CLIMATIC
ENVIRONMENT
SOLUTIONS AND
EQUIPMENT

ACU

A.C.U - Air Conditioning Unit

Installed on the ground or mobile on a trailer

MADE IN FRANCE

www.ett-hvac.com

CONTENTS

General description

The **ETT** packaged unit is delivered ready to operate. Its full aluminium structure (frame and casing), ensures an excellent corrosion protection (20-year anti-corrosion guarantee).

The **ETT** unit can be installed either at ground level or on a roof.

Eco**D**esign favors **DECONSTRUCTION**: **ETT** units are 98% recyclable (Reuse and recycling rates based on an ULTI+ R32 21 unit).

Our technical choices have a major impact on the environment

- Legal and regulatory framework:
  - Pursuant to the Directive 2008/98/EC on waste, considering clause 26: "The polluter pays principle is a guiding principle at European and international levels. "The producer and holder of the waste should manage it in such a way as to ensure a high level of protection for the environment and human health". ETT is a member of "Ecologic" in France.
  - In accordance with articles 5.3, 5.4 and 11 of (EC) Regulation No. 303/2008, ETT holds a certificate of capability to handle refrigerants (no. 637).
- Aluminium: a good choice for the planet!
  - Aluminium is 100% recyclable indefinitely.
  - Recycling provides over 30% of aluminium needs.
- Consumables: efficient waste management:
  - Filtration: ETT units incorporate "Eco-Concept" air filters (selective sorting of frame grille and media)
- ETT Low polluting manufacturing process:
  - Selective sorting by raw materials, all waste is recovered, 80% of which is recycled.
  - No paint on casings, no use of solvent.
- ETT certifications
  - ISO 14001 certification: Environmental management system
  - Iso 9001 certification: our Quality organisation has been awarded AFAQ Certificate no. 1994/2016f. Each unit is inspected and tested in the factory before delivery, and a test certificate is issued.
  - CSR assessment: Quality of CSR management system - Company Social Responsibility

We have placed ease of operation at the heart of our unit design:

- A separate technical compartment facilitates unit control and maintenance and allows measurement and adjustment during operation.
- Specially designed for this application and due to its very high flexibility, The PLC ensures optimum operation of the ETT unit and favors the user-friendly local or remote communication via remote display, PC or BMS.

In addition, each unit is delivered with a certificate of conformity to EU standards and complies with the following standards:

- Machinery Directive 2006/42/EC - Operator's safety
- Low Voltage Directive (LVD) 2014/35/EU - Electricity
- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Regulation (EU) 2016/426 – Gas appliances
- Standard NF EN 60204 -1- Electrical appliances
- Standard EN 378-2 : 2017 – Safety and environmental requirements
- PED Directive 2014/68/EU (in accordance with Articles 2.10, 2.11, 3.4, 5a and 5d of Annex 1) - Pressure equipment
- EcoDesign regulations ErP UE 2281/2016

100% recyclable aluminium

20-year guarantee against corrosion frame - casing

ENERGY SAVING

ENVIRONMENTAL ATTITUDE

SERVICE LINK

Description of the ACU unit

The ACU unit is installed on the ground, or on a trailer (option). Specially designed for air conditioning and heating aircraft under construction, ground maintenance or stopover.

The ETT ACU range comprises 4 units with air supply at 2°C and 3 units at 8°C to cover the needs of all aircrafts, with the aim of replacing the operation of the APU (auxiliary power unit).

Electrical compartment
Latest-generation control PLC

Touch screen (OPTION)

myETTvision supervision (OPTION)
Remote control and monitoring system for machine operation and energy consumption

AG3 Aluminium frame and casing assembly
20-year guarantee against corrosion frame - casing

External fans
Variable speed, communicating, electronically commutated "EC" motors, optimum efficiency and low noise levels

External condensers
with vinyl coating

Air and Electrical connections
Connector for circular ducts
Power cable reel

Duct storage (OPTION)

2 or 3 variable power circuits equipped with semi-hermetic reciprocating compressors or latest generation screw compressors
Refrigeration circuits equipped with electronic expansion valves

Double level of filtration on fresh air intake
ISO Coarse 65% (G4) + ISO ePM1 80% (F9) thickness 98mm
Easy maintenance, hinged panel access

Evaporator casing with condensate drain
Evaporator with specific coating
Double ball trap with no air leakage

Supply air fans + variable speed drive
With constant pressure

Accessories (OPTION)

- Ventilation ducts standard or customised

- Aircraft PCA connectors

Auxiliary heating compartment (OPTION)
- Thermal pins + Triac

Machine delivered (OPTION)
- On feet
- On mobile trailer

Description of the ACU unit

Energy
savings

The ACU range is an efficient, economical and environmentally-friendly solution for heating or cooling aircraft **replacing the use of the APU (Auxiliary Power Unit).**.

Thanks to its design, the unit can be precisely regulated for optimum energy performance throughout its years of operation.

ETT goes the extra mile...

Installation

Mobile on 25km/h trailer or fixed to the ground.

ETT Services

- 5-year warranty (optional).
- A team to guide you from commissioning to operational support
- Optional communication system via internet (MyETTvision).
- Audit visit and PED regulatory visit included
- Installation optimisation and retrofit
- Service contracts (comfort - tranquillity - serenity - à la carte).
- Training your teams.

ACU control

- Precise control and maintenance of supply air temperature without defrosting, even over extended periods of use.
- **Regulation of external ventilation in air-conditioning mode to optimise the machine's acoustic and energy performance.**
- Ongoing fault analysis.
- Hour meter and energy counter **for instantaneous consumption totals during stopovers**.

Flexibility & adaptability

A wide choice of power ratings and flow rates, enabling you to adapt both the air flow rate AND the outlet pressure of the machine to suit the type/code of aircraft to be connected.

- **Reduced size and weight**, making it easier to move units on the track and reducing the footprint of fixed units installed on assembly lines.

Supervision
myETTvision

MyETTvision (optional) lets you control and optimise your installation remotely and instantly.

- Internet access to your facilities
- Remote **configuration** (setpoints, time slots etc.)
- Fault alert by email
- Remote diagnosis and, where possible, acknowledgement of faults
- View your consumption
- Access to the ETT Services hotline

PLC
New Generation

- allows communication between units
- transfers the technical data from the machines to an external server for optimum remote control with MyETTvision.

Indoor
air quality

- Eco-Design filtration.
- Optimised casing with high performance tightness level.
- Free access to filters via removable panels allowing **quick and easy replacement of filters**.

ACU operating principle

The machine operates in air-conditioning mode:

> Source: outside air

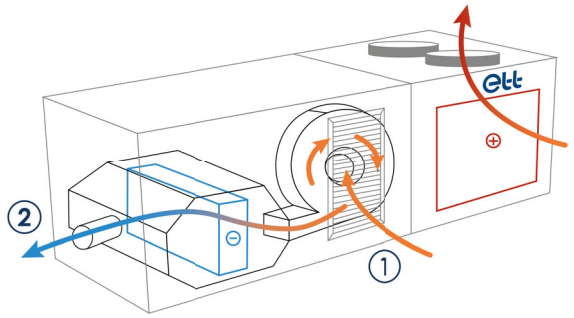
> Fluid handled: outside air

Operating modes can be:

> Air conditioner

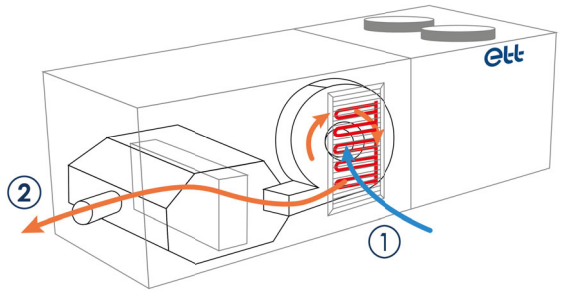
> Electric coil heating (optional).

Cooling mode:



Cooling mode:
Outside air is drawn in by the supply fan. Once filtered, it is cooled by the thermodynamic system and blown into the hose that will be connected to the aircraft.

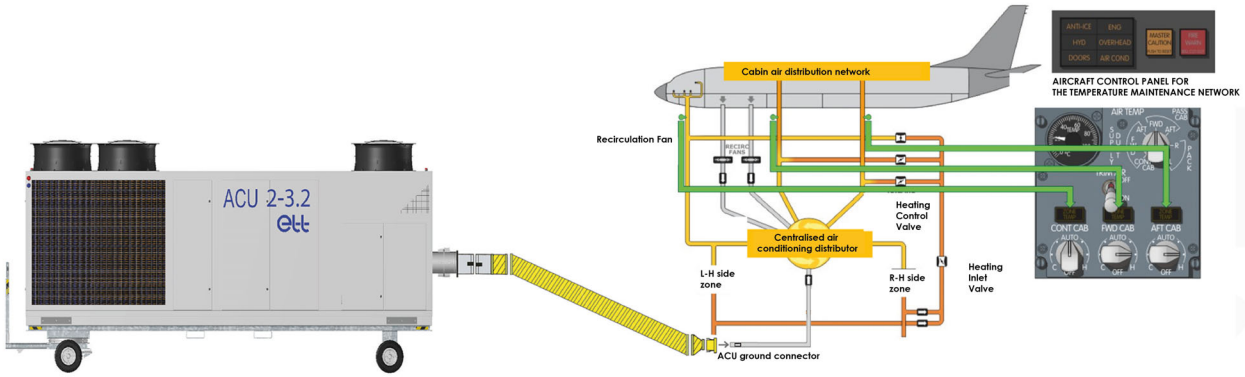
Heating mode:



Heating mode:
Outside air is drawn in by the supply fan. Once filtered, it is cooled by the electric heater and blown into the hose that will be connected to the aircraft

① Fresh air ② Supply air

Schematic diagram of aircraft connection:



Pressure/airflow combination suited to aircraft type
The ACU supply temperature is maintained at 02°C or 08°C depending on the type of unit

Detailed components of ACU units

The ETT packaged unit comprises 4 different sections:

1. An air handling **compartment.**
2. A **casing for heat dissipation** in air-conditioning mode.
3. A separate technical compartment, housing the **electrical board and the control components**.
4. A technical compartment housing the **components**

Aluminium frame and casing assembly :

- 20-year anti-corrosion warranty (casing and frame)
- Aluminium frame with vertical walls and AG3 roof **with sound insulation**.
- A rigid, compact, lightweight packaged unit that is perfectly weatherproof. The doors provide access to internal equipment such as condensers, expansion valves, valves, motors, supply fan, electrical resistors and evaporators.
  The doors are sealed by compression on a flexible lip seal, ensuring a perfect sealing.
- Internal sound and heat insulation on the walls and roof is provided by specific materials:
  - ✓ Air stream insulation: (upstream of the fan) 50 mm M0 glass wool + double skin,
  - ✓ Air handling unit insulation (downstream of fan): Stopflam foam, 20 mm thick,
  - ✓ Technical compartment insulation: Stopflam foam, 20 mm thick,
  - ✓ Electrical cabinet insulation: Stopflam foam, 20 mm thick,

Inside compartment:

The machine contains, in the air direction:

- An anodised aluminium fresh air intake grille mounted on hinges for access to the filters.
- 98 mm pleated media filters, ASHRAE gravimetric efficiency ISO Coarse 65% (G4) and opacimetric efficiency ISO ePM1 80%(F9), mounted on universal aluminium photocells.
- A single inlet centrifugal fan inclined towards the rear, selected for its high static pressure and low noise level. The electric motor is direct drive. It is an IP55 class F motor, protected by an ipsotherm device with an efficiency class of IE 3.
  Soft-start system with frequency converter to limit start-up jerk and adjust airflow to suit the type of aircraft connected.
- Direct expansion heat exchangers with copper tubes and aluminium fins, with high heat exchange capacity optimised by an electronic expansion valve. They have been chosen for an air speed of less than 2.5 m/s, to avoid any risk of condensate being carried away.
- The exchanger frames are made of aluminium.

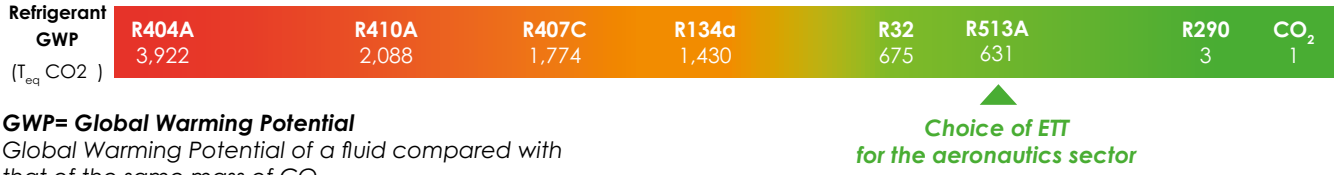
Cooling assembly:

Each refrigeration circuit is independent and corresponds to:

- Direct expansion coils made up of copper tubes with aluminium fins, with high heat exchange capacity optimised by an electronic **expansion valve**.
- Evaporators integrated into the sealed air handling unit.
- Condensate water from the evaporator is evacuated via **an air separator, allowing the condensate to be evacuated at low pressure.**
- A built-in condenser into the external compartment.
- The fins of the external condensers are protected by a **vinyl coating.**
- A semi-hermetic piston compressor or a screw compressor mounted on anti-vibration pads.
- Anti-acid filter driers with removable cartridges and service valves for maintenance operations.
- Control of the electrical resistors in the compressor housings.
- HP and LP safety pressure switches.
- Anti-acid indicators on the liquid line of the refrigeration circuit.
- An ETT Variable Refrigeration System (SRV)
  - ✓ The Variable Refrigeration System provides energy savings and maximum performance by reducing electricity consumption and adapting the power input to the thermodynamic power output.
- The fluid is type R513A

Detailed composition of ACU units

This refrigerant has the advantage of excellent thermodynamic performance and one of the lowest GWPs among non-toxic and non-flammable fluids.



GWP= Global Warming Potential
Global Warming Potential of a fluid compared with that of the same mass of CO_2

Outside compartment:

- Each refrigeration circuit has a propeller fan to ventilate its heat exchanger. The propeller fan has an aluminium casing, a high-energy-efficiency aluminium impeller, an IP55 motor with reinforced sealing, and a galvanised steel guard with cataphoresis protection and epoxy coating, all of which are perfectly weatherproof. Innovative blade design reduces compressor consumption thanks to lower power output. The motors are electronically commutated, which also reduces the noise level of the fans when they are in operation.
- The direct expansion external heat exchanger is made of copper tubes with an aluminium frame and aluminium fins with vinyl protection.

Electrical cabinet:

- All the power and electrical control equipment, as well as the regulation equipment, are connected in the electrical cabinet integrated into the unit and accessible from the outside.
  - ✓ Power switch with lockable external handle for full load cut-off.
  - ✓ A 400 Vac/24 Vac **transformer** for control and regulation circuits.
  - ✓ Fault summary with dry contact on standby terminal.
  - ✓ Numbered terminal blocks with disconnecting terminals for remote controls and transfers.
  - ✓ Internal wiring fully numbered at both ends with numbered rings.
  - ✓ Phase controller.
  - ✓ PLC with display.
  - ✓ External emergency stop.
  - ✓ Electrical cabinet lighting.
  - ✓ 230 Vac single-phase external auxiliary socket with 400 Vac / 230 Vac transformer and earth leakage protection.
  - ✓ Schneider or ABB electrical equipment
  - ✓ Wiring in compliance with NF C 15-100 and NF EN 60204-1 (IEC 60204-1), both of which fall within the scope of the Machinery Directive 2006/42/EC.
  - ✓ Mechanical ventilation of the electrical cabinet.
  - ✓ Motor protection using circuit-breakers.

Control

- Regulation is provided by a PLC specially developed for ETT. This conversational PLC performs the following functions:
  - ✓ Guaranteed thermal comfort thanks to the controller's progressive PID functions.
  - ✓ Optimisation of energy management for the ETT PLC.
  - ✓ Local communication (display of values, setpoints and variables from the keypad).
  - ✓ Operational safety and durability of air conditioning components.
- Year-round kit:
  - ✓ In order to obtain a constant pressure in the HP refrigerant circuit, the condensing pressure is regulated via the electronic board of the EC motors. A pressure sensor is connected directly to the fan, whose setpoint is controlled by the PID.
  - ✓ The year-round kit also makes it possible to reduce cooling capacity by maintaining the condensing temperature over a period when the power required is at its lowest.
  - ✓ The year-round kit makes it possible to adjust the flow of outside air according to demand, thus reducing noise emissions when the machine is in operation.

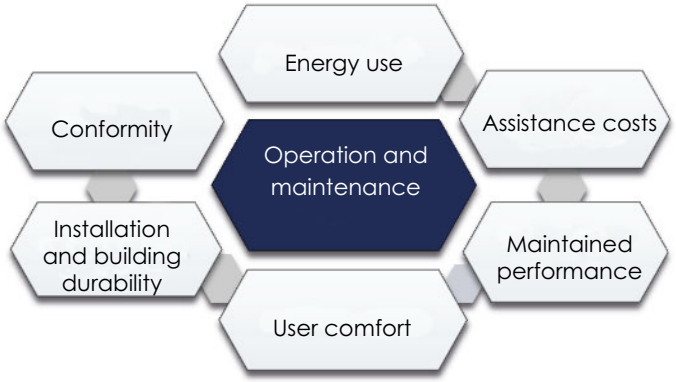
Operating tips for ACU units

OPERATION: COSTS, PERFORMANCE & GUARANTEES

The **quality of the operation** combined with the installation has a major impact on the overall **cost of the units.**

It affects 3 parameters:

- **Total cost**
  - ✓ Purchase and Implementation (15%)
  - ✓ Operating costs (85%)
- **Installation efficiency**
  - ✓ Operating **costs**
  - ✓ **Users**' comfort
  - ✓ **Durability**
  - ✓ **Availability**
- **Conformity**
  - ✓ **Regulations**
  - ✓ Manufacturer's **warranty conditions**



As soon as it is commissioned, the plant must be operated and maintained in such a way as to guarantee regulatory compliance. Operating instructions aim at optimising unit performance and settings. Also, the validity of the guarantee is conditional upon strict compliance with these instructions.

ETT recommends periodic inspections:

- **Checking/adjusting technical functions** (safety, ventilation, refrigeration circuits, etc.)
- **Control** adjustment (setpoints, time slots, advanced parameters, etc.)
- **Technical and regulatory** operations:
  - Leakage checking, once or twice a year
  - Initial commissioning inspection, periodic inspections, periodic re-qualifications (monitoring of pressure equipment)
  - Filters replacement, 2 to 4 times a year depending on the type of filters and installation environment
  - Checking and replacing sensitive parts of humidity sensors CO2 sensors or smoke detectors
- Inspection and maintenance of the environment (distribution networks, sensors condition, etc.)

ETT's **service solutions** make it possible to achieve **operational performance** and compliance **objectives** while providing **peace of mind** for the user.

Main options

Frame - Casing	▪ Motorised external supply damper (please consult us for any airflow configuration to be designed and installed at the machine outlet)
Acoustics	▪ STOPFLAM foam sound insulation for the technical compartment ▪ Compressor soundproofing covers
Air handling	▪ ISO Coarse 65% (G4) refillable 98mm filters + ISO ePM1 80% (F9)
Auxiliaries	▪ 3-stage sequential electric heater with Triac ▪ 2-row hot water coil with analogue frost protection thermostat (please consult us) ▪ 3-way progressive hot water valve (please consult us) ▪ Shut-off valve + TA control valve (please consult us) ▪ Vinyl coating on thermodynamic coils
Electrics	▪ Electricity meter and totaliser in compliance with French regulations RT 2005/RT 2012 ▪ 15+3m power supply cable - variable cross-section depending on type of unit ▪ Aluminium/copper terminal blocks (mandatory for aluminium power cables) ▪ Soft starter (compressor start-up current reducer) ▪ 230V/16 A single-phase PC socket in the technical room (separate power supply to be provided by installer) ▪ Remote control box - (consult us) ▪ "Synthé Park" overpressure protection kit (buzzer + pressure switch at machine outlet)
Installation	▪ Aluminium feet (height: 100 mm), other heights possible - (Please contact us) ▪ Towable trailer - designed for a maximum speed of 25km/h
Control	▪ Relative humidity sensor (anti-condensation function on supply air by analysing outside specific humidity)
Communication	▪ myETTvision ▪ ETT 'Control Box' remote touch display ▪ CCAD remote display ▪ RS485 Modbus ▪ IP Modbus ▪ BacNet IP

Technical features

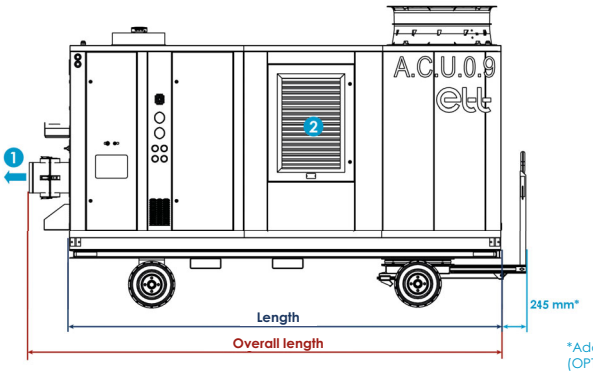
ACU 2 0.9

	DESIGNATION	Unit	ACU 2 0.9
FEATURES	**AIR FLOW RATE**		
	Maximum nominal mass airflow at discharge	**kg/s**	0.9
	Maximum nominal volumetric airflow at discharge at 2°C / 100% RH	**m³/h**	2,542
	Minimum mass air flow at discharge	**kg/s**	0.6
	Minimum volumetric airflow at discharge at 2°C / 100% RH	**m³/h**	1,695
	Available pressure at minimum air flow	**mbar**	60
	Available pressure at minimum air flow	**Pa**	6,500
	Available pressure at maximum air flow	**mbar**	80
	Available pressure at maximum air flow	**Pa**	8,000
	COOLING MODE		
	Nominal cooling capacity at 35°C/40% RH outside	**kW**	62.85
	Supply air temperature at nominal air flow rate	**°C**	2
	Net electrical power input	**kW**	26.14
	Gross EER	**kW/kW**	2.98
	Net EER at 35°C/40% RH outside.	**kW/kW**	2.06
	HEATING MODE		
	Heating capacity	**kW**	36
	Maximum supply air temperature	**°C**	45 (with regulation on air law)
ELECTRICS	Total installed electrical power	**kW**	61.4
	Rated current	**kW**	105.9
	Total absorbed current in operation at 35°C/40% RH outside	**kW**	46.3
	Starting current	**A**	194.1
	MARECHAL socket type	**-**	DS9
	Connection cable diameter	**mm²**	25
	Breaking capacity (Short-circuit current)	**kA**	10
	Neutral system	**-**	TT (suitable for TN)
	Control	**-**	Supply air temperature °C
	Control setpoint	**°C**	2
SUPPLY AIR	**FAN**		
	Electric power consumption of supply fan	**kW**	13.9
	Installed electrical power	**kW**	18.5
	OUTSIDE		
	Nominal outdoor air flow rate circuit 1	**m3/h**	27,000
	Nominal outdoor air flow rate circuit 2	**m3/h**	6,000
GENERAL INFORMATION	Refrigerant		R513A
	Quantity of circuits	**Unit**	2
	Power stages	**-**	20 - 100%
	Outside sound power level	**dB(A)**	100
	Resulting external sound pressure at 10m ref. 2x10 -5 in free field	**dB(A)**	69
	Filter efficiency	**-**	ISO Coarse 65% (G4) ISO ePM1 80% (F9)
	Quantity of filters	**Unit**	2 + 2
	Dimensions of filters	**mm**	592*592*98*2
	Maximum outdoor operating temperature in cooling mode	**°C**	45
	Minimum outdoor operating temperature in cooling mode	**°C**	18
	Hose outlet diameter	**mm**	300
	Hose outlet diameter	**inch**	12
	Quantity at outlet		1
	WEIGHTS AND DIMENSIONS		
	Case length (excluding support)	**mm**	4,200
	Case width (excluding support)	**mm**	2,300
	Case height (excluding support)	**mm**	2,000
	Fixed machine length (overall)	**mm**	4,450
	Fixed machine width (overall)	**mm**	2,415
	Fixed machine height (overall)	**mm**	2,380
	Length including trailer (overall)	**mm**	4,697
	Width including trailer (overall)	**mm**	2,415
	Height including trailer (overall)	**mm**	2,934
	Unit weight (excluding stand)	**Kg**	2,200
	Unit weight (including trailer stand)	**Kg**	3,010

Dimensions and connections

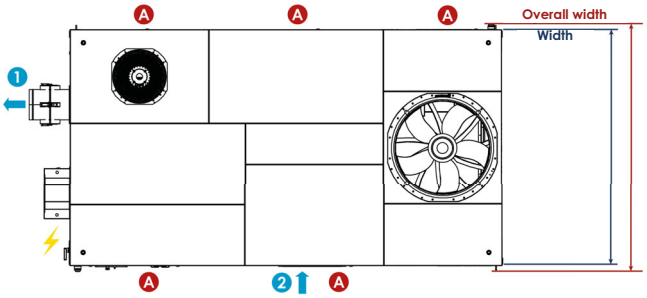
ACU 2 0.9

Front view:

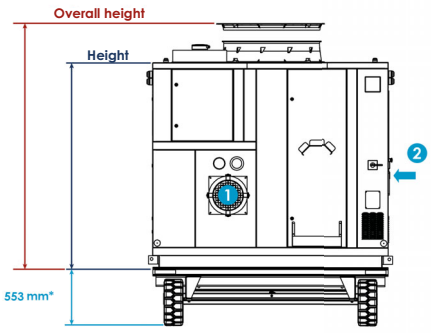


*Additional overall length of trailer bed (OPTION)

Top view:

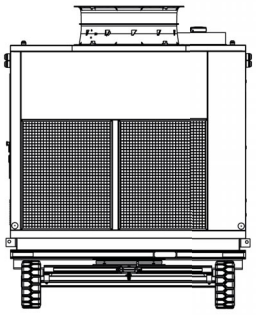


Side view:



*Trailer bed height (OPTION)

Side view :



1 Supply air
2 Fresh air
⚡ Power supply
A Access

	Length	Width	Height
Casing dimensions	4,200 mm	2,300 mm	2,000 mm
Overall dimensions	4,450 mm	2,415 mm	2,380 mm

Technical features

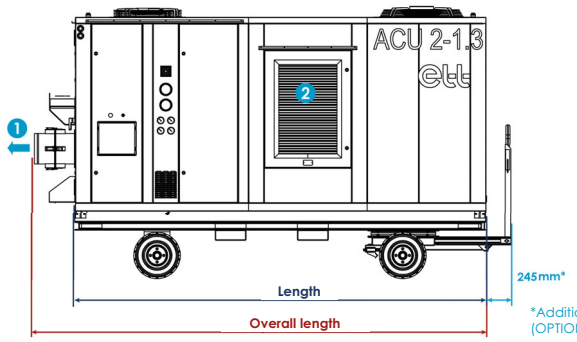
ACU 2 1.3

	DESIGNATION	Unit	ACU 2 1.3
FEATURES	**AIR FLOW RATE**		
	Nominal supply air mass flow rate	kg/s	1.3
	Nominal supply air volume flow rate at 2°C / 100% RH	m³/h	3,671
	Minimum mass air flow at discharge	kg/s	0.9
	Minimum volumetric airflow at discharge at 2°C / 100% RH	m³/h	2,536
	Maximum supply air mass flow rate	kg/s	1.5
	Maximum supply air volume flow rate at 2°C / 100% RH	m³/h	4,236
	Available pressure at minimum air flow	mbar	35
	Available pressure at minimum air flow	Pa	3,500
	Available pressure at nominal air flow rate	mbar	45
	Available pressure atnominal air flow rate	Pa	4,500
	Available pressure at maximum air flow	mbar	55
	Available pressure at maximum air flow	Pa	5,500
	COOLING MODE		
	Nominal cooling capacity at 35°C/40% RH outside.	kW	85.91
	Supply air temperature at nominal air flow rate	°C	2
	Net electrical power input	kW	38.85
	Gross EER	kW/kW	2.63
	Net EER at 35°C/40% RH outside.	kW/kW	2.20
	HEATING MODE		
	Heating capacity	kW	45
	Maximum supply air temperature	°C	45 (with regulation on air law)
ELECTRICS	Total installed electrical power	kW	103.71
	Rated current	kW	166.75
	Total absorbed current in operation at 35°C/40% RH outside	kW	71.0
	Starting current	A	277.75
	MARECHAL socket type	-	DS9
	Connection cable diameter	mm²	25
	Breaking capacity (Short-circuit current)	kA	10
	Neutral system	-	TT (suitable for TN)
	Control	-	Supply air temperature °C
	Control setpoint	°C	2
SUPPLY AIR	**FAN**		
	Electric power consumption of supply fan	kW	7.36
	Installed electrical power	kW	11
	OUTSIDE		
	Nominal outdoor air flow rate circuit 1	m3/h	28,000
	Nominal outdoor air flow rate circuit 2	m3/h	4,000
GENERAL INFORMATION	Refrigerant		R513A
	Quantity of circuits	Unit	2
	Power stages	-	20 - 100%
	Outside sound power level	dB(A)	96
	Resulting external sound pressure at 10m ref. 2x10 -5 in free field	dB(A)	65
	Filter efficiency	-	ISO Coarse 65% (G4) ISO ePM1 80% (F9)
	Quantity of filters	Unit	2 + 2
	Dimensions of filters	mm	592*592*98*2
	Maximum outdoor operating temperature in cooling mode	°C	45
	Minimum outdoor operating temperature in cooling mode	°C	18
	Hose outlet diameter	mm	300
	Hose outlet diameter	inch	12
	Quantity at outlet		1
	WEIGHTS AND DIMENSIONS		
	Case length (excluding support)	mm	4,000
	Case width (excluding support)	mm	2,200
	Case height (excluding support)	mm	2,000
	Fixed machine length (overall)	mm	4,200
	Fixed machine width (overall)	mm	2,315
	Fixed machine height (overall)	mm	2,107
	Length including trailer (overall)	mm	4,500
	Width including trailer (overall)	mm	2,315
	Height including trailer (overall)	mm	2,669
	Unit weight (excluding stand)	Kg	2,275
	Unit weight (including trailer stand)	Kg	3,015

Dimensions and connections

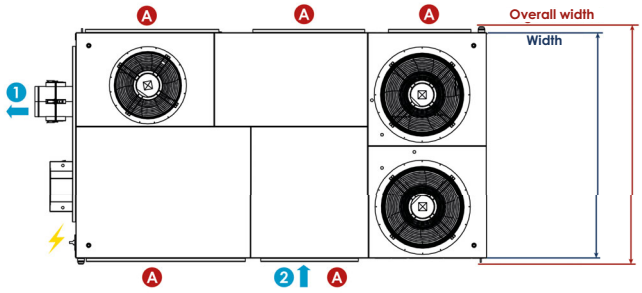
ACU 2 1.3

Front view:

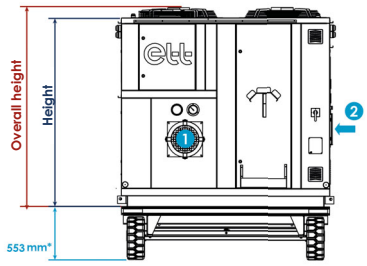


*Additional overall length of trailer bed (OPTION)

Top view:

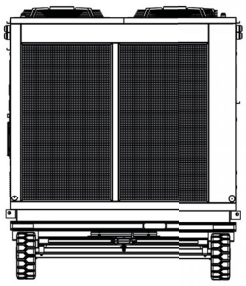


Side view:



*Trailer bed height (OPTION)

Side view :



1 Supply air
2 Fresh air
⚡ Power supply
A Access

	Length	Width	Height
Casing dimensions	4,000 mm	2,200 mm	2,000 mm
Overall dimensions	4,200 mm	2,315 mm	2,107 mm

Technical features

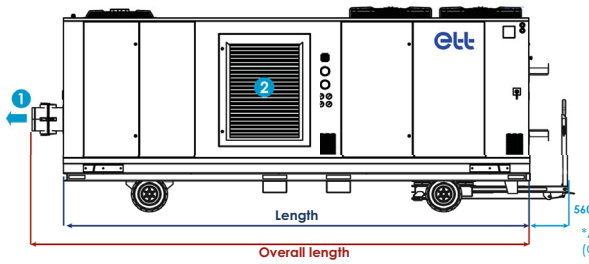
ACU 2 2.5

	DESIGNATION	Unit	ACU 2 2.5
FEATURES	**AIR FLOW RATE**		
	Maximum nominal mass airflow at discharge	kg/s	2.5
	Maximum nominal volumetric airflow at discharge at 2°C / 100% RH	m³/h	7,060
	Minimum mass air flow at discharge	kg/s	1.3
	Minimum volumetric airflow at discharge at 2°C / 100% RH	m³/h	3,671
	Available pressure at minimum air flow	mbar	35
	Available pressure at minimum air flow	Pa	3,500
	Available pressure at maximum air flow	mbar	80
	Maximum available pressure at maximum air flow rate	Pa	8,000
	COOLING MODE		
	Nominal cooling capacity at 35°C/40% RH outside.	kW	165.87
	Supply air temperature at nominal air flow rate	°C	2.0
	Net electrical power input	kW	83.59
	Gross EER	kW/kW	3.27
	Net EER at 35°C/40% RH outside.	kW/kW	1.98
	HEATING MODE		
	Heating capacity	kW	90
	Maximum supply air temperature	°C	45 (with regulation on air law)
ELECTRICS	Total installed electrical power	kW	137.33
	Rated current	kW	226.98
	Total absorbed current in operation at 35°C/40% RH outside	kW	140.4
	Starting current	A	387.98
	MARECHAL socket type	-	DS2
	Connection cable diameter	-	50 mm²
	Breaking capacity (Short-circuit current)	kA	10
	Neutral system	-	TT (suitable for TN)
	Control	-	Supply air temperature °C
	Control setpoint	°C	2.0
SUPPLY AIR	**FAN**		
	Electric power consumption of supply fan	kW	28.48
	Installed electrical power	kW	37
	OUTSIDE		
	Nominal outdoor air flow rate circuit 1	m3/h	48,000
	Nominal outdoor air flow rate circuit 2	m3/h	18,000
GENERAL INFORMATION	Refrigerant		R513A
	Quantity of circuits	Unit	2
	Power stages	-	25 - 100%
	Outside sound power level	dB(A)	101
	Resulting external sound pressure at 10m ref. 2x10 -5 in free field	dB(A)	70
	Filter efficiency	-	ISO Coarse 65% (G4) ISO ePM1 80% (F9)
	Quantity of filters	Unit	4 + 4
	Dimensions of filters	mm	595x595x98 - 595x292x98
	Maximum outdoor operating temperature in cooling mode	°C	45
	Minimum outdoor operating temperature in cooling mode	°C	18
	Hose outlet diameter	mm	350
	Hose outlet diameter	inch	14
	Quantity at outlet		1 or 2
	WEIGHTS AND DIMENSIONS		
	Case length (excluding support)	mm	5,850
	Case width (excluding support)	mm	2,200
	Case height (excluding support)	mm	2,000
	Fixed machine length (overall)	mm	6,050
	Fixed machine width (overall)	mm	2,315
	Fixed machine height (overall)	mm	2,107
	Length including trailer (overall)	mm	6,410
	Width including trailer (overall)	mm	2,315
	Height including trailer (overall)	mm	2,669
	Unit weight (excluding stand)	Kg	3,380
	Unit weight (including trailer stand)	Kg	4,150

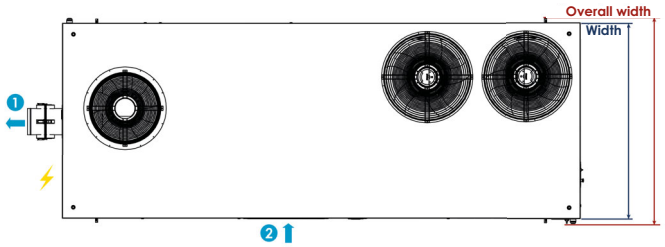
Dimensions and connections

ACU 2 2.5

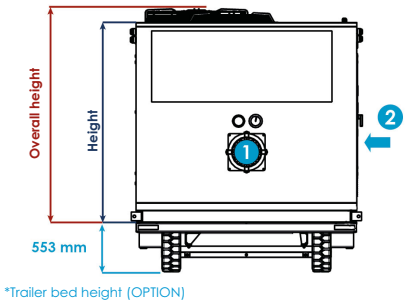
Front view:



Top view:



Side view:



Side view :

1 Supply air
2 Fresh air
⚡ Power supply
A Access

	Length	Width	Height
Casing dimensions	5,850 mm	2,200 mm	2,000 mm
Overall dimensions	6,050 mm	2,315 mm	2,135 mm

Technical features

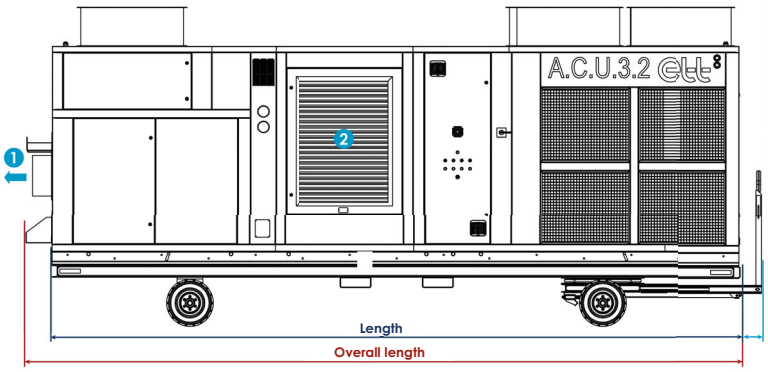
ACU 2 3.2

	DESIGNATION	Unit	ACU 2 3.2
FEATURES	**AIR FLOW RATE**		
	Nominal supply air mass flow rate	**kg/s**	3.2
	Nominal supply air volume flow rate at 2°C / 100% RH	**m³/h**	9,034
	Minimum mass air flow at discharge	**kg/s**	1.3
	Minimum volumetric flow rate of supply air at 2°C / 100% RH	**m³/h**	3,671
	Maximum supply air mass flow rate	**kg/s**	4.0
	Maximum supply air volume flow rate at 2°C / 100% RH	**m³/h**	11,297
	Available pressure at maximum air mass flow rate	**mbar**	120
	Available pressure at maximum air mass flow rate	**Pa**	12,000
	Available pressure at minimum air mass flow rate	**mbar**	35
	Available pressure at minimum air mass flow rate	**Pa**	3,500
	COOLING MODE		
	Nominal cooling capacity at 40°C/30% RH outside.	**kW**	212.3
	Supply air temperature at nominal air flow rate	**°C**	2.0
	Net electrical power input	**kW**	67.1
	Gross EER	**kW / kW**	3.5
	Net EER at 35°C/40% RH outside.	**kW/kW**	2.85
	HEATING MODE		
	Heating capacity	**kW**	90
	Maximum supply air temperature	**°C**	45 (with regulation on air law)
ELECTRICS	Total installed electrical power	**kW**	187.7
	Theoretical rated current	**A**	330.1
	Total absorbed current in operation at 35°C/40% RH outside	**A**	127.11
	Starting current	**A**	496.3
	MARECHAL socket type	**-**	DS2
	Connection cable diameter	**-**	70 mm²
	Breaking capacity (Short-circuit current)	**kA**	10
	Neutral system	**-**	TT (suitable for TN)
	Control	**-**	Supply air temperature °C
	Control setpoint	**°C**	2.0
SUPPLY AIR	**FAN**		
	Absorbed electrical power	**kW**	33
	Installed electrical power	**kW**	37
	OUTSIDE		
	Nominal outdoor air flow rate circuit 1	**m3/h**	55,000
	Nominal outdoor air flow rate circuit 2	**m3/h**	30,500
	Nominal outdoor air flow rate circuit 3	**kW**	17,500
GENERAL INFORMATION	Refrigerant		R513A
	Quantity of circuits	**Unit**	3
	Power stages	**-**	20 - 100%
	Outside sound power level	**dB(A)**	101
	Resulting external sound pressure at 10m ref. 2x10 -5 in free field	**dB(A)**	70
	Filter efficiency	**-**	ISO Coarse 65% (G4) ISO ePM1 80% (F9)
	Quantity of filters	**Unit**	4 + 4
	Dimensions of filters	**mm**	595x595x98- 595x292x98
	Maximum outdoor operating temperature in cooling mode	**°C**	50
	Minimum outdoor operating temperature in cooling mode	**°C**	18
	Hose outlet diameter	**mm**	400
	Hose outlet diameter	**inch**	16
	Quantity at outlet		1 or 2
	WEIGHTS AND DIMENSIONS		
	Case length (excluding support)	**mm**	6,700
	Case width (excluding support)	**mm**	2,350
	Case height (excluding support)	**mm**	2,500
	Fixed machine length (overall)	**mm**	6,920
	Fixed machine width (overall)	**mm**	2,465
	Fixed machine height (overall)	**mm**	2,607
	Length including trailer (overall)	**mm**	7,170
	Width including trailer (overall)	**mm**	2,465
	Height including trailer (overall)	**mm**	3,110
	Unit weight (excluding stand)	**Kg**	4,000
	Unit weight (including trailer stand)	**Kg**	4,800

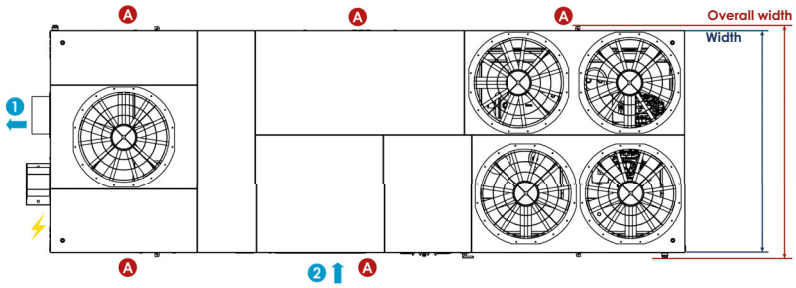
Dimensions and connections

ACU 2 3.2

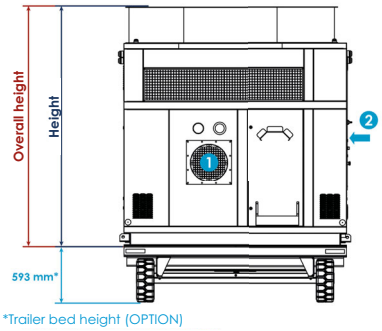
Front view:



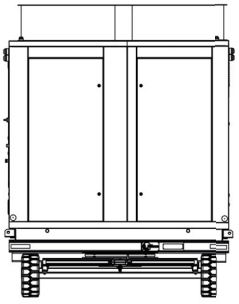
Top view:



Side view:



Side view :



1 Supply air
2 Fresh air
⚡ Power supply
A Access

	Length	Width	Height
Casing dimensions	6,700 mm	2,350 mm	2,500 mm
Overall dimensions	6,950 mm	2,465 mm	2,607 mm

Technical features

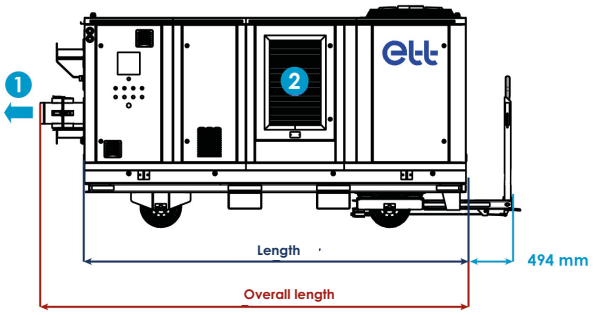
ACU 8 0.5

	DESIGNATION	Unit	ACU 8 0.5
FEATURES	**AIR FLOW RATE**		
	Nominal supply air mass flow rate	**kg/s**	0.5
	Nominal supply air volume flow rate at 8°C / 100% RH	**m³/h**	1,448
	Minimum mass air flow at discharge	**kg/s**	0.35
	Minimum supply air volume flow rate at 8°C / 100% RH	**m³/h**	1,014
	Maximum supply air mass flow rate	**kg/s**	0.7
	Maximum supply air volume flow rate at 8°C / 100% RH	**m³/h**	2,520
	Available pressure at nominal air mass flow rate	**mbar**	40
	Available pressure at nominal air mass flow rate	**Pa**	4,000
	COOLING MODE		
	Nominal cooling capacity at 32°C/40% RH outside.	**kW**	22.69
	Supply air temperature at nominal air flow rate	**°C**	8
	Net electrical power input	**kW**	11.13
	Gross EER	**kW / kW**	2.72
	Net EER at 32°C/40% RH outside.	**kW/kW**	2.01
	HEATING MODE		
	Heating capacity	**kW**	9
	Maximum supply air temperature	**°C**	45 (with regulation on air law)
ELECTRICS	Total installed electrical power	**kW**	18.0
	Rated current	**A**	31.7
	Total absorbed current in operation at 32°C/40% RH outside	**A**	20.1
	Starting current	**A**	68.4
	MARECHAL socket type	**-**	DS6
	Connection cable diameter	**-**	16 mm²
	Breaking capacity (Short-circuit current)	**kA**	10
	Neutral system	**-**	TT (suitable for TN)
	Control	**-**	Supply air temperature (C°)
	Control setpoint	**°C**	8
SUPPLY AIR	**FAN**		
	Absorbed electrical power	**kW**	2.95
	Installed electrical power	**kW**	5.5
	OUTSIDE		
	Nominal outdoor air flow rate circuit 1	**m3/h**	15,000
	Maximum absorbed electrical power per circuit	**kW**	2.6
GENERAL INFORMATION	Refrigerant		R513A
	Quantity of circuits	**Unit**	1
	Power stages	**-**	10-100%
	Outside sound power level	**dB(A)**	91
	Resulting external sound pressure at 10m ref. 2x10 -5 in free field	**dB(A)**	62
	Filter efficiency	**-**	ISO 65 % (G4) and ISO ePM1 80 % (F9)
	Quantity of filters	**Unit**	1/+1
	Dimensions of filters	**mm**	598x595x98 + 595x292x98
	Maximum outdoor operating temperature in cooling mode	**°C**	40
	Minimum outdoor operating temperature in cooling mode	**°C**	15
	Hose outlet diameter	**mm**	195
	Hose outlet diameter	**inch**	7.7
	Quantity at outlet		1
	WEIGHTS AND DIMENSIONS		
	Case length (excluding support)	**mm**	3,460
	Case width (excluding support)	**mm**	1,760
	Case height (excluding support)	**mm**	1,500
	Fixed machine length (overall)	**mm**	3,668
	Fixed machine width (overall)	**mm**	1,881
	Fixed machine height (overall)	**mm**	1,604
	Length including trailer (overall)	**mm**	4,206
	Width including trailer (overall)	**mm**	1,881
	Height including trailer (overall)	**mm**	2,000
	Unit weight (excluding stand)	**Kg**	1,120
	Unit weight (including trailer stand)	**Kg**	1,700

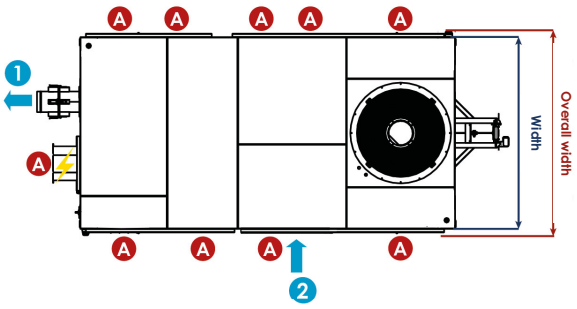
Dimensions and connections

ACU 8 0.5

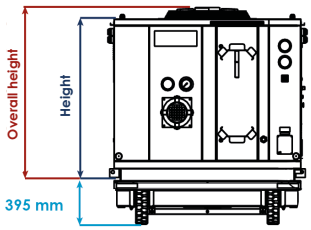
Front view:



Top view:

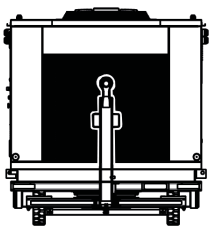


Side view:



*Trailer bed height (OPTION)

Side view :



1 Supply air
2 Fresh air
⚡ Power supply
A Access

	Length	Width	Height
Casing dimensions	5,400 mm	2,350 mm	2,000 mm
Overall dimensions	5,600 mm	2,465 mm	2,107 mm

Technical features

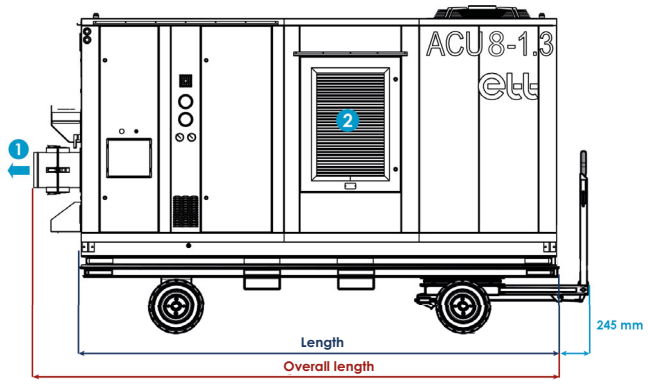
ACU 8 1.3

	DESIGNATION	Unit	ACU 8 1.3
FEATURES	**AIR FLOW RATE**		
	Nominal supply air mass flow rate	**kg/s**	1.3
	Nominal supply air volume flow rate at 8°C / 100% RH	**m³/h**	3,766
	Minimum mass air flow at discharge	**kg/s**	0.9
	Minimum volumetric flow rate of supply air at 8°C / 100% RH	**m³/h**	2,607
	Maximum supply air mass flow rate	**kg/s**	1.5
	Maximum supply air volume flow rate at 8°C / 100% RH	**m³/h**	4,236
	Available pressure at minimum air flow	**mbar**	35
	Available pressure at minimum air flow	**Pa**	3,500
	Available pressure at nominal air flow rate	**mbar**	45
	Available pressure atnominal air flow rate	**Pa**	4,500
	Available pressure at maximum air flow	**mbar**	55
	Available pressure at maximum air flow	**Pa**	5,500
	COOLING MODE		
	Nominal cooling capacity at 40°C/30% RH outside.	**kW**	68.5
	Supply air temperature at nominal air flow rate	**°C**	8
	Net electrical power input	**kW**	38.83
	Gross EER	**kW / kW**	2.95
	Net EER at 40°C/30% RH outside.	**kW/kW**	1.76
	HEATING MODE		
	Heating capacity	**kW**	45
	Maximum supply air temperature	**°C**	45 (with regulation on air law)
ELECTRICS	Total installed electrical power	**kW**	67.96
	Theoretical rated current	**A**	122.6
	Total absorbed current in operation at 40°C/30% RH outside	**A**	63.9
	Starting current	**A**	258.4
	MARECHAL socket type	**-**	DS9
	Connection cable diameter	**-**	25 mm²
	Breaking capacity (Short-circuit current)	**kA**	10
	Neutral system	**-**	TT (suitable for TN)
	Control	**-**	Supply air temperature °C
	Control setpoint	**°C**	8
SUPPLY AIR	**FAN**		
	Absorbed electrical power	**kW**	7.36
	Installed electrical power	**kW**	11
	OUTSIDE		
	Nominal outdoor air flow rate circuit 1	**m3/h**	30,500
	Nominal outdoor air flow rate circuit 2	**m3/h**	-
GENERAL INFORMATION	Refrigerant		R513A
	Quantity of circuits	**Unit**	3
	Power stages	**-**	20 - 100%
	Outside sound power level	**dB(A)**	93
	Resulting external sound pressure at 10m ref. 2x10 -5 in free field	**dB(A)**	63
	Filter efficiency	**-**	ISO Coarse 65% (G4) ISO ePM1 80% (F9)
	Quantity of filters	**Unit**	2 + 2
	Dimensions of filters	**mm**	592*592*98*2
	Maximum outdoor operating temperature in cooling mode	**°C**	45
	Minimum outdoor operating temperature in cooling mode	**°C**	18
	Hose outlet diameter	**mm**	300
	Hose outlet diameter	**inch**	12
	Quantity at outlet		1
	WEIGHTS AND DIMENSIONS		
	Case length (excluding support)	**mm**	3,800
	Case width (excluding support)	**mm**	2,200
	Case height (excluding support)	**mm**	2,000
	Fixed machine length (overall)	**mm**	4,000
	Fixed machine width (overall)	**mm**	2,315
	Fixed machine height (overall)	**mm**	2,107
	Length including trailer (overall)	**mm**	4,245
	Width including trailer (overall)	**mm**	2,315
	Height including trailer (overall)	**mm**	2,660
	Unit weight (excluding stand)	**Kg**	2,275
	Unit weight (including trailer stand)	**Kg**	3,010

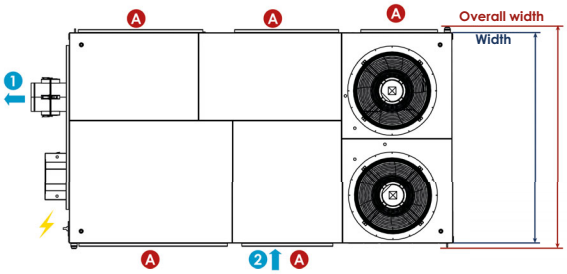
Dimensions and connections

ACU 8 1.3

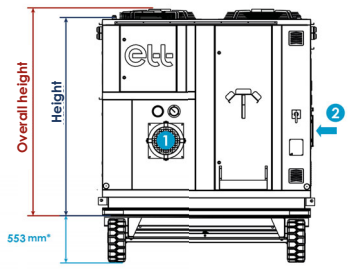
Front view:



Top view:

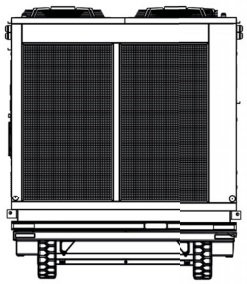


Side view:



*Trailer bed height (OPTION)

Side view :



1 Supply air
2 Fresh air
⚡ Power supply
A Access

	Length	Width	Height
Casing dimensions	3,800 mm	2,200 mm	2,000 mm
Overall dimensions	4,000 mm	2,315 mm	2,107 mm

Technical features

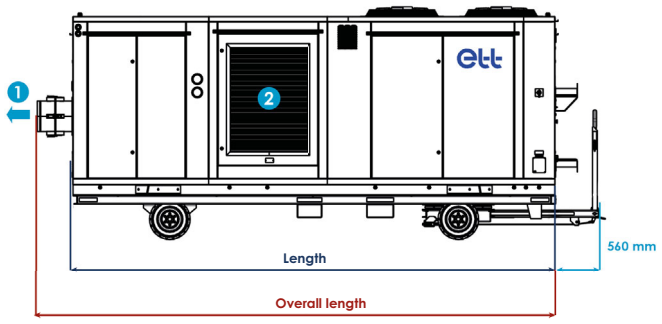
ACU 8 2.5

	DESIGNATION	Unit	ACU 8 2.5
FEATURES	**AIR FLOW RATE**		
	Maximum nominal mass airflow at discharge	kg/s	2.5
	Maximum nominal volumetric flow rate of supply air at 8°C / 100% RH	m^3/h	7,241
	Minimum mass air flow at discharge	kg/s	1.3
	Minimum supply air volume flow rate at 8°C / 100% RH	m^3/h	3,671
	Available pressure at minimum air mass flow rate	mbar	35
	Available pressure at minimum air mass flow rate	Pa	3,500
	Available pressure at maximum air mass flow rate	mbar	80
	Available pressure at maximum air mass flow rate	Pa	8,000
	COOLING MODE		
	Nominal cooling capacity at 35°C/40% RH outside.	kW	135.6
	Supply air temperature at nominal air flow rate	°C	8.0
	Net electrical power input	kW	82.12
	Gross EER	kW / kW	2.95
	Net EER at 35°C/40% RH outside.	kW/kW	1.65
	HEATING MODE		
	Heating capacity	kW	90
	Maximum supply air temperature	°C	45 (with regulation on air law)
ELECTRICS	Total installed electrical power	kW	135.96
	Rated current	A	246.7
	Total absorbed current in operation at 35°C/40% RH outside	A	144.6
	Starting current	A	304.5
	MARECHAL socket type	-	DS2
	Connection cable diameter	-	50 mm²
	Breaking capacity (Short-circuit current)	kA	10
	Neutral system	-	TT (suitable for TN)
	Control	-	Supply air temperature °C
	Control setpoint	°C	2.0
SUPPLY AIR	**FAN**		
	Absorbed electrical power	kW	28.48
	Installed electrical power	kW	37
	OUTSIDE		
	Nominal outdoor air flow rate circuit 1	m3/h	43,000
	Nominal outdoor air flow rate circuit 2	m3/h	18,000
	Maximum absorbed electrical power per circuit	kW	-
GENERAL INFORMATION	Refrigerant		R513A
	Quantity of circuits	Unit	2
	Power stages	-	10 - 100%
	Outside sound power level	dB(A)	97
	Resulting external sound pressure at 10m ref. 2x10 -5 in free field	dB(A)	65
	Filter efficiency	-	ISO Coarse 65% (G4) ISO ePM1 80% (F9)
	Quantity of filters	Unit	4 + 4
	Dimensions of filters	mm	595x595x98 - 595x292x98
	Maximum outdoor operating temperature in cooling mode	°C	45
	Minimum outdoor operating temperature in cooling mode	°C	18
	Hose outlet diameter	mm	350
	Hose outlet diameter	inch	14
	Quantity at outlet		1 or 2
	WEIGHTS AND DIMENSIONS		
	Case length (excluding support)	mm	5,400
	Case width (excluding support)	mm	2,350
	Case height (excluding support)	mm	2,000
	Fixed machine length (overall)	mm	5,600
	Fixed machine width (overall)	mm	2,465
	Fixed machine height (overall)	mm	2,107
	Length including trailer (overall)	mm	6,158
	Width including trailer (overall)	mm	2,465
	Height including trailer (overall)	mm	2,669
	Unit weight (excluding stand)	Kg	2,736
	Unit weight (including trailer stand)	Kg	3,700

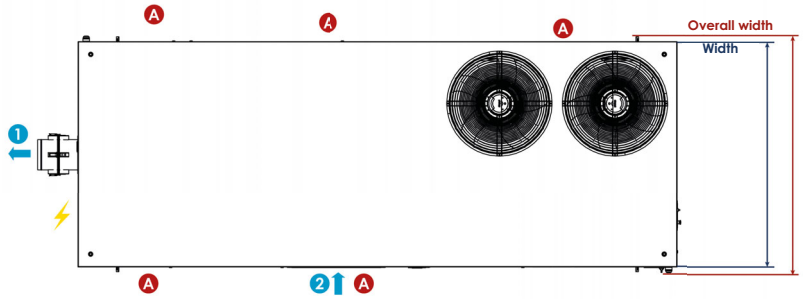
Dimensions and connections

ACU 8 2.5

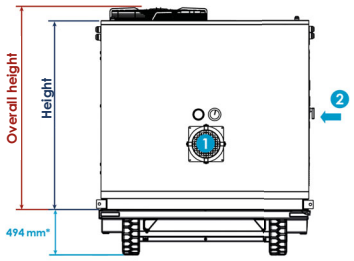
Front view:



Top view:

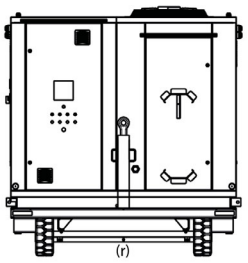


Side view:



*Trailer bed height (OPTION)

Side view :



1 Supply air
2 Fresh air
⚡ Power supply
A Access

	Length	Width	Height
Casing dimensions	3,460 mm	1,760 mm	1,500 mm
Overall dimensions	3,668 mm	1,881 mm	1,604 mm

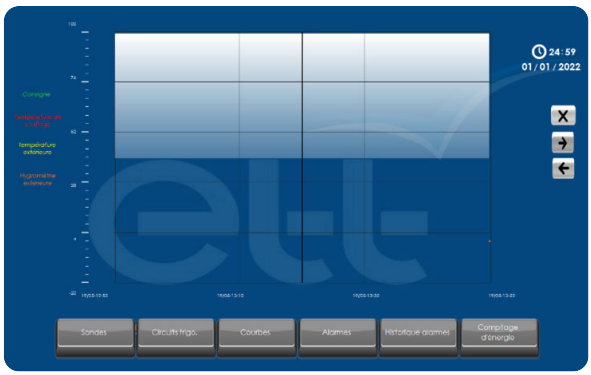
Additional options

Operator control panel - signalling:

- General fault indicator light (red indicator light)
- Unit start (white pushbutton)
- Unit stop (red pushbutton)
- 'Push-pull' emergency stop with metal cover.
- Supply air enable (white illuminated pushbutton)
- 2-position rotary knob Manual / Auto
- 3-Position rotary knob 'Operating mode' - Cooling/Ventilation/Heating
- Flashing red lights to indicate a general fault
- Flashing blue lights to indicate unit operation

Touch display

- **Unit** START (for touch screen)
- **Unit** STOP (for touch screen)
- Aircraft type selection (for touch screen)
- Operating mode selection (for touch screen)
- Access to the temperature recording curve
- Access to the energy meter

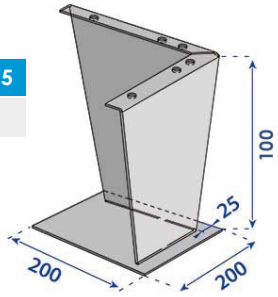


Installation accessories

FEET

Unit	ACU 2 .09	ACU 2 1.3	ACU 2 2.5	ACU 2 3.2	ACU 8 0.5	ACU 8 1.3	ACU 8 2.5
No. of feet	6	6	8	8	4	6	8

Fixed aluminium foot
Unit weight: 1 kg



TRAILER (OPTIONAL)

Frame	▪ The frame, the trailer's load-bearing structure, is made of machine-welded sheet steel
Running gears	▪ **Front**: an unbraked right-hand steering axle, bolted to the steering frame and connected to the frame by a ball-bearing ring gear ▪ **Rear**: an unbraked right-hand axle bolted to the frame. ▪ The front and rear axles are fitted with leaf spring suspension.
Trailer coupling	▪ The trailer is fitted with a straight articulated drawbar terminating in a drawbar eye Inside Ø. 76 mm. A clevis at the rear of the frame allows up to 2 trailers to travel together. ▪ **Height: Approx. 300 mm**
Decking	▪ Flat sheet metal top, thickness 3 mm.
Wheels	▪ 4 wheels with solid flexible tyres type 400x4 (Ø 306x116 mm) mounted on steel rims. ▪ **Maximum permissible load per wheel: 410 Kg at 25 Km/h**
Braking	▪ Park brake with pads on the front wheels, actuated by raising and lowering the tiller. ▪ Automatic tiller lock keeps tiller in vertical position.
Accessories	▪ Fork passage under the bed and 4 lifting points ▪ Side protection with Delta-type rubber seals ▪ A rear reflector
Finish	▪ 1 coat of zinc epoxy primer ▪ 2 coats of medium blue-green **polyurethane lacquer** RAL 5024

Our trailers are built **in accordance with the safety coefficients** governing handling equipment, i.e.:

> 1.1 of the rated dynamic load
> 1.25 of the rated static load.

Intended for use on private property only, they must be operated on level ground in good condition.

Duct accessories

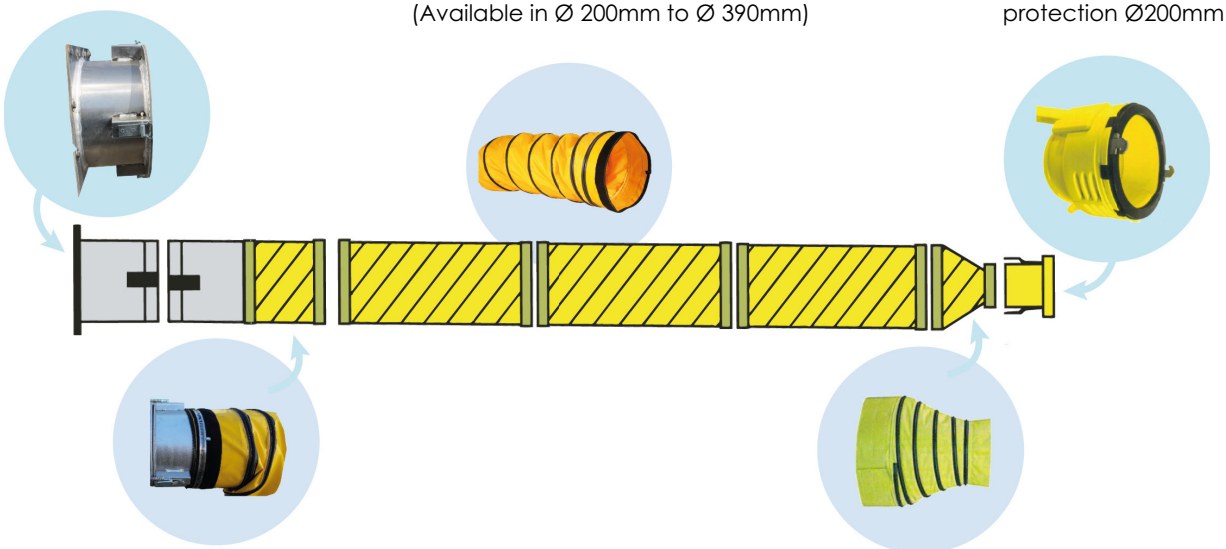
In order to ensure the expected operation at the unit outlet, ETT offers the complete supply of the air connection network. Numerous configurations are possible, including connection to rigid hoses, conversion connectors to 2 LPGC connectors, customised flexible hoses, etc.).

Example of proposed installation for the airflow connection of a mobile ACU to an aircraft using an LPGC coupling

Aluminium coupling with 4 female and male quick couplings (Available in Ø 200mm to Ø 390mm)

Section of 7.5lm zipped hose in coloured PVC polyester fabric (customisable).
Polyester wadding insulated hose – PDC 43Pa / lm
(Available in Ø 200mm to Ø 390mm)

PCA PAGE 360° aircraft connector with rodent protection Ø200mm



Zipped starter sleeve in coloured PVC polyester fabric (customisable).
Polyester wadding insulated hose
(Available in Ø 200mm to Ø 390mm)

Zipped tapered adaptor in coloured PVC polyester fabric (customisable).
Polyester wadding insulated hose
(Available in Ø 200mm to Ø 390mm)

Painted steel hose reel trolley. Capacity: 25 linear metres of hose. Available in 48 lm capacity

For more information, please contact us!

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