AERMEC

air conditioning

UNITA' ROOF TOP R410A - Manuale tecnico - installazione - manutenzione

RTE
480-800

AERMEC
COMPANY QUALITY SYSTEM
ICIM
ISO 9001:2008 - Cert. n° 0128
CISQ IQNet
AERMEC S.P.A.

CE

GB

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English

Contents

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DICHIARAZIONE DI CONFORMITA'
DECLARATION OF CONFORMITY
DÉCLARATION DE CONFORMITÉ
KONFORMITÄTSERKLÄRUNG

Tipo macchina / Type of unit / Type de machine / Maschinentyp	Condizionatore d'aria tipo Roof-top, Roof-top air conditioning unit Unité de climatisation Roof-top, Autonome Klimaanlage
Modello / Model / Modèle / Modell	
Matricola / Serial No / Numéro de série / Seriennummer	

La macchina è conforme alle disposizioni contenute nelle seguenti direttive: / The unit complies with the provisions contained in the following directives: / La machine est conforme aux dispositions contenues dans les directives suivantes: / Das Gerät entspricht den Bestimmungen der folgenden Richtlinien enthaltenen:

2006/42/CE Direttiva Macchine / Machine Directive / Machine Directive / Maschinenrichtlinie

2006/95/CE Direttiva Bassa Tensione / Low voltage Directive / Basse Tension / Niederspannungsrichtlinie

2004/108/CE Direttiva EMC / EMC Directive / EMC Directive / EMV-Richtlinie

97/23/CE Direttiva PED / PED Directive / PED Directive / PED-Richtlinie

ed è stato sottoposto alla procedura di valutazione A1 con controlli dell'organismo Società Consortile PASCAL a r.l. (n° 1115) via A. Scarsellini, 13 – 20161 Milano (certificato n° 20 del 10/02/2003)

has been evaluated according to the A1 procedures with controls carried out by PASCAL (n°1115) company, address A. Scarsellini 13, 20126 Milan (certificate n°20 dated 10/02/2003)

et a été vérifiée selon la procédure A1 par l'organism Società Consortile PASCAL a r.l. (n° 1115) via A. Scarsellini, 13 – 20161 Milano (certificat n° 20 date 10/02/2003)

wurde überwacht nach Beobachtung Unternehmen PASCAL (n°1115), Adresse A. Scarsellini 13, 20126 Mailand (Zertifikat n°20 von 10/02/2003

Componente / Component / Élément / Komponente	Modulo / Module / Module / Modul
Pressostato di alta pressione / Pressure switch / Pressostat / Druckschalter	B + D
Valvola di sicurezza / Pressure relief valve / Valve de sécurité / Sicherheitsventil	B + D
Compressore / Compressor / Compresseur / Kompressor	D1
Ricevitore di liquido / Liquid receiver / Flüssigkeitssammler / Boutilles liquide	A
Separatore di liquido / Suction accumulator / Flüssigkeitsabscheider / Boutilles anti-coup	A
Filtro deidratatore / Filter / Filter / Filtres	A
Rubinetti / Ball valve / kleinventile / Vanes	A
Batteria di scambio termico / Coil / Register / Batterie	A

La persona autorizzata a costituire il fascicolo tecnico è: / The person authorized to compile the technical file is: / La personne autorisée à constituer le dossier technique est: / Die Person berechtigt, die technischen Unterlagen zusammenzustellen:

Giampaolo Cardin via Luppia Alberi,170

Bevilacqua, 25/01/2011

Luigi Zucchi

General standards

The present manual is an integral part of the documentation enclosed with the machine. It must be conserved for future reference and must accompany the machine throughout its working life. The manual defines the purpose for which the machine was built and establishes the correct installation and use limits.

- All the technical and installation instructions of the unit are described in this manual, as well as the main accident prevention standards.
- Read all the information contained in this manual carefully. Pay particular attention to the use regulations that are accompanied by the words “DANGER” or “WARNING”: failure to observe them could cause damage to the machine and/or persons and property.
- For irregularities not contemplated by this manual, consult the local After Sales Service.
- AERMEC S.p.A. declines all responsibility for any damage due to the improper use of the machine, or to the partial or superficial reading of the information contained in this manual.
- Installation and maintenance must be carried out by trained and qualified personnel, with the requirements laid down by law 46/90 and/or DPR 380/2001 for electric/electronic and air conditioning installations, with consequent registration at the local CHAMBER of COMMERCE; otherwise AERMEC S.p.A. declines all responsibility regarding the safety of the product.

THE MANUFACTURER DECLINES ANY RESPONSIBILITY FOR DAMAGE TO PROPERTY, PERSONS OR ANIMALS CAUSED BY THE NON-OBSERVANCE OF THE INDICATIONS AND REGULATIONS CONTAINED IN THIS MANUAL.

Even though a suitable risk analysis was carried out during the design of the RTEA unit, pay ATTENTION to the pictograms on the machine; these make it easier to read the manual as they quickly draw attention to risks that can't be either avoided or sufficiently limited with the adoption of protective means and measures.

GENERAL DANGER SIGNS
Carefully observe all indications at the side of the pictogram. The non-observance of the indications could cause hazardous conditions with possible injury to the operator and to the user in general.

VOLTAGE DANGER SIGN
Carefully observe all indications at the side of the pictogram. The signs indicate components on the unit or, in this manual, identify areas that could generate risks of an electrical nature.

GENERAL WARNING SIGNS
Carefully observe all indications to the side of the pictogram that limit some actions in order to ensure greater safety for the operator.

IT IS FORBIDDEN TO CLEAN, OIL, GREASE, repair or adjust moving elements manually.

INFLAMMABLE MATERIAL

CONDITIONS

- The guarantee does not include payment for damages due to incorrect installation by the installer.
- The guarantee does not include payment for damages due to the improper use of the unit by the user.
- The manufacture is not responsible for injuries to the installer or user, caused by incorrect installation or improper use of the unit.

The guarantee is not valid if:

- the services and repairs have been carried out by unauthorised personnel or companies;
- the unit has been previously repaired or modified with non-original parts;
- the unit has not been suitably maintained;
- the instructions given in this manual have not been observed;
- unauthorised modifications have been made.

Note:
the manufacturer reserves the right to carry out modifications at any time deemed necessary to improve its product, and is not obliged to apply the said modifications to previously manufactured machines that have already been delivered or are being constructed.
The general conditions are in any case subject to the general sale conditions foreseen on the stipulation of the contract.

MAIN GUARANTEE

Description of the unit

The rooftop units of the **RTE** range have been designed taking into account the precise needs of the plant engineering sector, that deals with large structures for the "large-scale retail trade" (supermarkets and hypermarkets), and areas dedicated to exhibitions, trade fairs, and industrial use in general.
These units, usually positioned on rooftops or anyway out of doors, offer the following main advantages:

- their installation on the roof does not reduce the effective space available;
- they offer the maximum modularity, therefore allowing you to distinguish the treatment in different volumes with different usage characteristics (food section, clothing department, etc.);
- they offer high levels of environmental comfort, controlling not only the temperature but also the exchange, filtering and humidification or dehumidification of the air;
- the environmental noise level is kept down thanks to the careful soundproofing of the machine.

Components

The **RTE** rooftop units are all available in the cooling-only version (RTE F) or cooling + heat pump (RTE H).
The **RTE** rooftop units are supplied complete with:

- condensing unit with helicoidal fans and scroll compressors;
- cooling circuit with thermostatic valves, filters, liquid indicator lights;
- corrugated synthetic filter, class G4 (EN779);
- direct expansion coil with condensate collection tank in aluminium alloy;
- centrifugal supply fan, with blades forwards or backwards blades depending on the model and the pressure levels required, with belt transmission and variable pulley;
- adjustment by means of microprocessor;
- electric panel.

Sizes

The units of the **RTE** range are available in 5 sizes (480-560-600-700-800), with the possibility of **standard**, low noise **L** or high temperature **A** operation (excluding sizes 200 and 255). With a suitable combination of the numerous options available, it is possible to configure each model to satisfy the most demanding plant requirements.

Available configurations

Note: the figures shown refer to the dimensional diagrams on pages 23-26

Standard configuration: a single-block rooftop unit with flat G4 filters (efficiency level in compliance with EN779), evaporator coil (optional hot water coil) **(fig.1)**

SMP: rooftop unit with 2-ways mixing box, rear intake [1] **(fig.2)**

FT7: rooftop unit with flat G3 pre-filters and F7 rigid bag filters (EN779) **(fig.3)**

SM2: rooftop unit with 2-ways mixing box, side/lower intake [1] **(fig.4)**

SM3: rooftop unit with 3-ways mixing box with actuators and free-cooling for the temperature **(fig.7)**

REC: rooftop unit with plate heat recovery unit (with recirculation damper) and intake fan. The air/air heat recovery unit is of the static plate type with cross flows. It allows the recovery of sensitive heat from the expelled air with an efficiency level higher than 50% during winter operation. The two air flows (expulsion and intake) are completely separate, thereby avoiding any form of contamination. Modulating actuators included as standard **(fig.13)**

Gxxx: rooftop unit with condensing hot air generator. The condensing hot air generator is powered by natural gas. The air is heated as it passes over the surface of the combustion chamber and the exchange pipes. The combustion chamber is built entirely of AISI 430 stainless steel, while the surfaces in contact with the condensate (heat exchanger, flue gases collection hood) are made of AISI 304 L steel to be particularly resistant to corrosion. It is fitted with a safety thermostat with automatic reset **(fig.6)**.
The cooling circuit will be switched off when the hot air generator is working.
It is not possible to combine the hot air generator with the electric heating element.

RTE size	Heating capacity Gxxx [kW]
480/530/600	150 / 200
700/800	150 / 200 / 150+92

Configuration combinations

SM2-FT7: rooftop unit with 2-ways mixing box, side/lower intake and F7 bag filters [1] **(fig.5)**
Gxx-SMP: rooftop unit with heat generator and 2-ways mixing box, rear intake **(fig.8)** [1]
Gxxx-FT7: rooftop unit with heat generator and F7 bag filters **(fig.9)**
SM3-FT7: rooftop unit with 3-ways mixing box and F7 bag filters **(fig.10)**
SM2-Gxxx: rooftop unit with 2-ways mixing box and hot air generator **(fig.11)** [1]
SM2-Gxxx-FT7: rooftop unit with 2-ways mixing box, hot air generator and F7 bag filters **(fig.12)** [1]
REC-FT7: rooftop unit with static heat recovery unit and F7 bag filters **(fig.14)**
SM3-Gxxx: rooftop unit with 3-ways mixing box and hot air generator **(fig.15)**
SM3-Gxxx-FT7: rooftop unit with 3-ways mixing box, hot air generator and F7 bag filters **(fig.16)**
REC-Gxxx: rooftop unit with static heat recovery unit and hot air generator **(fig.17)**
REC-Gxxx-FT7: rooftop unit with section with static heat recovery unit, hot air generator and F7 bag filters **(fig.18)**

NOTE:
(1) dampers without actuators and recirculation damper upon request

Description of components

Cooling circuit

Compressors
Scroll-type tandem hermetic compressors fitted (in heat pump versions) with electric heater.
The heater is automatically powered when the unit stops, as long as the unit is still powered up.

Refrigerant
RTE roof-top series uses R410A ecological refrigerant.

Internal heat exchanger
Made with copper pipes and aluminium fins, blocked by the mechanical expansion of the pipes.

External heat exchanger
Made with copper pipes and aluminium fins, blocked by the mechanical expansion of the pipes. Different material and fins treatment upon request.

Liquid receiver
(only for heat pump version)

Thermostatic valve
The valve with an external equaliser (located at the evaporator outlet) modulates the flow of gas to the evaporator on the basis of the thermal load, thereby ensuring a sufficient level of overheating of the intake gas.

Filter-drier
It is of the mechanical type, made of ceramic and a hygroscopic material able to hold back the impurities and any traces of humidity in the cooling circuit.

Sight glass
Allows you to check the amount of refrigerating gas and any humidity in the cooling circuit.

Reverse cycle valve
(only for heat pump version)
Inverts the flow of refrigerant to the change of the summer/winter function and during the defrosting cycle.

Safety valves of the cooling circuit, assembled on the high and low pressure side: these intervene, discharging the over pressure in the event of abnormal pressure levels.

One-way valves
(only for heat pump version)
These allow the refrigerant to travel in one direction only.

Frame and fans

Condensation ventilation unit
Of the helicoidal type, statically and dynamically balanced. The electric fans are electrically and mechanically protected with metal anti-intrusion grilles.

Treatment fan unit
Centrifugal fan with double intake and forward-curved blades for higher efficiency and less noise, statically and dynamically balanced, activated by three-phase electric motors joined with trapezoidal belts and pulleys that can be adjusted at variable steps.

Load-bearing structure
The construction form for the air treatment side is: sandwich-type panelling with aluminium alloy on the outside and galvanised steel on the inside, 50mm thick with injected polyurethane insulation (density 42kg/m^3).

Safety and check components

Door-block disconnecting switch
For safety purposes, it is only possible to access the electric panel when the power is disconnected (by means of the opening lever on the electric panel itself). This lever can be blocked with at least one padlock during maintenance work, to prevent the machine being unintentionally powered.

Control keypad and monitor on the machine
This allows the unit to be fully commanded. For a detailed description, refer to the User Manual.

Electric panel
Contains the power section and the management of the controls and safety devices. The electric panel is in accordance with the CEI 60204-1 and the electromagnetic compatibility directives EMC 89/336/EEC and 92/31/EEC.

Anti-freeze probe (only with BTR accessory)
When the water temperature is lower than +5°C, the special software in the adjustment card will fully open the 3-way valve (if present), allowing the circulation of hot water via the digital output signal.

Cooling circuit pressure switches
These are located on the high pressure side of the cooling circuit. They stop the compressor working in the event of abnormal work pressure levels.

High and low pressure transducers
These are located on the high and low pressure sides of the cooling circuit and allow you to visualise the pressure value on the monitor. The low pressure transducer also stops the compressors if the pressure level falls below the low pressure alarm setting.

Control system

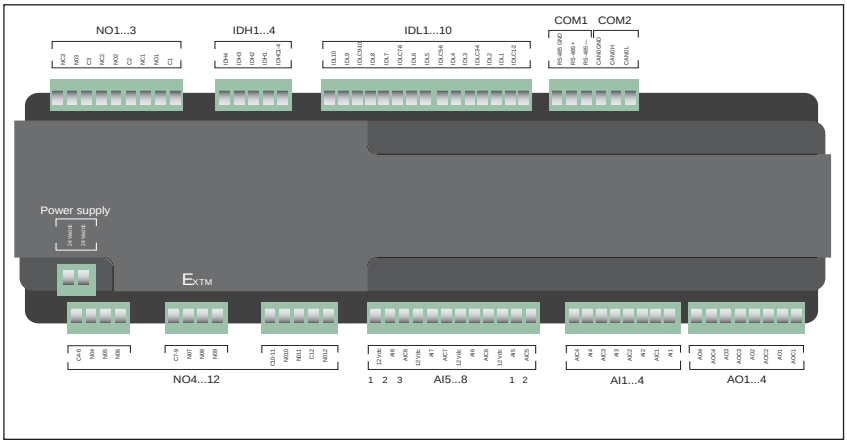


Fig. on the left: standard card
Fig. above: control panel in the unit / remote panel accessory

The control system used in the rooftop units is a device that can be configured for the HVAC market. Designed with the most advanced hardware and software technologies, and equipped with a 16-bit microprocessor using flash technology, this system constantly guarantees the maximum performance and a work speed suitable for the many needs of the market. By means of a control panel (consisting of a graphic LCD, a keypad and LEDs) fitted on the electric panel of the rooftop unit, you can carry out all the main application control and management operations.

Standard card

The standard card is designed for assembly on the EN rail CEI 60715 and is located inside the electric panel of the rooftop unit.
Depending on the functions in the rooftop unit, the standard card is available in two models that differ for the number of inputs and outputs that can be managed:

MODEL 1:
Consists of:
• 8 analogical inputs: 4 for the temperature + 4 configurable
• 14 digital inputs: 10 low voltage + 4 (low or high voltage)
• 12 digital outputs: 9 SPST + 3 SPDT
• 4 analogical outputs: individually configurable (4-20 mA, 0-10 V)
• COM1: RS-485
• COM2: CAN-BUS 0 for connection to the control panel in the unit
• COM3: RS-232
• COM4: CAN-BUS 1 for connection to the remote keypad (accessory).

MODEL 2:
Consists of:
• 16 analogical inputs: 8 for the temperature + 8 configurable
• 22 digital inputs: 14 low voltage + 8 (low or high voltage)
• 20 digital outputs: 17 SPST + 3 SPDT
• 4 analogical outputs: individually configurable (4-20 mA, 0-10 V)
• COM1: RS-485
• COM2: CAN-BUS 0 for connection to the control panel in the unit
• COM3: RS-232
• COM4: CAN-BUS 1 for connection to the remote keypad (accessory).

Control panel on the unit

The user can interact with the machine using a keypad with a large, backlit, graphic LCD monitor; it also has three LEDs and two keys (multifunction with 5 positions) to control and programme the tool.
The information provided from the keypad (with highly intuitive access) allows you to check the machine status at any time, if necessary modifying the settings. In particular, you can carry out all the operations linked to the use of the unit control system:
• set the working mode (heat,cool, standby, etc.)
• set the time bands
• check the resource status
• set the parameters
The keypad is equipped with a graphic LCD monitor (122x32mm). The command panel offers the following characteristics: degree of protection IP65; the environmental temperature field allowed for correct operation is between 5 and 60°C.

When any one of the keys is pressed, the monitor lights up for 10 seconds.
If you do not press another key within 10 seconds, the monitor light will switch off automatically.

Remote user interface (PR2 remote panel accessory)

This is the same keypad used for the control panel in the unit.
The remote panel allows you to carry out all the operations linked to the use of the unit control system.
The remote panel accessory is supplied without a cable for connecting it to the standard card (you are advised to use a BELDEN 3105A cable). The maximum cable length allowed is 50m.

Accessories

DCPR - Device for low temperatures (standard for low noise operation)
This accessory allows correct operation even with outside temperatures down to –20°C.

GP - Protection grilles
These protect the outer coils from accidental knocks and hailstorms.

T1 - Intake air recirculation right side, Rear fresh air intake (SM2 only). See pag. 27.

T2 - Intake air recirculation left side, Rear fresh air intake (SM2 only). See pag. 27.

T4 - Intake air recirculation below, Intake fresh air rear (SM2 only). See pag. 27.

T5 - Intake air recirculation right side, left side fresh air intake (SM2 only). See pag. 27.

T6 - Intake air recirculation left side, right side fresh air intake (SM2 only). See pag. 27.

AI - Intake from the bottom (only on SM3). See page 27.

PA4 - Supply **fan pressure up to 300 Pa** at nominal air flow.

MA - Upper air supply

PM4 - Supply **fan pressure up to 400 Pa** at nominal air flow.

BTR - Water-operated heating coil
2-row hot water coil complete with anti-freeze probe. They can only be managed in post-heating with the DP accessory. Possibility of combining with the Gxxx generator.

V3V - 3-way valve with actuator
3-way valve with modulating actuator to manage the water-operated coil.

BRE - Electric heating coil
Electric heating element fitted with double safety thermostat (one with automatic reset and the other with manual reset). They can only be managed in post-heating with the DP accessory. It is not possible to combine the BRE with the Gxxx generator.

PUC - Pre-arrangement for humidification control
ON/OFF contact (normally open) for humidification consent. In this case, the unit is fitted with a humidity probe located in the environment air intake. A humidity probe is also supplied, to be positioned downstream of the humidification section.

DP - KIT FOR MANAGING DEHUMIDIFICATION AND POST-HEATING
The check will force the compressors to work, to dehumidify the air until it reaches the set humidity value. If the water or electric coil is present, it will be possible to manage the post-heating as well.
Possibility of combining with the PUC accessory (humidification contact).

SCSR - Recirculation damper for SMP mixing box.

SRP - Recirculation damper for SMP mixing box, and modulating actuator (combined dampers).

SCMP - Recirculation damper for SMP mixing box, and modulating actuator with spring recovery.

SCS2 - Recirculation damper for SM2 mixing box.

SR2 - Recirculation damper for SM2 mixing box and modulating actuators.

SCM2 - Recirculation damper for SM2 mixing box and modulating actuator on intake and modulating actuator with spring return on renewal.

SCM3 - Modulating actuators with spring return for SM3 or REC set-ups.

FCH - Enthalpic free-cooling
Only with 3-ways mixing box and cross-flow heat recovery unit.
Manages the flow of external and intake air, referring to their enthalpy values.

PR2 - Remote panel
Allows you to carry out command operations on the rooftop unit from a distance.

SSV - RS485 SERIAL INTERFACE FOR SUPERVISION
Serial card necessary for interface with supervision systems.

SQA - Air quality probe
Analyses the air quality on the basis of a VOC mixed gas SnO2 sensor, evaluating the contamination by polluting gases. The presence of the probe, combined with rooftop unit control, allows:
- the setting of a sensitivity threshold on the basis of the maximum envisaged air contamination
- the ventilation of rooms only when necessary, thereby ensuring energy savings.

CAF - RAINPROOF CASINGS
To protect the external air meshes in the 2-damper mixer chambers or heat recovery unit. Supplied as standard with SM3.

CF - FLUE
In stainless steel, double insulated wall with inspection cap and measuring well with thermometer for flue gas temperature.

PF - Dirty filter pressure switch

RUB - Liquid and pressure taps(only for cooling-only version).

VT - Rubber vibration dampers.

Accessory compatibility table:

Size	480-560-600-700-800					
Version	cooling only (F)			heat pump (H)		
Operation	std	L	A (not 230-255)	std	L	A (not 230-255)
DCPR	o	•	o	o	•	o
GP	o	o	o	o	o	o
T1	o	o	o	o	o	o
T2	o	o	o	o	o	o
T4	o	o	o	o	o	o
T5	o	o	o	o	o	o
T6	o	o	o	o	o	o
AI	o	o	o	o	o	o
PA4	o	o	o	o	o	o
MA	o	o	o	o	o	o
PM4	o	o	o	o	o	o
BTR	o	o	o	o	o	o
V3V	o	o	o	o	o	o
BRE	o	o	o	o	o	o
PUC	o	o	o	o	o	o
DP	o	o	o	o	o	o
SCSR	o	o	o	o	o	o
SRP	o	o	o	o	o	o
SCMP	o	o	o	o	o	o
SCS2	o	o	o	o	o	o
SR2	o	o	o	o	o	o
SCM2	o	o	o	o	o	o
SCM3	o	o	o	o	o	o
FCH	o	o	o	o	o	o
PR2	o	o	o	o	o	o
SSV	o	o	o	o	o	o
SQA	o	o	o	o	o	o
CAF	o	o	o	o	o	o
CF (only with Gxxx)	o	o	o	o	o	o
PF	o	o	o	o	o	o
RUB	o	o	o	o	o	o
VT	o	o	o	o	o	o

(1) = The right or left direction refers to the direction of the air flow inside the treatment sections
• = standard
o = optional
- = not available

Hot water coil data (BTR accessory)

RTE model	480	530	600	700	800
Heating capacity (kW)	224	236	247	250	259
Number of rows [no.]	2	2	2	2	2
Water flow rate [l/h]	19,330	20,340	21,310	21,600	22,320
Water side pressure drops [kPa]	72	79	86	60	64

Performance of hot water coil referring to: intake air 20°C; water 80/70°C, water side pressure drops including the valve.

Electric heating element data (BRE accessory)

RTE model	480				530				600				700				800			
Capacity (kW)	36	48	60	72	36	48	60	72	36	48	60	72	36	48	60	72	36	48	60	72
Number of stages	2				2				2				2				2			

* for capacities other than those offered, contact the Technical Office

Cooling only F (standard)

NOMINAL TECHNICAL DATA	Version		480	530	600	700	800
Cooling capacity	F	kW	150.3	178.5	197.7	232.1	254.8
Sensible cooling capacity	F	kW	121.1	146.1	158.3	183.4	199.9
Total input power	F	kW	56.1	63.3	67.2	79.8	92

Energy indicators

E.E.R.	F		2.7	2.8	2.9	2.9	2.8

Condensing unit section

Compressors

Type	F		tandem scroll				
Number / circuits	F	no.	4/2	4/2	4/2	4/2	4/2
Capacity step control	F	no.	4	4	4	4	4
Input power of compressors	F	kW	38.6	42.2	46.2	56.8	69

Fans

Number / Installed power	F	no./kW	4/2.5	4/2.5	4/2.5	4/2	4/2
Air flow rate	F	m^3/h	74600	72400	69200	84400	80600

Air-handling section

Evaporator

Number of rows	F	no.	3	4	4	4	4

Fan

Type	F		Centrifugal, blades forwards				
Nominal air flow rate	F	m^3/h	26500	29500	31500	35000	38500
Minimum air flow rate	F	m^3/h	22500	25000	26800	29800	32700
Maximum air flow rate	F	m^3/h	30500	34000	36300	40300	44300
Number	F	no.	1	1	1	1	1
Total installed power	F	kW	7.5	9.0	11.0	15.0	15.0
Effective pressure with standard motor	F	Pa	200	200	200	200	200

Air filters

Thickness	F	mm	50	50	50	50	50
Efficiency	F	EN779	G4	G4	G4	G4	G4

Dimensions of standard configuration

Height	F	mm	2450	2450	2450	2450	2450
Width	F	mm	2350	2350	2350	2350	2350
Length	F	mm	4200	4200	4200	5500	5500
Weight	F	kg	2100	2200	2300	2700	2800

WARNING: technical data are referred to standard configuration unit and to nominal operative conditions.

Performance levels referring to:
room air 27°C / 50% r.h.
external air 35°C

Heat pumps H (standard)

NOMINAL TECHNICAL DATA	Version		480	530	600	700	800
Cooling capacity	H	kW	146.9	176.1	194.6	230.4	254.4
Sensible cooling capacity	H	kW	119.7	145.1	156.9	182.7	199.7
Heating capacity	H	kW	151.3	178.5	202.9	231.5	266.1
Total input power in cooling mode	H	kW	58.1	62	69.1	81	93.1
Total input power in pdc	H	kW	48.1	52.5	60.4	75.6	87.1

Energy indicators

E.E.R.	H		2.5	2.8	2.8	2.8	2.7
C.O.P.	H		3.1	3.4	3.4	3.1	3.1

Condensing unit section

Compressors

Type	H		tandem scroll				
Number / circuits	H	no.	4/2	4/2	4/2	4/2	4/2
Capacity step control	H	no.	4	4	4	4	4
Input power in cooling mode	H	kW	40.6	43	48.1	58	70.1
Input power in heating mode	H	kW	30.5	33.5	39.5	52.6	64.1

Fans

Number per installed power	H	no./kW	4/2.5	4/2.5	4/2.5	4/2	4/2
Air flow rate	H	m^3/h	74600	72400	69200	84400	80600

Air-handling section

Evaporator

Number of rows	H	no.	3	4	4	4	4

Fan

Type	H		Centrifugal, blades forwards				
Nominal air flow rate	H	m^3/h	26500	29500	31500	35000	38500
Minimum air flow rate	H	m^3/h	22500	25000	26800	29800	32700
Maximum air flow rate	H	m^3/h	30500	34000	36300	40300	44300
Number	H	no.	1	1	1	1	1
Total installed power	H	kW	7.5	9.0	11.0	15.0	15.0
Effective pressure with standard motor	H	Pa	200	200	200	200	200

Air filters

Thickness	H	mm	50	50	50	50	50
Efficiency	H	EN779	G4	G4	G4	G4	G4

Dimensions of standard configuration

Height	H	mm	2450	2450	2450	2450	2450
Width	H	mm	2350	2350	2350	2350	2350
Length	H	mm	4200	4200	4200	5500	5500
Weight	H	kg	2200	2300	2400	2800	2900

WARNING: technical data are referred to standard configuration unit and to nominal operative conditions.

Performance levels referring to:

Cooling-only
Room air 27°C / 50% r.h.
External air 35°C

Heat pump
Room air 20°C / 50% r.h.
External air 7°C / 70% r.h.

Cooling only F-A (high temperature)

NOMINAL TECHNICAL DATA	Version		480	530	600
Cooling capacity	F A	kW	156.3	182.7	208.5
Sensible cooling capacity	F A	kW	123.6	148.9	160.8
Total input power	F A	kW	53.7	59.2	63.3

Energy indicators

E.E.R.	F A		2.9	3.1	3.3

Condensing unit section

Compressors

Type	F A		tandem scroll		
Number / circuits	F A	no.	4/2	4/2	4/2
Capacity step control	F A	no.	4	4	4
Input power	F A	kW	36.2	40.2	42.3

Fans

Number per installed power	F A	no./kW	4/2.5	4/2.5	4/2.5
Air flow rate	F A	m^3/h	72.400	69.200	67.400

Air-handling section

Evaporator

Number of rows	F A	no.	3	4	4

Fan

Type	F A		Centrifugal, blades forwards		
Nominal air flow rate	F A	m^3/h	26500	29500	31500
Minimum air flow rate	F A	m^3/h	25000	26800	22500
Maximum air flow rate	F A	m^3/h	30500	34000	36300
Number	F A	no.	1	1	1
Total installed power	F A	kW	7.5	9.0	11.0
Effective pressure with standard motor	F A	Pa	200	200	200

Air filters

Thickness	F A	mm	50	50	50
Efficiency	F A	EN779	G4	G4	G4

Dimensions of standard configuration

Height	F A	mm	2450	2450	2450
Width	F A	mm	2350	2350	2350
Length	F A	mm	4200	4200	4200
Weight	F A	kg	2100	2200	2300

WARNING: technical data are referred to standard configuration unit and to nominal operative conditions.

Performance levels referring to:
room air 27°C / 50% r.h.
external air 35°C

Heat pumps H-A (high temperature)

NOMINAL TECHNICAL DATA	Version		480	530	600
Cooling capacity	H A	kW	152.9	181.2	205.2
Sensible cooling capacity	H A	kW	122.3	146.5	156.8
Heating capacity	H A	kW	159.1	183.8	208.3
Total input power in cooling mode	H A	kW	54.3	60.6	63.3
Total input power in pdc	H A	kW	48.7	52.8	61.5

Energy indicators

E.E.R.	H A		2.8	3	3.2
C.O.P.	H A		3.3	3.5	3.4

Condensing unit section

Compressors

Type	H A		tandem scroll		
Number / circuits	H A	no.	4/2	4/2	4/2
Capacity step control	H A	no.	4	4	4
Input power in cooling mode	H A	kW	36.8	41.6	42.3
Input power in heating mode	H A	kW	31.2	33.8	40.5

Fans

Number per installed power	H A	no./kW	4/2.5	4/2.5	4/2.5
Air flow rate	H A	m^3/h	72400	69200	67400

Air-handling section

Evaporator

Number of rows	H A	no.	4	4	4

Fan

Type	H A		Centrifugal, blades forwards		
Nominal air flow rate	H A	m^3/h	26500	29500	31500
Minimum air flow rate	H A	m^3/h	25000	26800	22500
Maximum air flow rate	H A	m^3/h	30500	34000	36300
Number	H A	no.	1	1	1
Total installed power	H A	kW	7.5	9	11
Effective pressure with standard motor	H A	Pa	200	200	200

Air filters

Thickness	H A	mm	50	50	50
Efficiency	H A	EN779	G4	G4	G4

Dimensions of standard configuration

Height	H A	mm	2450	2450	2450
Width	H A	mm	2350	2350	2350
Length	H A	mm	4200	4200	4200
Weight	H A	kg	2200	2300	2400

WARNING: technical data are referred to standard configuration unit and to nominal operative conditions.

Performance levels referring to:

Cooling
Room air 27°C / 50% r.h.
External air 35°C

Heat pump
Room air 20°C / 50% r.h.
External air 7°C / 70% r.h.

Cooling only F-L (low noise)

NOMINAL TECHNICAL DATA	Version		480	530	600	700	800
Cooling capacity	F L	kW	148.4	178.6	201.1	230.9	251.1
Sensible cooling capacity	F L	kW	123.6	146.2	159.7	182.5	199.9
Total input power	F L	kW	57.2	61.1	65.5	80.6	95.2

Energy indicators

E.E.R.	F L		2.6	2.9	3.1	2.9	2.6

Condensing unit section

Compressors

Type	F L		tandem scroll				
Number / circuits	F L	no.	4/2	4/2	4/2	4/2	4/2
Capacity step control	F L	no.	4	4	4	4	4
Input power	F L	kW	39.7	42.1	44.5	57.6	72.2

Fans

Number per installed power	F L	no./kW	4/2.5	4/2.5	4/2.5	4/2	4/2
Air flow rate	F L	m^3/h	57800	55400	51800	63200	59800

Air-handling section

Evaporator

Number of rows	F L	no.	4	4	4	4	4

Fan

Type	F L		Centrifugal, blades forwards				
Nominal air flow rate	F L	m^3/h	26500	29500	31500	35000	38500
Minimum air flow rate	F L	m^3/h	22500	25000	26800	29800	32700
Maximum air flow rate	H	m^3/h	30500	34000	36300	40300	44300
Number	F L	no.	1	1	1	1	1
Total installed power	F L	kW	7.5	9.0	11.0	15.0	15.0
Effective pressure with standard motor	F L	Pa	200	200	200	200	200

Air filters

Thickness	F L	mm	50	50	50	50	50
Efficiency	F L	EN779	G4	G4	G4	G4	G4

Dimensions of standard configuration

Height	F L	mm	2450	2450	2450	2450	2450
Width	F L	mm	2350	2350	2350	2350	2350
Length	F L	mm	4200	4200	4200	5500	5500
Weight	F L	kg	2200	2300	2400	2800	2900

WARNING: technical data are referred to standard configuration unit and to nominal operative conditions.

Performance levels referring to:
room air 27°C / 50% r.h.
external air 35°C

NOMINAL TECHNICAL DATA	Version		480	530	600	700	800
Cooling capacity	H L	kW	145.2	176.3	198.3	228.6	250.4
Sensible cooling capacity	H L	kW	118.9	145.1	158.6	181.9	198
Heating capacity	H L	kW	150.1	179.6	195.0	227.7	250.1
Total input power in cooling mode	H L	kW	59.1	62	66.7	82.2	96.2
Total input power in pdc	H L	kW	47.9	52.6	59.9	75.0	85.1

Energy indicators

E.E.R.	H L		2.5	2.8	3	2.8	2.6
C.O.P.	H L		3.1	3.4	3.3	3	2.9

Condensing unit section

Compressors

Type	H L		tandem scroll				
Number / circuits	H L	no.	4/2	4/2	4/2	4/2	4/2
Capacity step control	H L	no.	4	4	4	4	4
Input power in cooling mode	H L	kW	41.6	43	45.7	59.2	73.2
Input power in heating mode	H L	kW	30.4	33.6	38.9	52.1	62.1

Fans

Number per installed power	H L	no./kW	4/2.5	4/2.5	4/2.5	4/2	4/2
Air flow rate	H L	m^3/h	57800	55400	51800	63200	59800

Air-handling section

Evaporator

Number of rows	H L	no.	4	4	4	4	4

Fan

Type	H L		Centrifugal, blades forwards				
Nominal air flow rate	H L	m^3/h	26500	29500	31500	35000	38500
Minimum air flow rate	H L	m^3/h	22500	25000	26800	29800	32700
Maximum air flow rate	H L	m^3/h	30500	34000	36300	40300	44300
Number	H L	no.	1	1	1	1	1
Total installed power	H L	kW	7.5	9.0	11.0	15.0	15.0
Effective pressure with standard motor	H L	Pa	200	200	200	200	200

Air filters

Thickness	H L	mm	50	50	50	50	50
Efficiency	H L	EN779	G4	G4	G4	G4	G4

Dimensions of standard configuration

Height	H L	mm	2450	2450	2450	2450	2450
Width	H L	mm	2350	2350	2350	2350	2350
Length	H L	mm	4200	4200	4200	5500	5500
Weight	H L	kg	2200	2300	2400	2800	2900

WARNING: technical data are referred to standard configuration unit and to nominal operative conditions.

Performance levels referring to:

Cooling-only
Room air 27°C / 50% r.h.
External air 35°C

Heat pump
Room air 20°C / 50% r.h.
External air 7°C / 70% r.h.

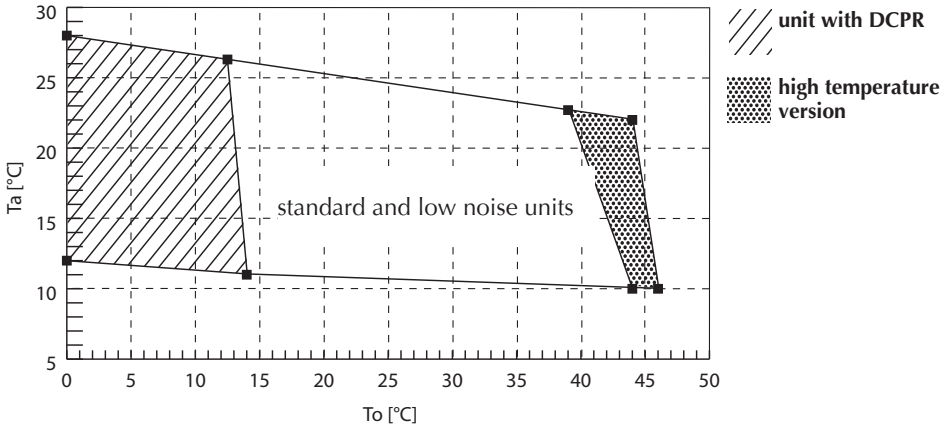
Operating limits

Summer operation

In their standard configuration, the units are not suitable for installation in a salty environment.

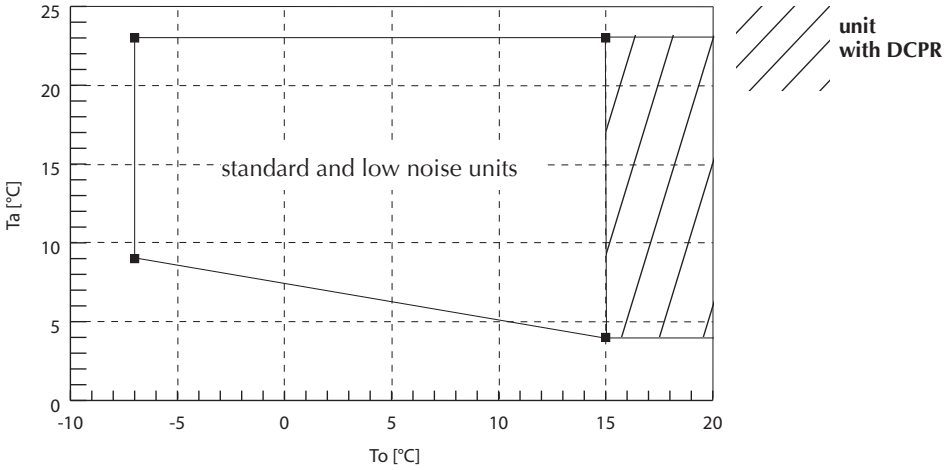
NB: if you want to operate the machine outside the limits indicated in the diagram, please contact the AERMEC technical/sales office.

If the machine is positioned in particularly windy areas, it is necessary to use windbreak barriers to avoid the unstable working of the DCPR device.



To: dry bulb air temperature at external heat exchanger intake
Ta: wet bulb air temperature at internal heat exchanger intake

Winter operation (heat pump)



To: dry bulb air temperature at external heat exchanger intake
Ta: wet bulb air temperature at internal heat exchanger intake

Sound data

Lw: sound power level
Lp: sound pressure level

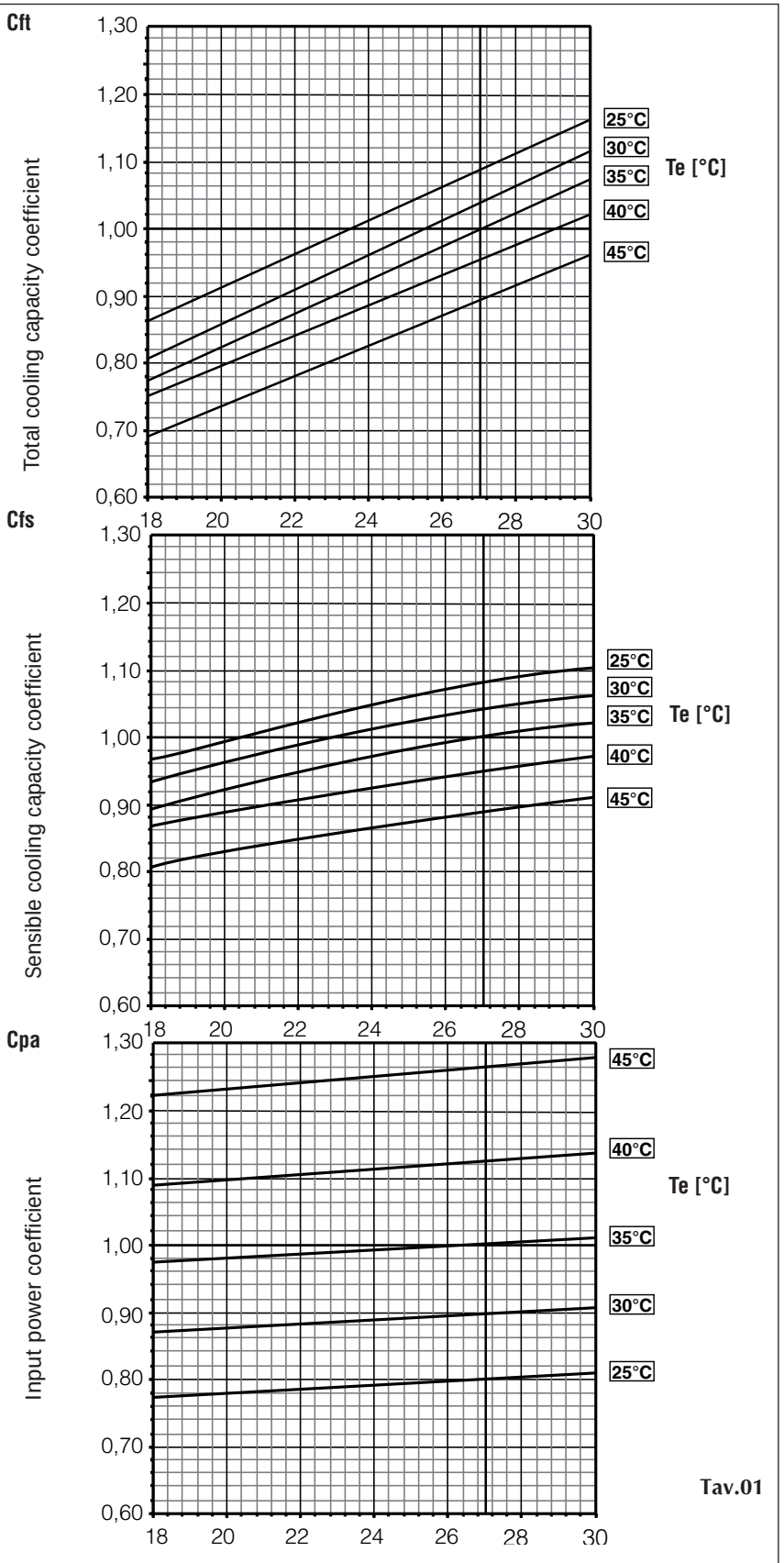
* 1m from the unit (electric board side), supply inlet of the ducted fan, direction factor Q = 2.

Standard and high temperature version (A)										
RTE	**Total noise levels**		**Octave band [Hz]**							
	Lp tot* [dBA]	Lw tot [dBA]	63	125	250	500	1000	2000	4000	8000
			Sound power levels Lw [dB]							
480	65.7	73.7	81	74	72	71	70	63	61	53
530	66.8	74.8	81	75	73	72	71	65	62	55
600	67.9	75.9	82	76	74	73	72	66	64	54
700	71.1	79.1	92	83	79	75	75	69	65	56
800	71.5	79.5	94	84	79	76	75	69	65	57

Variations in the cooling capacity and input power

The following diagrams allow you to obtain the correction coefficients to be used for the rooftop units in cooling mode. In line with each curve, there is the external air temperature (Te).

The total cooling capacity output, the sensible cooling capacity, and the electrical input power in conditions other than nominal are obtained by multiplying the nominal values in the technical data tables by the respective correction coefficients (Cft, Cfs and Cpa).



Key

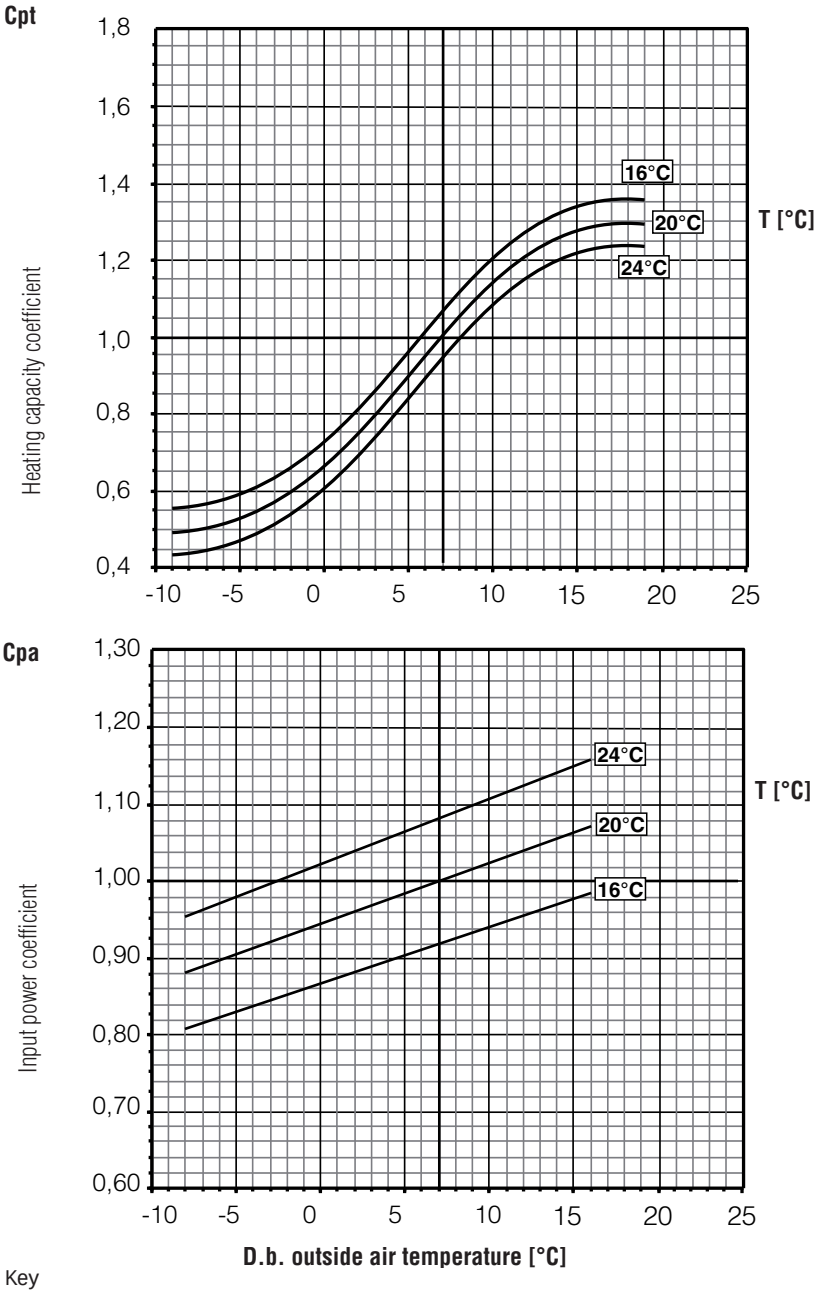
Cft Total cooling capacity coefficient
Cfs Sensible cooling capacity coefficient
Cpa Input power coefficient
Te Outside air temperature °C
d.b. dry bulb
R.H. Relative humidity

Variations in the heating capacity and input power

The following diagrams allow you to obtain the correction coefficients to be used for the rooftop units in heat pump mode. In line with each curve, there is the environment temperature (T). On the X-axis there is the dry bulb external air temperature with variable relative humidity, according to the data given in the table below.

The heating capacity output, and the electrical input power in conditions other than nominal are obtained by multiplying the nominal values by the respective correction coefficients (Cpt, Cpa).

The return is intended net of the defrosting cycles.



Key

Cpt Heating capacity coefficient

Cpa Input power coefficient

d.b. dry bulb

T Temperature of air to be treated, d.b.

In the diagrams of heat pump mode output, the X-axes give a temperature that refers to the following humidity conditions:

Outside air temperature on X-axis	°C	-8	-6	-4	-2	0	2	4	6	8	10	12	14	16
D.B. temperature	°C	-8	-6	-4	-2	0	2	4	6	8	10	12	14	16
Rel. Humid.	%	90	90	85	80	75	75	70	70	70	65	65	65	65

For other conditions, contact the AERMEC technical/sales office.

Correction coefficients for flow rates different from the nominal one

The data obtained from the diagrams on pages 18-19 refer to the nominal air flow rate (**Wn**) of the air treatment section.
For air flow rate values (**W**) different from the nominal one, use the cooling capacity correction factors given in the table alongside.

Correction coefficients for flow rates different from the nominal one, for total cooling capacity					
W/Wn	0.8	0.9	1	1.1	1.2
Cft	0.974	0.987	1	1.014	1.027

Correction coefficients for flow rates different from the nominal one, and for sensible cooling capacity					
W/Wn	0.8	0.9	1	1.1	1.2
Cfs	0.905	0.953	1	1.048	1.095

Correction coefficients for flow rates different from the nominal one, for heating capacity					
W/Wn	0.8	0.9	1	1.1	1.2
Cpt	0.974	0.987	1	1.014	1.027

Key
Cft Total cooling capacity multiplication coefficient
Cfs Sensible cooling capacity multiplication coefficient
Cpt Heating capacity multiplication coefficient

The input power shows no considerable variation when the flow rate of the air to be treated varies.

Variations in the total yield with changing humidity levels

The table allows you to obtain the multiplication coefficients in order to obtain the **total cooling capacity** ON THE UNITS WITH VARYING RELATIVE HUMIDITY, KEEPING THE D.B. TEMPERATURE CONSTANT.

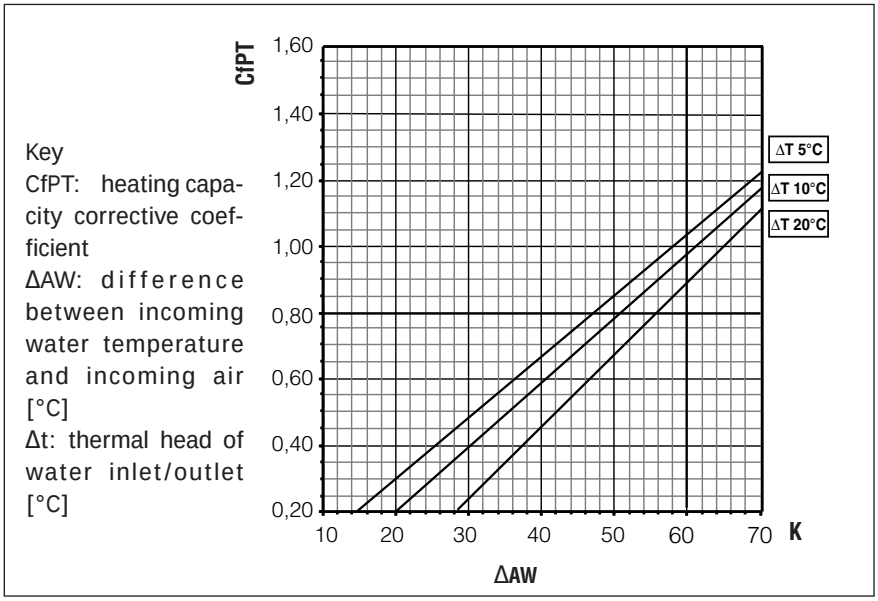
Correction coefficients for total cooling yields with varying relative humidity						
R.H.	%	30	40	50	60	70
Coefficient		0.90	0.94	1	1.04	1.10

The table allows you to obtain the multiplication coefficients in order to obtain the **sensible cooling capacity** on the units with varying relative humidity, keeping the d.b. temperature constant.

Correction coefficients for sensible cooling yields with varying relative humidity						
R.H.	%	30	40	50	60	70
Coefficient		1.28	1.13	1	0.87	0.76

Table showing the output of the water-operated heating coils

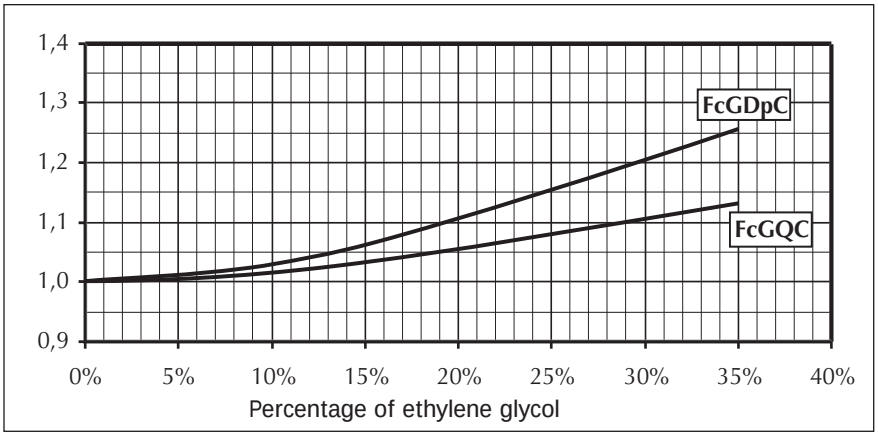
The RTE units can be fitted with a 2-row water-operated heating element (accessory) with a servo-commanded modulating 3-way valve (accessory).
The first diagram gives a summary of the working data of the water-operated heating elements for all sizes of unit.
From the first diagram it is possible to obtain the correction coefficients for the water-operated heating elements, to be applied to the nominal data on page 10.



Corrections for pressure drops and flow rate with glycol water

FcGDpC = Pressure drop correction factor
FcGQC = Flow rate correction factor

The correction factors for the water flow rate and pressure drops are applied directly to the data obtained for operation without glycol.



Technical data of heating modules Gxxx

Gxxx model		G150					G200					G242	
Combination with RTE sizes	RTE model	RTE480	RTE530	RTE600	RTE700	RTE800	RTE480	RTE530	RTE600	RTE700	RTE800	RTE480	RTE530
Combination with heating modules	no. per model	1x150	1x150	1x150	1x150	1x150	1x200	1x200	1x200	1x200	1x200	1x150 + 1x92	1x150 + 1x92
Thermal capacity (at nominal air flow rate and maximum heating capacity)	°C	17	15	14.3	13	11.7	22.6	20.3	19	17	15.6	20.7	18.9

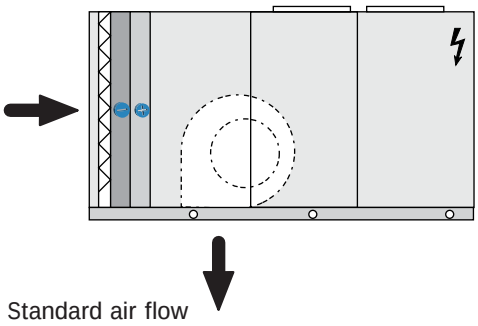
Heating module		092		150		200	
		min.	max.	min.	max.	min.	max.
Nominal heating capacity	kW	30	98	44	155	53	215
Capacity	%	105	95.3	105.2	93.5	105.1	91.6
Nominal heating capacity	kW	31.5	93.4	46.3	145	55.7	197
Condensate produced	l/h	2.6		3.9		4.9	
NOx	mg/kWh	37		43		39	
Diameter of gas connection		UNI ISO 7/1 - 1” M		UNI ISO 7/1 - 1” M		UNI ISO 7/1 - 1” M	
Diameter of intake/discharge pipes	mm	100 / 100		130 / 130		130 / 130	
Pressure available for flue gas discharge	Pa	120		100		140	
Minimum working temperature	°C	-15		-15		-15	
Power supply	V / Hz	230 / 50		230 / 50		230 / 50	
Category		II 2H 3B/P					
Power supply pressure G20 natural gas	mbar	20 (min. 17; max. 25)					
Consumption G20 natural gas (15°C - 1013 mbar)	m^3/h	3.18 - 10.38		4.50 - 15.80		5.60 - 22.30	
Carbon dioxide CO_2 G20 natural gas	%	8.7 +/- 0.2					
Power supply pressure G30	mbar	37		-		-	
Consumption G30 (15°C - 1013 mbar)	m^3/h	1.92 - 6.28		-		-	
Carbon dioxide CO_2 G30	%	9.5 +/- 0.3		-		-	
Power supply pressure G31	mbar	37					
Consumption G31 (15°C - 1013 mbar)	m^3/h	1.88 - 6.14		2.76 - 9.71		3.32 - 13.47	
Carbon dioxide CO_2 G31	%	9.5 +/- 0.3					

Dimensional diagrams

Standard version

Single-block rooftop unit

- front view
- supply downwards
- G4 filters
  (optional hot water coil)

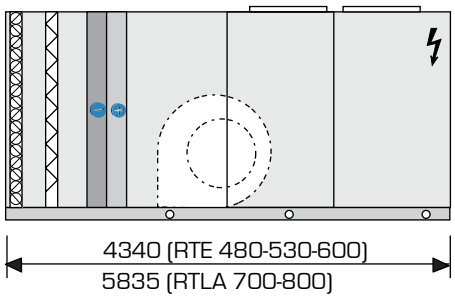


(fig.1)

SMP

Single-block rooftop unit

- 2-ways mixing box, rear intake
  (optional actuator)
- G4 filters
  (optional hot water coil)

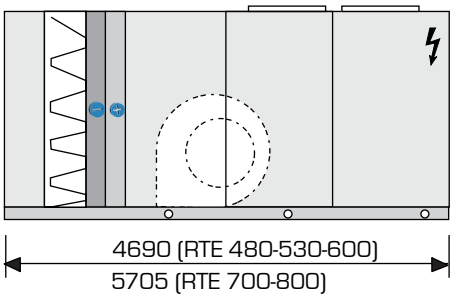


(fig.2)

FT7

Single-block rooftop unit

- G3 pre-filter
- F7 bag filters
  (optional hot water coil)

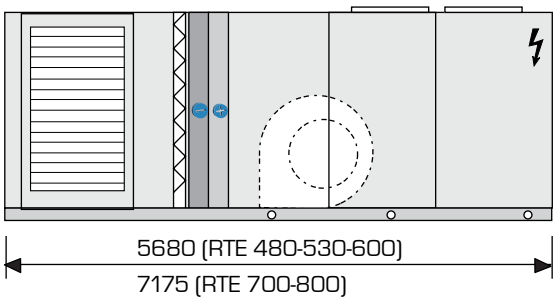


(fig.3)

SM2

Single-block rooftop unit

- 2-ways mixing box, side/lower
  intake (optional actuator)
- G4 filters
  (optional hot water coil)

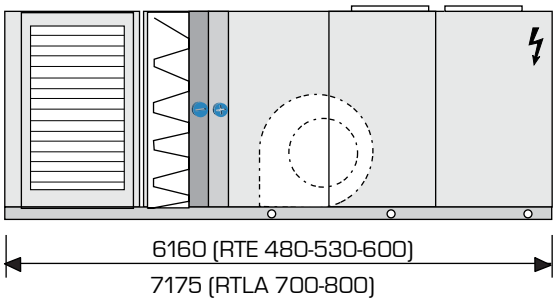


(fig.4)

SM2 - FT7

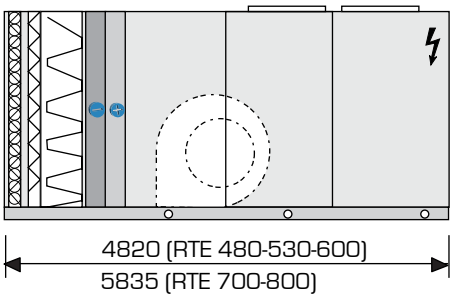
Single-block rooftop unit

- 2-ways mixing box, side/lower/front
  intake (optional actuator)
- G3 pre-filter
- F7 bag filters
  (optional hot water coil)



(fig.5)

SMP - FT7



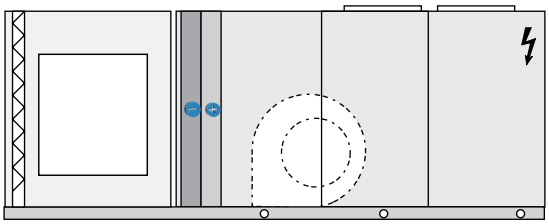
4820 (RTE 480-530-600)
5835 (RTE 700-800)

(fig.5bis)

Gxxx

Single-block rooftop unit

- G3 pre-filter
- condensing hot air generator (depending on the version) inserted in a module with sandwich panelling and mineral wool insulation (density 100kg/m^3)



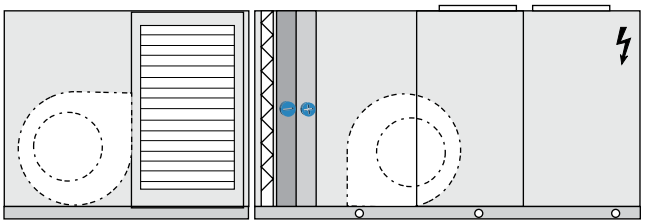
6205 (RTE 480-530-600)
7700 (RTE 700-800)

(fig.6)

SM3

Rooftop unit

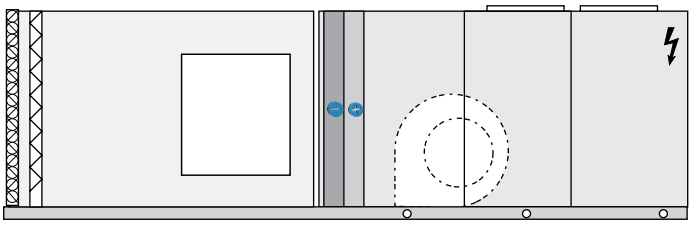
- 3-ways mixing box with:
  - intake fan with variable step pulley
  - modulating actuators for all the dampers (modulating spring actuators for external damper, as accessory).



6370 (RTE 480-530-600)
8025 (RTE 700-800)

(fig.7)

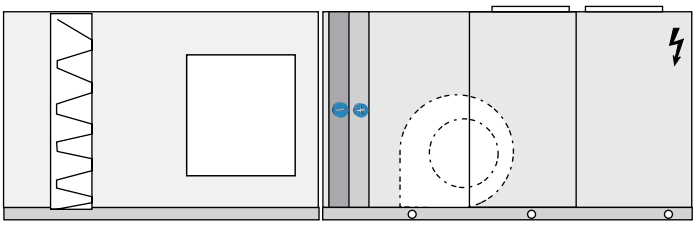
Gxxx - SMP



6335 (RTE 480-530-600)
7830 (RTE 700-800)

(fig.8)

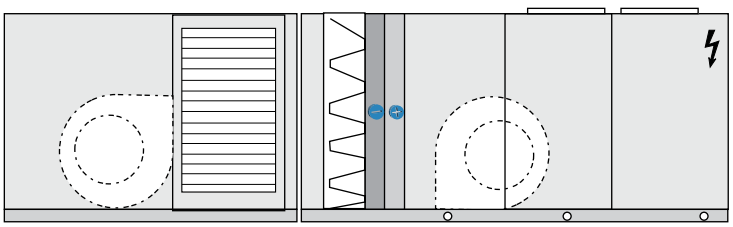
Gxxx - FT7



6685 (RTE 480-530-600)
7700 (RTE 700-800)

(fig.9)

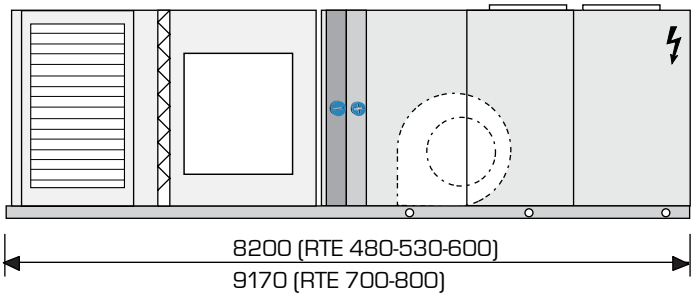
SM3 - FT7



6850 (RTE 480-530-600)
8025 (RTE 700-800)

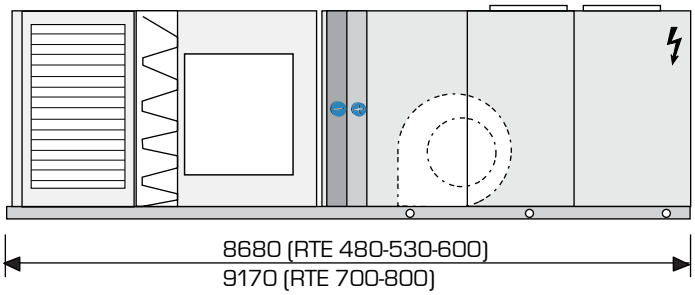
(fig.10)

SM2 - Gxxx



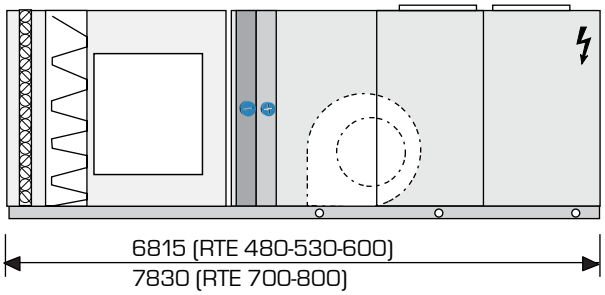
(fig.11)

SM2 - Gxxx - FT7



(fig.12)

SMP - Gxxx - FT7

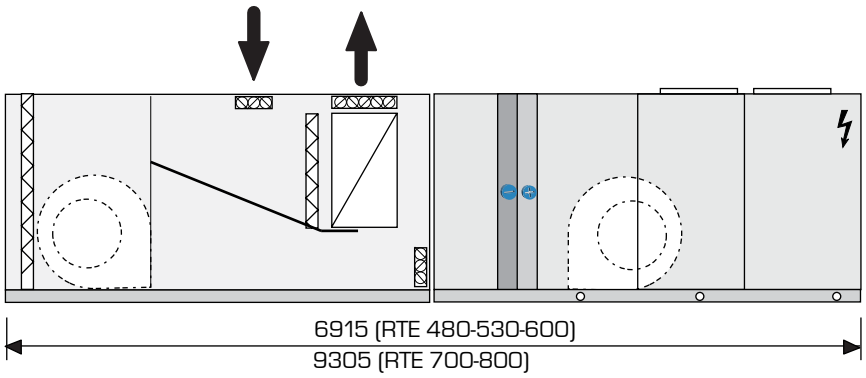


(fig.12bis)

REC

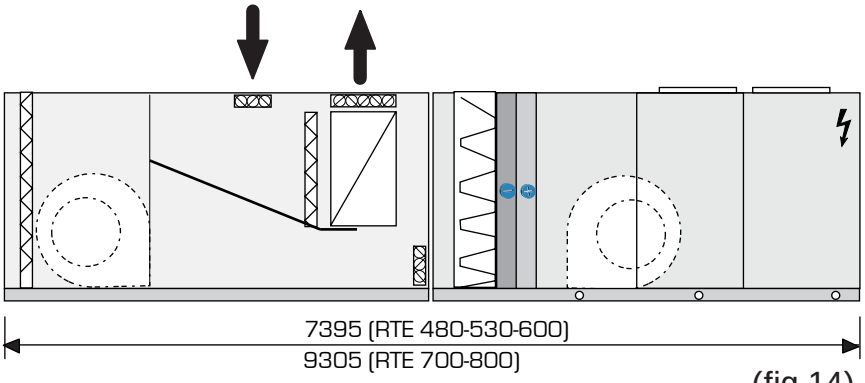
Single-block rooftop unit

- Heat recovery unit fitted with:
  - intake fan with variable step pulley
  - G4 flat filters for expulsion
  - G4 flat filters for renewal
  - modulating actuators for all the dampers (modulating spring actuators for external damper, as accessory).
  - double differential pressure switch for dirty filters, as accessory



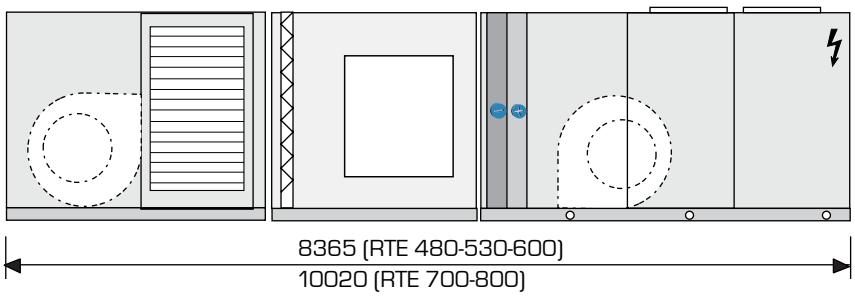
(fig.13)

REC - FT7



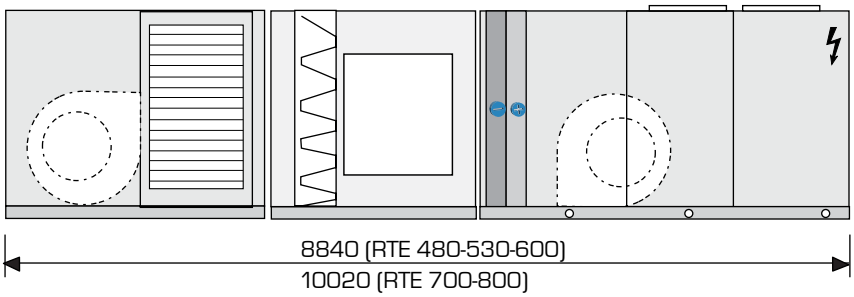
(fig.14)

SM3 - Gxxx



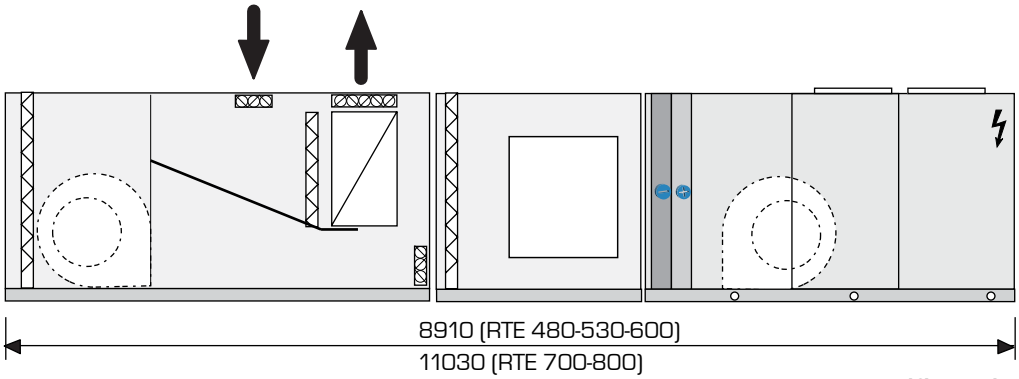
(fig.15)

SM3 - Gxxx - FT7



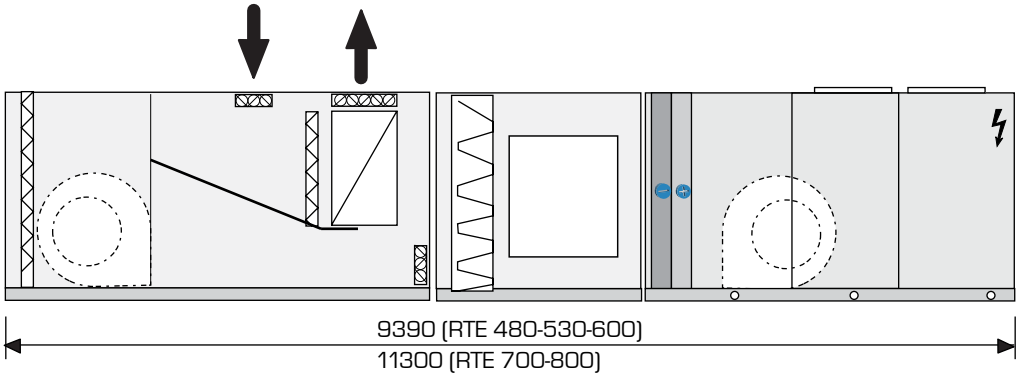
(fig.16)

REC - Gxxx



(fig.17)

REC - Gxxx - FT7



(fig.18)

RTE 480-560-600-700-800 with 2-ways mixing box SM2

The intake mouths of the rooftop units with 2-ways mixing box can vary as follows:

T1 - Intake air recirculation right side, Rear fresh air intake

T2 - Intake air recirculation left side, Rear fresh air intake

T4 - Intake air recirculation below, Intake fresh air rear

T5 - Intake air recirculation right side, left side fresh air intake

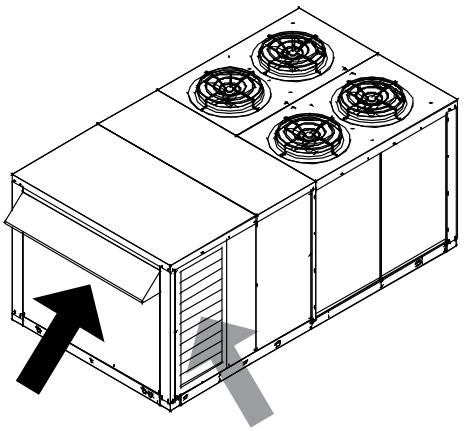
T6 - Intake air recirculation left side, right side fresh air intake

N.B.:
- the rainproof casings are optional
- Recirculation damper is optional (if foreseen is internally positioned)
- Renewal damper is ever present and internally positioned

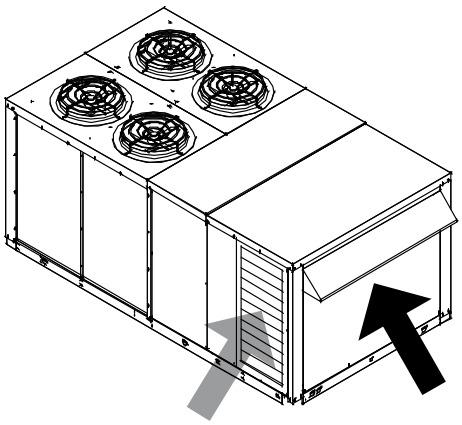
Fresh Air

Recirculation Air

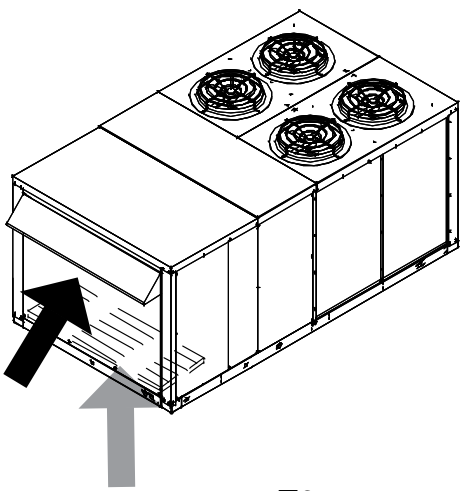
T1



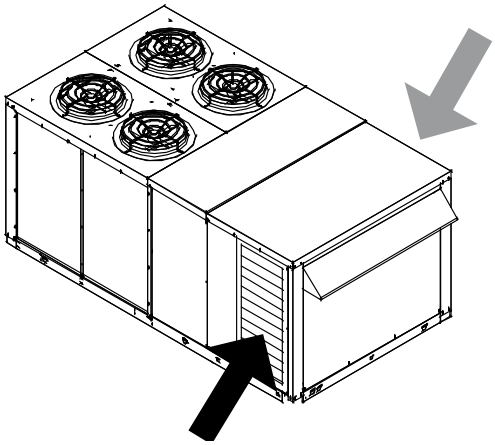
T2



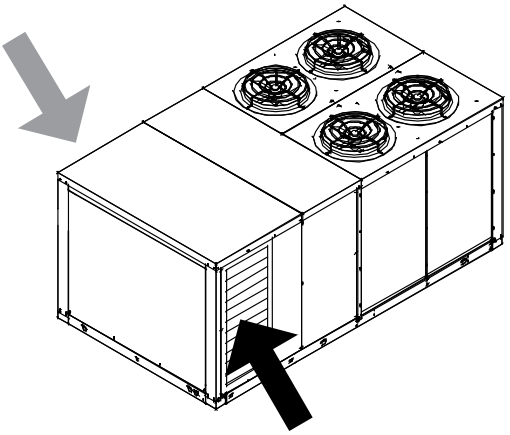
T4



T5



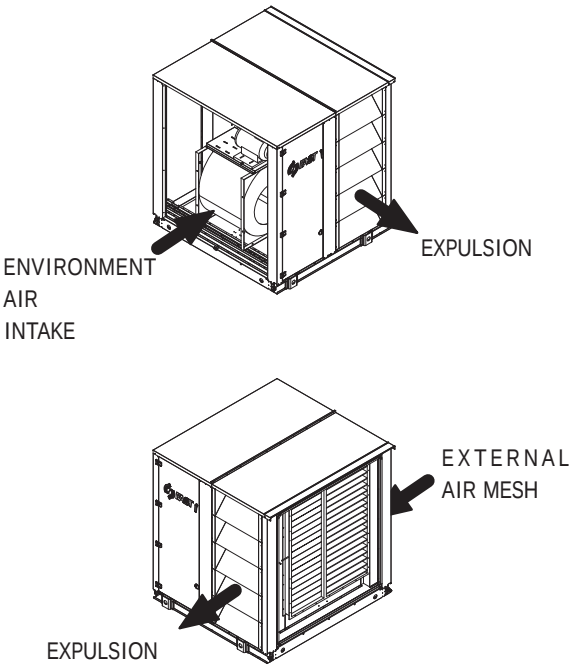
T6



RTE 480-560-600-700-800 with 3-ways mixing box

The environment air intake is on the back. The external air mesh with the relative damper, and the expulsion outlet with the relative damper, are on the side of the unit.
An internal recirculation damper allows the flow of intake air to be mixed in different proportions with the flow of external air.
With suitable climatic conditions, it is possible to work in Free-Cooling mode; the internal recirculation damper is completely closed, all the environment air is expelled and all the external air is sent to the rooms to be air-conditioned.

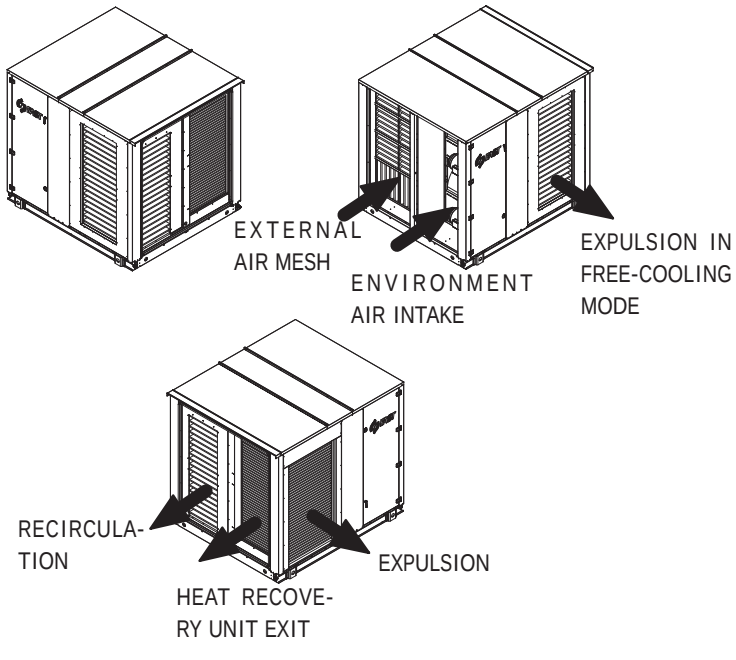
3-ways mixing box SM3



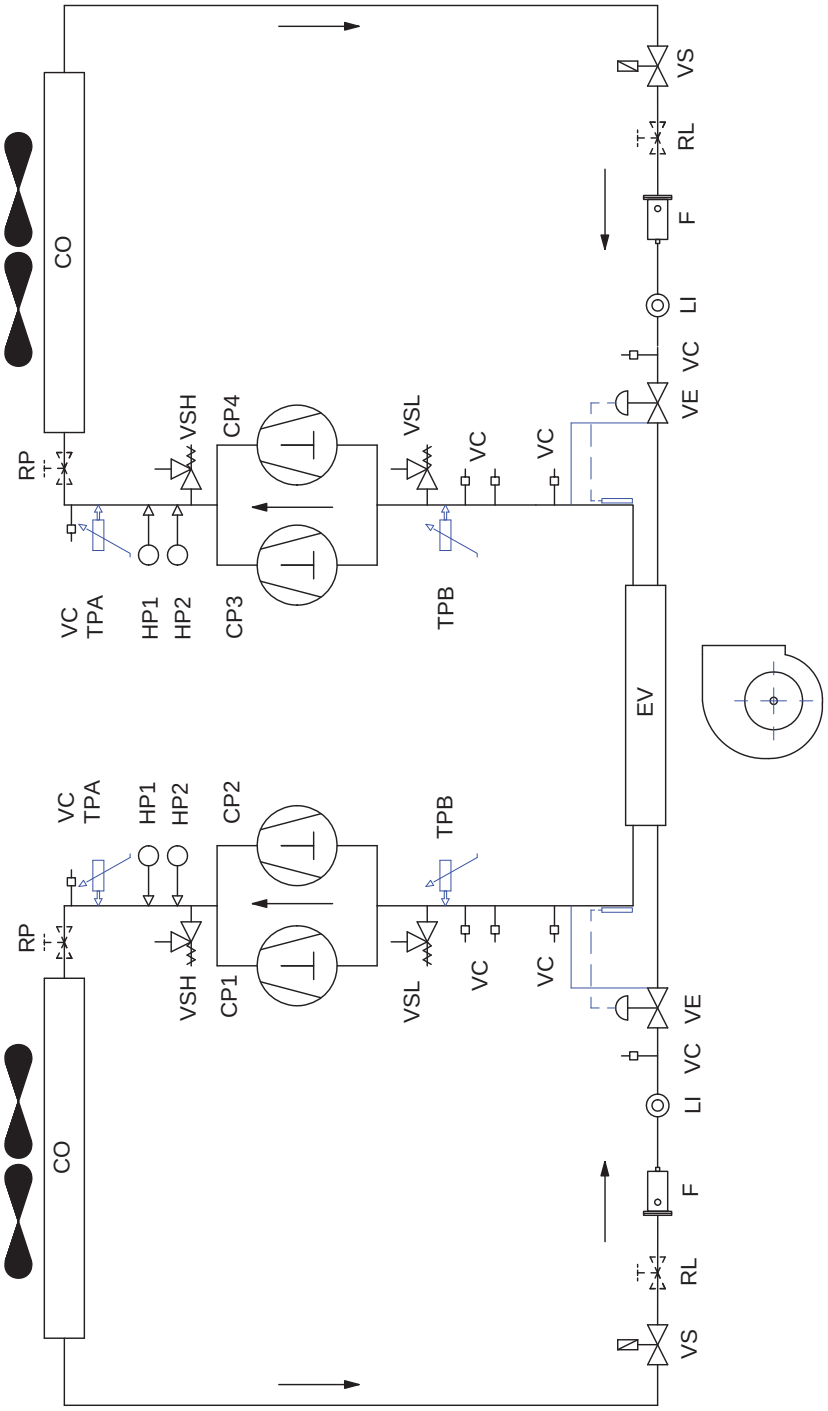
RTE 480-560-600-700-800 with heat recovery unit

- Heat recovery unit fitted with:
  - intake fan with variable pitch pulley
  - G4 flat filters on the external air mesh
  - modulating actuators for all the dampers (modulating spring actuators for external damper, as accessory)
  - double differential pressure switch for dirty filters, as accessory

In free-cooling mode, the expelled air leaves the expulsion damper in free-cooling, and does not pass through the heat recovery unit. It is possible to request the section with the heat recovery unit on the right side rather than the left side.



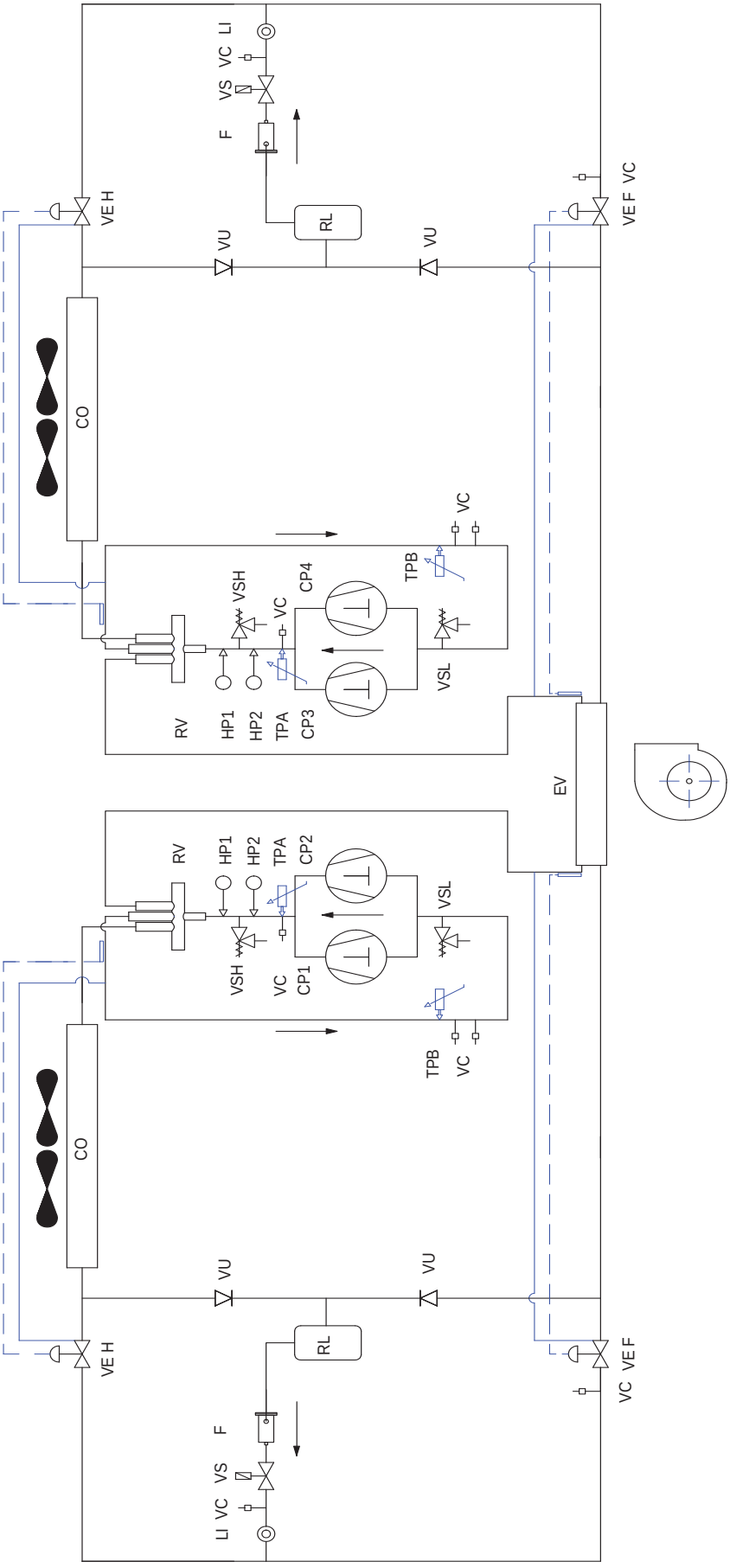
Cooling only version



Version F components key	
CO	condenser
CP1	scroll type compressor
CP2	scroll type compressor
CP3	scroll type compressor
CP4	scroll type compressor
EV	evaporator
F	drier filter
HP1	high pressure switch
HP2	high pressure switch
LI	liquid indicator
RL	liquid tap (optional)
RP	force tap (optional)
TPA	high pressure transducer
TPB	low pressure transducer
VC	service valve
VE	thermostatic expansion valve
VS	solenoid valve
VSH	high pressure safety valve
VSL	low pressure safety valve

Heat pump version

Version H components key	
CO	condenser
CP1	scroll type compressor
CP2	scroll type compressor
CP3	scroll type compressor
CP4	scroll type compressor
EV	evaporator
F	drier filter
HP1	manual reset high pressure switch
HP2	manual reset high pressure switch
LI	liquid indicator
RL	liquid receiver
RV	reverse cycle valve
TPA	high pressure transducer
TPB	low pressure transducer
VC	service valve
VEF	thermostatic expansion valve, summer operation
VEH	thermostatic expansion valve, winter operation
VS	solenoid valve
VSH	high pressure safety valve
VSL	low pressure safety valve
VU	single-acting valve



List of pressure equipment - Directive PED 97/23 EC

The list of pressure equipment is indicated in the table along with the related module fitted on the rooftop unit RTE, in accordance with Directive PED 97/23 EC.

COMPONENT	MODULE
Compressor	D1
Finned coil heat exchanger	A
Reverse cycle valve	A
Liquid receiver	D1
High pressure switch	B
High pressure side safety valve	B
Low pressure side safety valve	B

Safety

The machine has been designed to minimise the risks for the safety of the people interacting with it. During the design phase, it was not technically possible to completely eliminate the risk causes. It is therefore imperative to refer to the following instructions.

Access to the unit

Access to the unit once it has been installed must only be permitted to qualified operators and technicians. The operator is a person who has been authorised by the owner of the machine to carry out operations on the machine (in accordance with the indications given in this manual). The technician is a person authorised by AERMEC, or subordinate under their own responsibility by a AERMEC distributor, to carry out operations on the machine. The owner of the machine is the legal representative of the company, entity or individual owner of the system in which the AERMEC machine is installed. These people are responsible for the observance of all safety standards indicated in this manual and the existing law. If access to the machine by unauthorised people cannot be prevented, due to the nature of the installation location, a cordoned area must be defined around the machine, at least 1.5 metres from the external surface, inside which only operators and technicians are permitted. The operators and technicians must operate on the machine wearing suitable safety clothing (shoes, gloves, safety helmets, etc.) and with suitable tools.

Residual risks

The installation, start-up, shutdown and maintenance of the machine must be carried out in accordance with that stipulated in the technical documentation of the product and in such a manner that no hazardous situations are generated. Risks that were impossible to eliminate during the design phase are indicated in the following table.

CONSIDERED PART	RESIDUAL RISK	METHOD	PRECAUTION
Heat exchanger coil	small cuts	contact	avoid contact, use protective gloves
Fan grille and fan	injuries	insertion of sharp objects in the grille while the fan is working	do not insert objects of any type in the fan grille, and do not rest objects against the grilles
Inside the unit: compressor and supply pipes	burns	contact	avoid contact, use protective gloves
Inside the unit: metal parts and electrical cables	intoxication, electrocution, severe burns	insulation defect of the power supply cables upstream of the unit's electric panel; live metal parts	suitable electrical protection of the power supply line; maximum care when earthing the metal parts
Outside the unit: area around the unit	intoxication, severe burns	fire due to short-circuiting or overheating of the power supply line upstream of the unit's electric panel	cable section and power supply line safety system conforming with existing laws

Installation and use of the unit

Packaging

The units are usually supplied without packaging, apart from the high efficiency filtering cells and the assembly accessories, which are supplied in cardboard boxes and are to be installed by the customer. Upon request, the units can be supplied packed in polyethylene film, on pallets + polyethylene film, in crates or in chests.

Receipt and storage

On receipt of the goods, check they have not undergone damage and that they correspond with the indications on the accompanying documents. Possible damage or incomplete supply must be opportunely signalled. The unit can be stored in an area protected from weather with temperatures from -20°C to a maximum of +55°C.

Handling

Before handling the unit, check that it has not suffered damage during transportation, and check also that the lifting and positioning equipment to be used is of a suitable capacity and respects the current safety standards.
Pay particular attention to all loading, unloading and lifting operations in order to avoid dangerous situations for people and damage to the structure and working elements of the machine.
The eyebolts in the base that are to be used for lifting purposes are painted yellow.
Check the belts are type-approved to support the weight of the unit, and ensure they are well fixed to the upper frame and the lifting eyebolts. The safety closures must guarantee that the belts will not slip out of their housing.
The hook-up point of the lifting frame must be on the vertical of the centre of gravity.
The positioning can be carried out using two pallet trucks, one for each side of the section and preferably on the longer sides.
Alternatively, the positioning can be made by sliding the rooftop unit on pipes acting as rollers.
It is absolutely forbidden to stand beneath the unit.

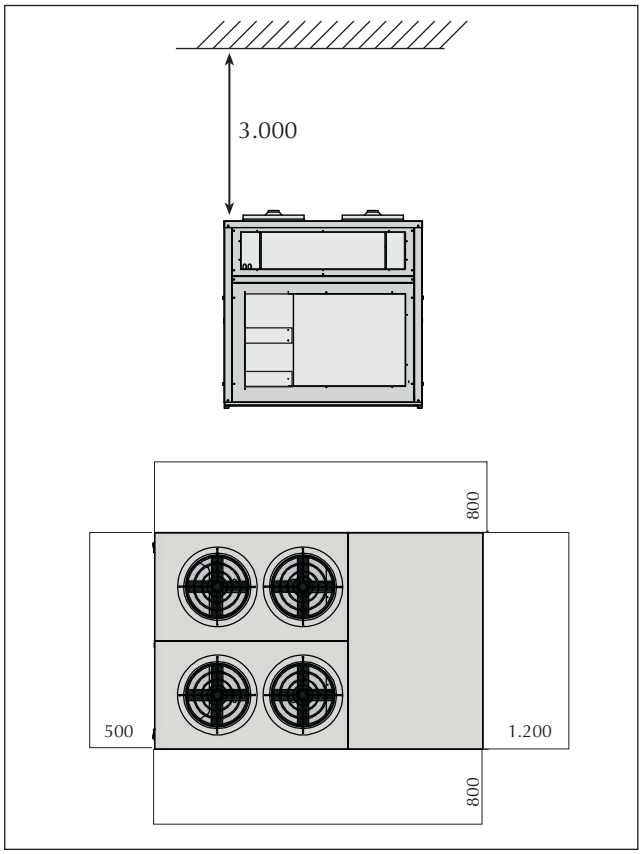
Location

If the machine is positioned in particularly windy areas, it is necessary to use windbreak barriers to avoid the unstable working of the DCPR device.

Minimum technical clearances

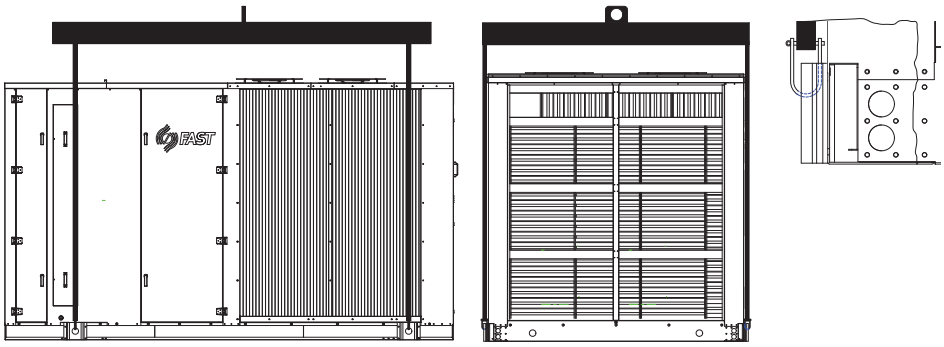
WARNING:
the units must be installed out-of-doors, in a suitable area, taking into consideration the necessary technical clearances shown in the figure below. This is essential, both to allow access for routine and extraordinary maintenance and for operational requirements, as the device must collect the take in the air from the outside along its sides, and expel it upwards. For the unit to work correctly, it must be installed on a perfectly horizontal surface. Check the surface is able to support the weight of the machine.

The guarantee does not cover in any case costs due to motor ladders, scaffolding or other similar elevating systems that are necessary to carry out operations under guarantee.



Lifting with crane

Lifting must be carried out in accordance with the diagram alongside, following the instructions given. Use an adjustable lifting beam or fork bars, ropes of a suitable strength (not chains), hooks with threaded closing pin (to connect to the eyebolt hole).



Electrical connections

The unit is fully wired in the factory, and for start-up requires a power supply in accordance with the indications given on the characteristics label, intercepted with line protection devices.
To access the electric panel and therefore the power supply control board the front upper panel must be dismantled. For the sizing of the power supply line, refer to the power and current values given in the wiring diagram (located inside the compressor compartment together with the rest of the documentation supplied).
Particular attention must be given to the following points:
- the electrical connections must be carried out by qualified personnel;
- the power supply cables must be protected upstream by a suitable device in accordance with the present laws against short circuits and overloads;
- the section of the cables must be in line with the upstream safety system setting and must take into account all influencing factors (temperature, type of insulation, length etc.);
- it is very important that the earthing connections are carried out with the maximum care;
- check the type of power supply, which must be three-phase;
- the installer is responsible for sizing the power supply line on the basis of the length, the type of cable, the absorption level of the unit, and the physical position.

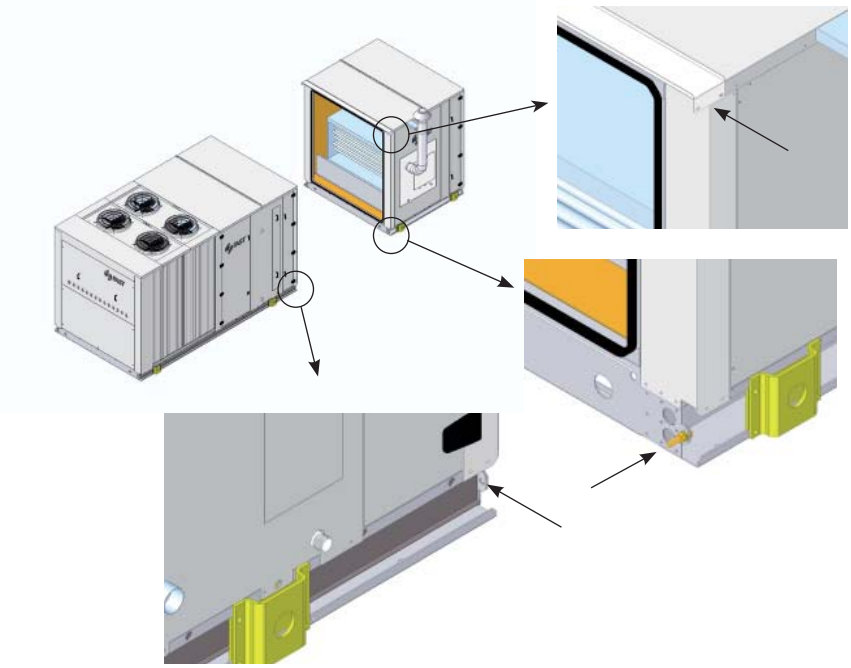
All the electrical wirings must satisfy the legislative regulations in force at the time of installation.
There are two pairs of clamps in the electric panel control board (free contacts): one is for the remote general alarm and the other is for the remote ON-OFF (see the wiring diagram).

WARNING:
for installation requirements, refer to the wiring diagram supplied with the device.

WARNING:
check all the clamps of the electricity wires are tightened, both at the time of the first start-up and 30 days later. After this, check they are tight every six months. Loosened terminals may cause the overheating of the wires and components.

Connecting the sections

The various sections that may make up the unit should be connected in accordance with the layout shown in the figure.
The connection points are located at the base of the unit, and on the cover.



First start-up or start-up after prolonged standstill

Preliminary checks of the electrical and refrigerating parts must be performed before starting up the rooftop unit.

Before starting

Before starting, check that:
– the electrical connections have been made correctly;
– the line voltage is within the permitted tolerances (±10% of the nominal value).

WARNING:
if heating elements of the compressor casing are present, the unit must be powered so as to allow them to evaporate any refrigerant present in the oil. This must be done at least 24 hours before the unit is used (or at the end of every prolonged standstill). Failure to observe this precaution may cause serious damage to the compressor and the guarantee will consequently fail to be valid.

Starting up the unit

Remember that for the units of this range, start-up is carried out by the AERMEC After Sales Service (in Italy).
The start-up must be agreed beforehand, on the basis of the system construction times.
Before the AERMEC After Sales Service intervene, all operations (electrical and hydraulic connections, filling and bleeding of air) must be completed.
Refer to the adjustments manual for the setting of all parameters and for detailed information concerning the machine operations and control board.

WARNING:
Make sure all the indications in this manual have been carried out before performing the checks upon the first start-up.
Before starting up the rooftop unit, check that:
• the electrical connections have been carried out correctly and that all terminals have been fully tightened;
• the voltage on the terminals is 230 V ± 5% (for units fed with 1 phase) or 400 V ± 5% (for units fed by 3 phases), which can be verified by means of a tester: if the voltage is subject to frequent changes, contact our Technical department for the choice of suitable protections;
• there are no leaks of refrigerant, using a leak detector if necessary.

WARNING:
Before starting, check that all the closing panels of the unit are in place and fixed with the appropriate screws.

System loading and draining

During the winter, and only if the water-operated coil is present, when the system is idle the water in the heat exchanger may freeze, causing irreparable damage to the heat exchanger itself.
To avoid the risk of freezing, there are three possible solutions:
1) the complete drainage of the water from the heat exchanger at the end of the season, and refilling at the start of the following season
2) functioning with glycol water, with a percentage of glycol depending on the minimum outside temperature envisaged. In this case, it is necessary to take into account the varying outputs of the heating coils and the size of the pumps
3) keep the water temperature above 5°C.

Usage regulations for R410A gas

Rooftop units using cooling gas R410A require particular attention during assembly and maintenance so as to avoid operating irregularities.
It is therefore necessary to:
- avoid topping up with oil different from that already introduced in the compressor
- if there are gas leaks that make the circuit even partially drained, do not top up with refrigerant, but completely empty the machine collecting the refrigerant for future disposal, and refill it with the foreseen amount
- if any part of the cooling circuit is replaced, do not leave the circuit open for more than 15 minutes
- in particular, if the compressor is replaced complete the installation within the above mentioned time after having removed the rubber plugs
- if empty, do not apply power to the compressor; do not compress the air inside the compressor
- using R410A gas cylinders, you are advised to pay attention to the maximum number of withdrawals allowed, in order to guarantee the correct relation of the components with the gaseous R410A mixture.

Preliminary checks - electric parts

Before carrying out the checks in this paragraph, make sure that the power supply line of the unit is disconnected upstream of the unit. Make sure that the disconnecting device is padlocked or that a suitable "Do not use" notice is applied to the handle.
All operations must be carried out without voltage, as follows:
- remove the upper front panel;
- move the main switch to the “0” position (OFF);
- open the door of the electric panel;
- make sure the power supply cables are correctly dimensioned;
- make sure the chiller is earthed;
- make sure the screws that fix the wires to the electrical components inside the panel are tight so as to guarantee a good contact;
- close the door of the electric panel.

At this point power can be applied to the machine, closing the line disconnector and moving the main switch of the machine to the “1” position (ON).
Using a voltmeter, check the phase voltage value supplied to the unit. The power supply voltage should be 400 V ± 10%. Determine the average phase voltage (RS+ST+RT)/3 and the percentage difference between each of the phase voltages and this average voltage. The maximum difference must not be greater than 3%. A greater variation will annul the guarantee.

EXAMPLE:

R-S = 397 V;
S-T = 406V;
R-T = 395 V

average of the values:
(397+406+395)/3 = 399.3 V

percentage difference:
(406 - 397) / 399.3 x 100 = 2.25%

(406 - 395) / 399.3 x 100 = 2.75%

(397 - 395) / 399.3 x 100 = 0.5%

Preliminary checks - cooling circuit section

Visually check the integrity of the various cooling circuit components.
Make sure the level of the lubricating oil on the compressors is approximately halfway up the eyehole.

Hydraulic connections

CONDENSATE DISCHARGE

The condensate collection tank has a 1″ G UNI 338 threaded outlet.
A discharge system must include a suitable drain-trap to:
- allow the free discharge of the condensate;
- prevent the undesired entry of air in vacuum systems;
- prevent the undesired entry of air in vacuum systems;
- prevent the infiltration of odours or insects.

Below, the rules to be followed for the sizing and operation of the drain-taps with the pressurised/depressurised tank (fig.06).

Negative pressure:
H1 = 2P
H2= H1 / 2

Positive pressure:
H1 = 2P
H2= H1 / 2

where P is the internal pressure expressed in mm of water column (1mm c.a. = 9.81 Pa). This pressure is indicated on the special label located near the condensate discharge point. The drain-tap must be fitted with a plug for cleaning the lower part, or must anyway allow quick disassembly for cleaning purposes.

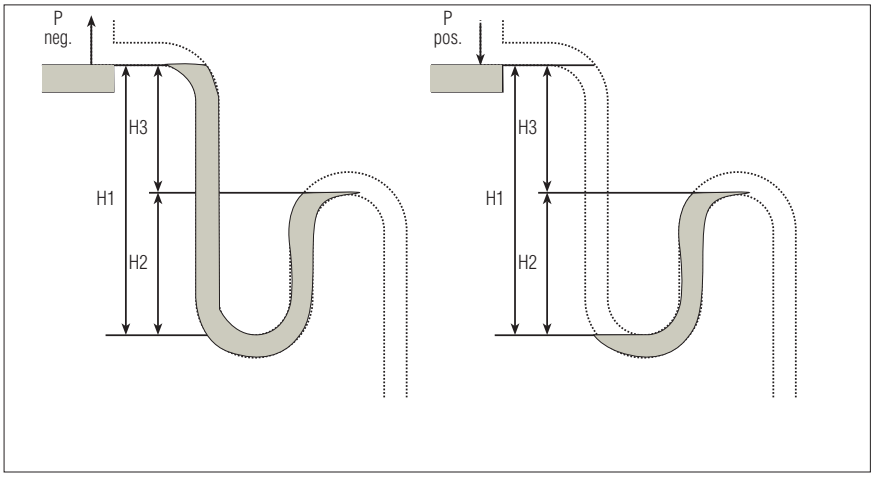


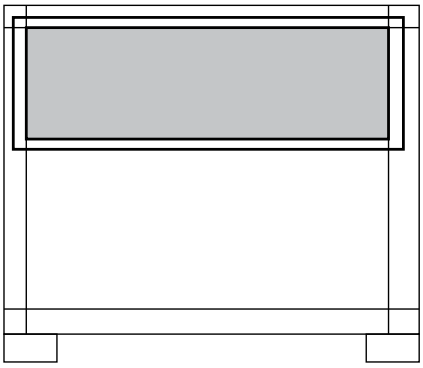
Figure - Hydraulic connection

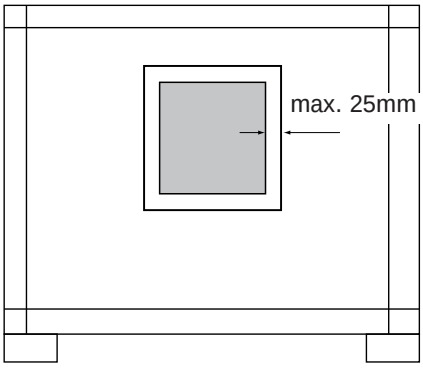
Aeraulic connection

For installation, proceed as follows:

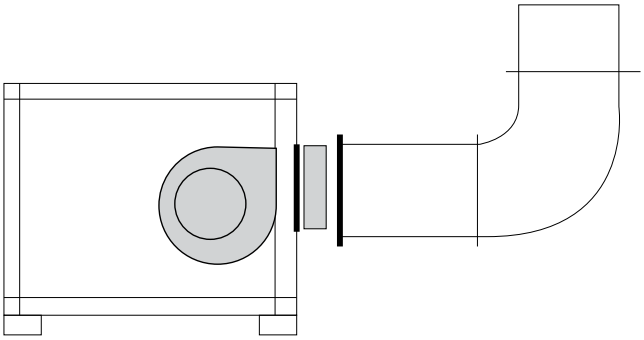
- arrange suitable brackets to support the ducts so as to prevent them weighing on the recovery unit;
- connect the supply and intake mouths to the ducts, interposing a vibration damper joint. The vibration damper joint is connected to the unit, screwing it into the flange or the damper (when present). If there is no flange or damper, the vibration damper joint must be attached to the frame of the unit, using self-threading screws;
- arrange an earth cable that acts as a bridge on the vibration damper joint to guarantee the equipotential connection between the ducts and the unit;
- before bends, branches etc., arrange the supply ducts with a straight part of a length at least 2.5 times the shorter side of the ducts (A), to avoid drops in the fan performance levels;
- ensure the ducts does not have slopes in the diverging tracts greater than 7°C.

The trend of the first bend must be made in compliance with the direction of the fan.





Note: the trend of the first bend must be made in compliance with the direction of the fan, as shown below



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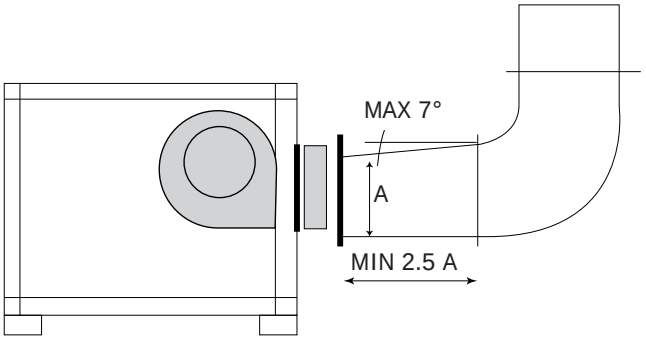

Unit maintenance

Routine maintenance consists of simple operations that should be carried out monthly.
The maintenance program must in any case be carried out by a qualified technician.

WARNING:

- **Use suitable personal protective equipment (PPE) during maintenance operations.**
- **Before accessing the unit for maintenance or cleaning operations, make sure the unit is disconnected from the power supply, that the supply can not be switched on again without the maintenance engineer's knowledge, and that the fans are switched off.**
- **The upper part of the compressor and the supply piping are at a high temperature: take particular care if working close to them.**
- **Take particular care when working close to finned coils because the fins are particularly sharp.**
- **Do not remove the fan protection grilles before disconnecting the power supply inside the machine; do not introduce foreign objects through the protection grille of the fans.**
- **After finishing the maintenance operations, make sure the panelling is correctly closed by means of fixing screws.**

The table below indicates the monthly maintenance operations for each component, indicating the type of check to be carried out. The monthly interval is indicative and can vary depending on the working and environmental conditions in which the rooftop unit is operating.

MONTHLY MAINTENANCE PROGRAM	
FANS	• Check the electrical absorption • Check the fan motors turn freely and without abnormal noise. Make sure the bearings do not overheat excessively • Check the fixing screws between the fans and the grille, and between the grille and the structure
CONDENSER COIL	• Check the condensation coils. These must be clean to guarantee a good heat exchange. Possible dirt that has built up on their surfaces, due to the movement of the air, must therefore be removed. Remove pieces of paper, leaves etc. and clean the fins with an air jet. To avoid damaging the aluminium fins, the air jet must be directed at right angles to the coil surface. The cleaning operations must be carried out with the utmost care because the coil fins are easily damaged (0.12mm aluminium). If the fins are damaged they must be arranged again by combing them with a special tool. Protective gloves must be worn before starting any operations on the coils, because accidental contact with the fins could cause small cuts.
Cooling circuit	• Check the condensate and evaporation pressures (to be performed by a refrigeration expert). The panels of the compressor compartment must be removed and a pressure gauge connected to the pressure test points on the chiller circuits. • Check the compressor's current absorption, the outlet pressure and the presence of any strange noises. • Check the correct quantity of refrigerant by means of the liquid indicator. • Check the calibration of the thermostatic valve (overheating 5 - 8°C). • Check the oil level indicated in the compressor indicator is not below the minimum. • Check the intervention of the safety devices (pressure switches).
ELECTRICAL CIRCUIT	• Check the electric power supply on all phases. • Make sure the electrical connections are sufficiently tightened. • Check the power supply cable of the machine has not undergone any alterations that could compromise its insulation. • Make sure the screws fixing the wires to the electrical components in the electric panel are correctly tightened, so as to guarantee the electrical connection; the same applies to the earth connections.
CHECK	• Check the control equipment, LEDs and monitor are functioning.

Improper use

The unit is designed and built to ensure the maximum safety in its immediate surroundings, and also to resist atmospheric agents. The fans are protected against accidental intrusion thanks to the protection grilles.
The door-block disconnecting switch prevents the accidental opening of the electric panel while the machine is working.
Avoid placing tools or heavy objects directly on the heat exchange side coils, as this could damage the finning.

DO NOT insert or drop objects through the fan motor grilles.

DO NOT lean against the heat exchange coil: sharp surface.

Important safety information

The machine must not exceed the pressure and temperature limits indicated in the table given in the paragraph "Operating limits".
Correct operation is not guaranteed following a fire; before restarting the machine, contact an authorised assistance centre.

The machine is fitted with safety valves which, in the event of excessive pressure, can discharge the high temperature gases into the atmosphere.

Wind, earthquakes and other exceptionally intense natural phenomena have not been taken into consideration.

If the unit is used in an aggressive atmosphere or with aggressive water, consult the company.

Following extraordinary maintenance work on the cooling circuit, involving the replacement of components, perform the following operations before restarting the machine:

1. pay the greatest attention when restoring the load of refrigerant indicated on the machine plate
2. turn on all the taps in the cooling circuit
3. connect the power supply and earth connection correctly
4. check the hydraulic connections
5. check the condenser coils are not dirty or obstructed
6. check the fan unit is rotating correctly.

Electrical connections

The unit is fully wired in the factory, and for start-up requires a power supply in accordance with the indications given on the characteristics label, intercepted with line protection devices.
The installer is responsible for sizing the power supply line on the basis of the length, the type of cable, the absorption level of the unit, and the physical position.
All the electrical wirings must satisfy the legislative regulations in force at the time of installation.

WARNING:
for installation requirements, refer to the wiring diagram supplied with the device.

WARNING:
check all the clamps of the electricity wires are tightened, both at the time of the first start-up and 30 days later. After this, check they are tight every six months. Loosened terminals may cause the overheating of the wires and components.

Diagnosis and troubleshooting

PROBLEM	CAUSE	SYMPTOM	REMEDY
1. SUPPLY AIR TEMPERATURE GREATER THAN EXPECTED VALUE	1. Excessive thermal load	- The temperature of the supply air is greater than the expected value	- Reduce the thermal load, by reducing either the flow rate or the temperature of the inlet air
	2. Excessive environment temperature	See 2.1.	- Avoid the circulation of air on the condenser. Improve the flow of fresh air
	3. Condenser fins blocked	See 1.1.	- Clean the condenser fins
	4. Front surface of the condenser blocked	See 1.1.	- Free the front surface of the condenser that is blocked
	5. The fan turns in the wrong direction	See 1.1.	- Invert the positions of two of the three phases of the fan
	6. Lack of refrigerant in the cooling circuit	- Low evaporation pressure - Bubbles in the liquid sight glass	- Check for leaks of refrigerant (carried out by a refrigeration expert) and eliminate them. - Top up the system (carried out by a refrigeration expert)
2. INSUFFICIENT REFRIGERATING PERFORMANCE	1. Lack of refrigerant	- The cooling circuit functions correctly, but with insufficient performance	See 1.6.
	2. Excessive environment temperature	See 2.1.	- Avoid the circulation of air on the condenser. Improve the flow of fresh air
3. ABNORMAL NOISE	1. Vibrations throughout the piping	- The noisiness of the machine is greater than normal	- Suitably brace the piping
	2. Noisy compressor	See 3.1.	- Check and replace if necessary
	3. Noisy thermostatic valve	See 3.1.	- Check. Add refrigerant if necessary. Replace if necessary.
4. ACTIVATION OF THE LOW PRESSURE SWITCH	1. Pressure switch inoperative	- The compressor stops	- Check and replace the pressure switch
	2. Machine completely empty	See 4.1.	See 1.6.
	3. Refrigerant filter blocked	See 4.1.	- Check and replace the filter
	4. Thermostatic valve non functioning correctly	See 4.1.	- Check, clean and if necessary replace it
	5. Environment temperature too low	See 4.1.	- Install the condensate control kit

PROBLEM	CAUSE	SYMPTOM	REMEDY
5. ACTIVATION OF THE HIGH PRESSURE SWITCH	1. One or more fans did not start	- The compressor stops - Activation of the general alarm relay	- Repair or replace the fan(s)
	2. Pressure switch inoperative	See 5.1.	- Check and replace the pressure switch
	3. Excessive refrigerant	See 5.1.	- Discharge the excessive gas
	4. Presence of non condensible gas in the cooling circuit	See 5.1.	- Fill the circuit again after having emptied the system and created a vacuum
	5. Insufficient air to the condenser coil	See 5.1.	- See 1.3, 1.4, 1.5
	6. Refrigerant filter blocked	See 5.1.	- Check and replace the filter
	7. Excessive environment temperature	See 5.1.	- Avoid the circulation of air on the condenser. Improve the flow of fresh air
	8. Circulation of hot air due to incorrect installation	- Condenser coil outlet air temperature over the maximum values	- Eliminate the cause of the circulation, respecting the minimum distances from a wall as indicated in the dimensional diagram, or preventing the condenser coils from coming into contact with hot air
6. COMPRESSOR OPERATING IRREGULARITIES	1. Defective compressor	- The compressor does not start	- Replace the compressor
	2. A safety device does not give its consent	- See 6.1	- See points 5 and 6
	3. Defective connection or contacts open	- See 6.1	- Check the voltage and close the contacts
	4. Power circuit open	- See 6.1	- Check the cause of the safety devices intervention, close the automatic of the compressor
	5. Compressor contactor de-energised	- See 6.1	- Check the voltage at the safety device terminals. Close the automatic of the compressor
	6. Compressor contactor defective	- The compressor starts and stops	- Check and replace if necessary
7. THERMOSTATIC VALVE OPERATING IRREGULARITIES	1. Thermostatic expansion valve too closed: excessive overheating of the evaporator outlet gas	- Compressor too hot	- Open the thermostatic valve to reduce overheating
	2. Thermostatic expansion valve too open: the system functions with overheating too low. Return of liquid to the compressor	- Compressor too cold and noisy	- Close the thermostatic valve to increase overheating
	3. Defective thermostatic valve: bulb unloaded or stem blocked	- Low evaporation pressure	- Replace the valve
8. FILTER DRIER OPERATING IRREGULARITIES	1. Filter drier blocked	- Compressor's inlet piping frosted - Bubbles in the flow indicator - Piping of the liquid colder at the filter drier outlet	- Clean or replace the filter

NOTES

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