navigation bars are always present on the display to allow quick and intuitive navigation.



TOP NAVIGATION BAR

1. Status of connection with the controller. Green: connection OK; Red: connection Error
2. Time and date
3. External temperature value by dedicated probe
4. Active percentage of Cooling
5. Active percentage of Heating
6. Active percentage of Post-Heating
7. Unit active functions
8. Power meter readings
9. PGD1 keyboard emulator
10. Rapid access to the menu (Quick menu)

BOTTOM NAVIGATION BAR

11. Light bar for machine status identification
12. Alarm button to access the alarm management screen and the number of active alarms
13. Home button for returning to the Homepage
14. pLAN network
15. Temperature of outlet air or percentage of humidity.
16. Operating mode button.
17. Inlet air temperature
18. Unit status
19. On/Off button

DISPLAY AREA

20. Main menu
    a. Operating mode and Set-Point
    b. Circuits
    c. Charts
    d. Compressors

For complete information on Graphic Display system, please consult the relative technical documentation.

OPTIONAL ACCESSORIES: A352 - NO DISPLAY

The unit is supplied without display and adjustment is only possible with the KipLink accessory.

OPTIONAL ACCESSORIES: P141 – ANALOGUE SET-POINT COMPENSATION

Analogue set point compensation according to an external analogue signal at Customer care.
The microprocessor control, through the additional module "expansion card", can manage a compensation signal of the return air setpoint by analogue input (0...1V; 0...5V; 0,5...4,5V; 4...20mA; 0...20mA). The compensation curve allows to assign a temperature setpoint offset respectively to the minimum and maximum signal managed by the input.

OPTIONAL ACCESSORIES: P181 – NETWORK ANALYZER
OPTIONAL ACCESSORIES: P182 – NETWORK ANALYZER+OPTIONAL
OPTIONAL ACCESSORIES: P183 – KIT NETWORK ANALYZER
OPTIONAL ACCESSORIES: P184 – KIT NETWORK ANALYZER+OPTIONAL

This device provides continuous measurement of power consumption, monitoring current, voltage and power. These values are sent to unit microprocessor via RS485 serial cable, as shown on the unit wiring diagram.
The displayed variables are:

- Phase to phase voltage, only for three-phase units;
- Phase voltage (phase-neutral);
- Phase current;
- Neutral current only for three-phase units;
- Active phase power, only for three-phase units;
- Total active power;
- Active energy;
- Hour counts

INTERNAL installation

INSTALLATION

Frame	Power Supply	Installation	Code
E1	400/3+N/50	EXTERNAL to the unit, supplied in kit	P183 / P184 (*)
E2	400/3+N/50	EXTERNAL to the unit, supplied in kit	P183 / P184 (*)
E3	400/3+N/50	EXTERNAL to the unit, supplied in kit	P183 / P184 (*)

(*) P182, P184 for units with optional (with electric heaters and/or humidifier)

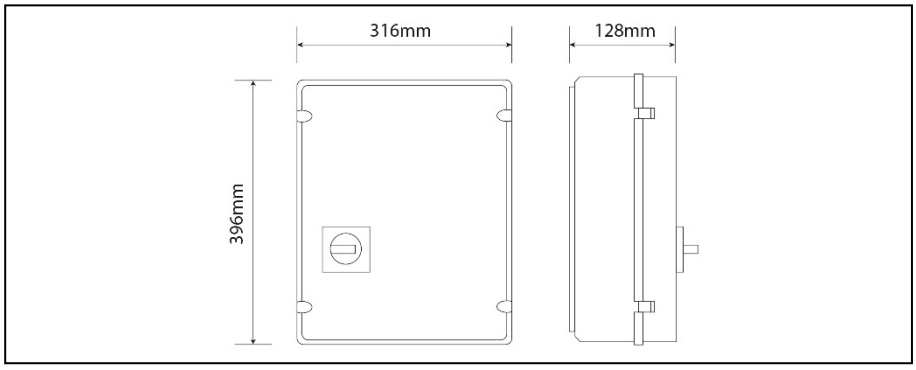
INTERNAL INSTALLATION
The optional is installed within the electrical box downstream the main switch with door safety lock and includes:

- Network transducer;
- Current transformers, one for each power supply phase cable.

EXTERNAL installation

MOUNTING KIT
The optional is supplied in box for external installation to the machine with the dimensions showed in the figure below, and includes:

- Main switch with door lock safety;
- Fuse;
- Network transducer;
- Current transformers, one for each power supply phase cable;
- Terminals.



OPTIONAL ACCESSORIES: A812 – FREE-COOLING DIRECT CONTROL

Preparation of the machine and the electrical panel for the direct free-cooling system "P034 Intake free-cooling plenum "

OPTIONAL ACCESSORIES: P021 – 2-WAY BALL BY-PASS VALVE

The optional is available for main chilled water circuit only.
2-way motorized valve with 0÷10 VDC control actuator and emergency manual control for the third way (by-pass) of the hydraulic circuit.
The valve is in combination with the main 2-way water flow control valve.
The optional accessory is factory installed and don't modify the overall dimensions of the unit.
The coupling to the main 2-way control valve of a second modulating valve, connected in by-pass, allows to obtain the same control system of a 3-way mixing valve for plant with constant water flow.
At the same time the appropriate sizing of these valves allows hydraulic balancing of the by-pass way.

This type of valve offers the following series of benefits:

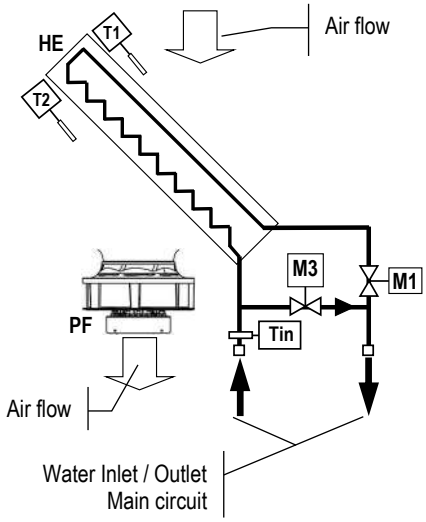
- Equal percentage flow control.
- No peaks initial flow.
- Excellent stability control thanks to the integrated characterizing disc.
- Excellent characteristic in partialisation.
- Stability in control.
- Maintenance free.
- Self-cleaning.

CHARACTERISTICS OF THE 2-WAY BALL VALVE

- Closing seal with leakage rate in Class A (EN 12266-1)
- Maximum fluid pressure Ps=1600kPa
- Maximum closing pressure (Close-off) ΔPs=1400kPa

The rotative actuator is controlled by a signal 0 … 10VDC from the microprocessor controller. The actuator is equipped with an emergency button for manual operation and is maintenance-free.

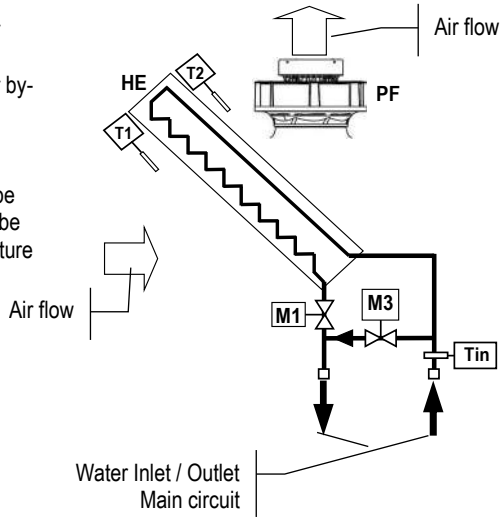
UNDER Version



LEGENDA

M1	2-way modulating valve for main coil
M3	2-way modulating valve for by-pass
HE	Main coil
PF	Plug Fan.
T1	Air return temperature probe
T2	Air supply temperature probe
Tin	Chilled water inlet temperature probe

OVER Version



TECHNICAL DATA

VERSION (1)		U / O	U / O	U / O
MODEL		012 M1 S	018 M1 S	022 M1 S
SIZE		E1	E2	E3
2-WAY VALVE FOR BY-PASS				
k_V – Flow coefficient	m^3/h	4,0	4,0	6,3

1. U = Under, downflow / O = Over, upflow

IMPORTANT: **For further information, please refer to chapter "VALVE PRESSURE DROP CALCULATION AS FUNCTION OF WATER FLOW RATE**.

OPTIONAL ACCESSORIES: A431 – ELECTRIC HEATERS
OPTIONAL ACCESSORIES: A432 – EXTRA POWER ELECTRIC HEATERS

A431 – ELECTRIC HEATERS
Electric heater consisting of finned aluminum elements, ensuring low surface temperature and deleting the air ionization problems. The optional is installed downstream the main cooling coil.
In electric heaters with three working steps the activation is binary type.
Components:

- Electric heater in aluminium armoured elements with integral fins
- Electrical control
- Safety thermostat.

Temperature control on suction air.

TECHNICAL DATA

VERSION (1)		U / O	U / O	U / O
MODEL		012 M1 S	018 M1 S	022 M1 S
SIZE		E1	E2	E3
THERMAL CAPACITY	kW	5,1	5,1	6,0
Absorbed current (OA)	A	7,4	7,4	8,7
First working step	kW	5,1	5,1	3,0
Second working step	kW	--	--	3,0+3,0
Third working step	kW	--	--	--
NET WEIGHT (2)	kg	4	4	7

A432 – EXTRA POWER ELECTRIC HEATERS
The optional is not available for size E1, E2
The components are the same of the standard accessory
Temperature control on suction air.

OPTIONAL ACCESSORIES : P051 – DEHUMIDIFICATION FUNCTION

The optional requires mandatory accessory “P161 T/rH air intake sensor“.

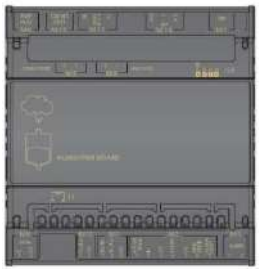
Components:

- T / rH air intake sensor.
- Electronic control system of the dew point temperature for the combined intervention of cooling capacity and air flow.

OPTIONAL ACCESSORIES: 4301 – STEAM HUMIDIFIER 3KG/H

Modulating steam humidifier with immersed electrodes fitted with safety and running accessories.
The optional includes the control board.
The optional requires mandatory accessory “P161 T/rH air intake sensor“.
The optional is factory installed and requires only water filling connection.
Humidifier water charge and discharge pipes are not supplied.
It is recommended to install a filter and a shut-off valve on the pipe to the water inlet.
This humidifier produces non-pressurized steam by electrodes immersed in the water inside the cylinder: they bring the electric phase in the water that works as an electrical resistance and overheats.
The steam so produced is distributed with dedicated distributors and used for ambient humidification or for industrial processes.

CHARACTERISTICS OF THE SUPPLY WATER
The quality of the used water influences the evaporation process, so the humidifier can be fed with **not-treated water, only when potable and non-demineralised.**



Humidifier control board

LIMIT VALUES

			Min	Max
Hydrogen ions	pH		7	8,5
Specific conductivity at 20°C	$\sigma_{R,\,20\,°C}$	µS/cm	350	750
Total dissolved solids	TDS	mg/l	(1)	(1)
Dry residue at 180°C	R_{180}	mg/l	(1)	(1)
Total hardness	TH	mg/l $CaCO_3$	100 (2)	400
Temporary hardness		mg/l $CaCO_3$	60 (3)	300
Iron + Manganese		mg/l Fe + Mn	0	0,2
Chlorides		ppm Cl	0	30
Silica		mg/l SiO_2	0	20
Residual chlorine		mg/l Cl^-	0	0,2
Calcium sulphate		mg/l $CaSO_4$	0	100
Metallic impurities		mg/l	0	0
Solvents, diluents, soaps, lubricants		mg/l	0	0

(1) Values depending on specific conductivity; in general: TDS ≅ 0,93 * $\sigma_{R,\,20\,°C;}$ R_{180} ≅ 0,65 * σ_R
(2) Not lower than 200% of the chloride content in mg/l di Cl^-
(3) Not lower than 300% of the chloride content in mg/l di Cl^-

WARNING:

- **Use only with drinking water.**
- **There is no reliable relationship between hardness and water conductivity**
- **Do not treat water with softeners! This could cause corrosion of the electrodes or the formation of foam, leading to potential operating problems or failures.**
- **Do not add disinfectants or corrosion inhibiters to water, as these substances are potentially irritant.**
- **Is absolutely forbidden to use well water, industrial water or water drawn from cooling circuits; in general, avoid using potentially contaminated water, either from a chemical or bacteriological point of view.**

TECHNICAL DATA

VERSION (1)		**U / O**	**U / O**	**U / O**
MODEL		**012 M1 S**	**018 M1 S**	**022 M1 S**
SIZE		**E1**	**E2**	**E3**
VAPOUR PRODUCTION	**kg/h**	**3**	**3**	**3**
Power input	kW	2,3	2,3	2,3
Absorbed current (OA)	A	3,2	3,2	3,2
Max absorbed current (OA)	A	4,5	4,5	4,5
Water content	l	3,9	3,9	3,9
Max water supply pressure	Bar	1÷8	1÷8	1÷8
NET WEIGHT (2)	kg	4	4	4
HYDRAULIC CONNECTION				
WATER INLET - ISO 228/1 – G M	Ø	3/4"	3/4"	3/4"
WATER OUTLET – external diameter	Ø mm	19	19	19

1. U = Under, downflow / O = Over, upflow
2. Value to be added to the weight of the standard unit. Does not include the weight of the water content.

OPTIONAL ACCESSORIES: P161 - T/RH AIR INTAKE SENSOR

P161: T/RH AIR INTAKE SENSOR
The accessory replaces the temperature sensor installed on the air intake in the unit and allows the displaying of the relative humidity room value
The sensor is mandatorily required with following option:

- 4301 Humidifier;
- P161 Dehumidification function;
- P034 Intake free-cooling plenum.

OPTIONAL ACCESSORIES: P071 / P072 / P073 / P074 - REMOTE T/RH PROBE

In addition to the on-board temperature probes, the unit's control can manage up to 4 remote T/RH probes (optional), to measure the return and the delivery air temperature in different positions.
Depending on the individual characteristics of the room and the cooling equipment, the customer can choose where to install the additional probes to achieve best measurement results (N. add. return probes + N. add. delivery probes ≤ 4).
The probes can be configured from the Service menu of the controller.
The probes that are enabled, contribute to the calculation of the return and delivery temperature used for capacity adjustment purposes.
The customer can choose between different types of calculation:

- Temperature of the first probe enabled
- Average temperature of the probes
- Highest temperature of the probes
- Lowest temperature of the probes.

Notes:
If a probe is connected but not enabled, its measurement can still be read on the display and by the BMS, but it is not used to calculate the adjustment temperature. It is possible to disable the probe on the unit and use only the remote probes for capacity adjustment purpose.

- **P071: One** Combined Temperature / Humidity sensor for remote installation. The optional is added to the on-board temperature sensors.
- **P072: Two** Combined Temperature / Humidity sensors for remote installation. The optional is added to the on-board temperature sensors.
- **P073: Three** Combined Temperature / Humidity sensors for remote installation. The optional is added to the on-board temperature sensors.
- **P074: Four** Combined Temperature / Humidity sensors for remote installation. The optional is added to the on-board temperature sensors

OPTIONAL ACCESSORIES: 4666 – EXTERNAL AIR PROBE

The probe must be installed protected against atmospheric agent and allows the displaying of the external air temperature.
The sensor is mandatorily required with following option:

- P034 Intake free-cooling plenum.

OPTIONAL ACCESSORIES: P113 – KIT DUAL POWER SUPPLY
OPTIONAL ACCESSORIES: P114 – KIT DUAL POWER SUPPLY + OPTIONAL

The motorised changeover switches automatically manage changeover under load between two three-phase power supplies, or manually for emergency operations.
These devices are suitable for low voltage systems with interruption of the supply to the load during transfer.
The model supplied in the automatic version checks the source and switches over automatically, based on configurable parameters.

OPEN TRANSITION TYPE TRANSFER SWITCH WITH A MINIMUM INTERRUPTION OF THE SUPPLY DURING TRANSFER.

To maintain the microprocessor powered and avoid its restarts it is suggested the "P091 Back-up module controller" optional accessory. The back-up module guarantees the microprocessor power supply for a few minutes, in case of supply voltage failure.

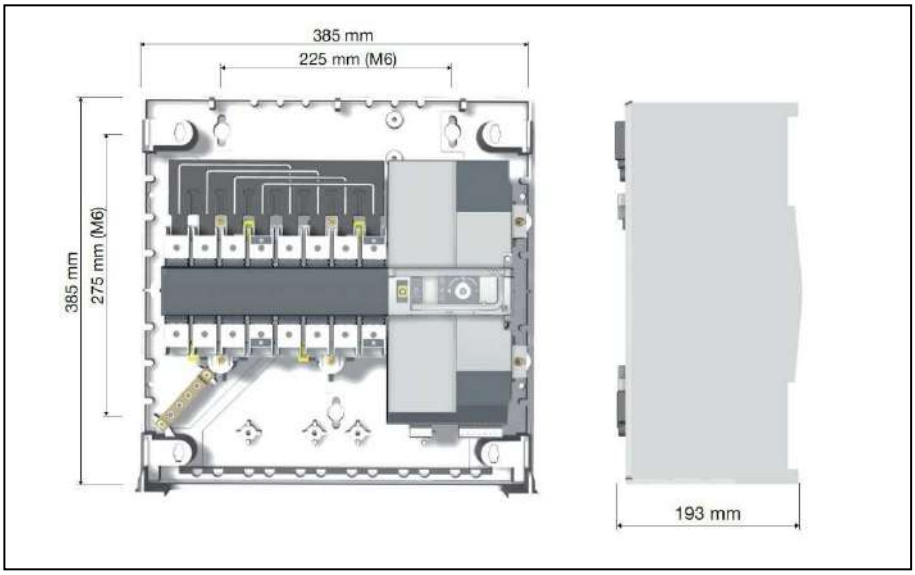
The remote condenser must be powered by the automatic transfer switch.
It is suggested the optional "P191 Power supply for condenser" from the indoor machine electrical board. The optional includes magnetothermic switches for condenser fans.

INSTALLATION

Frame	Power Supply	Installation	Code
E1	400/3+N/50	EXTERNAL to the unit, supplied in kit	P113, P114 (*)
E2	400/3+N/50	EXTERNAL to the unit, supplied in kit	P113, P114 (*)
E3	400/3+N/50	EXTERNAL to the unit, supplied in kit	P113, P114 (*)

(*) P114 for units with optional (with electric heaters and/or humidifier)

MOUNTING KIT
For EXTERNAL installation, the optional accessory is supplied in special box with IP 3X ingress protection, with the dimensions shown in the figure below.



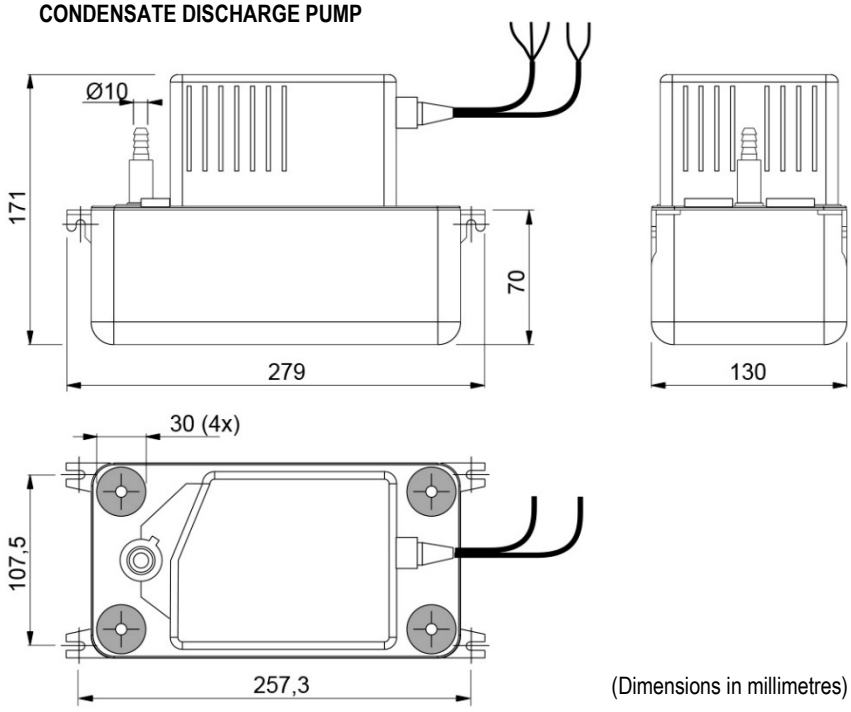
OPTIONAL ACCESSORIES: A381 - DRAIN PUMP

A plastic case contains the vertical type pump, the water tank with float plus safety switch and hydraulic and electric connection.
Together the pump 10 linear meters anti-crushing plastic discharge spiral tube is supplied
The optional has to be installed as shown in the documentation delivered together with the unit.
Wiring includes power supply and an alarm, displayed on microprocessor, that includes motor pump thermal protection and tank overflow.
The condensate discharge pump operation is fully automatic.

WARNING
For all the machines the optional accessory is supplied in mounting kit.

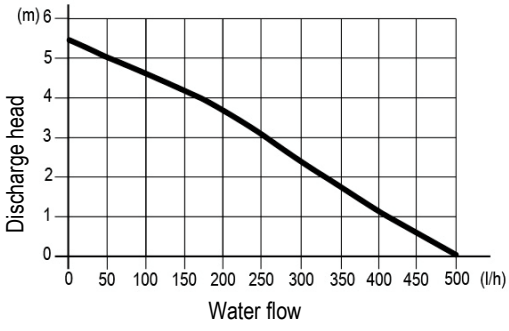
TECHNICAL DATA
Power supply: 230V~ 50Hz
Electrical data: 70W – 0,67A
Maximum water flow: 500 l/h
Maximum delivery height: 5.0 m
Sound level: 45dBA a 1 m
Maximum water temperature: 70°C
Water acidity: pH>2.5
Tray volume: 2.0 l
Protection IP 20

CONDENSATE DISCHARGE PUMP



(Dimensions in millimetres)

OPERATING DATA



	Total length of discharge pipes (Ø 10 mm internal)			
Discharge head	**5m**	**10m**	**20m**	**30m**
1m	380	300	240	190
2m	310	260	200	150
3m	240	200	145	110
4m	150	130	80	60
5m	30	20	0	0

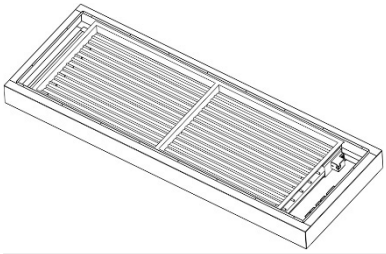
OPTIONAL ACCESSORIES: P084 – AIR FILTER ePM_{10} 50%

The ePM_{10} 50% air filters (according to ISO EN 16890), replace the standard one.
The filters generate a pressure drops higher than the standard ones.
The filters are made of glass micro-fibre and are not regenerable.

VERSION (1)		U / O	U / O	U / O
MODEL		012 M1 S	018 M1 S	022 M1 S
SIZE		E1	E2	E3
Additional pressure drops (2)	Pa	48	68	43

1. U = Under, downflow / O = Over, upflow
2. Additional pressure drops referred to nominal air flow and clean filter.

OPTIONAL ACCESSORIES: A531 – ON-OFF DAMPER



Non-return air damper with frame driven by electric servomotor.
Accessory installed on unit air delivery and it can be matched to plenums and floor stand.
The accessory requires mandatory accessory “9973 Wooden cage packing”.

FRAMEWORK

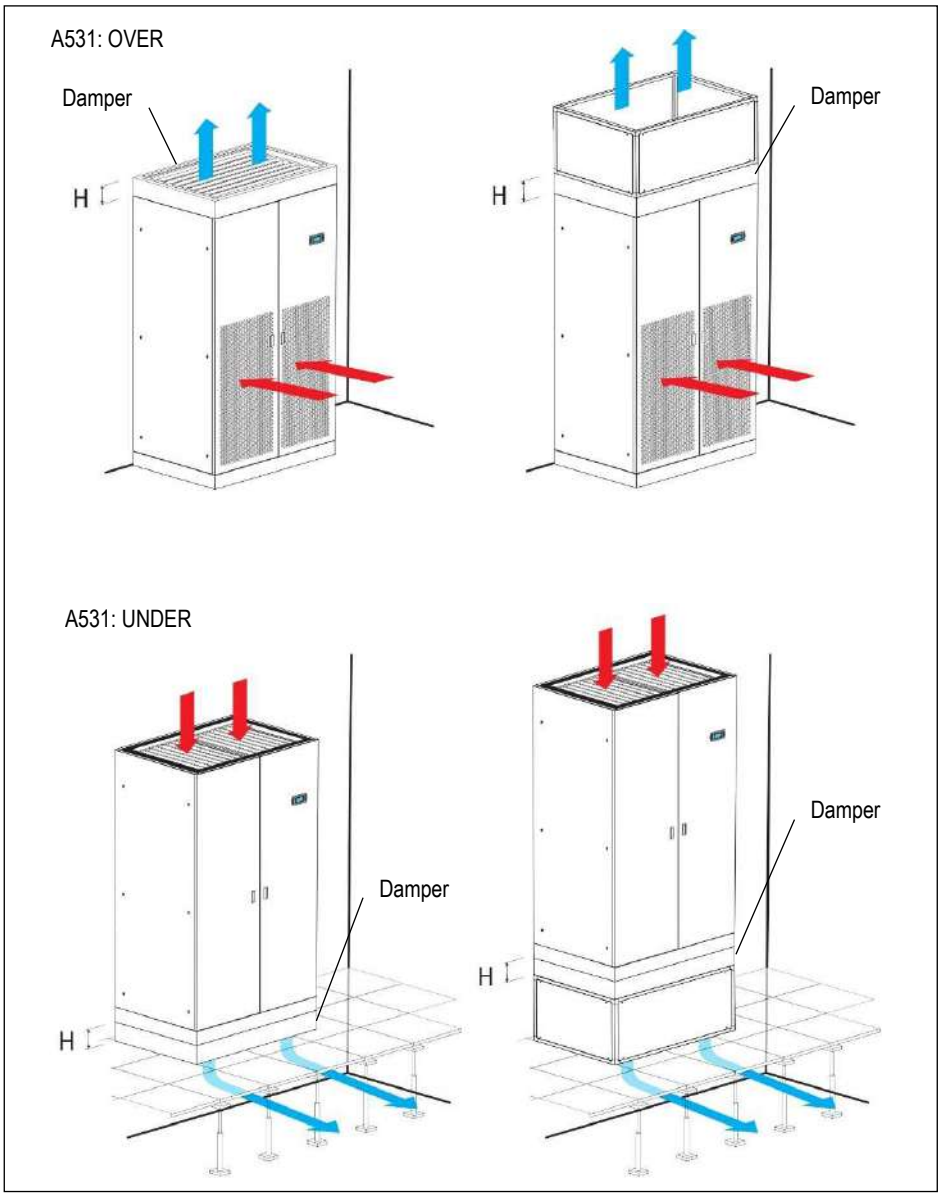
- Frame in galvanized steel sheet with protective surfaces treatment in compliance with UNI ISO 9227/ASTMB117 and ISO 7253, and painted with epoxy powders. Colour RAL 9005;
- Opposed blade dampers in galvanized steel sheet.
- Actuator for damper control.
- Terminals for electric connection to the unit.

VERSION (1)		U / O	U / O	U / O
SIZE		**E1**	**E2**	**E3**
A	mm	650	785	1085
B	mm	650	650	750
C	mm	300	450	750
D	mm	510	510	610
E	mm	231	216	216
F	mm	73	73	73
G	mm	46	46	46
H	mm	170	170	170
Weight (2)	kg	20	23	30

1. U = Under, downflow / O = Over, upflow
2. Add this value to the total unit weight

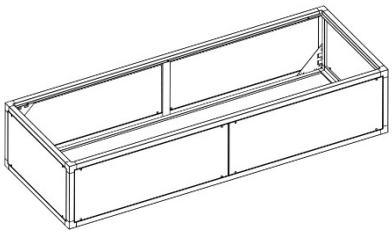
ACCESSORIES

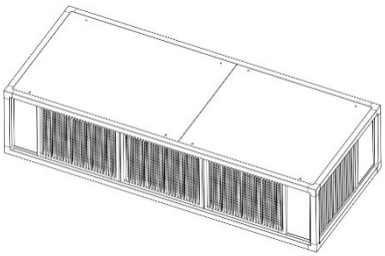
INSTALLATION EXAMPLE

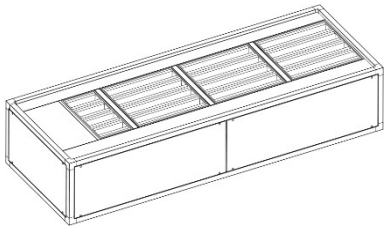


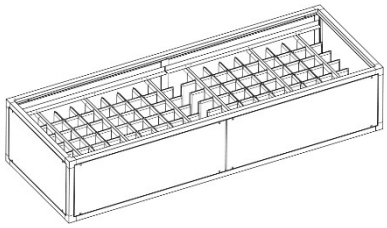
WORKING LOGIC
The damper opens at supply fans activation to allow air flow.
When the fans stop for failure or stop command, the damper closes, preventing air flow into the unit.

OPTIONAL ACCESSORIES: P011 - EMPTY PLENUM
OPTIONAL ACCESSORIES: P012 - EMPTY PLENUM CL.A1
OPTIONAL ACCESSORIES: P031 - EMPTY INTAKE PLENUM
OPTIONAL ACCESSORIES: P032 - EMPTY INTAKE PLENUM CL.A1
OPTIONAL ACCESSORIES: P013 - PLENUM + 3 GRILLES
OPTIONAL ACCESSORIES: P014 - PLENUM + 3 GRILLES CL.A1
OPTIONAL ACCESSORIES: P015 - SILENCED PLENUM
OPTIONAL ACCESSORIES: P016 - SILENCED PLENUM + 1 GRILLE
OPTIONAL ACCESSORIES: P017 - PLENUM + FILTER EPM2.5 50%
OPTIONAL ACCESSORIES: P018 - PLENUM + FILTER EPM1 50%
OPTIONAL ACCESSORIES: P019 - PLENUM + FILTER EPM1 85%









The optional is supplied separately and the installation on the unit is at Customer care.
The plenums have same technical characteristics and base dimensions of the machine cabinet.

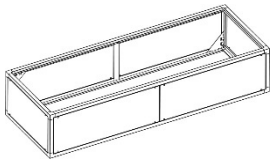
It is possible to install only a single plenum to ensure stability to the unit.

FRAMEWORK

- Frame in aluminium extrusion, painted with epoxy powders. Colour RAL 9005;
- Panels in galvanized steel sheet with protective surfaces treatment in compliance with UNI ISO 9227/ASTMB117 and ISO 7253, and painted with epoxy powders. Colour RAL 9005;
- Panels insulated with polyurethane foam and seals to ensure air tight.
- Panels fixed with screws.
- Removable panels.
- Set of fixing elements to fasten the plenum to the unit.

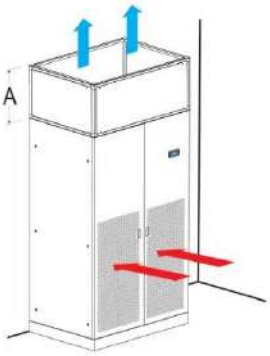
WARNING
In UNDER version units the piping is inside the machine.
The air delivery plenums sometime don't allow the extension of the pipes downwards.
In special cases, to keep the connections inside the machine, foresee a plenum 200mm higher than the standard one.

ACCESSORIES

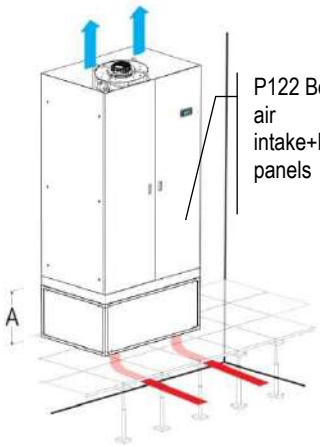


P011 / P012 – P031 / P032: EMPTY PLENUM
The plenum is void and can be used to rise the intake/delivery air inlet/outlet.
Also available with fire reaction in class "0" or "A1" (EN 13501-1).
The optional accessories "P031 Empty intake plenum, for OVER version" and "P032 Empty intake plenum CL.A1, for OVER version" require mandatory accessory "P122 Bottom air intake+blind panels, for OVER version only".

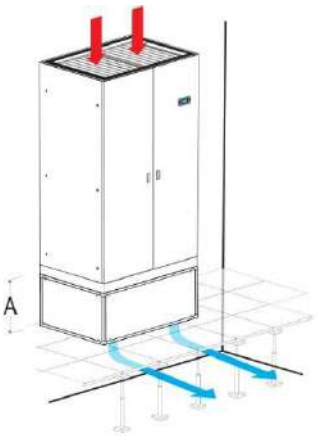
P011 / P012 OVER



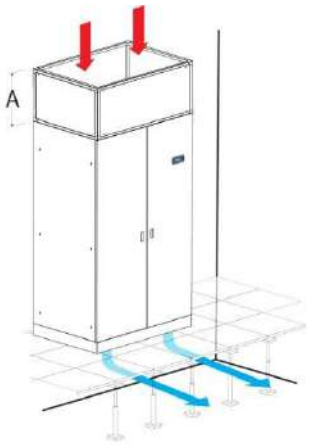
P031 / P032 OVER



P011 / P012 UNDER



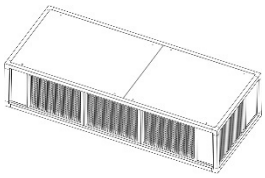
P031 / P032 UNDER



VERSION (1)		U / O	U / O	U / O
SIZE		E1	E2	E3
A	mm	490	490	490
Weight (2)	kg	20	21	20
Weight CL.0 or A1 (EN 13501-1) (2)	kg	25	27	27

1. U = Under, downflow / O = Over, upflow
2. Add this value to the total unit weight

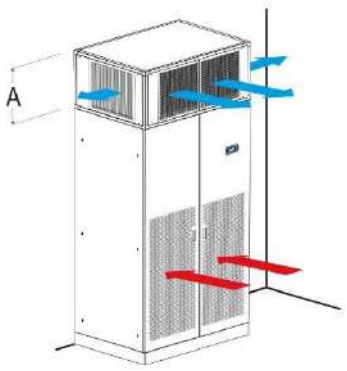
ACCESSORIES



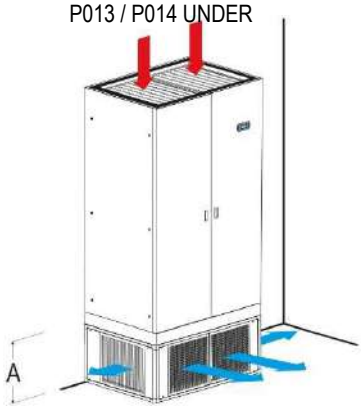
P013 / P014: PLENUM + 3 GRILLES

The plenum must be installed on air delivery.
The plenum allows the air distribution directly into the room. The plenum is supplied with air distribution grilles with double row adjustable grilles on front and lateral side.
Also available with fire reaction in class “0” or “A1” (EN 13501-1).

P013 / P014 OVER

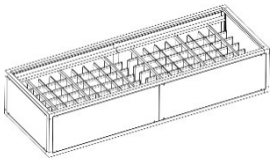


P013 / P014 UNDER



VERSION (1)		U / O	U / O	U / O
SIZE		E1	E2	E3
A	mm	490	490	490
Weight (2)	kg	21	23	30
Weight CL.0 or A1 (EN 13501-1) (2)	kg	25	28	37

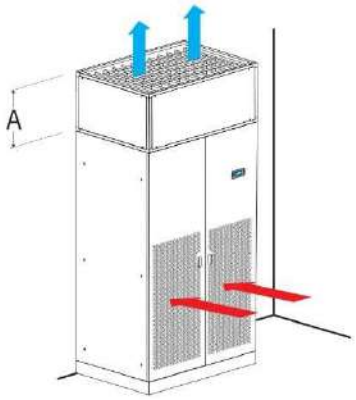
1. U = Under, downflow / O = Over, upflow
2. Add this value to the total unit weight



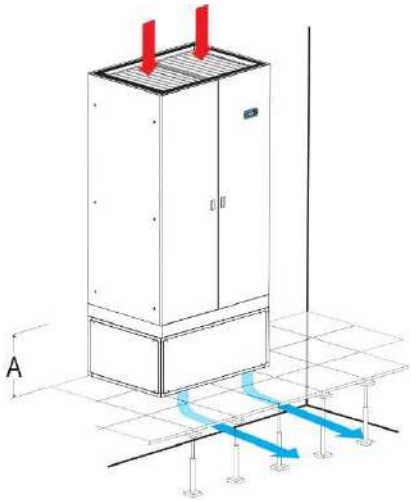
P015: SILENCED PLENUM

The plenum must be installed on air delivery.
The plenum is fitted with noise absorption partitions to reduce the noise emission.
Remove the frontal panels for inspection.

P015 OVER



P015 UNDER



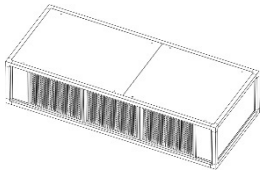
VERSION (1)		U / O	U / O	U / O
SIZE		E1	E2	E3
A	mm	490	490	490
Weight (2)	kg	25	27	30

1. U = Under, downflow / O = Over, upflow
2. Add this value to the total unit weight

ACOUSTIC DATA

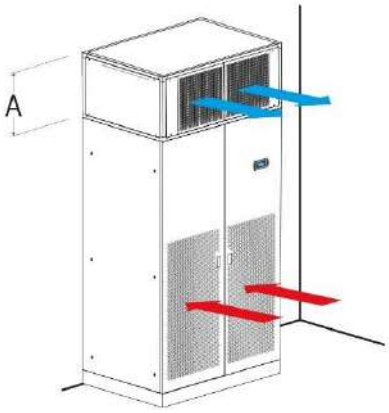
VERSION (1)		U / O	U / O	U / O
MODEL		012 M1 S	018 M1 S	022 M1 S
SIZE		E1	E2	E3
SOUND LEVEL ISO 3744 (2)				
On air delivery, Under	dB(A)	61,0	67,3	64,1
On air intake, Under	dB(A)	55,4	57,6	54,4
On front side, Under	dB(A)	46,2	48,1	44,8
On air delivery, Over	dB(A)	61,0	60,6	61,2
On air intake, Over (3)	dB(A)	53,2	47,5	48,5
On front side, Over (4)	dB(A)	45,7	41,4	41,7
Air flow (5)	m^3/h	2700	4100	5100

1. U = Under, downflow / O = Over, upflow
2. Noise pressure level at 1 meter in free field – ISO 3744
3. Air intake from the front
4. Air intake from the bottom
5. Nominal air flow with noise absorption partitions plenum installation and external static pressure 20 Pa.

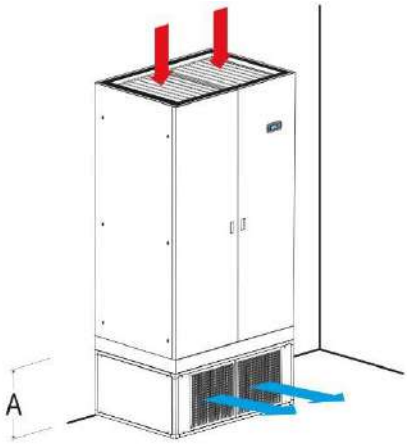


P016: SILENCED PLENUM + 1 GRILLE
The plenum must be installed on air delivery.
The plenum allows the frontal air distribution directly into the room and a noise reduction of the air delivery. The plenum is supplied with air distribution grille with double row adjustable grilles on front side and noise absorption partitions,

P016 OVER



P016 UNDER



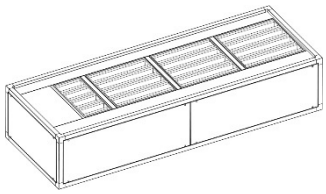
VERSION (1)		U / O	U / O	U / O
SIZE		E1	E2	E3
A	mm	490	490	490
Weight (2)	kg	30	30	37

1. U = Under, downflow / O = Over, upflow
2. Add this value to the total unit weight

ACOUSTIC DATA

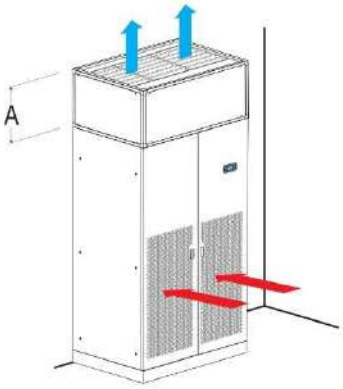
VERSION (1)		U / O	U / O	U / O
MODEL		012 M1 S	018 M1 S	022 M1 S
SIZE		E1	E2	E3
SOUND LEVEL ISO 3744 (2)				
On air delivery, Under	dB(A)	60,0	62,1	61,2
On air intake, Under	dB(A)	55,8	58,8	55,5
On front side, Under	dB(A)	46,6	50,9	45,6
On air delivery, Over	db(A)	60,0	62,1	61,2
On air intake, Over (3)	dB(A)	53,4	48,7	48,9
On front side, Over (4)	dB(A)	46,1	43,1	42,4
ADDITIONAL PRESSURE DROPS (5)	Pa	52	83	50
AIR FLOW	m^3/h	2700	4100	5100

1. U = Under, downflow / O = Over, upflow
2. Noise pressure level at 1 meter in free field – ISO 3744
3. Air intake from the front
4. Air intake from the bottom
5. Value to be subtracted from the nominal external static pressure of the unit

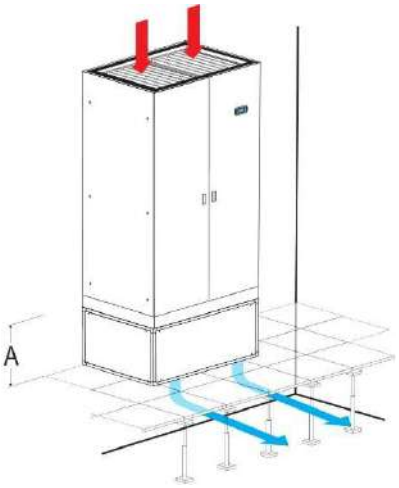


P017 / P018 / P019: SUPPLY PLENUM + FILTER
The plenum must be installed on air delivery.
The optional is not compatible with “P084 Air filter ePM10 50%”.
The plenum is fitted with high efficiency rigid bag filters.
Filters are made of glass micro fibre and are not regenerable.
Remove the frontal panels for filters replacement.

P017 / P018 / P019 OVER



P017 / P018 / P019 UNDER



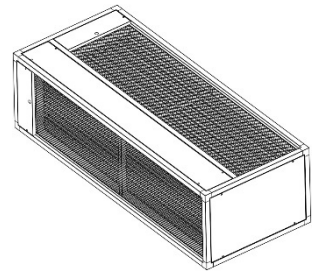
VERSION (1)		U / O	U / O	U / O
SIZE		E1	E2	E3
A	mm	490	490	490
Weight (2)	kg	26	27	30

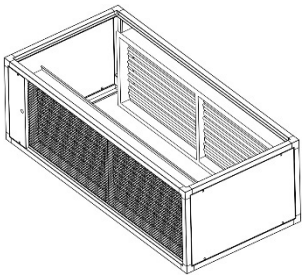
1. U = Under, downflow / O = Over, upflow
2. Add this value to the total unit weight

VERSION (1)		U / O	U / O	U / O
MODEL		012 M1 S	018 M1 S	022 M1 S
SIZE		E1	E2	E3
PRESSURE DROPS (2)				
Filters $ePM_{2.5}$ 50%	Pa	58	113	64
Filters ePM_1 50%	Pa	72	115	79
Filters ePM_1 85%	Pa	86	138	97

1. U = Under, downflow / O = Over, upflow
2. Data referred to the nominal air flow and clean filters. Value to be subtracted from the maximum external static pressure of the unit.

OPTIONAL ACCESSORIES: P034 – INTAKE FREE-COOLING PLENUM



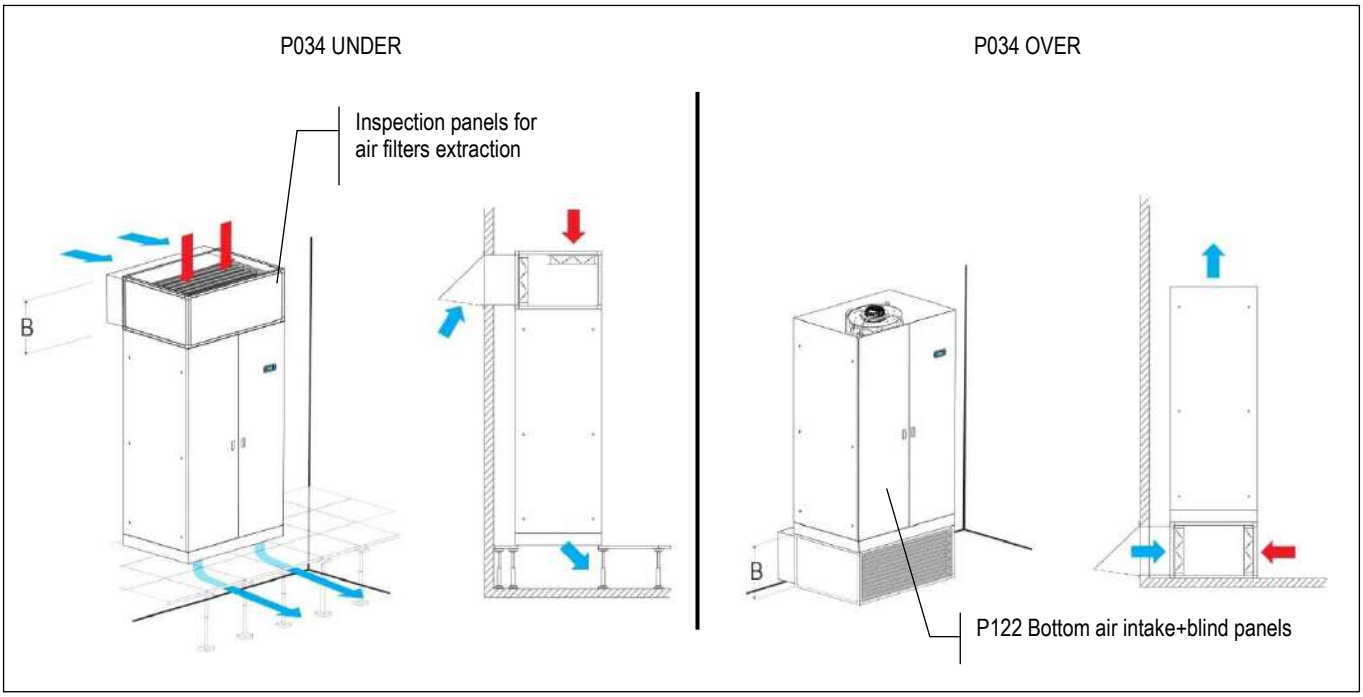


The optional is supplied separately and the installation on the unit is at Customer care.
The optional requires mandatory accessories "P161 T/rH air intake sensor", "4666 External air probe", "A812 Free-cooling direct control" and "P122 Bottom air intake+blind panels, for OVER version only"
The plenums have same technical characteristics and base dimensions of the machine cabinet.
The optional allow to obtain free-cooling by direct ambient air intake into the room.
The dampers are proportionally managed by the microprocessor control, that regulates the quantity of the ambient air to put in the room per the set-point.

COMPONENTS

- Frame in aluminium extrusion, painted with epoxy powders. Colour RAL 9005;
- Panels in galvanized steel sheet with protective surfaces treatment in compliance with UNI ISO 9227/ASTMB117 and ISO 7253, and painted with epoxy powders. Colour RAL 9005;
- Panels insulated with polyurethane foam and seals to ensure air tight.
- Removable panels with screws.
- Opposed blade dampers in galvanized steel sheet and safety grille for ambient air and room air suction.
- Actuator for each damper.
- Terminals for electric connection to the unit.
- Set of fixing elements to fasten the plenum to the unit.
- T / rH air intake sensor. The sensor must be moved outside the air conditioners for a proper read of the room temperature value.
- External air probe. The sensor must be installed in the outdoor air suction duct or anyway protected against atmospherics agent.
- Free contact for free-cooling operating status monitoring.
- Terminals on indoor unit for:
  - 24 Vac power supply for the overpressure damper servomotor
  - 0-10Vdc control signal for the servomotor

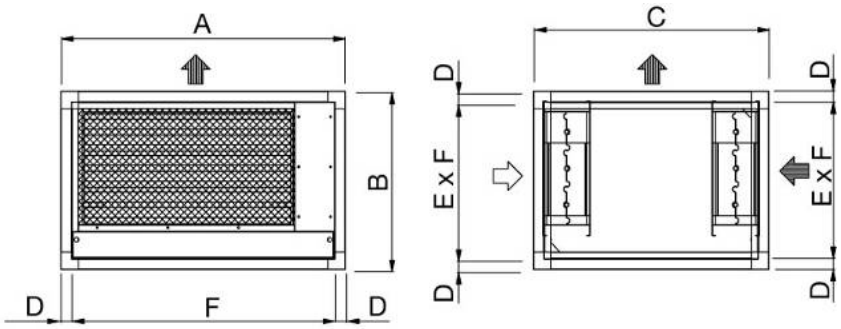
INSTALLATION EXAMPLE



Ducting for ambient air suction are at Customer care.
A rain cover with grille on ambient air intake is recommended.

OVER VERSION

Size E1 / E2 / E3

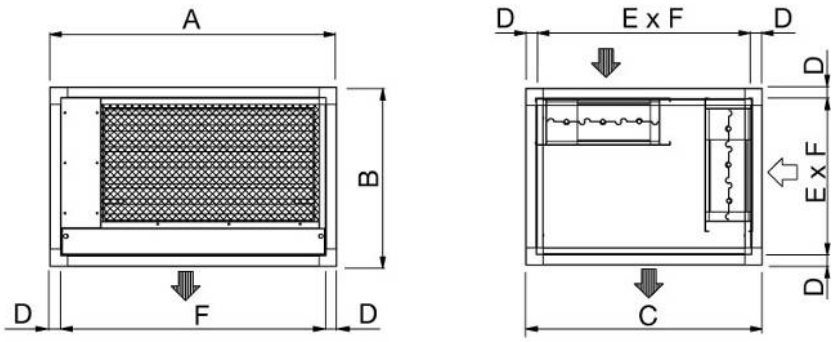


VERSION (1)		O	O	O
SIZE		E1	E2	E3
A	mm	650	785	1085
B	mm	490	490	490
C	mm	650	650	750
D	mm	30	30	30
E	mm	430	430	430
F	mm	590	725	1025
G	mm	--	--	--
Weight (2)	kg	24	27	35

1. U = Under, downflow / O = Over, upflow
2. Add this value to the total unit weight

UNDER VERSION

SIZE E1 / E2 / E3



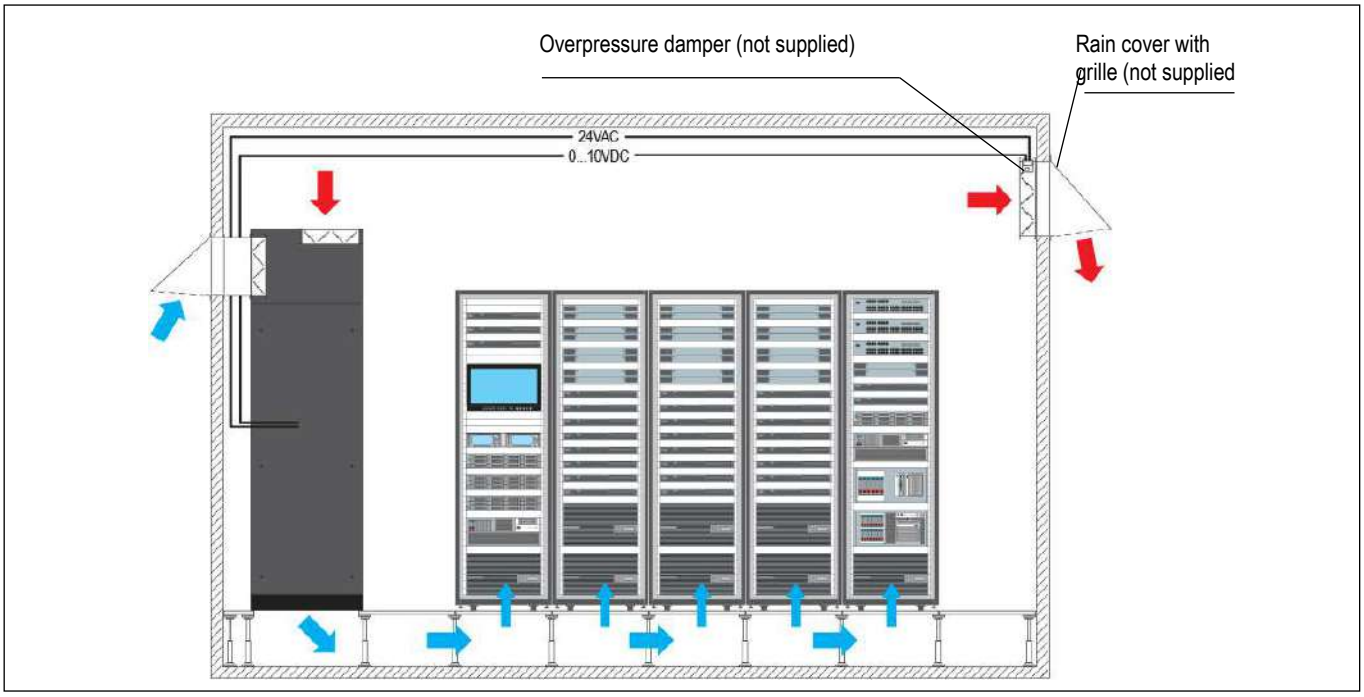
VERSION (1)		U	U	U
SIZE		E1	E2	E3
A	mm	650	785	1085
B	mm	490	490	490
C	mm	650	650	750
D	mm	30	30	30
E	mm	430	430	430
F	mm	590	725	1025
G	mm	--	--	--
H	mm	--	--	--
Weight (2)	kg	24	27	35

1. U = Under, downflow / O = Over, upflow
2. Add this value to the total unit weight

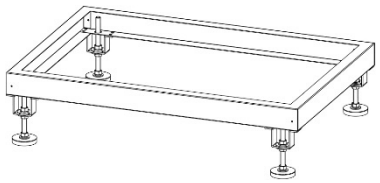
AIR EXHAUSTION DAMPER – Not supplied

WARNING
IT IS COMPULSORY TO INSTALL IN THE ROOM TO BE CONDITIONED A MOTORIZED DAMPER APPROPRIATELY DIMENSIONED FOR THE EXHAUSTION OF AIR FROM THE ROOM DURING FREE-COOLING OPERATION.

During free-cooling operation, the air conditioner supplies ambient air directly into the room, this causes an increase in air pressure inside the room.
The exhaustion damper avoids the increase in pressure in the room.
The damper must be installed at the highest point of the room to exhaust excess hot air to the outside.
Install the damper if possible, in opposite position to air conditioner.
The damper is controlled by the modulating signal 0-10Vdc of the free-cooling control of the air conditioner. The 24Vac power supply of the servomotor and the 0-10Vdc free-cooling signal is available on the unit's electrical terminal block (see wiring diagram for connections).
Air exhaustion must be protected with a rain cover and a grille (at Customer care).
The electrical connection cables are not supplied.

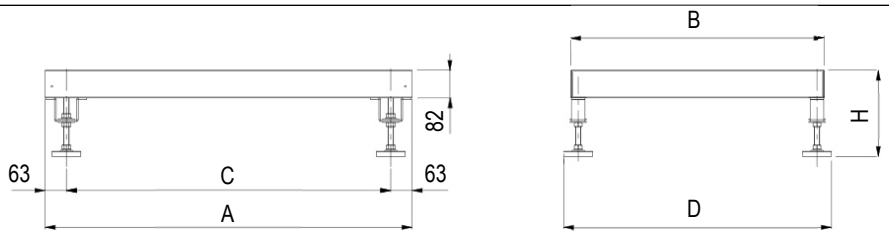


OPTIONAL ACCESSORIES: P041 – SUPPORT FRAME H 255-350MM
OPTIONAL ACCESSORIES: P042 – SUPPORT FRAME H 355-450MM
OPTIONAL ACCESSORIES: P043 – SUPPORT FRAME H 400-510MM



The accessory is supplied as an assembly kitIt is not possible to match the unit floor stand with plenum installed under the machine.
The floor stand is available in 3 different heights.

SIZE E1 - E2 – E3



VERSION (1)		U / O	U / O	U / O
SIZE		E1	E2	E3
A	mm	650	785	1085
B	mm	650	650	750
C	mm	524	659	959
D	mm	691	691	791

MODEL		P041 - Hmax350	P042 - Hmax450	P043 - Hmax510
H min height	mm	255	355	400
H max height	mm	350	450	510

1. U = Under, downflow / O = Over, upflow

OPTIONAL ACCESSORIES: 3601 – COMPRESSOR OPERATING SIGNAL CONTACT

A voltage free electrical contact is supplied for remote signalling “Compressor operation”.
Electrical connection on the machine's terminal board.

OPTIONAL ACCESSORIES: 2411 – PHASE SEQUENCE RELAY

The system checks that the phase sequence of the power supply is correct to prevent the opposite rotation of the three phase electric motors of the machine as compressors. The optional is installed in the electrical box downstream the main switch with door lock safety and in case of wrong phase sequence prevents starting the machine.

OPTIONAL ACCESSORIES: A272 – CL.0 or A1 (EN13501-1) INSULATION

The optional is designed **TO SUPPLY THE PANELING ONLY WITH FIRE REACTION IN CLASS "0" OR "A1 (EN 13501-1)"**; furthermore, allows a noise insulation of the panels of the air conditioners. The pressure level reduction of the unit is about 2 dB(A). The reduction refers ONLY to the sound level radiated from the unit or in front of the unit. The noise level data on return and delivery air do not undergo reductions.
The accessory includes:

- External part as standard panel.
- Internal part in galvanized steel sheet.
- The inside noise insulation with special soundproof material.

REACTION TO FIRE CLASSIFICATION
On Italian territory, the classification is per the D.M. of June 26, 1984 and subsequent amendments, providing for a sort in "Classes" from 0 (non-combustible material) to 5 (extremely flammable material). The EN 13501-1 regulation is ordered in classes from A1 (non-combustible material) to F (extremely flammable material).
A comparison of the classes is not possible because the methods and evaluation criteria are completely different. The comparison table below is being considered purely indicative.

Definition	Italian classes	EN 13501-1
Non-combustible material	Class 0	A1
Combustible material, very limited contribution to fire	Class 1	A2 – B
Combustible material, limited contribution to fire	Class 2	A2 – B - C
Combustible material, medium contribution to fire	Class 3	C – D
Combustible material, highly contribution to fire	Class 4	E
Combustible material, easily flammable	Class 5	F

Is possible to provide the sandwich panels for the OVER units with air flow from the top.
This implies that the air intake must necessarily be from the base of the unit with front blind paneling.
The accessory increases the unit weight:

OVER				
SIZE		**E1**	**E2**	**E3**
Weight increasing (1)	kg	30	42	48

UNDER				
SIZE		**E1**	**E2**	**E3**
Weight increasing (1)	kg	26	48	55

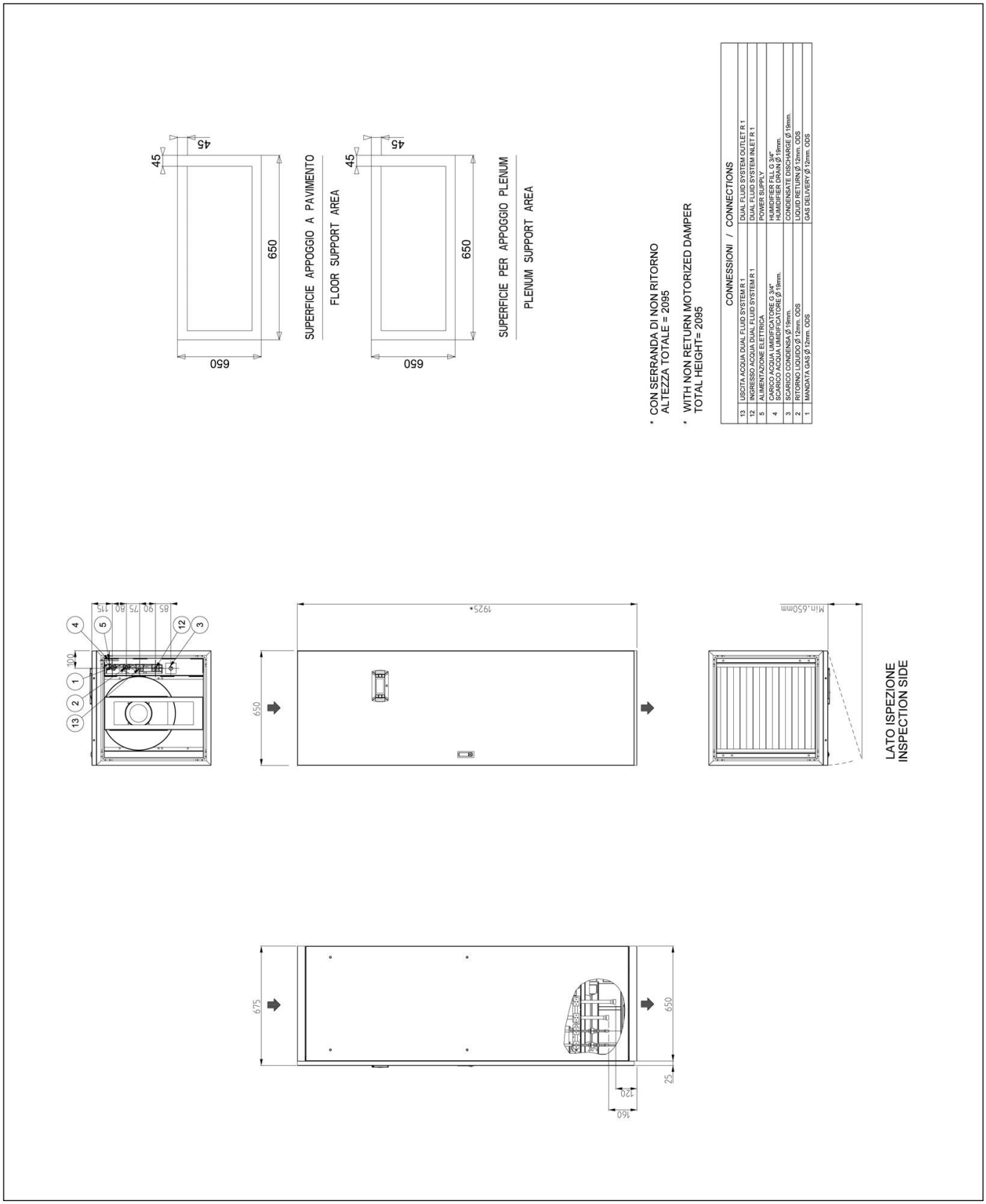
1. Add this value to the total unit weight

OPTIONAL ACCESSORIES: P151 – LOWERED DISPLAY FOR UNDER

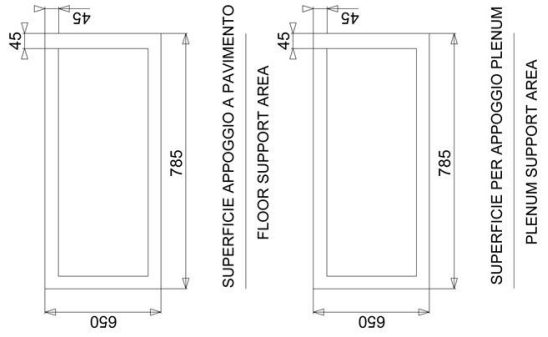
For machines installed above the supply plenum.
The display / keypad on the front panel of the machine is installed lowered by about 50cm to facilitate consultation and use.

MACHINE DRAWINGS

Dimensions in mm – UNDER E1



MACHINE DRAWINGS - Dimensions in mm – UNDER E2

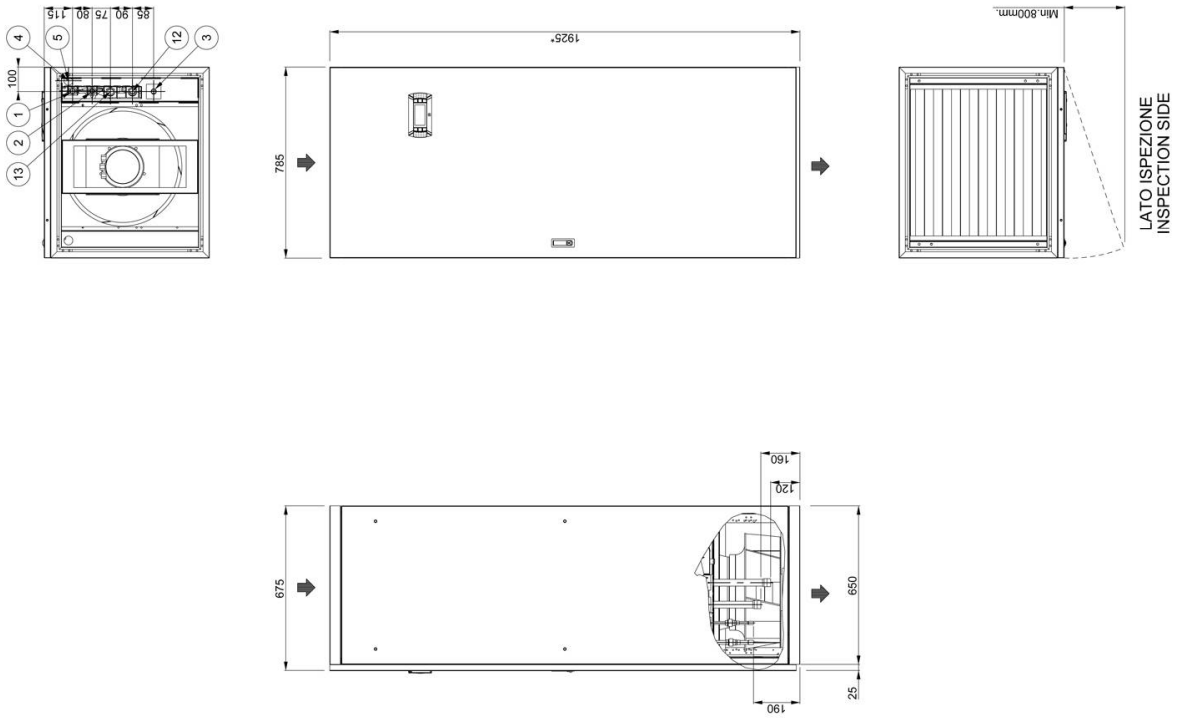


* CON SERRANDA DI NON RITORNO
ALTEZZA TOTALE = 2095

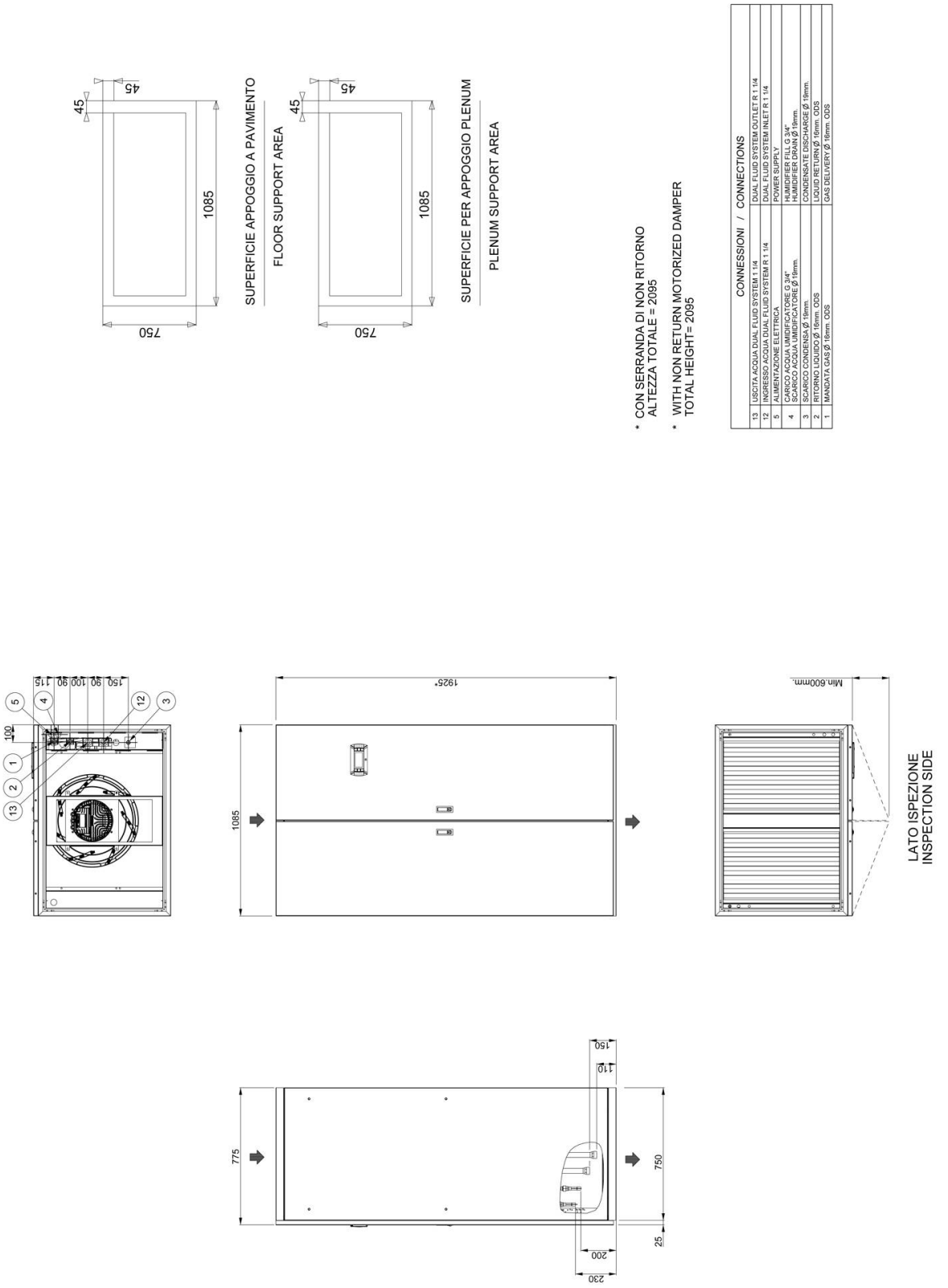
* WITH NON RETURN MOTORIZED DAMPER
TOTAL HEIGHT= 2095

CONNESSIONI / CONNECTIONS

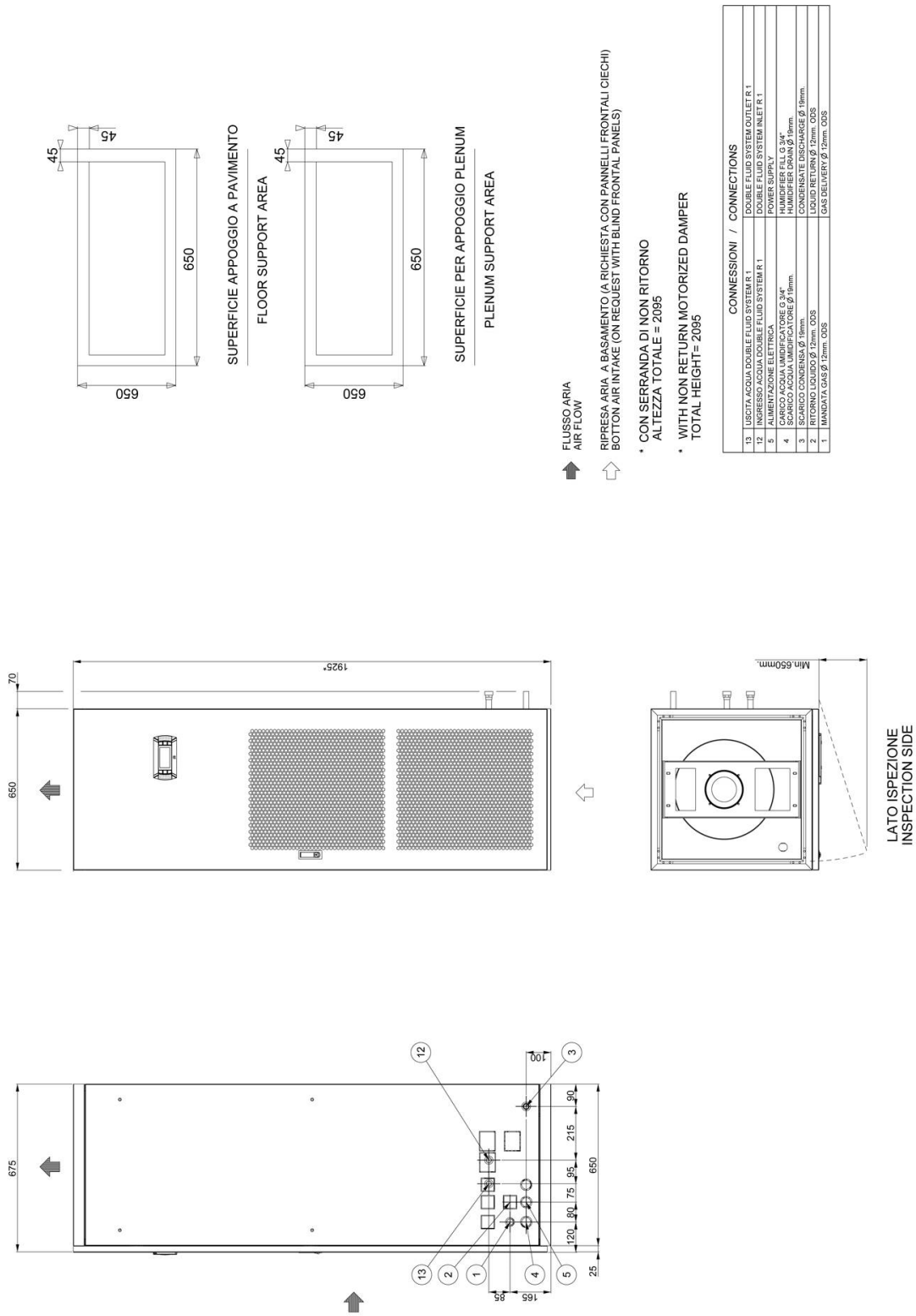
13	USCITA ACQUA DUAL FLUID SYSTEM R 1	DUAL FLUID SYSTEM OUTLET R 1
12	INGRESSO ACQUA DUAL FLUID SYSTEM R 1	DUAL FLUID SYSTEM INLET R 1
5	ALIMENTAZIONE ELETTRICA	POWER SUPPLY
4	CARICO ACQUA UMIDIFICATORE G 3/4"	HUMIDIFIER FILL G 3/4"
	SCARICO ACQUA UMIDIFICATORE Ø 19mm	HUMIDIFIER DRAIN Ø 19mm
3	SCARICO CONDENSA Ø 19mm	CONDENSATE DISCHARGE Ø 19mm
2	RITORNO LIQUIDO Ø 12mm ODS	LIQUID RETURN Ø 12mm ODS
1	MANDATA GAS Ø 16mm ODS	GAS DELIVERY Ø 16mm ODS



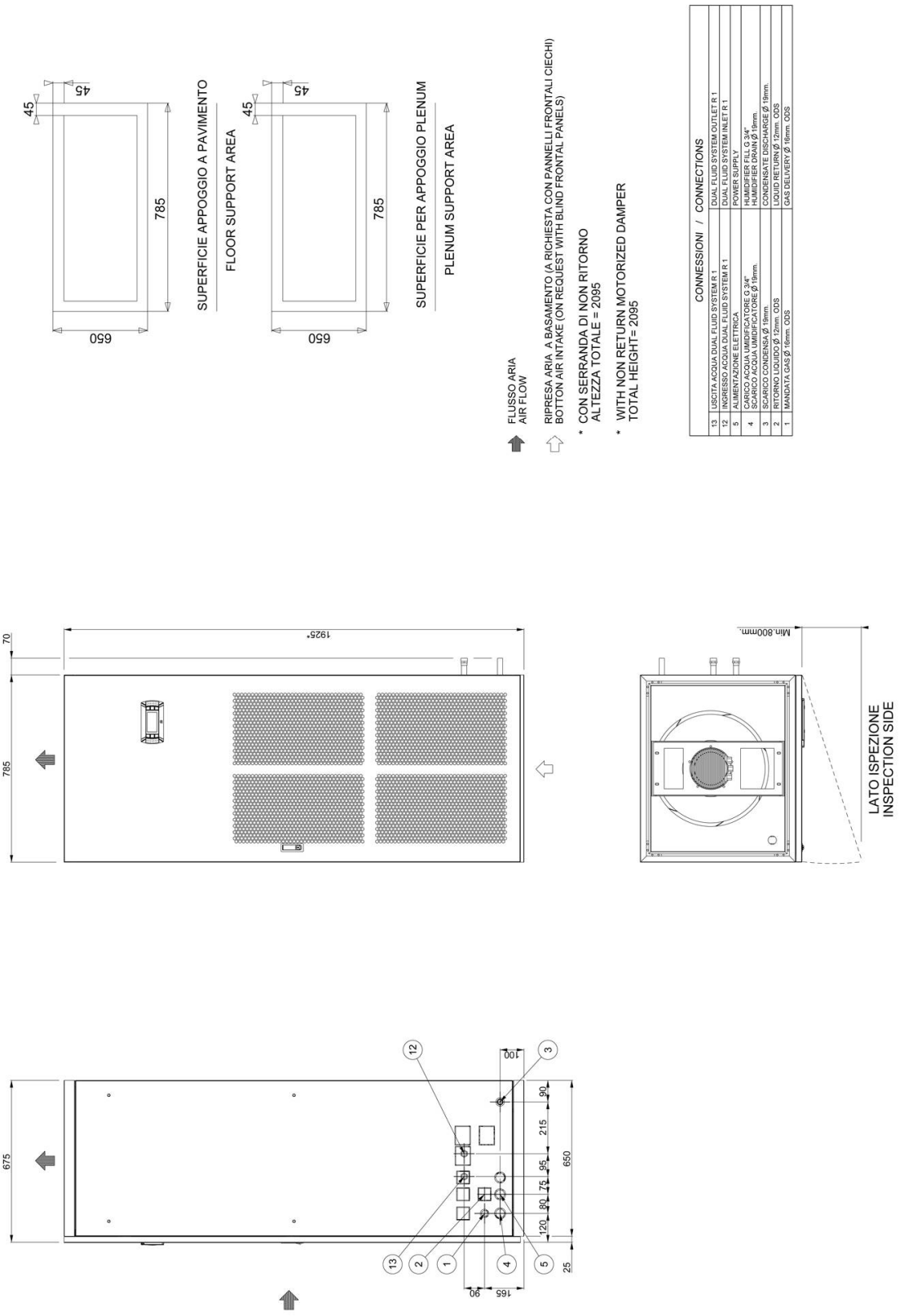
MACHINE DRAWINGS - Dimensions in mm - UNDER E3



MACHINE DRAWINGS - Dimensions in mm – OVER E1

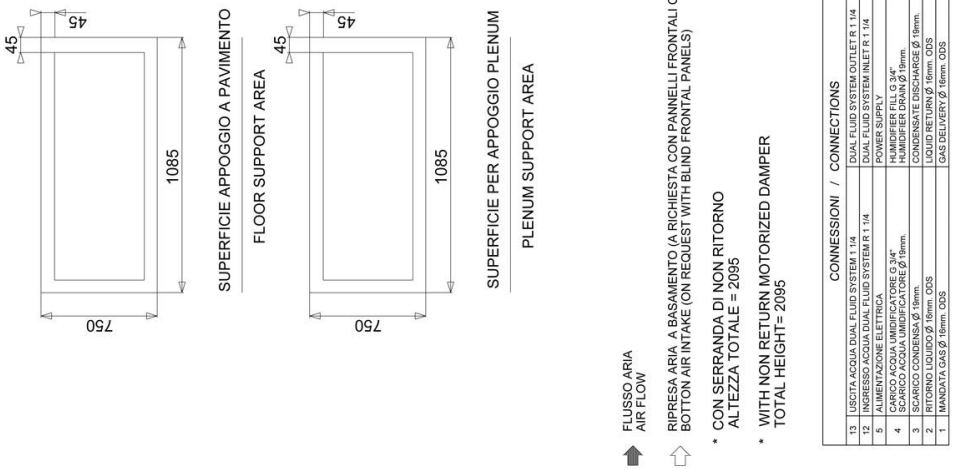


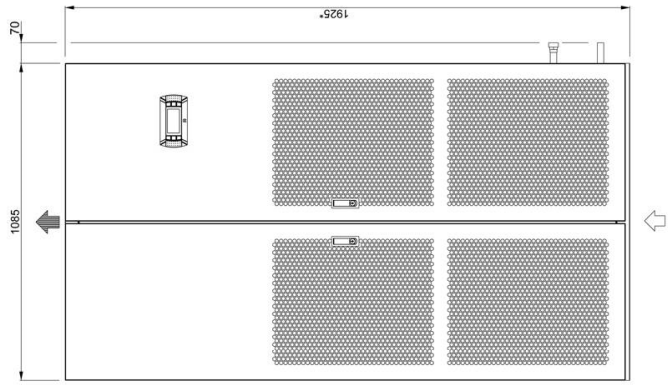
MACHINE DRAWINGS - Dimensions in mm – OVER E2

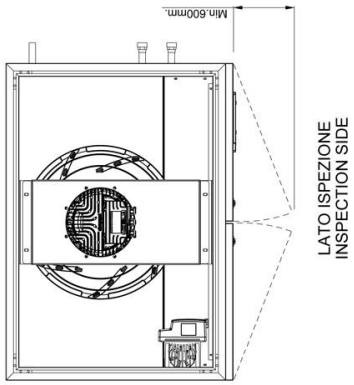


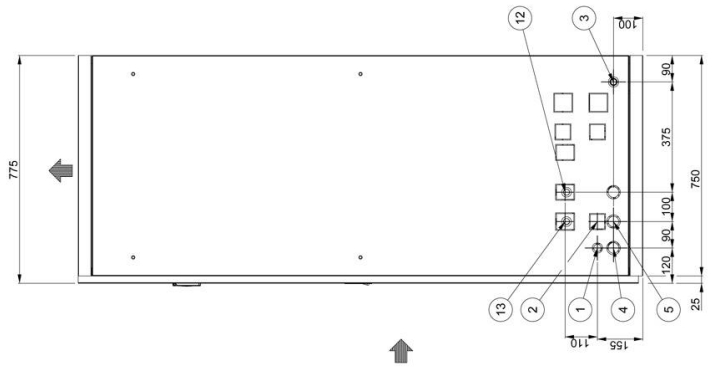
MACHINE DRAWINGS

MACHINE DRAWINGS - Dimensions in mm – OVER E3



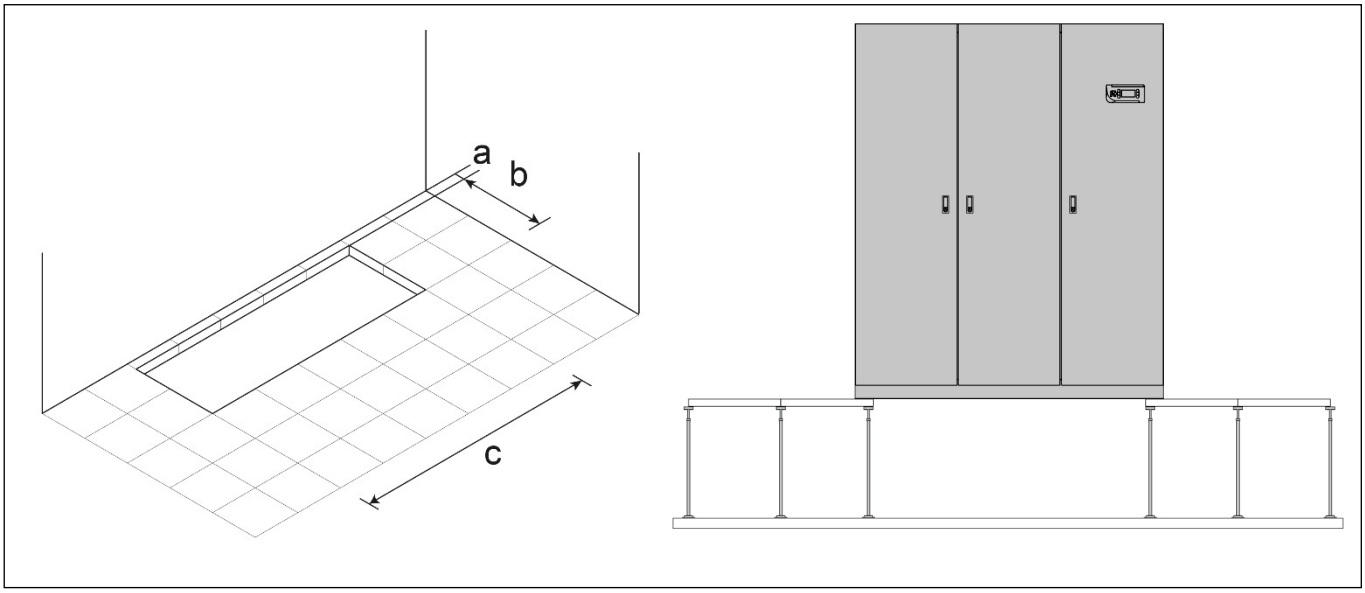






HOLE IN THE RAISED FLOOR FOR DOWNFLOW VERSION

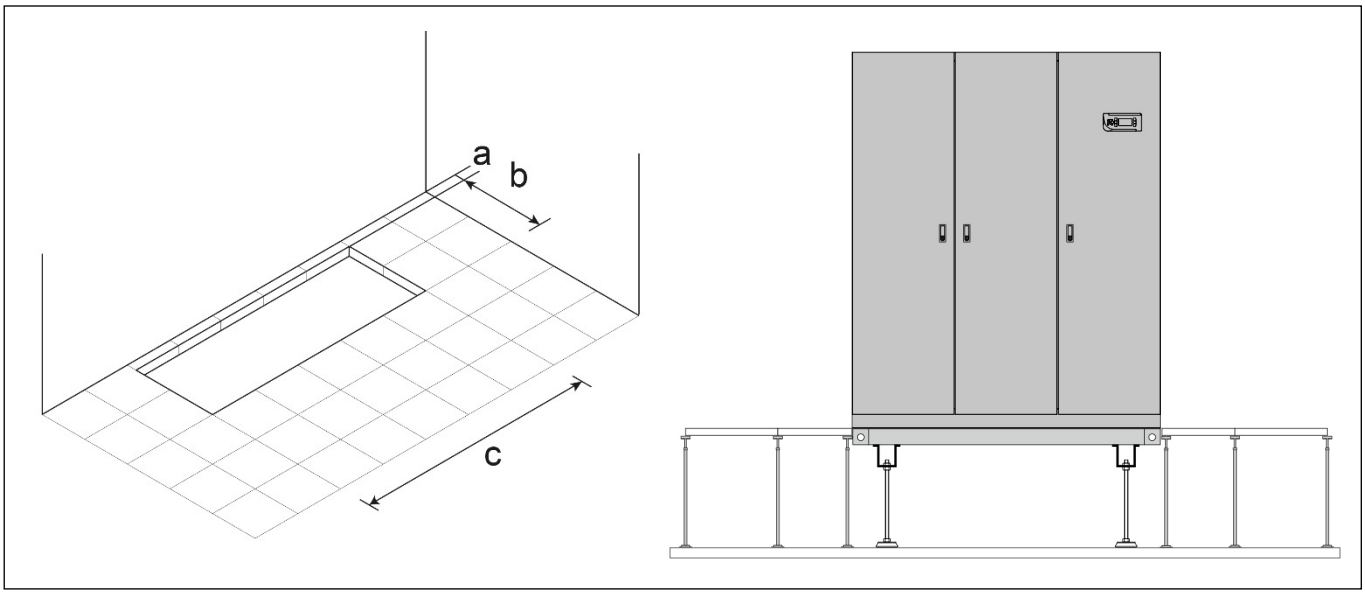
HOLE IN THE RAISED FLOOR WITHOUT FLOOR STAND



Foresee a hole in the floor with the following dimensions:

GRANDEZZA		E0	E1	E2	E3
a	mm	90	95	95	95
b	mm	340	560	560	660
c	mm	585	560	695	995

HOLE IN THE RAISED FLOOR WITH FLOOR STAND

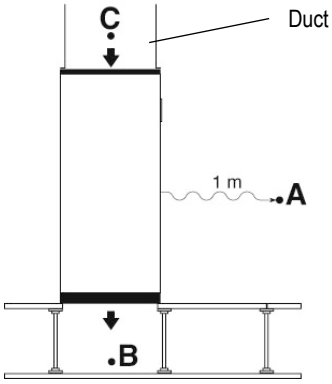


Foresee a hole in the floor with the following dimensions:

GRANDEZZA		E0	E1	E2	E3
a	mm	50	50	50	50
b	mm	440	670	670	770
c	mm	675	670	805	1105

EXAMPLE FOR MACHINES NOISE EMISSION CALCULATION

UNDER MACHINE WITH DUCT ON AIR INTAKE



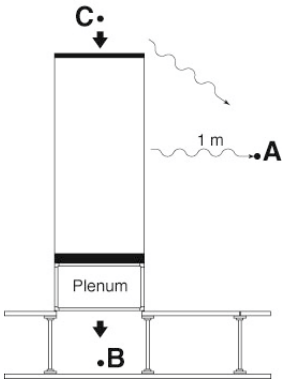
Lp **A** = Front side Under catalogue value

Lp **B** = Air delivery Under catalogue value

Lp **C** = Air intake Under catalogue value

The points **B** and **C** do not influence the point **A**

UNDER MACHINE WITH PLENUM ON AIR DELIVERY



Lp **A** = Front side Under catalogue value

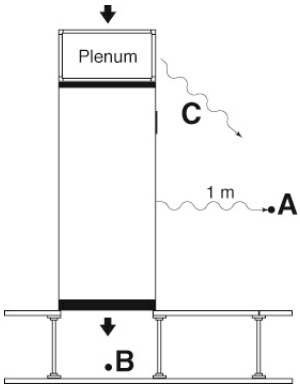
Lp **B** = Air delivery Under catalogue value –plenum noise reduction

Lp **C** = Air intake Under catalogue value

$$\text{Lp } \mathbf{A+C} = 10 \log_{10}\left(10^{\frac{LpA}{10}} + 10^{\frac{LpC}{10}}\right)$$

The point **B** do not influence the point **A**

UNDER MACHINE WITH PLENUM ON AIR INTAKE



Lp **A** = Front side Under catalogue value

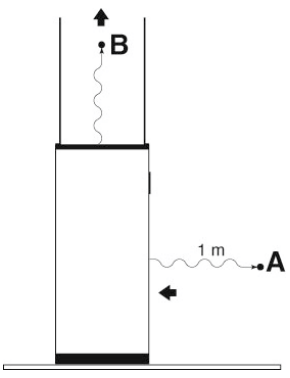
Lp **B** = Air delivery Under catalogue value

Lp **C** = Air intake Under catalogue value – plenum noise reduction

$$\text{Lp } \mathbf{A+C} = 10 \log_{10}\left(10^{\frac{LpA}{10}} + 10^{\frac{LpC}{10}}\right)$$

The point **B** do not influence the point **A**

OVER MACHINE WITH DUCT



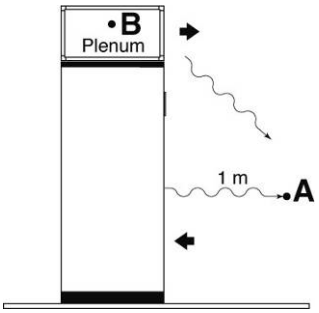
Lp **A** = Air intake Over catalogue value

Lp **B** = Air delivery Over catalogue value

The point **B** do not influence the point **A**

EXAMPLE FOR MACHINES NOISE EMISSION CALCULATION

OVER MACHINE WITH PLENUM ON AIR DELIVERY

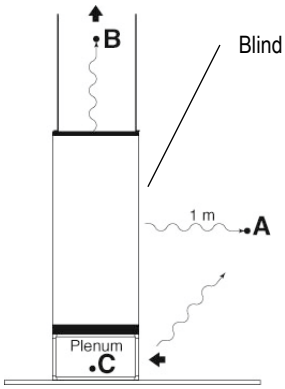


Lp **A** = Air intake Over catalogue value

Lp **B** = Air delivery Over catalogue value – plenum noise reduction

$$Lp\ \mathbf{A+B} = 10\log_{10}\left(10^{\frac{LpA}{10}} + 10^{\frac{LpC}{10}}\right)$$

OVER MACHINE WITH DUCT AND PLENUM ON AIR DELIVERY



Lp **A** = Front side Over catalogue value

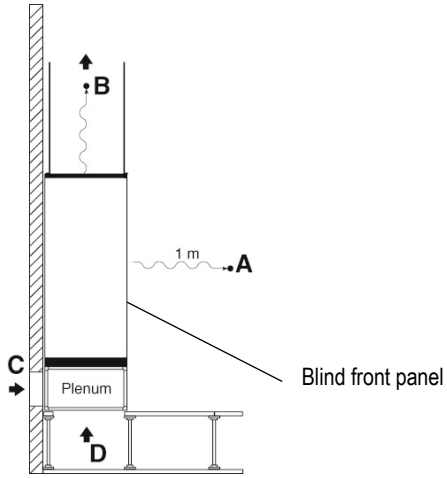
Lp **B** = Air delivery Over catalogue value

Lp **C** = Lp **A** + 6dB(A) – plenum noise reduction

$$Lp\ \mathbf{A+C} = 10\log_{10}\left(10^{\frac{LpA}{10}} + 10^{\frac{LpC}{10}}\right)$$

The point **B** do not influence the point **A+C**

OVER MACHINE WITH DUCT AND PLENUM ON AIR DELIVERY



Lp **A** = Front side Over catalogue value

Lp **B** = Air delivery Over catalogue value

Lp **C** = Lp **D** = Lp A + 6 dB(A) – plenum noise reduction

The points **B, C** and **D** do not influence the point **A**

IMPORTANT
The declared noise levels are intended in free field conditions.
The noise pressure level of an installed unit is affected by the room acoustic characteristics.
Please consider an average noise increase of +4/+6 dB(A).

VALVE PRESSURE DROP CALCULATION AS FUNCTION OF WATER FLOW RATE

Flow coefficient k_V defines the water flow (between 5°C and 40°C) expressed in m^3/h that cross a valve with a pressure drop of 1bar (100kPa).

With this data is possible to calculate the localized pressure drop as function of the water flow rate.

$\Delta P = (Q / k_V)^2$

ΔP (bar) = localized pressure drop of valve;
Q (m^3/h) = water flow rate – it varies according to the desired operating condition;
k_V (m^3/h) = valve flow coefficient.

The formula allows to calculate the value of the localized pressure drop (in bar).
The pressure drops values showed on the documentation are supplied in kPa.
Is possible to change from one unit to another through the following conversion.

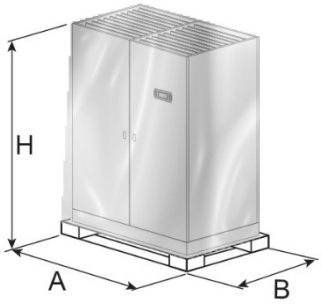
1 bar = 100kPa

SHIPMENT: PACKING DIMENSIONS

Values referred to basic machine. The presence of some accessories increases the weight of machine.

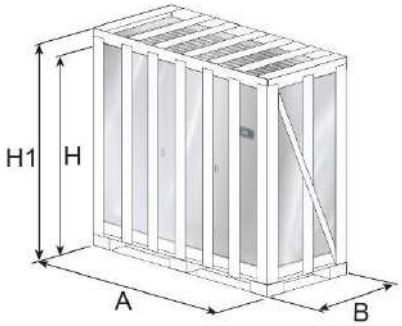
The machines are shipped on pallet and covered with shrink wrap.
On request packing on pallet covered with shrink wrap and wooden cage.

STANDARD PACKING DIMENSIONS



Size	A (mm)	B (mm)	H (mm)
E1	750	750	2080
E2	900	750	2080
E3	1200	910	2080

OPTIONAL 9973: WOODEN CAGE PACKING DIMENSIONS



Size	A (mm)	B (mm)	H (mm)	H1 (*) (mm)
E1	790	790	2150	2350
E2	940	790	2150	2350
E3	1240	950	2150	2350

H1 (*) = Packing height with optional A531 on/off damper

SHIPMENT: SHIPPING WEIGHT

STANDARD PACKING

Model		012 M1 S	018 M1 S	022 M1 S
Size		**E1**	**E2**	**E3**
Weight UNDER	kg	254	288,2	384
Weight OVER	kg	244	278,2	374

OPTIONAL 9973: WOODEN CAGE PACKING

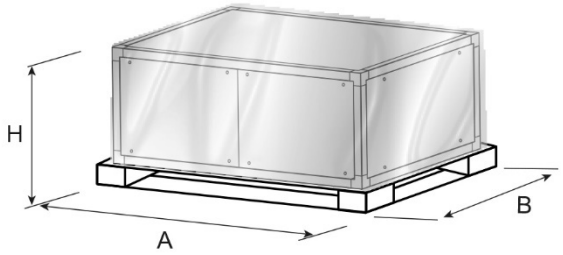
Model		012 M1 S	018 M1 S	022 M1 S
Size		**E1**	**E2**	**E3**
Weight UNDER	kg	281	316,2	416
Weight UNDER (1)	kg	303	341,2	449
Weight OVER	kg	271	306,2	406
Weight OVER (1)	kg	293	331,2	439

(1) Machine with optional A531 on/off damper

SHIPMENT: OPTIONALS PACKING DIMENSIONS AND SHIPPING WEIGHT

P011 - EMPTY PLENUM
P012 - EMPTY PLENUM CL.A1
P031 - EMPTY INTAKE PLENUM
P032 - EMPTY INTAKE PLENUM CL.A1
P013 - PLENUM + 3 GRILLES
P014 - PLENUM + 3 GRILLES CL.A1
P015 - SILENCED PLENUM
P016 - SILENCED PLENUM + 1 GRILLE
P017 - PLENUM + FILTER EPM2.5 50%
P018 - PLENUM + FILTER EPM1 50%
P019 - PLENUM + FILTER EPM1 85%

The plenums are shipped on pallet and covered with shrink wrap.

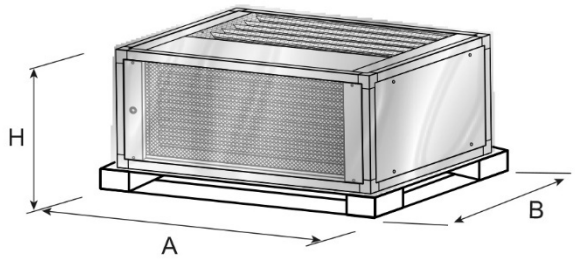


Size		E1	E2	E3
DIMENSIONS				
A	mm	750	900	1200
B	mm	750	750	910
H	mm	630	630	630
SHIPPING WEIGHT				
P011 - Empty plenum “O” / “U”	kg	31	34	41
P012 - Empty plenum CL.A1 “O” / “U”	kg	36	39	47
P031 - Empty intake plenum “O” / “U”	kg	31	34	41
P032 - Empty intake plenum CL. A1 “O” / “U”	kg	36	39	47
P013 - Plenum + 3 grilles “O” / “U”	kg	32	35	47
P014 - Plenum + 3 grilles CL. A1 “O” / “U”	kg	36	40	54
P015 - Silenced plenum “O” / “U”	kg	36	39	47
P016 - Silenced plenum + 1 grille“O” / “U”	kg	41	44	54
P017 - P018 - P019 – Plenum + filter “O” / “U”	kg	37	39	47

“O” Over / “U” Under

SHIPMENTS

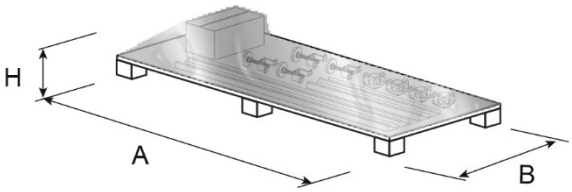
P034: INTAKE FREE-COOLING PLENUM
The plenums are shipped on pallet and covered with shrink wrap.



Size		E1	E2	E3
DIMENSIONS				
A	mm	750	900	1200
B	mm	750	750	910
H	mm	630	630	630
SHIPPING WEIGHT				
P034 - Intake free-cooling plenum “U”	kg	35	39	52
P034 - Intake free-cooling plenum “O”	kg	35	39	52

“O” Over / “U” Under

P041 / P042 / P043: SUPPORT FRAME
The support frames are shipped on pallet and covered with shrink wrap.

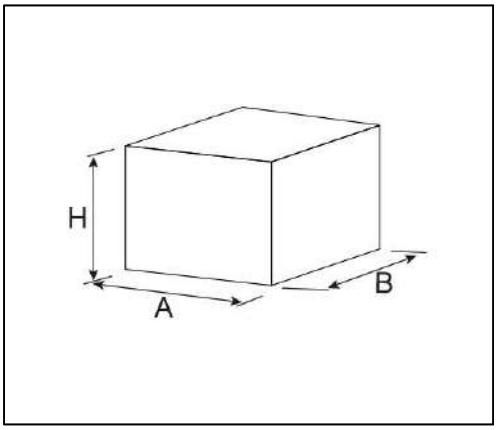


Size		E1	E2	E3
DIMENSIONS				
A	mm	1200	1200	1200
B	mm	900	900	900
H	mm	500	500	500
SHIPPING WEIGHT	kg	26	27	29

P183 / P184: KIT NETWORK ANALYZER / KIT NETWORK ANALYZER+OPTIONAL
P113 / P114: DUAL POWER SUPPLY KIT / DUAL POWER SUPPLY KIT+OPTIONAL
The optionals are shipped in a cardboard box.

P183 / P184 - KIT NETWORK ANALYZER / KIT NETWORK ANALYZER+OPTIONAL

Size		E1	E2	E3
DIMENSIONS				
A	mm	410	410	410
B	mm	410	410	410
H	mm	210	210	210
SHIPPING WEIGHT	kg	5	5	5



P113 / P114 - DUAL POWER SUPPLY KIT / DUAL POWER SUPPLY KIT+OPTIONAL

Size		E1	E2	E3
DIMENSIONS				
A	mm	400	400	400
B	mm	400	400	400
H	mm	210	210	210
SHIPPING WEIGHT	kg	12	12	12

MITSUBISHI ELECTRIC
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