APU OFF SOLUTIONS

Guinault
AIRCRAFT GROUND ENERGY

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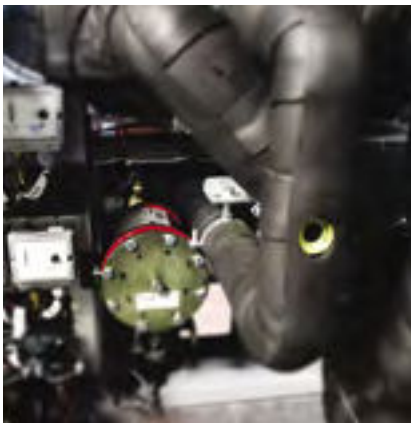


COMPANY

PRESENTATION

COMPANY FOUNDED AT THE START OF THE GREAT CIVIL AVIATION HISTORY

Today, GUINAULT employs more than 150 people, in France near Orléans.

Guinault machines are deployed on five continents in 125 countries, including the U.S.A, the United Arab Emirates, Germany, Singapore, Brazil, Japan, etc.

More than a manufacturer of equipment, GUINAULT ensures through its proposed solutions that aircraft engines (and auxiliary engines such as APU) are no longer used on the ground, significantly reducing the environmental impact and operating costs of the airlines.

HISTORY

GUINAULT has been supplying the European aeronautics industry for more than 70 years.

Maurice GUINAULT founded the company GUINAULT in 1949. The generators of the time mainly supplied continuous electric current at 28 volts to airplanes.

In the early 1970s, GUINAULT manufactured the first 400 Hz ground power unit produced in France for the Boeing 707, which was a novelty on French soil. In the early 1990s GUINAULT manufactured the first multi-voltage GPU, based on multi-coil alternators.

Customers included Dassault (Mirage aircraft), Aerospatiale (now EADS) and Sud Aviation (now Eurocopter).

In 2000, GUINAULT designed the variable speed electronically controlled pneumatic starting unit (ASU), while the first 400 Hz static converter was designed and produced in 2001.

In 2010, GUINAULT jointly designed a unique, ultra-compact and electronically controlled air conditioning unit for military applications, as well as a complete range of air conditioning units for commercial aircraft.

Maurice Guinault

CULTURE

RECRUITMENT / ENVIRONMENT

GUINAULT has been continuously growing for 12 years and is regularly recruiting to ensure its continued development . The technical jobs carried out at GUINAULT are performed by electronic, electrical, industrial refrigeration and mechanical engineers, senior technicians in the same disciplines, test technicians and developers. The Procurement, Industrialisation and Supplies and Manufacturing Logistics (electrical cables, electromechanics) Departments ensure the quality of our products.Technological expertise and manufacturing quality are the founding values of our company culture of technical innovation and commercial development.

Our sales engineers ensure the growth of our sales in more than 125 countries, by managing a network of international trading partners. Last but not least, our after-sales service provides technical support to all 5 continents. We strongly believe in a variety of backgrounds, and in developing skills through work and training. With an average age of 37, GUINAULT is a young company yet still very experienced. We believe in human talent, and rely on the loyalty of our teams.

COMPANY

GUINAULT IN NUMBERS

The Group has been pursuing solid, reasonable and uninterrupted growth since 2003, reaching a turnover of 51 million euros in 2017.

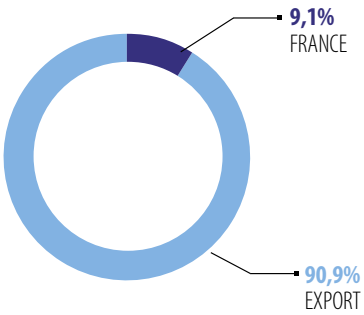
With an average growth of 13% in revenue per year, GUINAULT demonstrates exceptional dynamism in industrial activity. GUINAULT owes its growth to its internal forces, its development being only organic (by increasing activity without acquiring any external company).

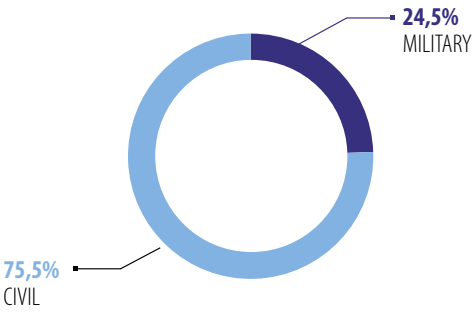
As a family group, the GUINAULT Group is managed in the way a good parent would manage a family. Its financial strategy is to encourage the professional development of its employees and the long-term sustainability of its activities. GUINAULT has been profitable without interruption since 2003, and capitalises the majority of its results to finance its development.

GUINAULT exports to more than 125 countries on 5 continents. 90% of its activity is carried out outside the country of manufacture.

Military activity accounts for one quarter of its activity. This highly technological activity is a source of advanced technical developments, which are, where appropriate, applied to the civilian sectors.

GUINAULT EXPORTATIONS AND ACTIVITY





APU OFF SOLUTIONS

GUINAULT : SUPPLIER OF DECARBONISED ENERGY FOR AIRCRAFT ON THE GROUND

Guinault ensures, above all, to all its customers that they will really be able to stop using APUs, thanks to its **SPECIALISATION** in solutions that allow the replacement of APUs by relying on its unique technical expertise in industrial refrigeration, power electronics and electromagnetism.

Guinault **CUSTOMISES** its commercial offer to ensure the shutdown of the APU, taking into account the type of aircraft, its configuration, the airline's processes and the geographical area, and the data collected by the machines in operation worldwide.

Guinault offers a complete range of **PRODUCTS**, and a commercial offer adapted to the purpose. You can buy the equipment, or just pay for its use.

More than a GSE supplier, Guinault is a supplier of **DECARBONISED ENERGY** at the foot of the aircraft, through an innovative offer of products and services :

- APU-OFF service offers charged for each hour of APU shutdown, and thus naturally financed by fuel savings
- Product offer based on a study of the specific needs of the airline or its subcontractor, the environment of use, the operational, budgetary and ecological requirements.

Zero emission solution offer (grid-connected electric, autonomous battery electric, self-powered hydrogen electric), defined on the basis of operating data and use-case

GUINAULT, an expert partner in the decarbonisation of energy on the ground

APU OFF SAVINGS

A major step towards the decarbonisation of the aerospace sector, generating substantial savings

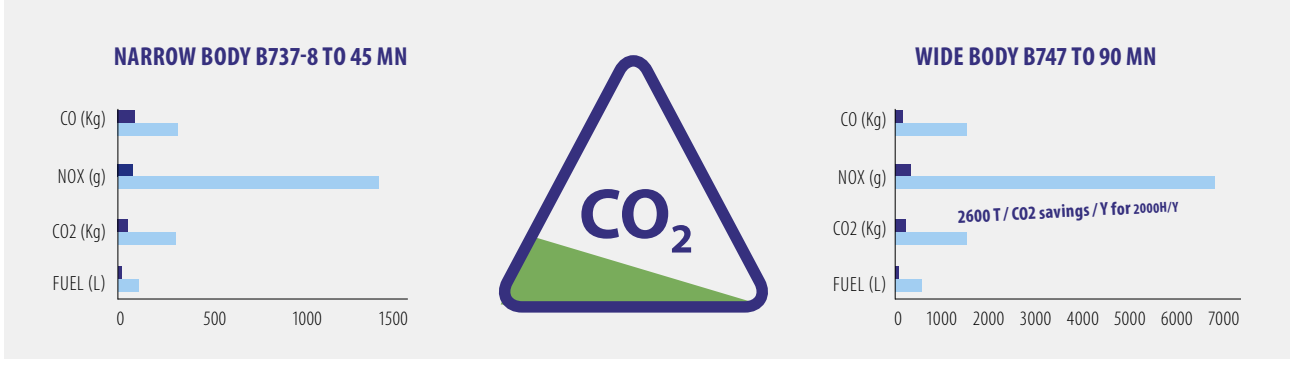
GUINAULT solutions to guarantee APU OFF allow fuel savings between **€150 000 and €600 000** per year and per aircraft, a reduction in carbon footprint between **350 T and 1000 T of CO2** per year and per aircraft, reduced noise and increased security on the airport.

APU OFF : A SOURCE OF SAVINGS IN A HIGHLY COMPETITIVE MARKET

There are substantial savings opportunities when the aircraft is on the ground at the airport, as the aircraft APU is very often on. The APU is an auxiliary turbine that supplies the aircraft on the ground with electrical, pneumatic and climatic energy. The costs of fuel consumption and maintenance of the APU are very high, compared to the costs of using ground support equipment (electric or diesel powered).

The commercial aviation market has become very competitive. Airlines are looking for cost reductions and new sources of income. They usually focus their savings on one key item: fuel costs. A number of studies have already allowed them to reduce their fuel consumption in flight by optimising approach paths and speed or by using the latest generation of aircraft equipped with fuel-efficient engines : In-flight fuel savings are now achieved, with a limited scope for improvement.

The APU OFF, that is to say the total shutdown of the APU when the aircraft is on the ground, makes it possible to exploit a new source of savings.



HUGE SAVINGS FOR THE AIRLINE

SO WHY APU OFF ISN'T A GIVEN?

It is generally assumed that the equipment provided by mainstream manufacturers does not allow a real substitution to the APU due to lack of performance or reliability, forcing the pilot to start the APU to ensure passenger comfort while the aircraft is parked.

Historically considered as "basic" logistics equipment by market players, the direct cost of acquiring the machine is often the essential element in the purchasing decision, without taking into account the energy, ecological and economic issues at the aircraft level.

The start-up of the APU does not require the ground support equipment to be shut down: the ground equipment operates without powering the aircraft, consuming energy and costing money while the APU provides the aircraft with all necessary electrical and climatic energy.

This observation (APU ON and ground support equipment simultaneously connected to the aircraft) can be made in many airports.

CASH CAPACITY TO INVEST IN THE RIGHT EQUIPMENT

PILOT AUTHORITY (SAFETY)

UNRELIABLE/ UNSUFFICIENT PACKAGE OF GROUND EQUIPMENT
(all kind of aircraft in all condition)

APU OFF SOLUTIONS

Plug and save

MOBILE

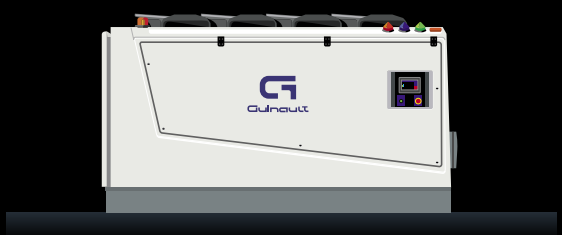
ACU

Air Conditionning Unit

COMBO

Air Conditionning Unit
+ Ground Power Unit

FIXED

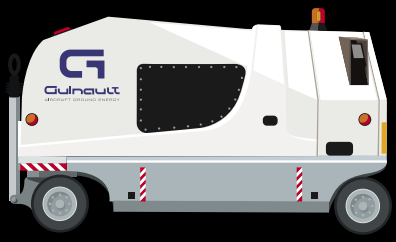


ASU

Air Start Unit

GPU

Ground Power Unit



GPU

ACU

GPU

Ground Power Unit

GUINAULT continues to claim the LOWEST TCO GPU (Total Cost of Ownership) based on :

- the use of the most efficient engine rpm on the market 1714 rpm, being the best compromise between performance / response time / fuel consumption
- the high efficiency GUINAULT Alternator manufactured in FRANCE (optimized for low load operation representing 70 % of the operating time of GPU)
- and the advanced home-made Electronic Control System resisting against sandy/dusty wind, humid and corrosive atmosphere

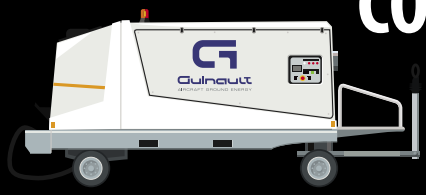
Designing the electronics and alternator internally offers great advantages in terms of obsolescence management, and compatibility with the most advanced aircraft. Both 400 Hz power supplies, solid-state Converter and diesel driven GPUs are field proven on both A350 & B787 Aircraft.

ACU

Air Conditioning Unit

The GUINAULT Air Conditioning Unit has created a major change into the GSE market in bringing the capability to effectively substitute to the onboard APU of the largest existing aircraft's in the most difficult climatic conditions. This unique possibility to offer a real on-ground APU substitute has been identified by more and more Airlines as a key cost saving alternative while offering Airports a quiet solution to reduce NOx and CO^2 emissions.

When for Wide Body aircraft's the critical challenge has always been to deliver the necessary capacity to properly cool the aircraft cabin, the key requirement for Narrow body operations has been the implementation of a very efficient APU substitute. The similar and unique refrigeration technology has been used to design both alternatives, each one being adapted to the Airlines operational environment in order to offer a unique APU OFF solution.



COMBO

ASU

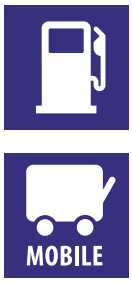
GPU + ACU

Combo Unit

The GUINAULT combination Unit (AC & 400 Hz) has been designed to substitute to the aircraft APU using one single equipment, maintaining the suitable temperature in the cabin while providing the required electrical power during pre-flight operations, boarding and maintenance. These Units present numerous advantages, integrating our unique refrigeration technology coupled with our deep expertise in power electronics and 400 Hz power supply, proposing to the Airlines one single equipment alternative to APU usage on the ground for commuter, regional and narrow body aircraft in continental, tropical or desert climates.

ASU

Air Start Unit



Our range of ASU from 180 ppm to 400 ppm includes GUINAULT Exclusive electronic regulation, based on variable speed (rpm) drive. This unique device ensures a higher lifetime of the components, as well as significant reduction of the fuel consumption, ie the lowest TCO. This technology makes it possible to adjust the pressure if necessary, limit the flow, or add any control function that would be required in the future. GUINAULT ensures the obsolescence management by offering in house and flexible technology, which can easily be adapted to future requirements.

APU OFF

AIRCRAFT GROUND POWER UNIT

BATTERY GPU, DIESEL GPU AND FREQUENCY CONVERTER

WHILST ON THE GROUND, AN AIRCRAFT REQUIRES SPECIAL ELECTRICAL POWER: 400 Hz OR 28 Vdc.

THE USE OF A GROUND POWER UNIT (GPU) INSTEAD OF EITHER AN AIRCRAFT ENGINE OR AUXILIAIRY POWER UNIT ENSURES VERY SIGNIFICANT SAVINGS IN TERMS OF FUEL CONSUMPTION AND MAINTENANCE.

Guinault
AIRCRAFT GROUND ENERGY

MOBILE 400 Hz BATTERY GROUND POWER UNIT FOR AIRCRAFT UP TO 90 KVA

MOBILE APU OFF

E GA

The GUINAULT BATTERY Ground Power Unit ensures the supply of electrical power to aircraft up to code C (A320/B737) in the most extreme environments. The GUINAULT battery GPU is based on the GUINAULT ultra-sturdy diesel GPU technology, GUINAULT solid-state converter, and third party lithium ion high capacity battery. This ultra-sturdy design is fully protected against corrosion and is engineered to withstand harsh conditions in airport environments. The modular design enables the integration of numerous options within a universal standard. The logical commonality of elements assists in the functional understanding of the machine, and contributes to the quality of maintenance. The machine can receive different types of batteries, with capacity from 55 to 165 kWh.

The Battery GPU is one of the solutions Guinault offers to substitute to the APU : Diesel driven, Gasoline Driven, Electrical, Hybrid. GUINAULT believes the right APU substitution solution varies from one place to the other, and depends on aircraft fleet, ground operation, infrastructure.

GUINAULT APPROACH IS TO MAKE THE APU SUBSTITUTION HAPPEN, WHATEVER THE RIGHT TECHNOLOGY SHOULD BE.

GENERATING VALUE

- Limit emissions of pollutants associated with the APU
- Greatly reduce the ground-level noise
- Generate new revenue for airports by offering airline companies a value-added
- Achieve significant cost reductions in jet-fuel for airlines
- Greatly reduce the maintenance costs of the APU

ADVANTAGES

- Performance and efficiency under extreme conditions (- 40 / + 50°C)
- Sturdiness and reliability
- Maintenance access, modular construction service
- Ease of use
- Versatility
- Low Total Cost of Ownership

Specifications

		EGA90-55	EGA90-110	EGA90-165	EGA180-165
• **BATTERIES TYPE**		LFP batteries (Lithium ion Phosphate (LiFe P04)			
• **BATTERIES CAPACITY NMC BATTERIES EQUIVALENT CAPACITY (80% DOD)**		55 kWh Eq. to 68 kWh NMC	110 kWh Eq. to 137 kWh NMC	165 kWh Eq. to 206 kWh NMC	165 kWh Eq. to 206 kWh NMC
• **115/200 V - 400 HZ OUTPUT**	Nominal power	**90 kVA**			**180 kVA**
	Number of outputs	1 (2 as option)			2
• **28 VDC OUTPUT** *(option)*	Continuous and peak current Number of outputs	800 A permanent, 2 400 A peak (with limiting device at 1 275 A for ATR) 1			
• **WEIGHTS**	Weight (Kg)	2800 kg	3450 kg	4100 kg	4300 kg
• **AND DIMENSIONS**	L x W x H (mm)	3460 x 2130 x 1680			
• **CONVERTER**	Manufacturer Technology Voltage Frequency Total Harmonics Distortion Transient performance	GUINAULT - manufactured in France High frequency IGBT commutation 115/200 V ±0,5% 400 Hz ± 0.5% < 3% MIL-STD-704F / EN2282 standards / SAE ARP 5015 compliant			

SAFETY FEATURES

Battery
- Low temperature
- High temperature
- BMS faults
- Battery charge failure

Generation 115 V/400 Hz
- Over-voltage
- Under-voltage
- Over-frequency
- Under-frequency
- Overload

Generation 28 Vdc
- Over-voltage
- Under-voltage
- Overload

ASSEMBLY

- Metallic canopy with easy access for maintenance
- Hot dip galvanized frame provides excellent protection against corrosion
- Lateral side cable trays
- Leading front axle with ball bearings

OPTIONS

- 28 Vdc Output: Permanent 800 A, 2400 A peak (with limiting device at 1275 A for ATR)
- GPU to be mounted on a truck or Push-Back tractor
- Extreme cold kit for operation below -25°C
- Anti-towing safety: a sensor detects the movement of the trailer and triggers an audible and visible alarm if all aircraft outlets are not correctly stored to prevent damage to the aircraft socket
- Cable roller for easy cable handling
- Battery heating
- Battery cooling for extreme weather conditions
- On board charger 400V/50 Hz - 480V/60Hz - 200 V/400 Hz

Data are subject to modification without prior notice.

Guinault
AIRCRAFT GROUND ENERGY

MOBILE 400 Hz GROUND POWER UNIT DIESEL/GASOLINE FOR AIRCRAFT FROM 90 TO 180 KVA

MOBILE APU OFF

GA 90-180

The GUINAULT Ground Power Unit ensures the supply of electrical power to both civil and military aircraft, of all types in the most extreme environments. Their ultra-sturdy design is fully protected against corrosion and is engineered to withstand harsh conditions in airport environments. The modular design enables the integration of numerous options within a universal standard. The logical commonality of elements assists in the functional understanding of the machine, and contributes to the quality of maintenance.

GENERATING VALUE

- Limit emissions of pollutants associated with the APU
- Greatly reduce the ground-level noise
- Generate new revenue for airports by offering airline companies a value-added service
- Achieve significant cost reductions in jet-fuel for airlines
- Greatly reduce the maintenance costs of the APU

ADVANTAGES

- Performance and efficiency under extreme conditions (- 40 / + 50°C)
- Sturdiness and reliability
- Maintenance access, modular construction
- Ease of use
- Versatility
- Low Total Cost of Ownership

Specifications

		GA90	GA140	GA180
• **ENGINES STAGE 3A**	DEUTZ CUMMINS	TCD2013L04-2V QSB 4.5	TCD2013L06-2V QSB 6.7	TCD2013L06-4V QSL 9
• **STAGE 5/TIER 4F**	DEUTZ CUMMINS FORD	TCD 4.1 QSB 4.5 RSG 862	TCD 6.1 QSB 6.7	TCD 7.8 QSB 6.7
• **115/200 V - 400 HZ OUTPUT**	Nominal power Overloads Number of outputs	**90 kVA** 100 kVA -10min 112 kVA - 5min 1 (2 as option)	**140 kVA** 155 kVA - 10min 175 kVA - 5min 2	**180 kVA** 200 kVA - 10min 225 kVA - 5min 2
• **28 VDC OUTPUT** *(option)*	Continuous and peak current Number of outputs	800 A permanent, 2 400 A peak (with limiting device at 1 275 A for ATR) 1 or 2 - Ability to simultaneously use 115 V / 400 Hz and 28 Vdc outputs		
• **DIMENSIONS**	L x W x H (mm)	3300 x 1880 x 1790 3550 x 2000 x 1700 (GA140-180 Stage 5, TIER 4F)		
• **AND WEIGHTS**	Weight (Kg)	2200 kg	2500 kg	2700 kg
• **ENGINE**	Type Fuel	Turbo Diesel - Liquid cooling Diesel EN590		
• **ALTERNATOR**	Manufacturer Number of Poles Type Voltage Frequency Voltage Regulator Total Harmonics Distortion Transient performance	GUINAULT - manufactured in France 22 poles (28 poles for version at 1 714 rpm) Brushless - single bearing - self-excited - with integrated fan 115/200 V ±1% 400 Hz ± 0.5% GUINAULT RS525 electronic regulator < 3% MIL-STD-704F / EN2282 standards / SAE ARP 5015 compliant		

SAFETY FEATURES

Engine
- Low oil pressure
- High temperature
- Clogged Air filter
- Battery charge failure
- Overspeed

Generation 115 V/400 Hz
- Over-voltage
- Under-voltage
- Over-frequency
- Under-frequency
- Overload

Generation 28 Vdc
- Over-voltage
- Under-voltage
- Overload

ASSEMBLY

- Polyester tip-over hooding with easy access for maintenance
- Hot dip galvanized frame provides excellent protection against corrosion
- 260 liters fuel tank (8 to 20 hours autonomy)
- Lateral side cable trays
- Batteries: 2 x 12 V - 125 Ah
- Braking when draw-bar is raised or lowered
- Tyres 600 x 9
- Leading front axle with ball bearings

OPTIONS

- 28 Vdc Output: Permanent 800 A, 2400 A peak (with limiting device at 1275 A for ATR)
- GPU mounted on a truck or Push-Back tractor
- Extreme cold kit for start-up at low temperatures (< -25°C) including engine preheating (50 / 60 Hz heater)
- Double electrical insulation (4000 V)
- Anti-towing safety: a sensor detects the movement of the trailer and triggers an audible and visible alarm if all aircraft outlets are not correctly stored to prevent damage to the aircraft socket
- Operation at low engine speed = 1714 rpm: 28-pole GUINAULT alternator (instead of 22-pole standard for 2182 rpm)
- Automatic idling for further fuel savings
- Cable roller for easy cable handling
- 56 Vdc Output, 37 VAC, 115 V single phase for Russian aircraft
- Stage 3/4/5 engine - Tier 3 / FT4 engine

Data are subject to modification without prior notice.

Guinault
AIRCRAFT GROUND ENERGY

COMPACT MOBILE 400 Hz GROUND POWER UNIT DIESEL/GASOLINE FOR AIRCRAFT FROM 90 TO 180 KVA

MOBILE APU OFF

GA, GB 45 / GC 20

Specially designed at conception for military use, the GUINAULT GA45, GB45/20 and GC20 Ground Power Units are the perfect solution for providing 400 Hz or 28 Vdc electrical power for regional aircraft.

Their compactness is unrivalled in the market (being only 1.1 m high), which significantly reduces the risk of accidents on the tarmac.

The strong performance of the dual voltage GUINAULT alternator makes it possible to use an oil cooled DEUTZ COMPACT engine, without water cooling. Maintenance and fuel consumption are reduced. The 9-phase GUINAULT alternator provides a high quality direct current (18 pulses).

A Low-Cost market-leading airline (being highly cost sensitive) selected the GUINAULT compact generator based on a comparative analysis of existing products available on the market.

The choice of the GUINAULT product was made, based upon the following criteria:

- Low maintenance cost
- The lowest fuel consumption
- Ease of manoeuvre of the GPUs (1200 kg / 2060 x 1430 x 1 120 mm)

Specifications

		GA45	GB45/20	GC20
• **AC OUTPUT** *(for GA/GB only)*	Power Power Factor Voltage Frequency	**45 kVA** 0.8 115/ 200 VAC (3 phase + N) 400 Hz	**45 kVA** 0.8 115 / 200 VAC (3 phase + N) 400 Hz	- - - -
• **DC OUTPUT** *(for GB/GC only)*	Voltage Permanent current Peak current Peak voltage	- - -	28.5 Vdc 714 A 2000 A (during 3S) As per MIL - STD - 704 F	28.5 Vdc 714 A 2000 A (during 3S) As per MIL - STD - 704 F
• **ENGINE**	Brand/Type Cooling Acceptable fuel Emissions	Deutz TD2011L04i Oil cooled (integrated cooler) Diesel and jet fuel STAGE 3A		
• **ALTERNATOR**	Model Number of Poles Voltage Regulation Voltage Regulator Transient Voltage Frequency Regulation Transient Frequency 28 Vdc rectifying	GUINAULT AB180 18 poles ± 1% Electronic ± 3V < 200 ms, charged ± 1 Hz ± 15 Hz < 2s, charged	GUINAULT AB180 18 poles ± 1% Electronic ± 3V < 200 ms, charged ± 1 Hz ± 15 Hz < 2s, charged 18 pulses	GUINAULT AB180 18 poles ± 1% Electronic - - - 18 pulses
• **BATTERIES**		2 x 12 V - 50 Ah total in 24 Vdc		
• **OUTPUT**		1 AC output 115 V-400 Hz	1 AC output 115 V-400 Hz, 1 DC output 28 Vdc	1 DC output 28 Vdc
• **DIMENSIONS AND WEIGHTS**	Weight (Kg) L x W x H (mm)	1100 2060 x 1430 x 1120	1260 2060 x 1430 x 1120	1200 2060 x 1430 x 1120

SAFETY FEATURES

Engine
- Overheat
- Low oil pressure
- Battery charge failure
- Overspeed
- Clogged air filtrer

Generation 115 V / 400 Hz
- Over-voltage
- Under-voltage
- Over-frequency
- Under-frequency
- Overload

Generation 28 Vdc
- Over-voltage
- Undervoltage
- Overload

ASSEMBLY

- Braking when tow-bar is raised or lowered
- Polyester tip-over hooding with easy access for maintenance, corrosion resistant hot dip galvanized chassis
- Lateral side cable trays
- Front axle with turnable steering
- 85 litres Fuel Tank

OPTIONS

- Anti-towing alarm
- Extrem cold kit for start-up at low temperatures

Guinault
AIRCRAFT GROUND ENERGY

HYBRID 400 Hz & 28 Vdc GROUND POWER UNIT FOR CIVIL, MILITARY HELICOPTER AND BUSINESS AVIATION

MOBILE APU OFF

GB3/5

Specifically designed for starting and maintaining helicopters, the GUINAULT HYBRID generator is a powerhouse at very low cost: the charged batteries add their capacity to the diesel motor-generator in order to ensure the peak currents necessary for aircraft start-up. The dual voltage alternator allows to simultaneously provide:

- an alternating current (AC) of 115 VAC/400 Hz required by the on-board electronics during flight preparation
- a direct voltage of 28 Vdc for helicopter maintenance operations and start-up

As a result of the peak 28 Vdc direct current capacity, the GB3/5 GUINAULT GPU is adapted for the majority of helicopters.

The GUINAULT hybrid unit is an autonomous, ultra-compact, light, and air portable generator for helicopters, giving, with its diesel-electric hybrid design, very low fuel consumption.

Specifications

		GB3/5
• AC OUTPUT	Power Voltage Frequency	**3 kVA (p.f. 0.8)** 115/200 V (3 phase + N) 400 Hz
• DC OUTPUT	Power Voltage Permanent current Peak current Battery recharge time After 3 start-ups	5 kW 28.5 Vdc 175 A 1300 A/1500 A (option 4 batteries) 7 min
• ENGINE	Brand/Type Cooling type Usable fuel Power	Kohler KD 440 Air Diesel and jet fuel 1 Cylinder, 440 cm^3 - 8.0 kW
• ALTERNATOR	Model Number of Poles Voltage Regulation Voltage Regulator Transient Voltage Frequency Regulation	GUINAULT AB100 brushless 14 poles ± 1.5% ± 0.5 Vdc GUINAULT RS525 Regulator ± 3 V <200 ms, under impact 0-80%, 80% - 0 charged ± 3%
• BATTERIES		2 x 12 V - 50 Ah total in 24 Vdc 4 x 12 V - 100 Ah total in 24 Vdc (option 4 batteries)
• OUTPUT		1 AC output 115 V-400 Hz, length 8 m. + plug ISO461 1 DC output 28 Vdc, length 8 m. + plug ISO461
• DIMENSIONS AND WEIGHTS	Weight (Kg) L x W x H (mm)	240 (160 + 80) 300 (160 + 140) (option 4 batteries) 1700 x 800 x 1010

FEATURES

Engine
- Overheat
- Low oil pressure
- Battery charge failure

Generation 115 V/400 Hz
- Over/Under voltage
- Over/Under frequency
- Overload

Generation 28 Vdc
- Over/Under voltage
- Overload

MAIN COMPONENTS

- Braking when tow-bar is raised or lowered
- Tubular frame with anti-corrosion protection
- Cable compartments above the GPU
- Leading front axle with slewing ring steering
- Fuel Tank 5 litres

Data are subject to modification without prior notice.

Guinault
AIRCRAFT GROUND ENERGY

28 Vdc POWER SUPPLY ADAPTED TO THE NEW GENERATION AIRCRAFT & ROUGH AIR SIDE OPERATION CONDITIONS

MOBILE APU OFF

SC20

Our expertise in power electronics and electromagnetics for 50 years, and cooperation with airlines and aircraft manufacturers, enables us to guarantee you electrical power at 28 Vdc for very reliable, efficient, and measurable aircraft power supply. GUINAULT power supply provides the power supply at the lowest cost for the aircraft of today and tomorrow.

STURDY DESIGN: GUINAULT SC20 is designed with an ultra corrosion resistant galvanized chassis, designed for rough conditions. The cooling airflow is fitted with fine granulation air filters. The SC20 is all weather resistant, for operation indoor and outdoor, from - 30°C to + 55°C.

REDUCED MAINTENANCE: The maintenance is limited to the air filter cleaning or replacement, once a year.

RELIABILITY: The design is based on robust thyristors, air cooled power pack, and IP 55 design ensures the highest reliability.

SIMPLY OPERATION: The operation is limited to pushing an ON-OFF button to get the power at the plug.

MILITARY SPECIFICATION DESIGN: In option, the unit is fitted with reinforced Electromagnetic Compatibility according to MIL-STD-461. The MIL SPEC SC20 is certified according to MIL-STD-461.

POWER OUTPUT: The power quality complies to all applicable, including MIL-STD-704F, SAE ARP 5015, and complies with all aircraft requirement.

Specifications

		SC20 (28 Vdc)
• INPUT	Voltage	400 V 3 Phases + Earth (+/- 10 %)/alternative 50 Hz
	Current	48 A (at 400 V / 50 Hz)
• OUTPUT	Voltage	28 Vdc - adjustable from 22 to 32 Vdc for test purposes with configurable output current limit
	Current	600 A continuously - 2000 A peak / 20 V
	Performance	Voltage ripple at 450 A 28 Vdc < 0.5 V RMS
• DIMENSIONS AND WEIGHTS	Weight (Kg)	450 with cables
	L x W x H (mm)	1690 x 956 x 1190

SAFETY FEATURES

- Over/Under voltage
- Output overloads
- Input electrical failures (U, f)

MAIN CHARACTERISTICS AND OPERATIONS

- Easy operation on the control pannel (U, I displayed)
- Tow-bar
- 28 Vdc cable - 10 m length with standard ISO 461 plug
- Cable storage roof basket (on top of unit)
- Standard operating temperature: - 30°C to + 55°C
- Indoor or outdoor operation
- Galvanized steel chassis
- Color: white RAL9010
- Noise level: < 65 dB (A)

OPTIONS

- Trolley with cable storage
- Deep cold operation kit (- 30°C)
- 480 V/60 Hz Input voltage

Guinault
AIRCRAFT GROUND ENERGY

400 Hz FREQUENCY CONVERTER FOR CODES B TO F AIRCRAFT

FIXED MOBILE APU OFF

SA 90-180

Our frequency Converter can provide electrical power for civil and military aircraft in the most extreme environments. These Unit can be installed under passenger boarding bridges, on a control room floor, on the apron, or in maintenance hangars. The GUINAULT frequency converter is also available in a mobile version, in an ultra-robust design, adapted to the often harsh conditions experienced when handling and towing equipment in the airport environment.

GENERATING VALUE

- Limit emissions of direct pollutants to the ground
- Greatly reduce the ambient noise level on the ground
- Generate new revenue for the airport by offering an added-value service to airlines
- Significant savings in jet fuel consumption for airlines
- Greatly reduce the maintenance costs of the APU
- Improve comfort and air quality on board

ADVANTAGES

- Versatility: synchronization, extremely cold and hot conditions, variable frequency, 28 Vdc options
- Performance and efficiency
- Robustness and reliability
- Silence and comfort
- Ease of use
- Reduced maintenance
- Remote access and monitoring

Specifications

		SA90	SA180
• PERFORMANCE	Frequency	400 Hz ± 0.5 %	
	Voltage	115 / 200 V ± 0.5 %	
	Rated power	**90 kVA (p.f.1)**	**180 kVA (p.f.0.8)**
	Power factor	Any power factor compliant	
	THD (I) input	< 9%	< 9%
	Efficiency	94%	94%
	No load losses	< 2 kW	< 2 kW
	Waveform	ISO 6858 / SAE ARP 5015 / DFS 400 Compliant	
• DISTRIBUTION	Output cables	Depending on the use and length: cable, reel or trapdoors (see options)	
	Number of outputs	1 (2 optional)	2
• INPUT CURRENT	Inrush current	< 10 A	
	Frequency	50-60 Hz ± 5%	
	Voltage	400 V ± 15%	
	Rated current	125 A ± 5 %	250 A ± 5 %
• SOUND PRESSURE LEVEL	At 1 meter's distance, free field	< 65 dB (A)	
• OPERATION CONDITIONS		- 30°C / + 55°C relative humidity up to 100% (no condensing) Indoor/outdoor (IP 55)	
• DIMENSIONS AND WEIGHTS	L x W x H (mm) / Weight (Kg)		
	Fixed unit	720 x 720 x 1511 / 580 kg	720 x 720 x 1800 / 680 kg
	Mobile unit	2300 x 1500 x 1200 / 990 kg	2300 x 1500 x 1250 / 1100 kg

OPTIONS

- Software for diagnostic and consolidated monitoring of the unit
- Start-up/operation in extreme cold (T - 40°C)
- Optional 2nd 400 Hz output (SA90)
- Cable depending upon type of distribution (buried, aerial) and length
- Military grade electromagnetic shielding (MIL STD 461F)
- Multi-Converter 400 Hz synchronization
- Dynamic compensation, multiple outputs of various lengths
- 800 / 2 400 A 28 Vdc Output (except for SA180 mobile)
- Cable box cover
- Other input voltage (220 V, 480 V, 575 V)
- Variable frequency 350-800 Hz

ACCESSORIES DISTRIBUTION

- Cable retriever
- Cable "crocodile"
- Underground distribution through PITS

Data are subject to modification without prior notice.

APU OFF

AIRCRAFT AIR START UNIT

ASU

ALTHOUGH MOST AIRCRAFT ARE FITTED WITH AN ONBOARD APU TO START ENGINES, AN AIR STARTER IS NEEDED SHOULD THE APU FAIL. EVEN IF THE AIRCRAFT IS ALLOWED TO FLY IF THE APU IS OUT OF SERVICE, IT CANNOT START ITS ENGINES.

Guinault
AIRCRAFT GROUND ENERGY

PNEUMATIC AIR START UNIT FOR AIRCRAFT UP TO 400 PPM

MOBILE

APU OFF

GS 180 - 400

The Air Start Unit requires high reliability in order to avoid AOG (Aircraft on Ground) in case of failure of an APU (Auxiliary Power Unit). It must be able, at any time and for any type of aircraft, to provide the necessary compressed air (42PSI of pressure) to run the turbines and perform the start-up. GUINAULT designed the safest Air Start Unit in the world using components known for their reliability, such as Deutz, Scania, and MTU engines, coupled with GHH RAND screw compressors. The use of electronic regulation allows them to operate in the best conditions and thus improve their lifespan, to limit noise at airports, and significantly reduce fuel consumption.

GENERATING VALUE

- Drastically reduce the risk of AOG
- Reduce costs by covering a wide range of aircraft with just one model
- Fuel savings (variable engine speed operation 1300-2000 rpm)compared to conventional technologies
- Provide very low maintenance costs (diesel engine)
- Extend the lifespan of the product by an optimized operation (variable speed)
- Reduce the level of noise on the tarmac (by reducing engine speed)
- Extend the lifespan by the use of proprietary regulation technology (elimination of the risk of obsolescence of spare)

ADVANTAGES

- Sturdiness and reliability
- Optimized design
- Ease of use
- Electronic control
- Ease of maintenance
- No risk of obsolescence of the control system

Specifications

	GS180	GS280	GS400
ENGINES AVAILABLE **• STAGE 3 / TIER 3 CE**	DEUTZ TCD2015V06 360 kW	DEUTZ TCD2015V08 500 kW	SCANIA DC16 566 kW (Tier 0) MTU 12V2000 675 kW (Tier 2)
• STAGE 4-5 / TIER 4F	Scania DC13 331 kW	Scania DC16 493 kW	Scania DC16 566 kW
• AIR FLOW/ AIR PRESSURE	**180 ppm / 42 psig**	**280 ppm / 42 psig**	**400 ppm / 40 psig**
• COOLING/AIR FLOW REGULATION	Integrated oil tank and external oil cooler GUINAULT RS686 electronic pressure / flow regulator Variable speed operation 1300-2000 rpm (stepless)		
• COMPRESSOR			
Model	CD26S	CD42S	CD72S
Type	Screw compressor, dry type		
• DISTRIBUTION	1 connector	2 connectors	3 connectors
	30 feet in length (9.15 m) with ISO 2026 coupling, optional length 50 feet (15 m)		
• DIMENSIONS AND WEIGHTS			
Weight (Kg) (Approx)	4900	5800	7500 kg (Scania) 9800 kg (MTU)
L x W x H (mm)	4730 x 1970 x 2480	4730 x 1970 x 2480	6080 x 2130 x 3100 (MTU) 5746 x 2139 x 2056 (Scania)
• DIESEL ENGINE			
Type	Turbo Diesel - liquid cooling		
Fuel	Diesel EN 590		

SAFETY FEATURES

Engine
- High temperature and low oil pressure
- Clogged air filter
- Battery charge failure
- Overspeed

Compressor
- Air overpressure
- Clogged air filter
- Low oil pressure
- High oil temperature

ASSEMBLY

- Metal body with wide doors for maintenance access
- Tray for hoses storage
- Braking when tow-bar is raised or lowered
- Front axle with turnable steering
- Batteries: 4 x 12 V-125 Ah

OPTIONS

- Airpac Mode: regulated pressure at 36psi for aircraft air conditioning (Air pack air supply)
- Truck mounted
- Cold start kit at low temperatures (< - 25°C) including engine electrical preheating

APU OFF

AIRCRAFT AIR CONDITIONING UNIT

ACU

GUINAULT DESIGNS COST-EFFECTIVE, RELIABLE, AND POWERFUL MACHINES PROVIDING A REAL ALTERNATIVE TO THE ON-GROUND USE OF THE APU.

GUINAULT UNITS INCORPORATE THE LATEST INDUSTRIAL COOLING TECHNOLOGY AND PROVIDE THE HIGHEST RELIABILITY.

Guinault
AIRCRAFT GROUND ENERGY

MOBILE AIR CONDITIONING UNIT FOR AIRCRAFT CODES B TO C

FIXED MOBILE APU OFF

GF15 / CF15

GUINAULT Air Conditioning Units are designed to replace an aircraft's APU and maintain the correct temperature in the cockpit and cabin during pre-flight operations, boarding and maintenance. These Units make it possible to meet the needs and requirements of code B and C civil aircraft in continental, tropical or desert climates.

GENERATING VALUE

- Limit emissions of direct pollutants on the ground
- Significant reduction of noise level on the ground
- Generate new revenue for the airport by offering an added-value service to airlines
- Significant savings in jet fuel consumption and APU maintenance for airlines
- Improve comfort and air quality on board

ADVANTAGES

- Performance and efficiency under extreme conditions
- Robust and reliable
- Simple operation
- Remote monitoring and maintenance
- Optimized maintenance access, thanks to modular construction
- Versatility

Specifications

		GF15 (Diesel) / CF15 (Electric)
• **ENGINE**	Type	Deutz TCD 2013L04-2V (Stage 3) or TCD3.6 (Tier 4 / Stage 5)
	Fuel tank capacity	160 L / 43 US GAL
• **DIMENSIONS AND WEIGHTS**	L x W x H (mm)	5360 x 2200 x 2400 mm
	Weight (Kg)	4900 kg
• **AIR CIRCUIT**	Maximum airflow	1.5 kg/s
	Pressure at PCA outlet	7500 pascal / 1.08 Psi
	Fan type	Centrifugal - Variable speed (VFD)
• **COOLING CIRCUIT & SYSTEM**	Air outlet	1 outlet - 10 m
	Main blower	Centrifugal high-pressure blower with filters mounted on the air intake
	Compressor qty	2 independant cooling circuits
	Refrigerant	R513a
	Input Power Source	Electrical supply from integrated diesel genset *(or from 50/60 Hz main supply as an option)*
	Compressors	Semi-hermetic compact reciprocating compressors (no maintenance)
	Condenser	Top condenser made of copper tubes and aluminum fins
	Expansion	Electronically regulated expansion valves
	Evaporator	Copper tubes and aluminum fins
• **HEATING MODE** *(option)*	Heating capacity	45 kW
• **INPUT POWER REQUIREMENT** *(for electric/CF15 only & GF15 with dual mode option)*	Input current	< 100 A

SAFETY FEATURES

Engine
- Low oil pressure
- High temperature
- Battery charge failure
- Overspeed

Cooling system
- High-low pressure refrigerant
- Compressor overheating (KRIWAN)
- Oil level/temperature
- Air outlet overpressure

CONSTRUCTION

- Touch screen panel for easy intuitive operation and troubleshooting
- Compartment for hose storage
- Front axle with 5th wheel design (turn-table)
- Batteries: 2 x 12 V-125 Ah (24 Vdc)
- Brakes applied when tow-bar is raised or lowered
- Hot dip galvanized chassis provides excellent protection against corrosion

OPTIONS

- Heating mode
- Dual power mode: 50/60 Hz mains power input
- Cold temperature kit, engine pre-heating supplied by 50/60 Hz mains, for start-up in extremly low temperature (< - 25°C)
- Colour: other than white (RAL 9010)

Guinault
AIRCRAFT GROUND ENERGY

MOBILE AIR CONDITIONING UNIT & COMBO FOR AIRCRAFT CODES B TO C

ACU COMBINED WITH 400 Hz / 28 Vdc POWER SUPPLY

FIXED MOBILE APU OFF

GF15 COMBO

GUINAULT combined Air Conditioning Units / 400 Hz are designed to replace an aircraft's APU and maintain the correct temperature in the cockpit and cabin during pre-flight operations, boarding and maintenance. These Units make it possible to meet the needs and requirements of code B and C civil aircraft in continental, tropical or desert climates.

GENERATING VALUE

- Limit emissions of direct pollutants on the ground
- Significant reduction of noise level on the ground
- Generate new revenue for the airport by offering an added-value service to airlines
- Significant savings in jet fuel consumption and APU maintenance for airlines
- Improve comfort and air quality on board

ADVANTAGES

- Performance and efficiency under extreme conditions
- Robust and reliable
- Simple operation
- Remote monitoring and maintenance
- Optimized maintenance access, thanks to modular construction
- Versatility

Specifications

		GF15 COMBO
• **ENGINE**	Type	Cummins QSB4.5 (stage 5/Tier 4) or TCD 2013 L04 2V (Tier3)
	Fuel tank capacity	160 L / 43 US GAL
• **DIMENSIONS AND WEIGHTS**	L x W x H (mm)	5659 x 2200 x 2400 mm
	Weight (Kg)	5400 kg
• **AIR CIRCUIT**	Maximum airflow	1.5 kg/s
	Pressure at PCA outlet	7500 pascal /1,08 Psi
	Fan type	Centrifugal - Variable speed (VFD)
• **COOLING CIRCUIT & SYSTEM**	Air outlet	1 outlet - 10 m
	Main blower	Centrifugal high-pressure blower with double filters mounted on the air intake
	Compressor qty	2 independant cooling circuits
	Refrigerant	R513a
	Input Power Source	Electrical supply from integrated GPU
	Compressors	Semi-hermetic compact reciprocating compressor (no maintenance)
	Condenser	Top-mounted condenser made of copper tubes and aluminum fins
	Expansion	Electronically regulated expansion valves
	Evaporator	Copper tubes and aluminum fins
• **HEATING MODE** *(option)*	Heating capacity	45 kW
• **AIRCRAFT POWER SUPPLY** *(Combo only)*	400 Hz / 115/200 VAC	90 kVA
	28 Vdc (option)	700 / 2000 A Peak

SAFETY FEATURES

Engine
- Low oil pressure
- High temperature
- Battery charge failure
- Overspeed

Cooling system
- High-low pressure refrigerant
- Compressor overheating (KRIWAN)
- Oil level/temperature
- Air outlet overpressure

Generation 115V/400Hz
- Over-voltage
- Under-voltage
- Over-frequency
- Under-frequency
- Overload

CONSTRUCTION

- Touch screen panel for easy intuitive operation and troubleshooting
- Compartments for hoses and cable storage
- Front axle with 5th wheel design (turn-table)
- Batteries: 2 x 12 V-125 Ah (24 Vdc)
- Brakes applied when tow-bar is raised or lowered
- Hot dip galvanized chassis provides excellent protection against corrosion

OPTIONS

- Heating mode
- Cold temperature kit, engine pre-heating supplied by 50/60 Hz mains, for start-up in extremly low temperature (< - 25°C)
- Colour: other than white (RAL 9010)

Guinault
AIRCRAFT GROUND ENERGY

MOBILE AIR CONDITIONING UNIT FOR AIRCRAFT CODES C TO F

FIXED MOBILE APU OFF

GF 30-50 / CF 30-50

GUINAULT Air Conditioning Units are designed to replace the aircraft's APU and maintain the correct temperature in the cockpit and cabin during pre-flight operations, boarding and maintenance. These two models of the GF / CF range make it possible to meet the needs and requirements of all types of civil aircraft in continental, tropical or desert climates.

GENERATING VALUE

- Limit emissions of direct pollutants on the ground
- Significant reduction of noise level on the ground
- Generate new revenue for the airport by offering an added-value service to airlines
- Significant savings in jet fuel consumption and APU maintenance for airlines
- Improve comfort and air quality on board

ADVANTAGES

- Performance and efficiency under extreme conditions
- Robust and reliable
- Simple operation
- Remote monitoring and maintenance
- Optimized maintenance access, thanks to modular construction

Specifications

		GF30	GF50
• **ENGINE** *(GF only)*	DEUTZ	TCD2013L06-2V / TCD6.1	TCD2013L06-4V/TCD 7.8
	Minimum air flow	1 kg/sec	1.5 kg/sec
	Maximum air flow	3 kg/sec	5 kg/sec
	Number of air outlets	2	2
	Air outlet temperature *(at conditions 30°C/50%RH)*	+ 2°C	+ 2°C
	Electrical Power Requirement *(for CF & GF with Dual Mode)*	< 200 A	< 300 A
• **DIMENSIONS AND WEIGHTS**	Weight (Kg)	9500	10500
	LxWxH (mm)	8400 x 2500 x 3000	
• **COOLING SYSTEM**	Input power source	Electrical supply from integrated diesel genset (or from the 50/60 Hz main supply as an option)	
	Compressors	Semi-hermetic compact compressors (no maintenance) 1 screw and 1 reciprocating compressor	
	Refrigerant	R513a	
	Condenser	Top-mounted condenser made with copper tubes and aluminum fins. Variable speed fans (VFD controlled)	
	Expansion	Electronically regulated expansion valves	
	Evaporator	Copper tubes and aluminum fins with automatic defrosting system	
	Main blower	Centrifugal high-pressure blower with double-mounted filters on the air intake Variable speed (VFD controlled)	

SAFETY FEATURES

Engine
- Low oil pressure
- High temperature
- Clogged air filter
- Battery charge failure
- Overspeed

Cooling system
- High-low pressure refrigerant
- Compressor overheating (KRIWAN)
- Oil level/temperature
- Air outlet overpressure

CONSTRUCTION

- Touch screen panel for easy intuitive operation and troubleshooting
- High-capacity fuel tank (700 liters offering more than 8 hours of continuous operation)
- Compartment for hoses storage
- Front axle with 5th wheel design (turn-table)
- Batteries: 2 x 12 V-125 Ah (24 Vdc)
- Brakes applied when tow-bar is raised or lowered
- Painted chassis provides excellent protection against corrosion

OPTIONS

- Heating mode
- Dual power mode: 50/60 Hz mains power input
- Truck-mounted ACU
- Cold temperature kit, including engine pre-heating supplied by 50/60 Hz mains, for start-up in extremly low temperature (< - 25°C)
- Extra sound insulation
- Power input limited at 250A

Guinault
AIRCRAFT GROUND ENERGY

AIR CABIN HEATERS-ELECTRICAL

ACH POWERED BY 400 Hz / 200 V GPU OR 50 HZ / 400 V

MOBILE APU OFF

CR80

The GUINAULT Air Cabin Heater ensures the supply of the airflow for heating purpose to both civil and military aircraft, of all types in the most extreme environments. Its ultra-sturdy design is fully protected against corrosion and is engineered to withstand harsh conditions in airport environments. The logical commonality of elements assists in the functional understanding of the machine, and contributes to the quality of maintenance.

GENERATING VALUE

- Improve comfort and quality on board
- Greatly reduce the ground-level noise
- Use it in remote aircraft parking without diesel engine, in connection with a 400 Hz GPU
- Achieve significant cost reductions in jet fuel for airlines

ADVANTAGES

- Performance and efficiency under extreme conditions (down to -30°c)
- Flow, pressure and temperature electronic control with aircraft selection
- Maintenance access, modular construction
- Low Total Cost of Ownership
- Sturdiness and reliability
- Approved by German Berufsgenossenschaft

Specifications

		CR80
• INPUT	Input power	Voltage 400 V ± 10%, 50 or 60 Hz Voltage 200 V as per ISO6858 / 400 Hz (from GPU) Alternative : 400 Hz input power socket Power: - 91 kW max (max power can be reduced by software set up (80 kW heating power and 11 kW blower)
	Input power cable	50 Hz version: 20 m long / 4 x 35 mm^2 cable - plug CE60309 400 Hz version: 20 m long / 4 x 70 mm^2 - plug STANAG 3303 (male) Cable compartment at the front side of the machine
• OUTPUT	Output power*	Airflow 0 to 3000 m^3/h = 1765 cfm - electronically controlled - Pressure 8000 Pascal = 1,16 psi at aircraft connector at rated flow - Heating capacity: 80 kW (273 700 BTU/h) - Air temperature: adjustable / 60°C maximum
• DIMENSIONS AND WEIGHTS	Weight (approx.) L x W x H	1000 kg 3223 x 1240 x 1474 mm (= 10 ft 6.9 in x 4 ft 0.82 in x 4 ft 10 in)

* Given at 15°C/sea level

MAIN CHARACTERISTICS AND OPERATIONS

- Operation temperature : - 30°C to + 35°C
- Air distribution:
  - one insulated hose / 8 m long
  - hose compartment at the rear side of the ACH
- Noise level:
  - 75 dB at control panel - measured at 1 m distance
  - the lowest noise level achieved on the market due to a single part polyester canopy and a very low air inlet speed
- Use friendly:
  - simply select the aircraft type on the display
  - the heater will set up all parameter (temperature, pressure, flow) to operate as per aircraft requirement
- Maintenance:
  - limited to the replacement / cleaning of the air inlet filters
  - the air filters can be replaced without opening the canopy, by simple removing the rear air inlet grid

APU OFF FIXED SOLUTIONS

SA

WHILST ON THE GROUND, AN AIRCRAFT REQUIRES SPECIAL ELECTRICAL POWER: 400 Hz OR 28 Vdc.

THE USE OF A GROUND POWER UNIT (GPU) INSTEAD OF EITHER AN AIRCRAFT ENGINE OR AUXILIAIRY POWER UNIT ENSURES VERY SIGNIFICANT SAVINGS IN TERMS OF FUEL CONSUMPTION AND MAINTENANCE.

Guinault
AIRCRAFT GROUND ENERGY

400 Hz STATIC FREQUENCY CONVERTERS FOR CODES B TO F AIRCRAFT

FIXED MOBILE APU OFF

SA 90-180

400 Hz CONVERTER

GUINAULT frequency converters provide the most versatile 400 Hz solution for today and tomorrow's aircraft. Our frequency converters can provide electrical power for civil aircraft in the most extreme environments. These machines can be installed under passenger boarding bridges, on a control room floor, on the tarmac or in maintenance hangars. They are made in an ultra-robust material, in order to withstand the often harsh conditions experienced when handling and towing equipment in the airport environment. Our frequency converters are also available in a mobile version.

GENERATING VALUE

- Limit emissions of direct pollutants to the ground
- Greatly reduce the ambient noise level on the ground
- Generate new revenue for the airport by offering an added-value service to their airlines' customers
- Significant savings in kerosene consumption for airlines
- Greatly reduce the maintenance costs of the APU

ADVANTAGES

- Versatility : synchronization, extremely cold and hot conditions, variable frequency, 28 Vdc options
- Performance and efficiency
- Robustness and reliability
- Silence and comfort
- Ease of use
- Reduced maintenance

Specifications

		SA90	SA180
• PERFORMANCE	Frequency	400 Hz ± 0.5 %	
	Voltage	**90 kVA (p.f.1)** 115 / 200 V ± 0.5 %	**180 kVA (p.f.0.8)**
	Power factor	Any power factor compliant	
	THD (I) input	< 9%	< 9%
	Efficiency	94%	94%
	No load losses	< 2 kW	< 2 kW
	Waveform	ISO 6858 / SAE ARP 5015 / DFS 400 Compliant	
• DISTRIBUTION	Output cables	Depending on the use and length: cable, reel or trapdoors (see options)	
	Number of outputs	1 (2 optional)	2
• INPUT CURRENT	Inrush current	< 10 A	
	Frequency	50-60 Hz ± 5%	
	Voltage	400 V ± 15%	
	Rated current	125 A ± 5 %	250 A ± 5 %
• SOUND PRESSURE LEVEL	At 1 meter's distance, free field	< 65 dB (A)	
• OPERATION CONDITIONS	- 30°C / + 55°C relative humidity up to 100% (no condensing) Indoor/outdoor (IP 55)		
• DIMENSIONS AND WEIGHTS	L x W x H (mm) / Weight (Kg)		
	Fixed unit	720 x 720 x 1511 / 580 kg	720 x 720 x 1800 / 680 kg
	Mobile unit	2300 x 1500 x 1200 / 990 kg	2300 x 1500 x 1250 / 1100 kg

OPTIONS

- Software for diagnostic and consolidated monitoring of the unit
- Start-up/operation in extreme cold (T - 40°C)
- Optional 2nd 400 Hz output (SA90)
- Cable depending upon type of distribution (buried, aerial) and length
- Military grade electromagnetic shielding (MIL STD 461F)
- Multi-Converter 400 Hz synchronization
- Dynamic compensation, multiple outputs of various lengths
- 800 / 2 400 A 28 Vdc Output (except for SA180 mobile)
- Cable box cover
- Other input voltage (220 V, 480 V, 575 V)
- Variable frequency 350-800 Hz

ACCESSORIES DISTRIBUTION

- Cable retriever
- Cable "crocodile"
- Underground distribution through PITS

Guinault
AIRCRAFT GROUND ENERGY

CABLE COIL RETRIEVER FOR 400 Hz POWER DISTRIBUTION

APU OFF

CC 25

400 Hz Delivery System

GUINAULT cable retrievers offer a very high level of reliability for 400 Hz Installations. They drastically improve the availability of 400 Hz power supply at the gate. Our cable retrievers represent the most versatile solution for today and tomorrow's aircraft. They provide a safe storage for electrical cables in the most extreme environments. They can be installed underneath passenger boarding bridges, on the tarmac or in hangars. Our cable retrievers were designed for intensive use and harshest ambient conditions.

GENERATING VALUE

- Optimize the performance and the efficiency of 400 Hz installation
- Provide fast service on ground

ADVANTAGES

- Provide higher availability of 400 Hz at the gate with robust and proven components and mechanism
- Provide higher durability of the cable with a wide drum diameter, which protects control wires from deterioration
- Conceived with one-side access to the whole mechanism
- Maintenance Free Direct drive

Specifications

	CC25
• **DIMENSIONS**	800 x 840 x 840 mm
• **WEIGHT**	300 kg without cable / 410 kg with cable and plug
• **POWER SUPPLY**	1 phase 230V 50 / 60 Hz
• **CIRCUIT BREAKER PROTECTION**	16 A
• **STORAGE TECHNOLOGY**	Drum with spiral cable slot
• **ELECTRICAL CABINET**	IP54 rated
• **PROTECTIONS**	Blocked cable, motor overload, emergency pushbutton, airbridge interlock
• **UNWINDING/WINDING SPEED**	Up to 1,1 m/s
• **CABLE TYPE**	7 x 35 mm^2 + 18 x 1 mm^2
• **CABLE LENGHT**	25 meters standard (up to 26 meters in option)
• **PLUG TYPE**	Anderson with ON/OFF controls - alternative available
• **OPERATING CONDITIONS**	-30°C / + 60°C O.A.T from 5 to 99% RH
• **MOUNTING**	Ground mounting Airbridge mounting: Underneath
• **CORROSION PROTECTION AND FINISH**	Cataphoresis process protection and RAL9010 powder paint
• **OPTIONS**	Remote Control panel with Lamps

COMPONENTS & FEATURES

- Frame and panels treated with cataphoresis technic and powder painted
- Direct drive gearmotor
- PLC controlled

Guinault

AIRCRAFT GROUND ENERGY

APU OFF SOLUTIONS : 400 Hz GPU/E-GPU * Air Conditioning Units ACU/PCA * COMBO 400HZ/ACU * Air Start Units

ACU & COMBO : NEW COOLING DESIGN - UNIQUE NO FROST TECHNOLOGY

www.guinault.com