●奄美空港にて撮影。燃費の良い ATR 型機と同じ「エコ・ハート」が描かれた eGPU（手前）。

JAC、バッテリー式電源装置「eGPU」を本邦初導入

編　集　部

3 月 22 日、日本エアコミューター（株）（以下 JAC、https://www.jac.co.jp/）は、多摩川エアロシステムズ（株）（以下、多摩川エアロシステムズ、http://www.tamagawa-as.jp/）と共同で、同日より順次、鹿児島県内の全就航離島に環境負荷や騒音の軽減が期待されるリチウム・イオン・バッテリー式電源装置「eGPU」を国内エアラインとして初めて導入したことを明らかにした。

空港にて駐機中の航空機には、次便の出発準備の作業を行うため、外部電源を供給しているが、これまで使用していたディーゼル・エンジン式電源車両「GPU」は燃料で稼働するため、排気ガスが発生していた。今回、新たに導入した「eGPU」は、排気ガスが発生せず、低騒音かつエンジンによる振動もなく、消耗品や故障頻度が少ないバッテリー式電源装置となっている。それにより、GPU が使用できない場合の APU（ホテルモード、地上で ATR 機のエンジン 1 基を APU〔補助動力装置〕として運転するモード）の使用回数も低減できるとのこと。

●デンマーク国の GSE（地上支援機材）メーカーである ITW GSE 社製の eGPU（ITW GSE 7400 JetEx28VDC eGPU）。日本においては、多摩川エアロシステムズが国内代理店を務めている。

JAL グループは、豊かな地球を次世代に引き継ぐために、2050 年までに CO_2（二酸化炭素）排出量実質ゼロを目指す等、全てのフライトをサステナブルなものとし、空の旅を誇らしい価値に変えていくための取り組みを進めている。

今回の「eGPU」は、従来以上に環境負荷を軽減し、また就航離島の自然をしっかりと未来に残して行く、という想いから導入が決定された。

●eGPU には、バッテリー容量等の情報を表示するディスプレイの他、ユーザーが認識し易いアイコンベースの操作パネルが装備されている。

● eGPU（ITW GSE 7400 JetEx28VDC eGPU）は、容量 40kWh の第 4 世代日産リーフ・バッテリー・パック（リチウム・イオン・バッテリー）およびソリッド・ステート・コンバーターなどを採用し、信頼性の高い電源を実現した。

● eGPU の内部は、従来の GPU の様に内燃機関（ディーゼル・エンジン）駆動型発電機を排除し、燃料を燃焼して排気ガスを生じることが無く、低騒音のため、機体付近で作業する航空整備士やグランドハンドリング作業員とって歓迎されるものとなっている。

●今年 1 月下旬に羽田空港の多摩川エアロシステムズ施設内において撮影した eGPU。JAC には複数台が納入された。

ITW GSE

7400 eGPU

Zero Emission

Battery-powered Ground Power Unit
90 - 140 - 180 kVA

Available on a
Power by the Hour
subscription plan

For greener airports and
a better working environment

It's all about connections

CO_2 FOOTPRINT DURING TURNAROUND

Which piece of equipment would you exchange to create a greener environment?

GO GREEN ON GROUND

IT'S THE GREEN WAY OR NO WAY

Airports all over the world are beginning to think greener. At the time of writing, almost half of global passenger traffic passes through Airport Carbon Accredited airports. The number of these airports is rapidly increasing, and more and more airports are interested in reducing their environmental impact. Often the world's largest airports are located next to major cities that are growing in line with global trends, meaning cities and airports are coming into ever-closer contact. This leads to stricter requirements in terms of the emissions levels local governments can and will accept.

BATTERY-POWERED GSE MARCHES FORWARD

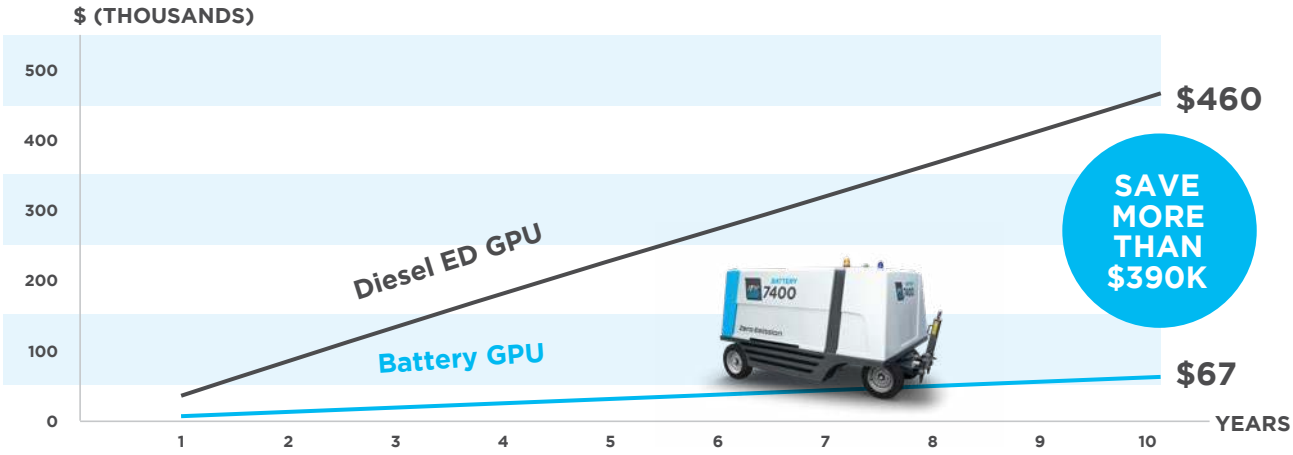
To reduce emissions in airports, battery-powered Ground Support Equipment is rapidly replacing diesel-powered equipment such as cargo loaders and pushback tractors. However, 400 Hz Ground Power Units are an even greater energy guzzler. More energy needs to be delivered over a longer time period. This is why ITW GSE's ground-breaking and environmentally friendly 7400 eGPU is a game changer. A great benefit stands to be gained from replacing popular diesel hungry GPUs and creating a better environment. Did you realize that savings would correspond to emissions in the range of approx. 50,000 kgs / 110,000 lbs of CO_2, 45 households, 30 cars or 60 acres of forest?

110,000 LBS CO_2 | **45 HOUSE-HOLDS** | **30 AVG. CARS** | **60 ACRES FOREST**

The figures are based on an average estimate for a 90 kVA eGPU, and they may vary, depending on country.

SAVE MORE THAN $390,000
ON OPERATING EXPENDITURES

The 7400 GPU is a unique product with a green approach. Thanks to its lack of moving parts, vulnerable to wear and tear, maintenance costs are almost non-existent, meaning overall operating costs stay low. With current electricity prices and maintenance costs, the eGPU is a clear winner in comparison to a diesel GPU.

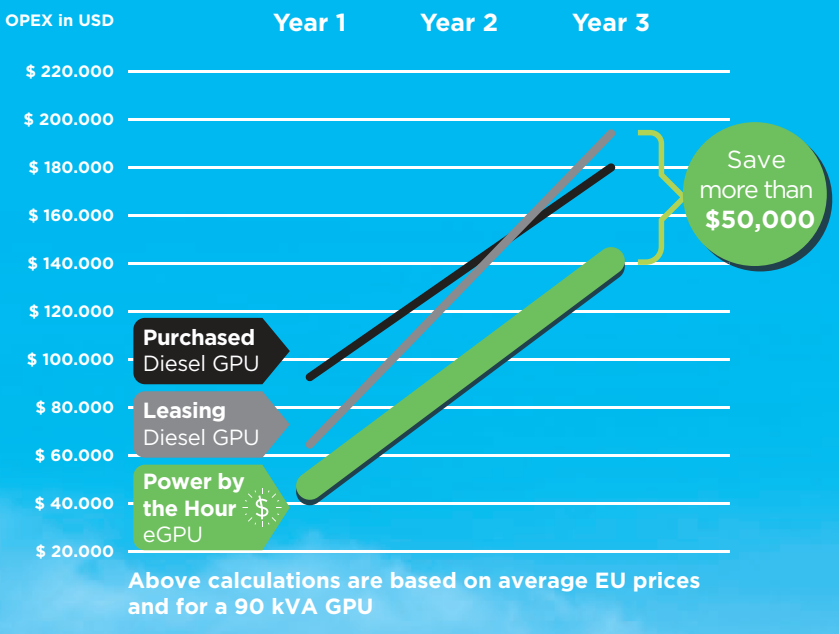


CUMULATIVE OPEX – DIESEL ENGINE GPU VS eGPU

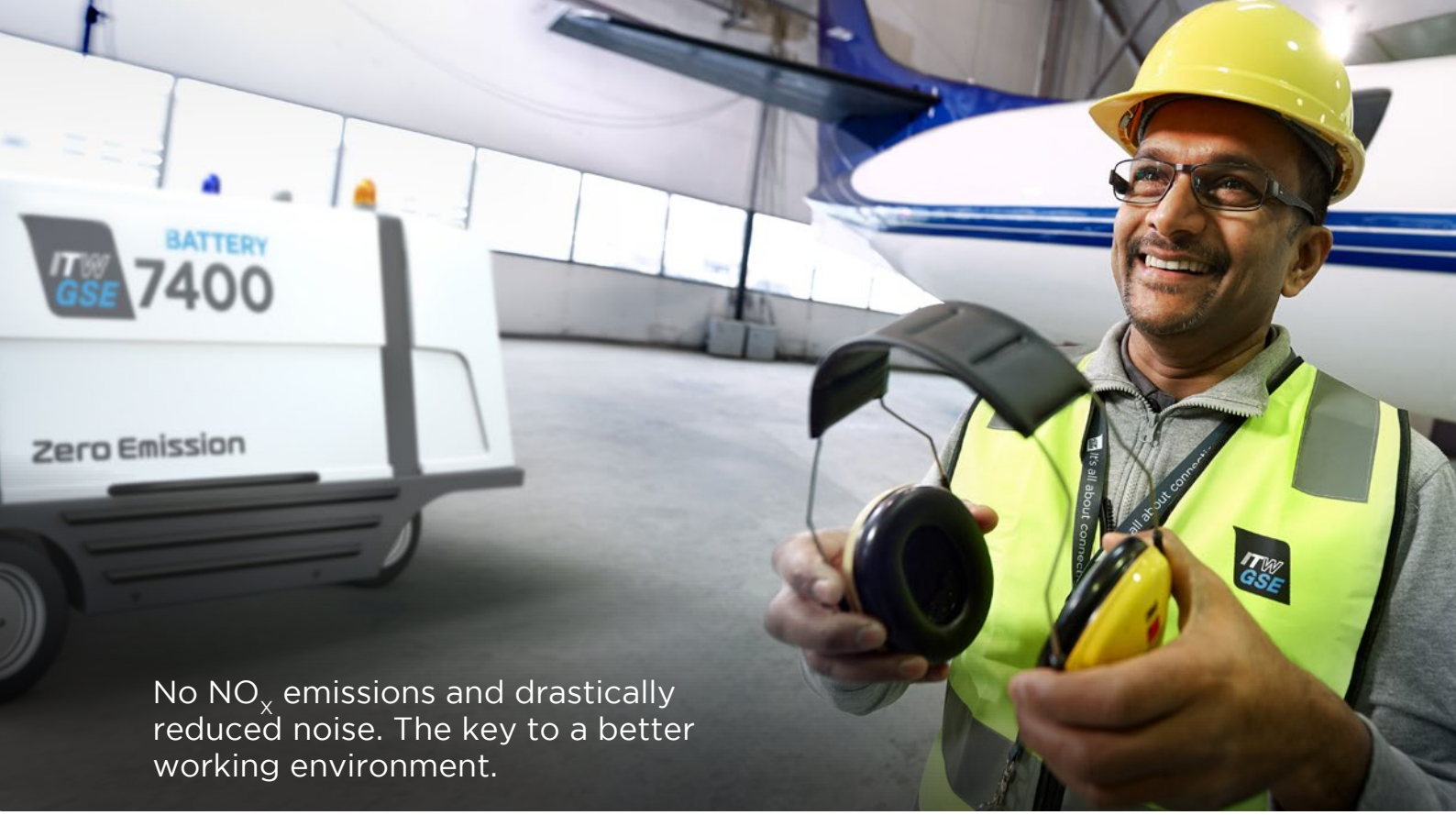
The graph shows the cumulative operating costs of a diesel GPU and a 90 kVA eGPU used 5 ½ hours/day/year.
Lower electricity and maintenance costs make the eGPU a winner in this comparison.
Provide your fuel and electricity prices for a customized calculation of *YOUR* savings.
Total Cost of Ownership (TCO) lower than diesel after 2 years.

GO GREEN. CUT COSTS.

An eGPU on a Power by the Hour subscription costs approx. $48,000 a year. In comparison, leasing a diesel GPU on a 6 hours/day basis your OPEX will be $65,000 a year.
Choosing an eGPU means reductions of your OPEX with more than $50.000 over three years - per 90 kVA eGPU.
6 hours a day is a modest figure compared to the average use in the industry. The more hours your eGPUs run, the more you save. Furthermore, we do not consider any GPU that you have in reserve to ensure a resilient operation. Even if you usually buy your GPUs, you come out on top when you choose a Power by the Hour subscription instead.



Above calculations are based on average EU prices and for a 90 kVA GPU



No NO_x emissions and drastically reduced noise. The key to a better working environment.

A GIANT LEAP FORWARD THAT LEAVES A TINY FOOTPRINT

WITH AN ITW GSE 7400 eGPU, YOU CAN REDUCE YOUR CO_2 EMISSIONS BY 90% AND NO_x EMISSIONS BY 95%

CO_2 EMISSIONS

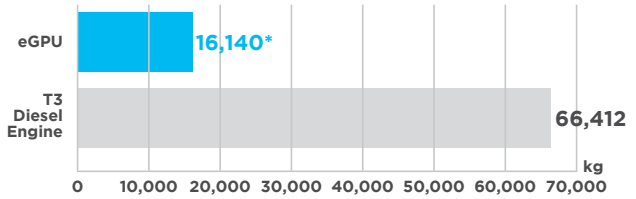
Diesel GPUs have high fuel consumption since they need to be constantly running at high engine speeds to generate the 400 Hz power an aircraft requires. This means high CO_2 emissions and high noise levels.

The ITW GSE 7400 eGPU is a zero-emission alternative that uses battery power instead of conventional diesel, meaning it is practically clean and silent.

NO_x EMISSIONS

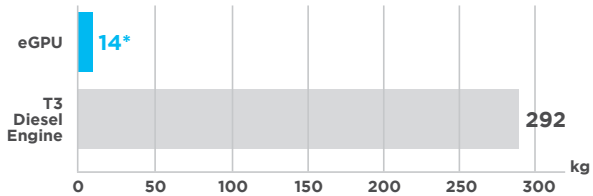
Diesel GPUs have a high level of NO_x emissions. The harmful health effects of this are becoming increasingly better understood. The eGPU emits no NO_x into its operating environment, so it can contribute significantly to a cleaner and safer working environment for your employees.

OVERALL IMPACT ON CO_2 EMISSIONS



CO_2 emissions for 1 unit for 1 year (Avg. 5 1/2 operating hours per day)

OVERALL IMPACT ON NO_x EMISSIONS



Annual NO_x emissions (Avg. 5 1/2 operating hours per day)

*Calculated using average power plant emissions based on data from electricitymap.org

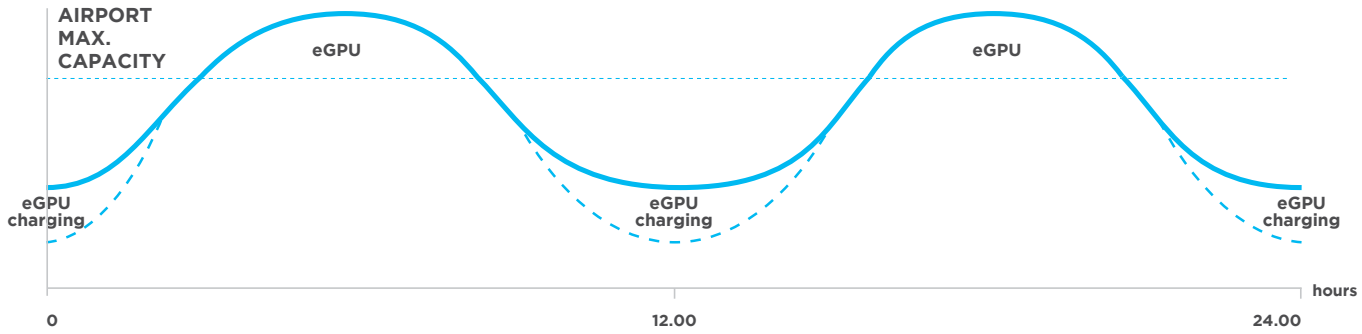
Above figures are based on an average estimate for a 90 kVA eGPU

GROW THE CAPACITY
OF YOUR EXISTING INFRASTRUCTURE

WITH THE 7400 BATTERY eGPUs

Airports frequently experience peak load periods with a consumption level very close to the power grid's maximum capacity. Increasing the grid capacity requires huge investments in infrastructure.

Making eGPUs a part of your airport's electrical infrastructure allows you to smooth out your capacity demands over a 24-hour period. The eGPUs can be charged during quiet periods and contribute to increasing total capacity in peak periods.



eGPUs CAN MITIGATE OR ELIMINATE THE NEED FOR EXPENSIVE UPGRADES OF AIRPORT INFRASTRUCTURE

Use in hangars – no input power cables

Can supply power and recharge at the same time

Mobile GPU and linepowered converter in one unit

On-Board Charging System BC

Recharge from any 50/60Hz socket

EXTREME FLEXIBILITY

The ITW GSE 7400 eGPU changes how airports think about ground power without making compromises. It is independent due to the onboard battery packs and can easily be transported to wherever it is needed. The flexibility of the 7400 eGPU provides the same outstanding, well-proven features as other ITW GSE solid-state GPUs, including accurate and clean output voltage at the aircraft plug, and individual phase regulation of each output phase. It can perform multiple turnarounds before it needs recharging, and can be recharged from any 50/60Hz socket.

eGPUs FOR ALL POWER NEEDS

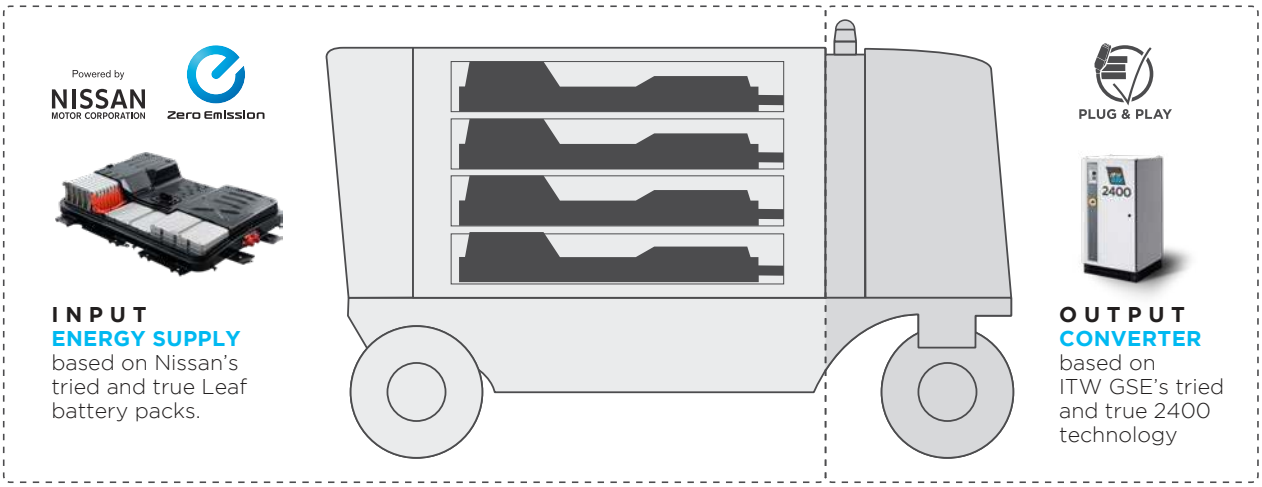
The ITW GSE 7400 eGPU family covers all your power needs. From the ITW GSE 7400 JetEx 28 VDC eGPU to the larger models that are well-suited to supply narrow-body and wide-body aircraft. Ideal for hangars and remote stands with no fixed 400 Hz installations.

A WELL-PROVEN SOLUTION

INNOVATIVE eGPU - BUILD ON KNOWN TECHNOLOGIES

The ITW GSE 7400 eGPU is powered by 2-5 battery packs with a capacity of 40 or 62 kWh (depending on model). At the output of the eGPU is ITW GSE's well-proven 2400 solid-state converter.

The combination of two well-proven technologies has created the rock-solid eGPU high level of safety. The 90 kVA eGPU is equipped with our Plug & Play system and can therefore deliver a unique voltage at the aircraft plug, right where it matters.



SAME EASY-TO-USE COMMON DESIGN PLATFORM

The backbone of all ITW GSE design is our common design platform that offers significant advantages. Like all ITW GSE products, the 7400 eGPU has a common icon-based user interface that is as easy to use as a smartphone or a tablet. This means airport employees already familiar with one ITW GSE product can easily operate another, reducing human error during operation and making product training easier.

MODULAR DESIGN

Modular design is the hallmark of ITW GSE. The 7400 eGPU is built from modular components. This ensures fast replacement, servicing and spares commonality.

SPECIFICATIONS

ITW GSE 7400 eGPU - 90 - 140 - 180 kVA

ITW GSE 7400 eGPU ISO 6858: 2017(E) IN COMPLIANCE WITH

Zero Emission

October 2022: M12692, Rev. D

Input

- Charger input range:
  3 phased @ 260–520 V / 45–65 Hz

Charging Time (based on charging only):

		4 x Battery Packs (160 kWh)	5 x Battery Packs (310 kWh)
Wall Outlet	**16 A**	< 15 h	N/A
	32 A	< 8 h	< 20 h
	63 A	< 4 h	< 10 h
	125 A	< 3 h	< 5 h
	200 A	N/A	< 4 h

Values based on 3 x 400 V and 20°C ambient

Output

- Rated power: 90 kVA; 140 kVA; 180 kVA Unity Power Factor
- Voltage: 3 x 115/200 V
- Frequency: 400 Hz ± 0.1%
- Power factor: 0.7 lagging to 0.95 leading
- Voltage regulation:
  <0.5% for balanced loads and
  up to 30% for unbalanced loads
- Voltage recovery: Δ<8% and recovery time<10 ms to 100% load change
- Total harmonic content:
  <2% at linear load (typically 1.5%)
  <2% at non-linear load according to ISO 1540
- Crest factor: 1.414 ± 3%
- Voltage modulation: <1.0%
- Phase angle symmetry:
  120° ± 1° for balanced loads
  120° ± 2° for 30% unbalanced loads

Protection

- Protection class: IP55
- No break power transfer
- Over/under voltage at output
- Overload
- Internal high temperature
- Control voltage error
- Short circuit at output
- Plug insertion interlock
- Neutral voltage supervision
- Neutral voltage displacement
- Leakage current supervision

Overload Ratings

- As per ISO 6858:2017

Turnarounds as Function of Time and Aircraft

Based on average measured consumption. Subject to aircraft configuration.		Time at gate in minutes		
		40	60	80
1x 90 kVA (160 kWh) Unit	CRJ-900LR	16	11	8
	A320-200	15	10	9
	A321-200	8	5	4
	B737-800	10	6	5
2 x 90 kVA Unit or 180 kVA (310 kWh)	A340		6	5
	A350		5	4
	B777-200		6	5

Depending on ambient conditions and usage, the capacity can be expected to derate up to 30% over 10 years

Norms and Standards

• DFS400	Specification for 400 Hz Aircraft Power
• MIL-STD-704F	Aircraft Electric Power Characteristics
• SAE ARP 5015	Ground Equipment – 400 Hertz Ground Power Performance Requirements
• ISO 6858:2017	Aircraft Ground Support Electrical Supplies
• EN 62619:2017	Safety Requirements for Li-Ion Batteries
• UN38.3	Certified Battery System
• EN 62040-1-1	General & Safety Requirement
• EN 61558-2-6	General & Safety Requirement
• EN 61000-6-4	Electromagnetic Compatibility Generic Standards – Emission Standard
• EN 61000-6-2	Generic EMC Standards
• EN 1915-1 & 2	Machinery; general safety requirements
• EN 12312-20	Machinery; general safety requirements

Weight, Mobile Unit

- 90 kVA (160 kWh): 2,510 kg (5,533 lbs)
- 140 kVA (248 kWh): 3,680 kg (8,113 lbs)
- 180 kVA (310 kWh): 4,200 kg (9,259 lbs)

Environmental

- Operating temperature:
  -10°C to 45°C (14°F to 113°F)
  without additional heating/cooling.
  For other operational temperatures, please contact ITW GSE
  Relative humidity: 10–100%
- Noise level: <65 dB(A) @1 m
  – typically 60 dB(A)

Efficiency

- 400 Hz converter and charger part > 0.95

Miscellaneous

- MTTR: max. 20 minutes
- Color: RAL 7035, Light grey (standard)
  Trailer: RAL 7043, Traffic Grey
  Rear cover: Pantone 2393, Cleantech Blue

Standard Features/Equipment:

- Plug & Play automatic voltage compensation (with one output active only)
- Adjustable max. input current settings
  90 kVA: 16 to 100 A in steps of 1 A
  140-180 kVA: 16 to 200 A in steps of 1 A
- Beacon for operation/charging*
- Beacon for warning/low battery* incl. siren
- Towbar interlock (non-lock version)
- Simultaneous charging while supplying 400 Hz power

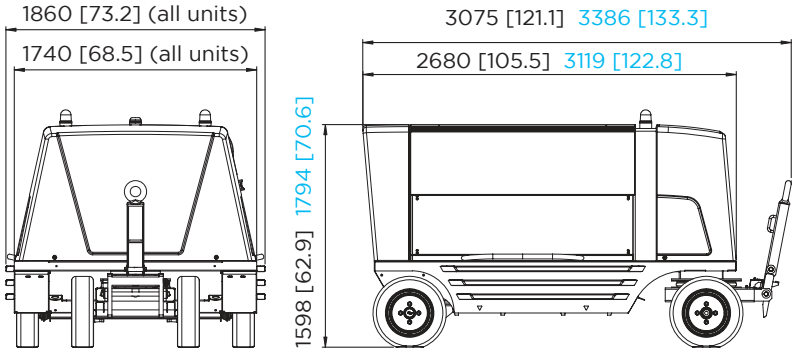
*Color acc. to customer specification

Standard Options Available

- Dual output: optional for 90 kVA
  Standard on 180 kVA
- Input cable and plug according to clients specifications
- 4 x 50 mm2 output cable (AWG 1/0) (recommended)
- Lockable towbar interlock
- Towbar with DIN40 towing eye
- White clearance light
- ITW GSE Connect
  (data/location via GSM/GPS)

Below Options are for 90 kVA only

- 28 VDC / 600 A ARU (Automatic Rectifier Unit) Simultaneous usage 45 kW(AC)
- Ability to power the 7400 from another GPU in case of unexpectedly long turnaround time
- Range extender module (See separate brochure)
- Forklift pocket for transportation



Dimensions are shown in mm and [inches]. Numbers in blue are 180 kVA eGPUs.

It's all about connections

ITW GSE