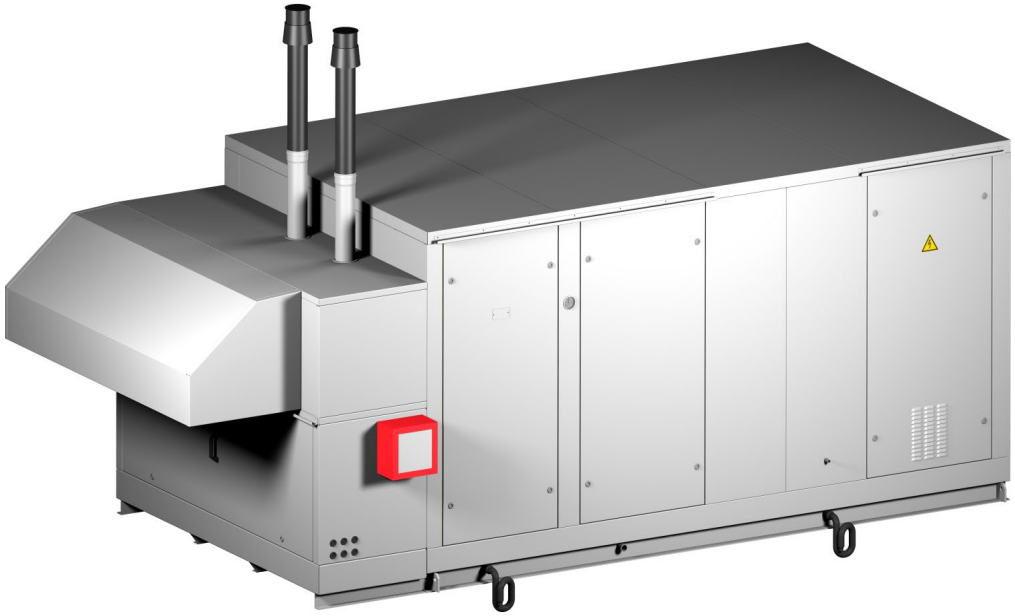
ENVIRONMENTAL
CLIMATE CONTROL
EQUIPMENT
& SOLUTIONS

CTA ULTI+ ADIA CC+



Single flow air processing plant with condensation boiler(s) and glass fiber media adiabatic cooling system

TITRE V RT 2012

MADE IN FRANCE

www.ett-hvac.com

ENERGIE TRANSFERT THERMIQUE

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).

Aluminium facilitates the REFURBISHMENT of machines for a second life, unlike a steel structure.

Our technical choices have a major impact on the environment

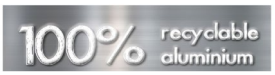
•DECARBONATION:

ETT is committed to an ambitious approach to reducing greenhouse gas emissions:

- Reducing the energy consumption of our machines
- Fluid refrigerants with low GWP
- Energy monitoring & AI
- Adiabatic cooling
- Development of machine retrofits

•ALUMINIUM : PERFORMANCE AND DURABILITY!

- Lightweight: 3 times lighter than steel
- Corrosion resistant and long lifespan
- Thermal performance
- 100% recyclable indefinitely
- Facilitates the refurbishment of our machines



• ECO-DESIGN:

Our technologies are designed with sustainability in mind, reducing their environmental impact throughout their life cycle.

• LOW-POLLUTION MANUFACTURING PROCESS:

- Selective sorting: 80% recovery rate
- No paint or solvents

• END OF MACHINE LIFE:

In compliance with regulations, ETT is a member of the Ecologic eco-organisation for the end-of-life processing of machines, which are 98% recyclable.

EcoLogic

• ETT CERTIFICATIONS

- **CSR assessment**: ECOVADIS Gold Medal for our CSR approach

GOLD | Top 5% ecovadis Sustainability Rating JAN 2025

- **ISO 14001 & ISO 9001 certification** : our Quality and Environmental Management System

ISO 14001 ISO 9001

- **Certificate of competence for handling refrigerants**
- **Membership of the UN Global Compact**
- **Qualiopi certification** for our training centre

Qualiopi processus certifié RÉPUBLIQUE FRANÇAISE
La certification qualité a été délivrée au titre de la catégorie d'action suivante : Actions de formation

As a positive-impact company, ETT contributes to a more sustainable world through its decarbonising products and services.

CE 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

20-year guarantee against corrosion frame - casing

ENERGY SAVING

ENVIRONMENTAL ATTITUDE

SERVICE LINK

Operating principles

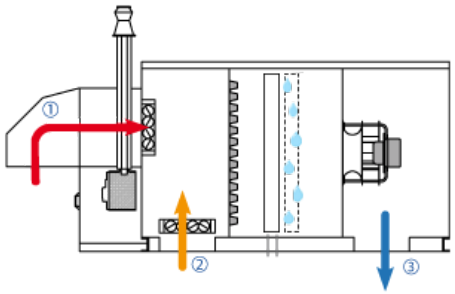
The following operating modes are available:

> Adiabatic cooling
> Free Cooling: cooling with outside air
> Heating with condensing boiler

In these modes, the unit can operate:

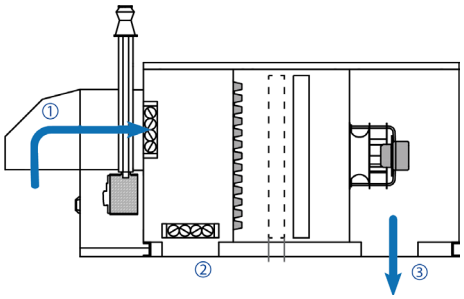
> With all recirculated air
> With all fresh air
> Fresh air + return air

Adiabatic cooling mode



Cooling mode: activation of the adiabatic system with automatic switching between new and recirculated air according to the most favourable ambient/outdoor conditions.

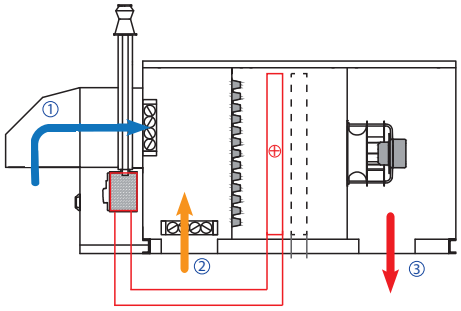
Free Cooling mode



Free Cooling mode: In mid-season, comfort temperature is maintained using in priority the Introduction between outside air and inside air.

Free Cooling **allows considerable.**

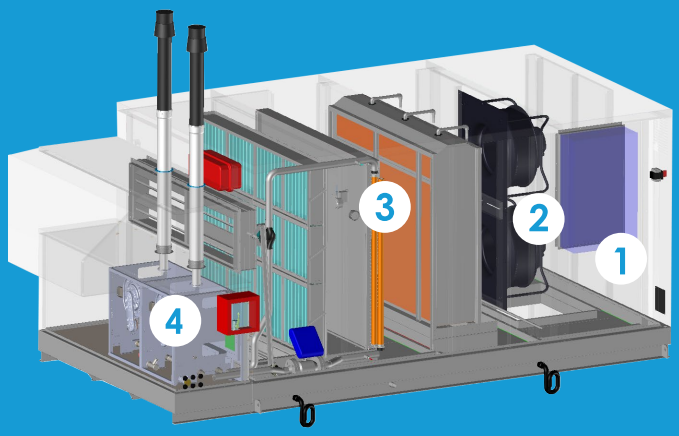
Heating mode



Heating mode: Winter comfort temperature maintained by hot water coil fed by one or more condensation boilers.

① Fresh air ② Return air ③ Supply air

Unit description



The CTA ULTI+ ADIA CC+ unit comprises 4 different sections:

1. **a sealed, air-flow insulated**electrical compartment (IP44).
2. **a separate technical compartment** containing the refrigerating and regulating components.
3. **the body of the unit** incorporating the filter, the hot water coil, the adiabatic cooler and the fans.
4. **a separate housing** comprising the condensation boiler(s) and their regulating components.

Aluminium frame and casing:

- **Rigid, compact and lightweight packaged unit**, perfectly weather-resistant, with a 20-year anti corrosion guarantee on casing.
- **Aluminium vertical panels and roof** (AG3).
- A separate **technical section** facilitates unit control and maintenance and allows measurement and adjustment during operation.
- **Watertight floor** with drainage outlets around the unit, connected to rubber siphons.
- **Access through large removable panels**. Panels are closed with square locks. Doors tightness is ensured by a flexible gasket under compression, providing ideal elasticity day after day.
- **Inside acoustic and thermal double skin insulation of the panels** with M0 glass wool, 50 mm thickness. Protection of glass wool by aluminium sheet metal.
- **Floor acoustic and thermal insulation** using 80 mm M0/A rock wool with double skin.
- **2-damper mixing box** including a motorised fresh air damper with bird proof grid and a motorised return air damper to ensure the desired proportions and optimise Free Cooling phases. Dampers have class 3 extruded aluminium blades with low pressure drop. The damper frame is made of aluminium.

Unit description

Air assembly:

- **Eco-concept filtration, 98 mm thick**(on supply and exhaust air) with easy-to-remove - ISO Coarse 65% (G4) pleated media, with pressure switch for fouling control.
- **Plug fan** on supply air. This technology avoids losses due to pulley-belt transmissions.
- **The motor** allows:

✓ Limit the kickback during start-up in the case of textile sheaths (soft start function).
✓ Set the maximum rotation speed to match the site's pressure drop.
✓ reduced speed operation in Free Cooling mode to save energy.

Auxiliary heating assembly:

- **Premix type condensing boiler** compliant with the 2009/142/EC directive on gas appliances (performance from 98% to 108% LHV).
- **Highly modular capacity** with 1 to 4 boilers of 70 kW (LHV).
- **Hot water coil** in the supply air stream.
- **Circulation pump.**
- **Expansion tank.**
- **Smoke circuit** with concentric flue to separate smoke evacuation from air supply (supplied by ETT, to be mounted by the installer).
- **Gas shut-off valve** in safety box with glass window.
- **300 mbar/20 mbar expansion valve** mounted on gas supply.
- **Condensate drain pan.**
- **Control board** to constantly monitor boiler securities.
- **Differential pressure switch** to control boiler operation.
- **Water outlet/inlet temperature probe**.
- **Water flow regulator.**
- **One controller** for all boilers' electronic cards to modulate capacity from 30% to 100%.

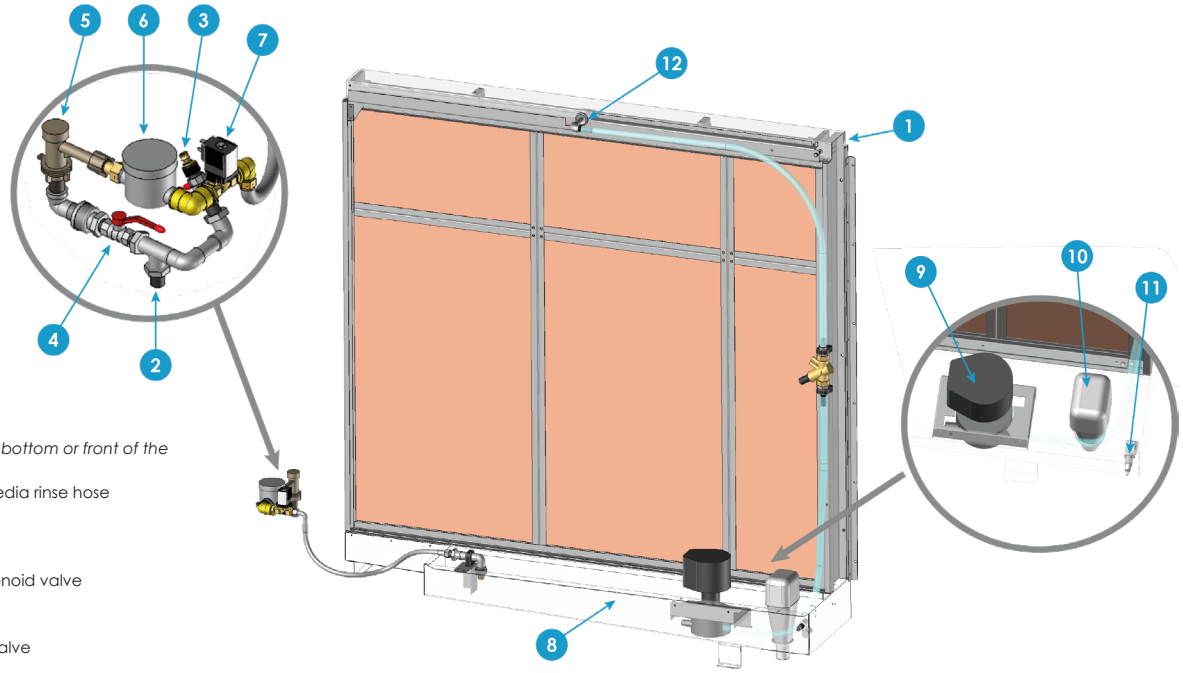
The module controller and the rooftop unit controller of the CTA ULTI+ ADIA CC+ are wired in order to adjust the air flow rate and capacity according to room air requirements.

Electrical assembly:

- **Electrical board** compliant with French standards NF EN C 15-100 and NF EN 60204-01, including:

✓ **ETT controller** with display
✓ **Power switch** with lockable external handle for full load cut-off
✓ **A 400-230-24 volt transformer** for control circuits.
✓ **Fault synthesis** with pending dry contact on terminal
✓ **Numbered terminal blocks** with disconnecting terminals for remote controls and transfers.
✓ **Internal wiring** with numbered ferrules at both extremities
✓ **Ik3 breaking capacity** of basis 10 kA.
✓ **All components protected** by circuit breakers.

Description of the adiabatic principle



1. Adiabatic chiller
2. Water supply
(Connection at the bottom or front of the machine)
3. Connector for media rinse hose
4. Stop valve
5. Cartridge filter
6. Water meter
7. Water supply solenoid valve
8. Water tank
9. Pump
10. Drain solenoid valve
11. Float
12. Distribution manifold

When cold is required, the water supply solenoid valve opens to fill the tank until the float contact is activated. Once this level is reached, the pump starts to feed a water distribution manifold located above the adiabatic media. The fibreglass media will uniformly become saturated with water through run-off.

The hot air passing through the moist media will transfer its heat to the water and evaporate some of it.

At the media outlet, the air is cooled while the water, which is still in the liquid phase, continues to trickle and then falls back into the tank. It is then pumped back into the media loop. There is no loss of water.

Drain cycles are intelligently controlled to ensure minerals are properly removed, based on both water hardness and the amount of water evaporated. This reduces water consumption by 20% compared with traditional dilution systems.

If there is no cooling demand (room temperature set point reached, machine shut down at the end of the day, etc.), a time delay is started, after which the tank and all the water distribution pipes are completely drained to eliminate the risk of Legionella developing.

Caution:
The water supply pressure to the adiabatic module must be greater than 1 bar and must not exceed 3 bar for each machine.
The water hardness of the water to be supplied to the adiabatic module must be provided when the purchase order is placed. If this is not the case, the number of cycles before emptying will be defined according to the average water hardness for the department.

Adiabatic cooling and legionella

The risk of legionella developing is eliminated because the 3 simultaneous conditions that could favour it are not met:

> automatic emptying of the water tank when the machine is switched off prevents water from standing for long periods of time.
> the temperature of the run-off water remains below temperatures conducive to the development of the bacteria (between 25 and 45°C).
> due to the technology and the effective air speed through the soaked media, there is no water entrainment.

This is why this type of 'adiabatic chiller with water trickling over media' **was officially excluded** from French **ICPE heading 2921** (risk management of water dispersion cooling installations) by the French **Ministerial Order of 14/12/2013**.

Description of the adiabatic principle

The unit regulates:

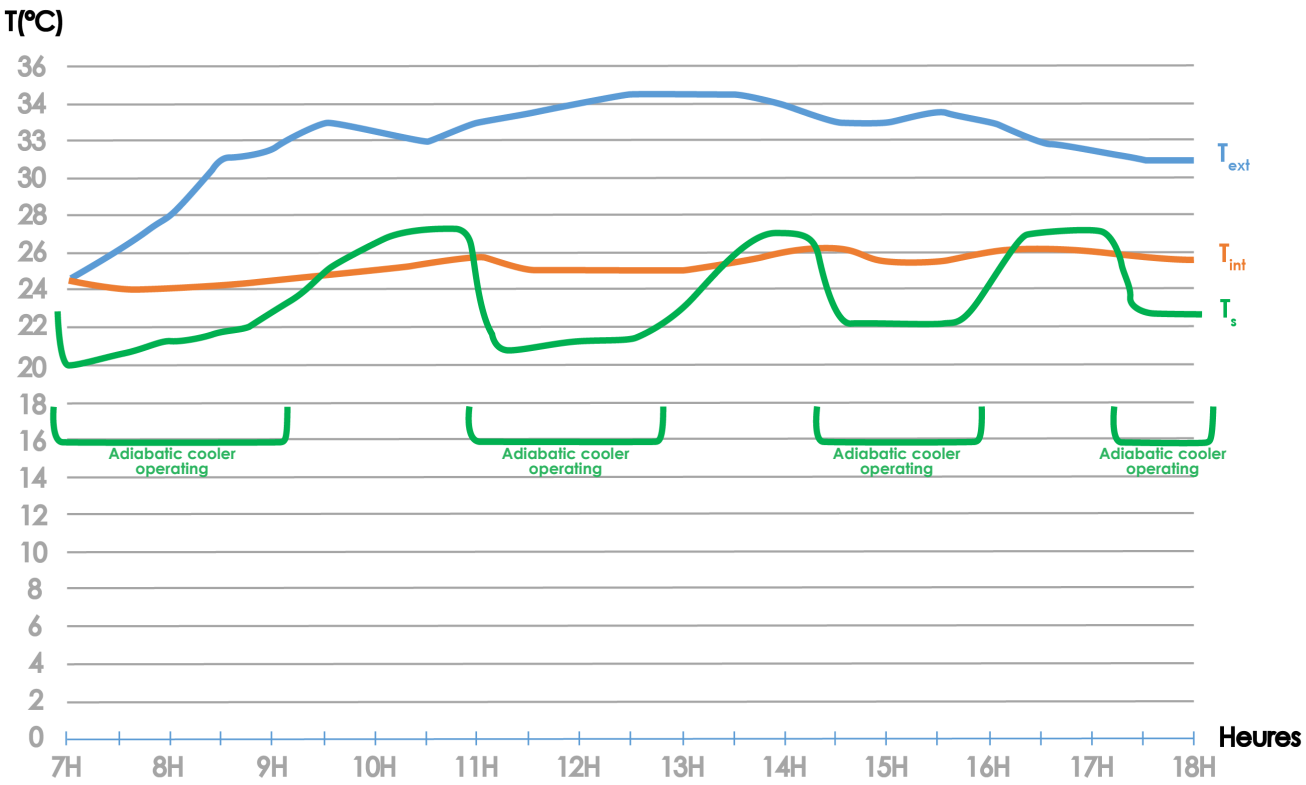
- keeping the ambient temperature set point: When it is exceeded, the adiabatic system is engaged.
- Keeping below a high limit of the CO_2 level by gradually opening the fresh air damper (when it is not already in the open position).
- keep below a high limit of the humidity rate (adjustable to 65% or 70% for example) by switching off the adiabatic system.

Outdoor and ambient temperatures and humidities are measured in real time. The PLC continuously calculates the most appropriate operating point and switches in all new air if the conditions are most favourable. One of the operating scenarios is:

- At start-up, the unit is fully recycled with direct adiabatic module operation.
- The humidity gradually rises (depending on the sealing of the building, the fresh air rate…) in the atmosphere.
- At a certain level of ambient humidity, the controller will conclude that it is more interesting to switch to all fresh operation with potentially warmer but drier air.

Real case: Evolution of temperatures

Measurement campaign in a large retail outlet carried out over 1 day of activity (June 2021)



Δaverage T between T_{ext} and T_{int}: 7.5°C
Average rH inside the outlet: 60%

It should be noted that the enthalpic calculation, carried out by the PLC in real time, determined that the unit could operate in any Air recycled over the whole day (advantage: The consumption of city water is then divided by 2 compared to a All Fresh Air operation).

Control description

Control assembly:

- CTN type temperature probes. Their accuracy and reliability have been tested and validated both at the factory and on site.
- **One or more BEST controllers** (Building Energy Saving Technology) especially developed by ETT for this range of units. Programs are updated annually in order to add functions requested for some applications and to optimise units power consumption.

  The microprocessor, memory and controller size are adapted to the chosen applications and options by integrating a program set-up in the factory out of 160 possible configurations.

  The controller is in a plastic box that guarantees a high mechanical protection and reduces electrostatic shock threats.
- The controller offers the following functions, among others:

✓ **On/Off with remote contact** or vacancy contact.
✓ **On/Off** according to programmed schedule (2 time slots per day).
✓ **Fault synthesis** with dry contact for transfer to customer system.
✓ **Security management** (antifreeze thermostat, smoke detector, etc.) and fault management.
✓ **Economiser management** (Free Cooling) through inside temperature analysis and comparison between return air and outside air temperatures.
✓ **2 setpoints** (Cooling and Heating) according to the European directive 2002/91/EC.
✓ **Frost protection**.
✓ **Management of cyclic boilers** depending on the outside temperature.
✓ **Written fault history** (no code needed) with time and outside temperature display.
✓ **Operating time counting** for unit.
✓ **Air quality control** with CO_2 sensor to optimise fresh air quantities to introduce, therefore limiting energy consumption.
✓ **Oil change management** : The time between two oil changes is calculated according to the water hardness.

Main options

Frame - Casing	▪ Motorised external damper for supply air (2006/42/EC Directive) ▪ Painting ▪ Vertical supply air (V) ▪ Supply air on side ▪ Supply air at the end ▪ Return air on side
Acoustics	▪ Fresh air cowl acoustic insulation ▪ Technical section acoustic insulation using STOPFLAM flexible fire-proof polyurethane foam
Air handling	▪ Dial pressure gauge per filtration stage ▪ Filters fouling analogue control (FFAC) ▪ Analogue air flow controller (AFC), air flow rate indication and measurement ▪ Self-contained smoke detector backed-up or not ▪ Epoxy coating for fan & Vinyl coating for exchangers ▪ ISO Coarse 65% Options (G4) type refillable ▪ 1 set of 65% so Coarse (G4) replacement ept. 98 mm ▪ 292 mm opacimetric filters with additional box ▪ ISO opacimetric filters ePM1 50% (F7) and F9 epr. 98 mm ▪ Supply air fan available pressure: 400 Pa maxi ▪ Metal ISO Coarse 30% filter thickness 23mm thickness on fresh air ▪ Double filters ISO Coarse 65% (G4) + ISO ePM1 50% (F7) et ISO ePM1 80% (F9) (48 + 48 mm)
Gas	▪ Gas stop valve with box
Installation	▪ 200 or 400 mm aluminium feet ▪ Aluminium ventilated roof curb ▪ Adapter interface on existing roof curb ▪ Aluminium connection roof curb ▪ Aluminium adaptation connection roof curb ▪ Roof curb side insulation
Electricity	▪ Unit global energy metering
Control	▪ Mini fresh air slaving using turret contacts (2 maximum)
Energy	▪ Pre-cooling water coil (water from water in the tank) ▪ Water meter linked to the myETTvision option

Technical features

Type 01 - 11 - 12

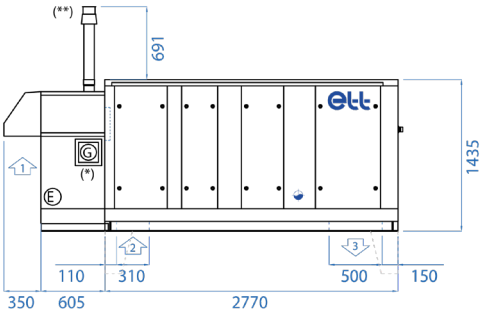
	NAME	Unit	01	11	12
CAPACITIES	Rated air flow rate for 400Pa	**m^3/h**	8,500	15.000	20.000
	Cooling capacity (AFA 35°C/40%	**kW**	31	54	72
	Adiabatic yield	**%**		94	
	Media surface	**m^2**	0.9	1.7	2.2
	Air speed	**m/s**		2.5	
	Supply air temperature	**°C**	24.4	24.5	24.4
GAS GENERATOR	LHV on capacity	**kW**	63	126	
	Natural gas flow rate(1) G20 (20 mBar) (LHV gas = 10.2 kWh/m^3 (n))	**m^3/h**	6.68	13.36	
	Natural gas flow rate(1) G25 (25 mBar) (LHV gas = 9.3 kWh/m^3 (n))	**m^3/h**	7.37	14.74	
	Natural gas flow rate(1) 2E-G20 (GZ-50) (20 mBar) (LHV gas = 10.2 kWh/m^3 (n))	**m^3/h**	7.24	14.48	
	Natural gas flow rate(1) 2LW-G27 (GZ-41.5) (20 mBar) (LHV gas = 9.3 kWh/m^3 (n))	**m^3/h**	8.04	16.08	
	Propane gas flow rate (1) G31/G30 (37 mbar)	**kg/h**	4.91	9.82	
	Required pressure for the NG burner with gas expansion valve	**mbar**		300	
	Gas connection diameter	**mm**	15 x 21	20 x 27	
	Circulation pump capacity	**W**	92	130	
	Capacity modulation	**%**	26 to 100%	13 to 100%	
ELECTRICAL CONNECTION	Total installed electrical power with 400 Pa (2)	**kW**	4.35	6.1	10.8
	Rated/Starting current with 400 Pa	**A**	8/10.4	11/14.7	18.3/25.6
GENERAL	Sound pressure at 10 m, reference: $2x10^{-5}$ in free field	**dB(A)**	53	52	55
	Filters efficiency		ISO Coarse 65% (G4) (98 mm)		
	Unit weight	**kg**	590	871	1.150

(1) Gas temperature: 15°C/Atmospheric pressure: 1013 mbar.
(2) 400V - 50 Hz 3-phase power supply + earth without neutral

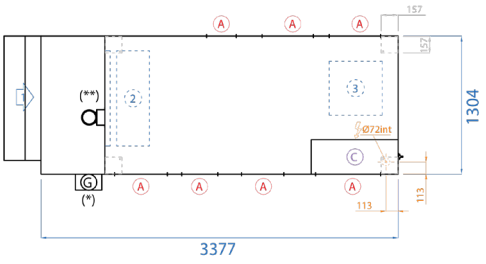
Dimensions and connections

Type 01

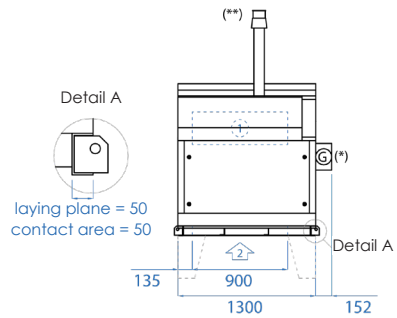
Front view:



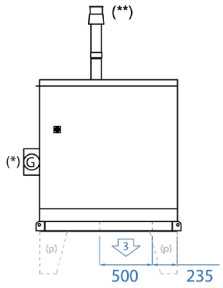
Top view:



Return air side view:



Supply air side view:



① Fresh air
② Return air
③ Supply air
Ⓐ Access
⚡ Power supply
Ⓒ Technical section
Ⓖ Gas supply
Ⓔ Condensates evacuation
Tap in water supply

	Length	Width (1)	Height
Casing dimensions	3.377	1.304	1.435
Transport overall dimensions	3.427	1.374	1.735

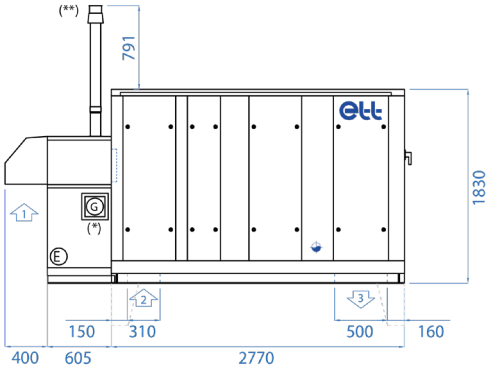
(*) Optional gas box, connection to be made by the installer.
(**) Flue connection to be made by the installer.

Nota: Fresh air cowls shall be installed by the installer.

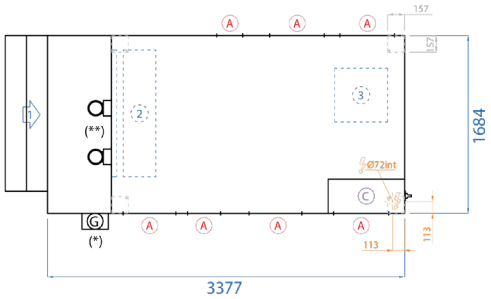
Dimensions and connections

Type 11

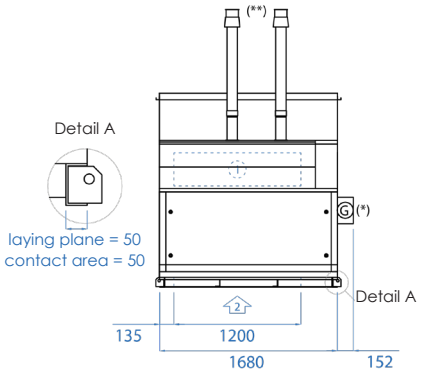
Front view:



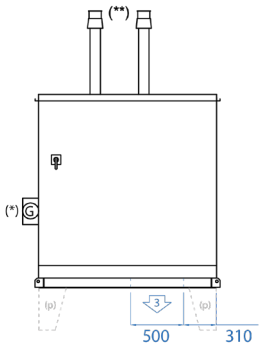
Top view:



Return air side view:



Supply air side view:



① Fresh air
② Return air
③ Supply air
Ⓐ Access
⚡ Power supply
Ⓒ Technical section
Ⓖ Gas supply
Ⓔ Condensates evacuation
Tap in water supply

	Length	Width [1]	Height
Casing dimensions	3.377	1.684	1.830
Transport overall dimensions	3.427	1.754	2.130

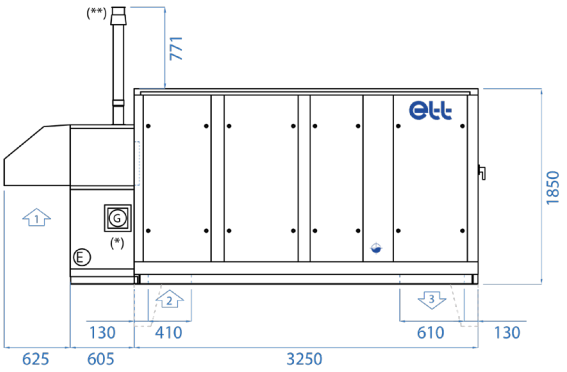
(*) Optional gas box, connection to be made by the installer.
(**) Flue connection to be made by the installer.

Nota: Fresh air cowls shall be installed by the installer.

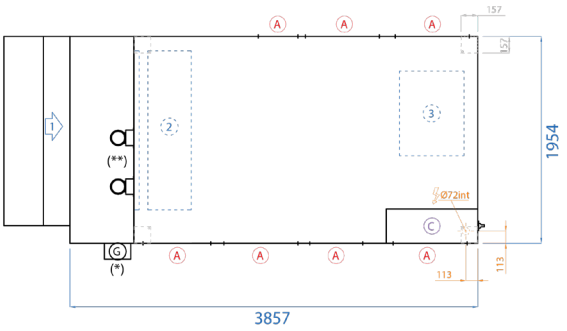
Dimensions and connections

Type 12

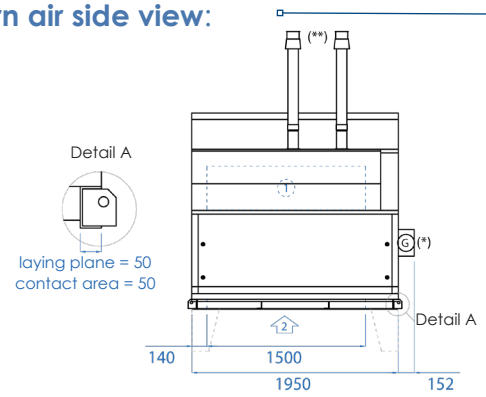
Front view:



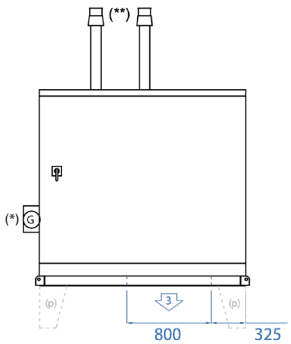
Top view:



Return air side view:



Supply air side view:



① Fresh air
② Return air
③ Supply air
Ⓐ Access
Power supply
Ⓒ Technical section
Ⓖ Gas supply
Ⓔ Condensates evacuation
Tap in water supply

	Length	Width [1]	Height
Casing dimensions	3.857	1.954	1.850
Transport overall dimensions	3.907	2.024	2.150

(*) Optional gas box, connection to be made by the installer.
(**) Flue connection to be made by the installer.

Nota: Fresh air cowls shall be installed by the installer.

Technical features

Type 21 - 22 - 23

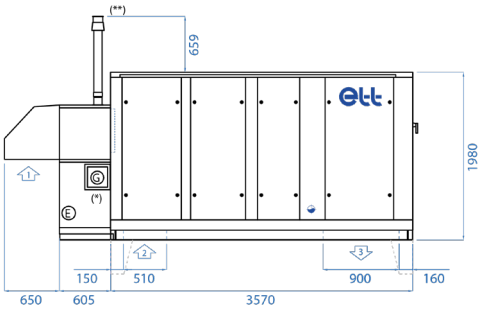
	NAME	Unit	21	22	23
CAPACITIES	Rated air flow rate for 400Pa	**m^3/h**	25,000	40.000	55.000
	Cooling capacity (AFA 35°C/40%)	**kW**	90	144	198
	Adiabatic yield	**%**		94	
	Media surface	**m^2**	2.8	4.4	6.1
	Air speed	**m/s**		2.5	
	Supply air temperature	**°C**	24.4	24.5	24.4
GAS GENERATOR	LHV on capacity	**kW**	189	252	
	Natural gas flow rate(1) G20 (20 mBar) (LHV gas = 10.2 kWh/m^3 (n))	**m^3/h**	20.04	26.72	
	Natural gas flow rate(1) G25 (25 mBar) (LHV gas = 9.3 kWh/m^3 (n))	**m^3/h**	22.11	29.48	
	Natural gas flow rate(1) 2E-G20 (GZ-50) (20 mBar) (LHV gas = 10.2 kWh/m^3 (n))	**m^3/h**	21.72	28.96	
	Natural gas flow rate(1) 2LW-G27 (GZ-41.5) (20 mBar) (LHV gas = 9.3 kWh/m^3 (n))	**m^3/h**	32.16	16.08	
	Propane gas flow rate (1) G31/G30 (37 mbar)	**kg/h**	14.73	19.64	
	Required pressure for the NG burner with gas expansion valve	**mbar**		300	
	Gas connection diameter	**mm**		26 x 34	
	Circulation pump capacity	**W**	260	310	
	Capacity modulation	**%**	26 to 100%	13 to 100%	
ELECTRICAL CONNECTION	Total installed electrical power with 400 Pa (2)	**kW**	11.4	16.1	20.8
	Rated/Starting current with 400 Pa	**A**	20.9/28.2	28.2/39.2	35.5/50.2
GENERAL	Sound pressure at 10 m, reference: $2x10^{-5}$ in free field	**dB(A)**	53	54	54
	Filters efficiency			ISO Coarse 65% (G4) (98 mm)	
	Unit weight	**kg**	1230	1780	2560

(1) Gas temperature: 15°C/Atmospheric pressure: 1013 mbar.
(2) 400V - 50 Hz 3-phase power supply + earth without neutral

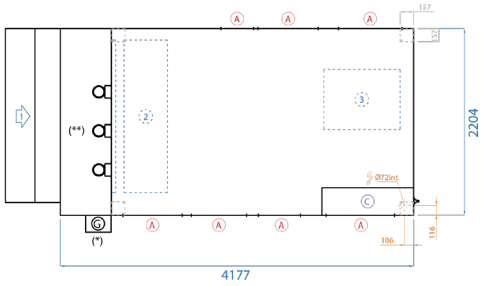
Dimensions and connections

Type 21

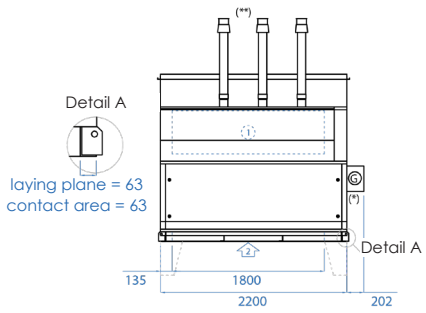
Front view:



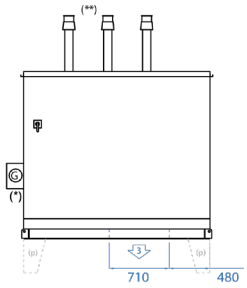
Top view:



Return air side view:



Supply air side view:



	Length	Width (1)	Height
Casing dimensions	4.177	2.204	1.980
Transport overall dimensions	4.227	2.274	2.280

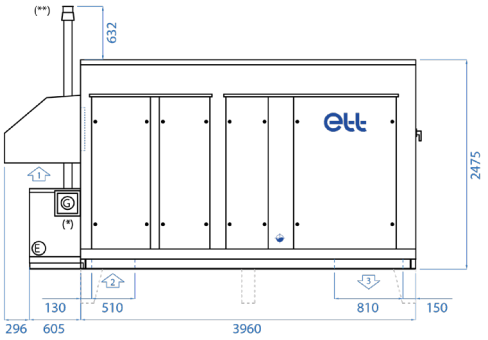
① Fresh air
② Return air
③ Supply air
Ⓐ Access
⚡ Power supply
Ⓒ Technical section
Ⓖ Gas supply
Ⓔ Condensates evacuation
Tap in water supply

(*) Optional gas box, connection to be made by the installer.
(**) Flue connection to be made by the installer.

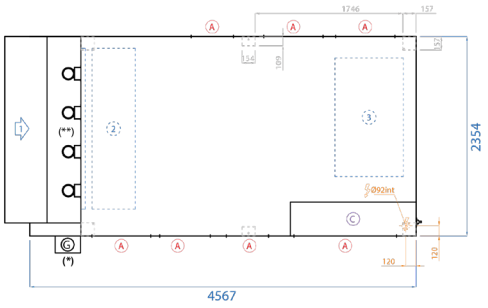
Nota: Fresh air cowls shall be installed by the installer.

Dimensions and connections

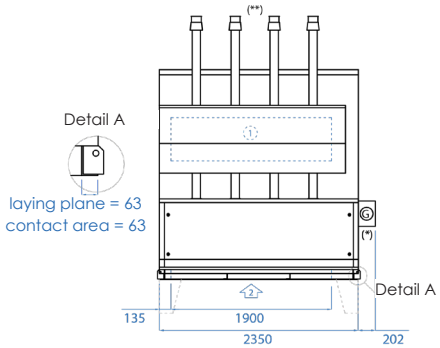
Front view:



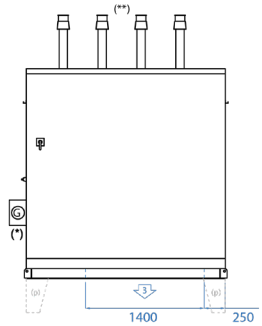
Top view:



Return air side view:



Supply air side view:



① Fresh air
② Return air
③ Supply air
Ⓐ Access
Power supply
Ⓒ Technical section
Ⓖ Gas supply
Ⓔ Condensates evacuation
Tap in water supply

	Length	Width (1)	Height
Casing dimensions	4.567	2.354	2.475
Transport overall dimensions	4.617	2.424	2.675

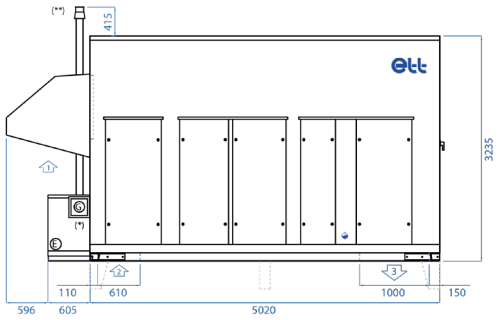
(*) Optional gas box, connection to be made by the installer.
(**) Flue connection to be made by the installer.

Nota: Fresh air cowls shall be installed by the installer.

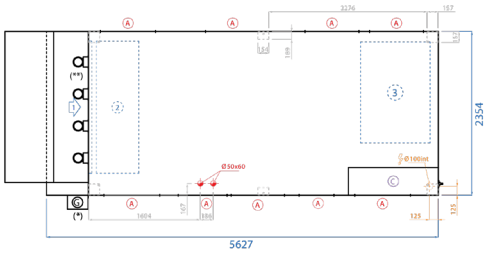
Dimensions and connections

Type 23

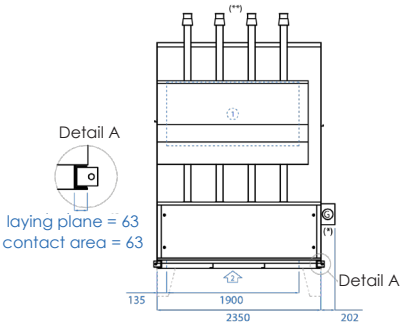
Front view:



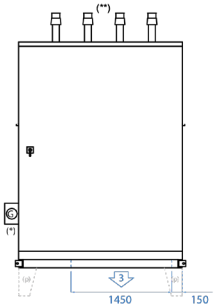
Top view:



Return air side view:



Supply air side view:



① Fresh air
② Return air
③ Supply air
Ⓐ Access
⚡ Power supply
Ⓒ Technical section
Ⓖ Gas supply
Ⓔ Condensates evacuation
Tap in water supply

	Length	Width (1)	Height
Casing dimensions	5.627	2.354	3.235
Transport overall dimensions	5.677	2.424	3.435

(*) Optional gas box, connection to be made by the installer.
(**) Flue connection to be made by the installer.

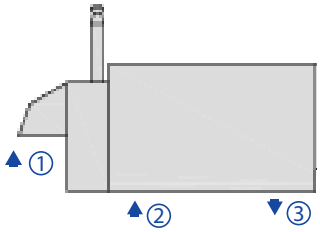
Nota: Fresh air cowls shall be installed by the installer.

Arrangements

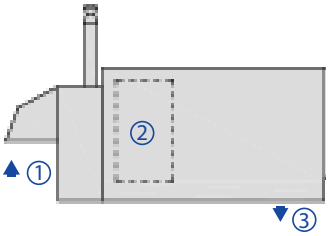
Supply air downwards

Installation on roof curb or customer frame on roof.

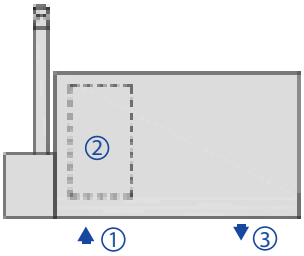
Arrangement 1.1



Arrangement 1.8



Arrangement 1.10

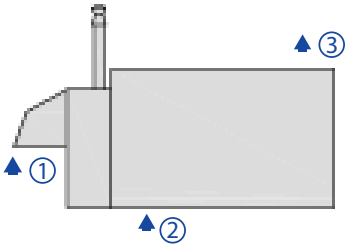


Supply air upwards

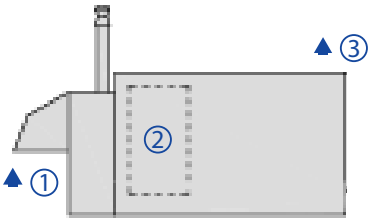
Installation on feet (400 mm minimum) or customer frame Feet are optional.

A supply air damper is necessary for units over 10000 m³/h in PAB.

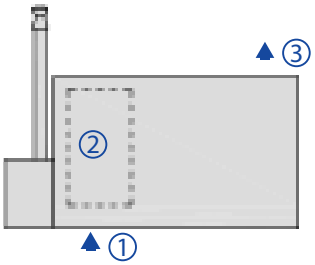
Arrangement 2.1



Arrangement 2.8



Arrangement 2.10



① Fresh air ② Return air ③ Supply air

Installation accessories: Roof curbs

DESCRIPTION

The roof curb provides the interface between the roof and the rooftop. Its design makes it easy to mount on roofs and simplifies installation of the machine.

Standard curb on header:

Adjustable connecting curb:

- Complies with French standard NF P 84-206-1 (installation of corrugated steel sheet roofs with a waterproofing coating) and fire regulations for Public Access Buildings (French Order of 14 February 2000).
- A one-piece aluminium curb that is significantly lighter than a galvanised steel curb.
- Adjustable L-sections to compensate for the slope of the roof. Other slope percentages are available on request (option). In this case, specify the percentage and direction of the slope when carrying out the work.
- Skirtboard for up to 100 mm of insulation according to French RT 2005 specifications.
- The curbs are designed for a maximum height of 145 mm for the steel tray and 200 mm for the insulation (i.e. maximum height H = 345 mm).
- Lifting lugs for easy positioning when craning.
- Inside side insulation in Stopflam 20 mm, to limit the risk of condensation.

Adjustable ventilated curb

In addition to the 7 points listed for the "connection adjustment":

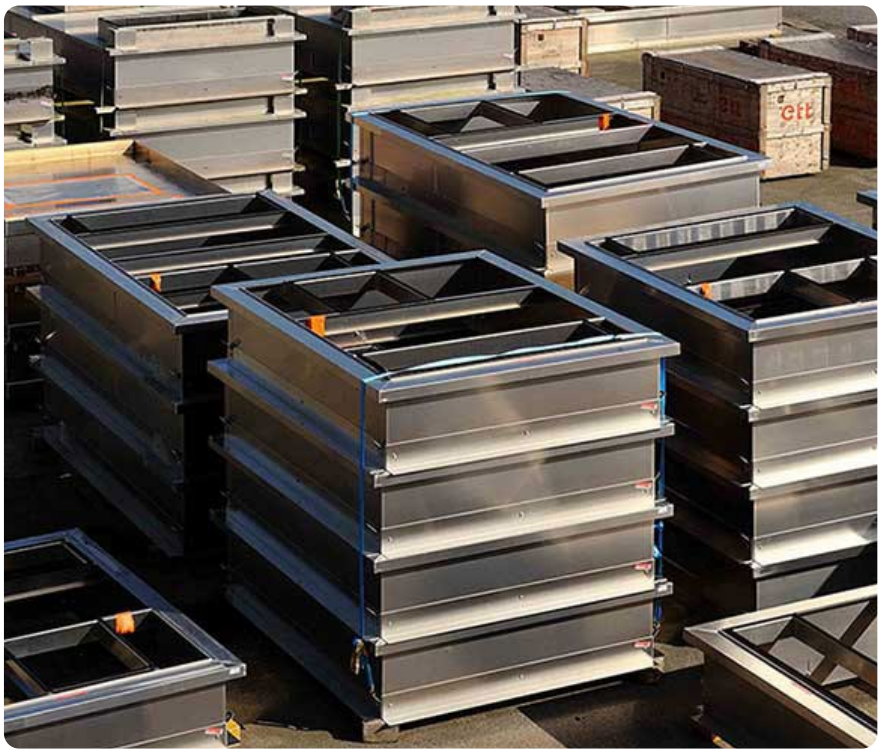
- Ventilated air gap of 200 mm. The machine is bolted on 4 (or 6) legs, with foam gasket sealing applied to the frames of the supply and return air ducts.
- The air gap also provides acoustic insulation, significantly reducing the noise radiated from the underside of the machine.
- The outlets of the supply and return ducts and the roof of the ventilated curb are insulated with 25 mm thick glass wool with protective fleece. The insulation is welded to the sheet using aluminium clips, providing a better hold than glued solutions. Insulation limits heat loss and prevents condensation on the underside.
- Sleeves for routing power supply cable and hot water coil pipes through the underside of the machine.

Adaptation curb:

on existing header

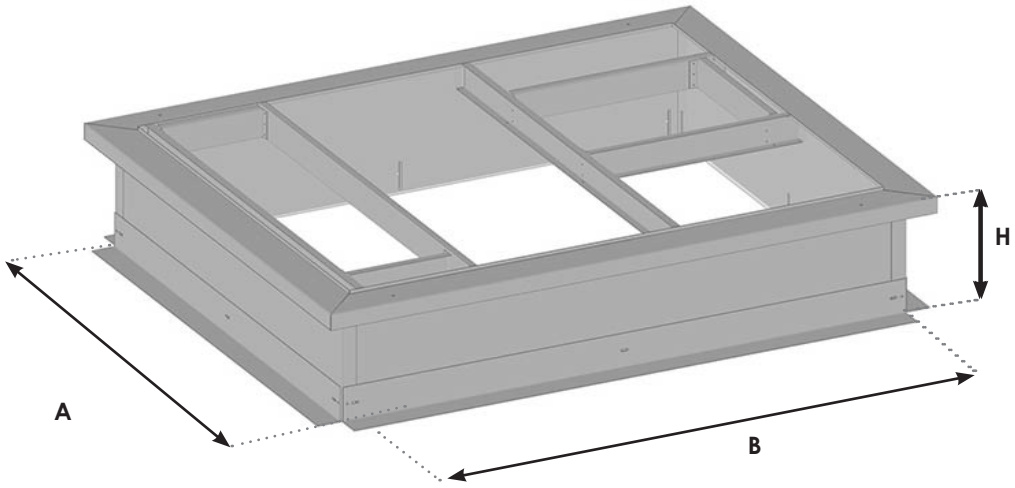
Or existing roof curb

- Custom-made curb to fit all types of existing curbs or headers according to dimensions supplied by the installer (see our special clauses for this type of equipment).
- Complies with French standard NF P 84-206-1 (installation of corrugated steel sheet roofs with a waterproofing coating) and fire regulations for Public Access Buildings (French Order of 14 February 2000).
- A one-piece aluminium curb that is significantly lighter than a galvanised steel curb.
- Possible compensation for the slope of the roof. To be checked with the Engineering and Design office.
- Inside isolation.



Installation accessories: Roof curbs

ADJUSTABLE CONNECTING ROOF CURB

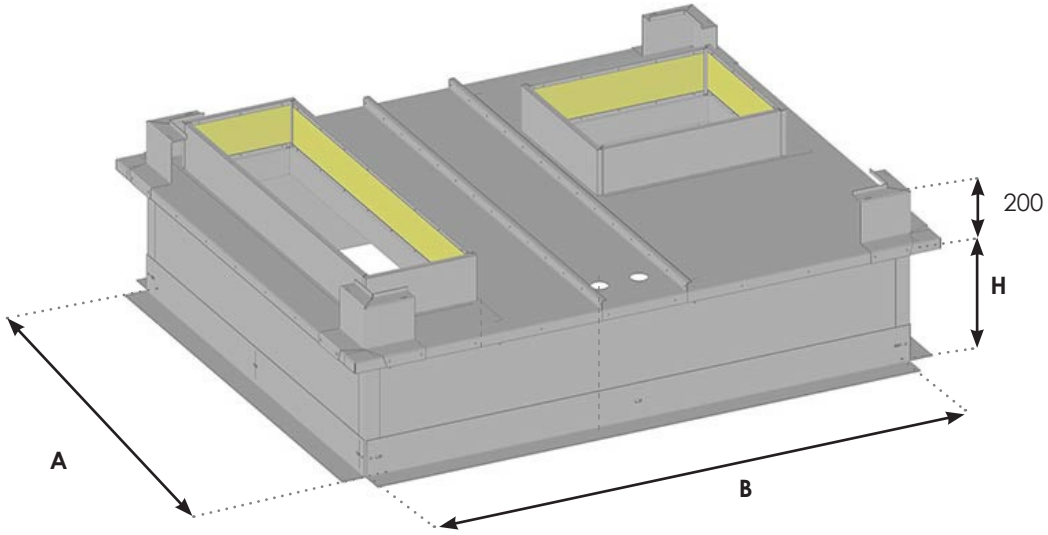


ATTENTION : With this type of roof curb installation, the installer is responsible for the ten-year roofing guarantee.
If the value of the slope is greater than that in the table below, you must send us (see MARK-NOT_55-EN_ Measurement_ Form):

- the value of the slope of your roof in %,
- the direction of the slope
- the orientation of the machine in relation to the slope of the building
- the thickness of the waterproofing complex (insulation + steel deck + membrane)

The roof curbs must be counter-drilled after assembly. **The machine must be bolted to the roof curb**. Putty must be applied to the underside of the machine frame.

VENTILATED ADJUSTABLE ROOF CURB



ATTENTION : With this type of roof curb installation, the installer is responsible for the ten-year roofing guarantee.
If the value of the slope is greater than that in the table below, you must send us (see MARK-NOT_55-EN_ Measurement_ Form):

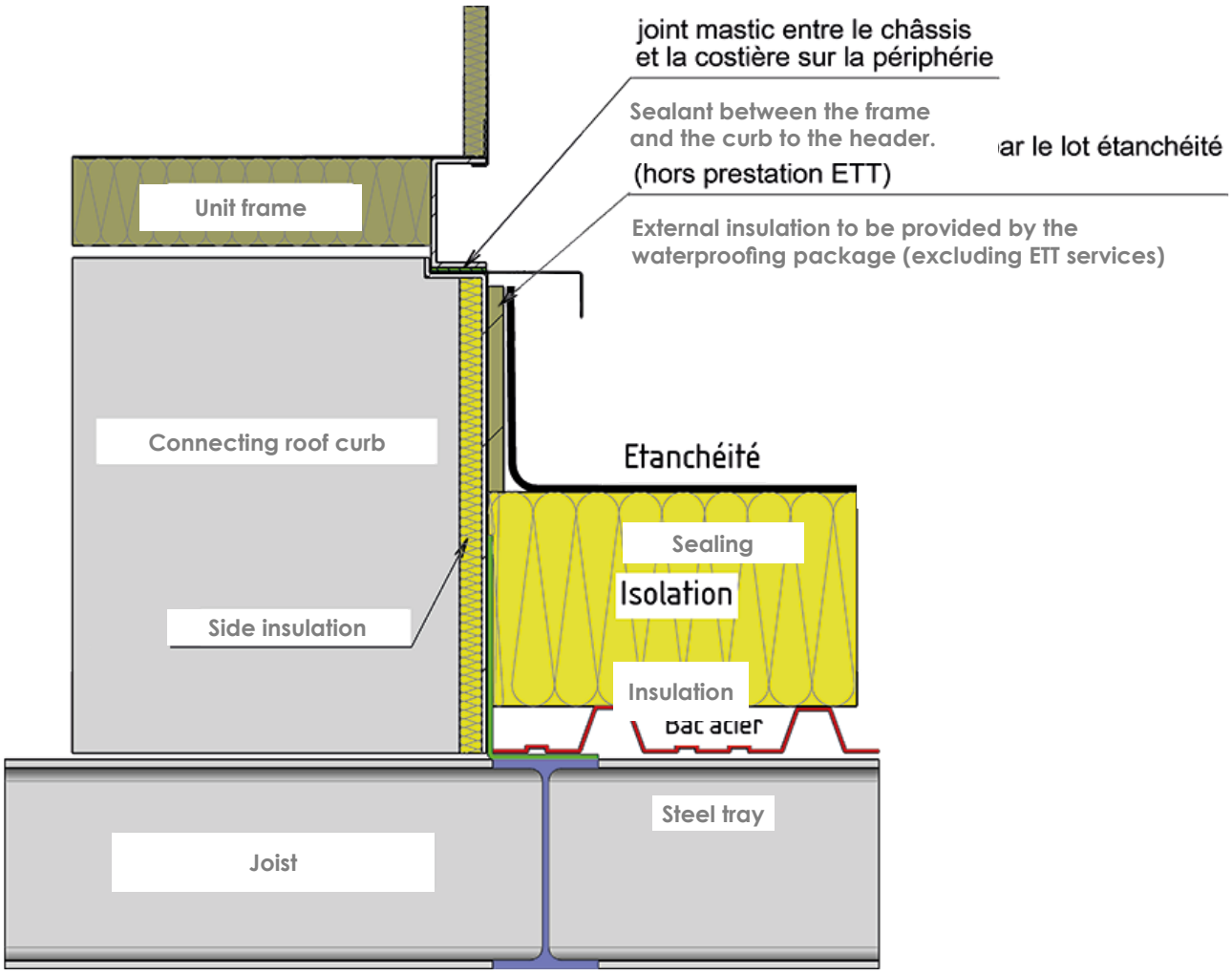
- the value of the slope of your roof in %,
- the direction of the slope
- the orientation of the machine in relation to the slope of the building
- the thickness of the waterproofing complex (insulation + steel deck + membrane)

The roof curbs must be counter-drilled after assembly. **The machine must be bolted to the roof curb.**

Installation accessories : Roof curbs & feet

HOW TO INSTALL ROOF CURBS

The diagram below is a schematic diagram,, se conforming to French standard DTU 43.1 (Sealing of flat roofs and pitched roofs with load-bearing masonry elements in lowland climates):



Note: The curbs are designed for a maximum total height of 345 mm of steel tray and insulation.
To maintain a standard curb height (refer to the curb drawing), you need to check that, depending on the slope of the roof on site, the 'insulation and steel tray' height dimension leaves sufficient insulation height in accordance with French standard DTU 43.1.

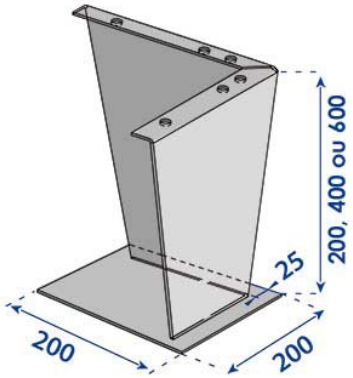
An optional blanking plate can be supplied to protect the building from the bad weather between the installation of the curb and the unit.

Installation accessories : Roof curbs & feet

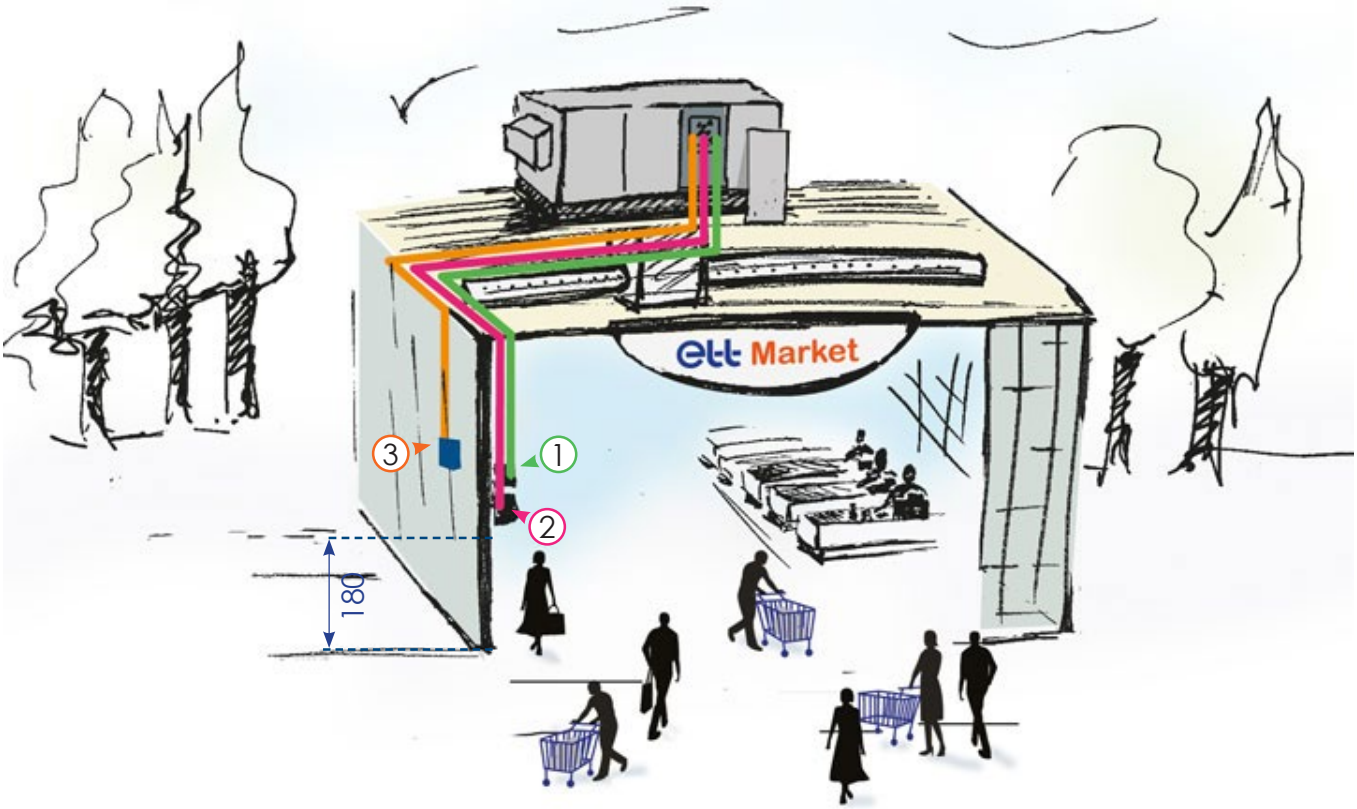
Feet

AG3 fixed foot
Unit weight: 1 kg

No. of feet	4



Sensors connection principle



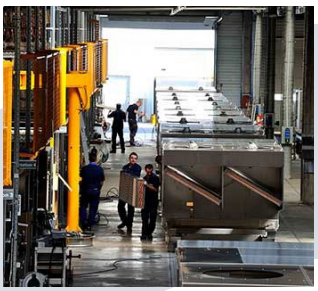
- 1 **Room sensor:** 1 pair shielded cable, 2 x 0,75 mm² LIY-CY (max. length 100ml)
- 2 **CO_2 sensor:** 2 shielded pairs wire, 3 x 0.75 mm²LIY-CY (max. length 100ml)
- 3 **Humidity sensor:** Shielded 2-pair cable, 5 x 0,75 mm² LIY-CY (max. length 100ml) *(optional)*

Nota: Please note that the value indicated can vary depending on probe location. For more representative results, do not install them:

> Close to heat sources (spotlight, cooking appliances, glass wall, flues)
> In draft zones (close to entrance, stockrooms, openings)
> In dead zones (behind shelves, in a corner)
> Close to crowded areas (checkout, fitting rooms)

For accurate measurements:

> Do not install the probes in the axis of the duct used for their wiring.
> Do not install control cables and power cables in the same duct (risk of electromagnetic interference).



Reference: MARK-BRO_42-EN_F

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