ITW GSE

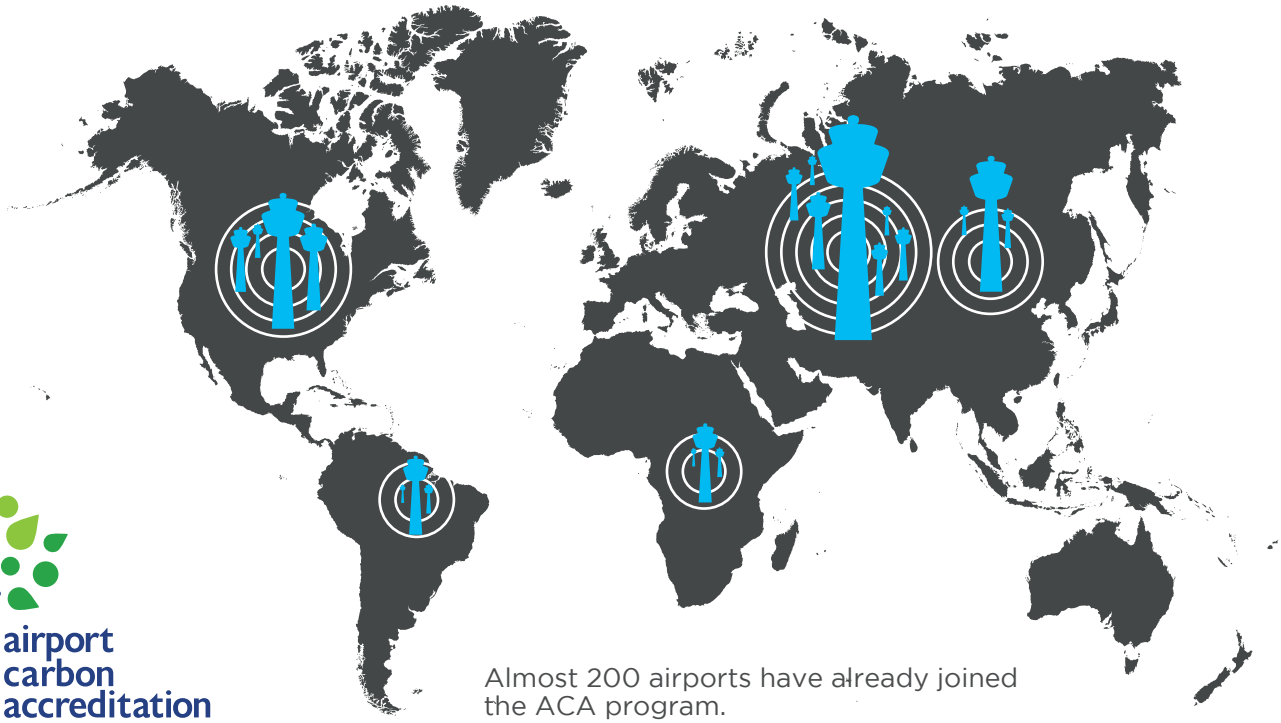
7400 eGPU

Zero Emission

Introducing the battery-powered GPU
Ideal for gates and hangars with
no fixed 400 Hz installations

For greener airports and
a better working environment

It's all about connections ITW GSE



airport carbon accreditation
MAPPING I REDUCTION I OPTIMISATION I NEUTRALITY

Almost 200 airports have already joined the ACA program.
Source: ACA 2016–2017 Annual Report

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 local governments can and will accept.

BATTERY-POWERED GSE MARCHES FORWARD

To reduce emissions to airports, battery powered GSE is rapidly replacing diesel-powered equipment such as cargo loaders and pushback tractors.
400 Hz GPUs are an even greater energy guzzler. More energy needs to be delivered over a longer time period. This is why the introduction of ITW GSE's groundbreaking and environmentally friendly 7400 eGPU will be a game changer. A great benefit stands to be gained from replacing popular diesel-hungry GPUs and creating a better environment.

OUR VISION

"We will supply the aviation industry with the cleanest, most reliable and most cost efficient GSE system available."

This is why we developed the ITW GSE 7400 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

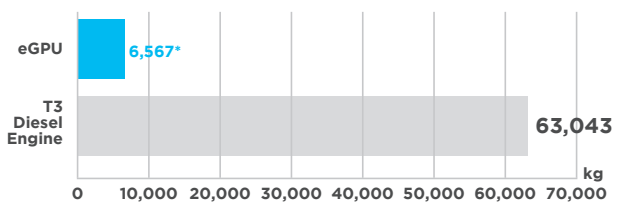
Diesel GPUs have high fuel consumption since they need to be constantly running at high engine speeds to generate the 400 Hz power an aircraft requires. This means high CO_2 emissions and high noise levels.

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

NO_X EMISSIONS

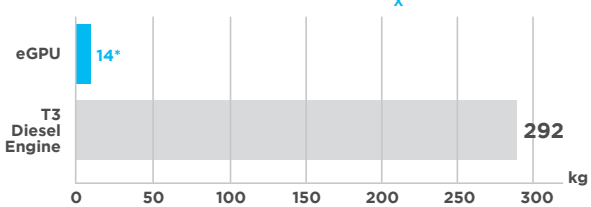
Diesel GPUs have a high level of NO_X emissions. The harmful health effects hereof are becoming increasingly better understood. The eGPU emits no NO_X into its operating environment, so it can contribute significantly to a cleaner and safer working environment for your employees.

OVERALL IMPACT ON CO_2 EMISSIONS



CO_2 emissions for 1 unit for 1 year (Avg. 5 ½ operating hours per day)

OVERALL IMPACT ON NO_X EMISSIONS



Annual NO_X emissions (Avg. 5 ½ operating hours per day)

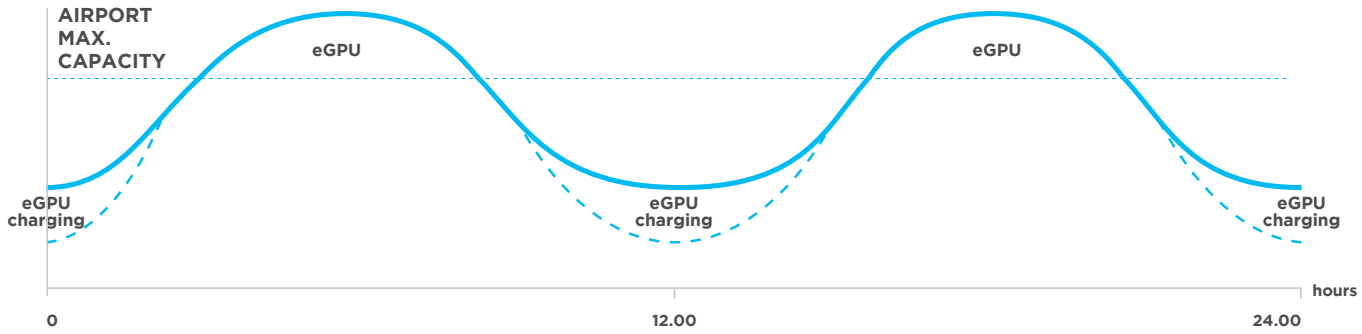
*Calculated using average power plant emissions based on data from electricitymap.org

GROW THE CAPACITY
OF YOUR EXISTING INFRASTRUCTURE

WITH 7400 BATTERY GPUs

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

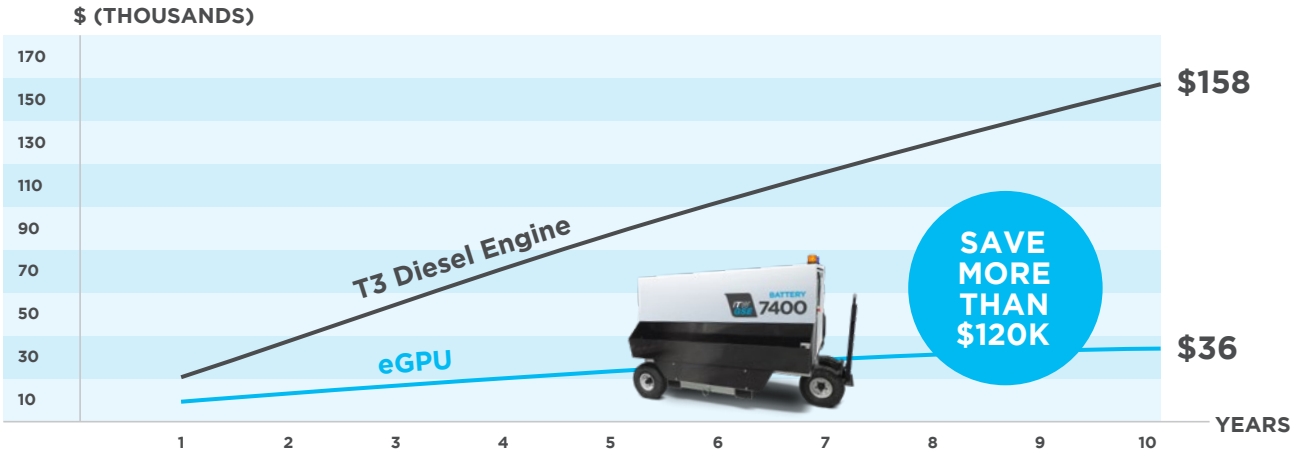
Making eGPUs a part of your airport's electrical infrastructure allows you to smooth out your capacity demands over a 24-hour period. The eGPUs can be charged during quiet periods and contribute to increasing total capacity in peak periods.



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

SAVE MORE THAN $120,000
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 an eGPU used 5 ½ hours/day during the year. Lower electricity and maintenance costs make the eGPU a winner in comparison. Provide your fuel and electricity prices for a customized calculation of *YOUR* savings.

SUCCESSFULLY TESTED AT AMSTERDAM SCHIPHOL AIRPORT

In 2017, a desire to develop Schiphol airport sustainably led to Nissan and ITW GSE carrying out a comprehensive test of a prototype eGPU based on Nissan Leaf battery technology combined with an ITW GSE 2400 converter. The result was clear.

"THE FUTURE LOOKS CLEAN AND BRIGHT"
These were the words of Marcel van Beek, Manager for Process Innovation at Schiphol, after the test. The desire was for a quiet, zero-emission eGPU that did not require retraining employees, with light maintenance requirements and solid reliability. The answer is the ITW GSE 7400 eGPU.

Use in hangars – no input power cables

Plug & Play Voltage Compensation

Mobile GPU and linepowered converter in one unit

On-Board Charging System

Recharge from any 50/60Hz standard socket

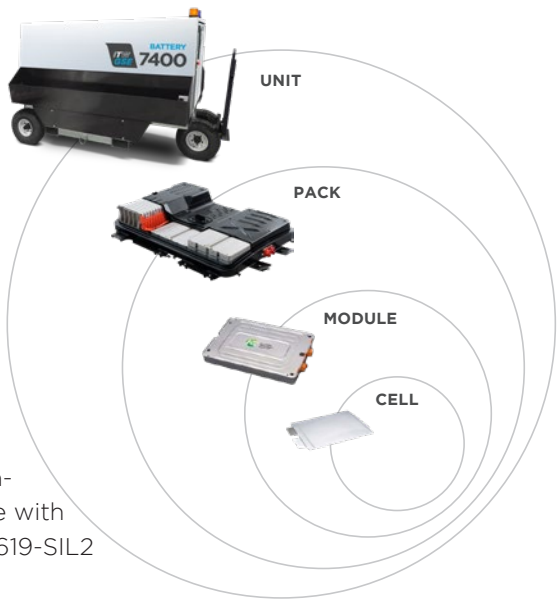
Size to fit (2-4 battery packs)

EXTREME FLEXIBILITY

The ITW GSE 7400 eGPU is set to change 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 standard 50/60Hz socket.

FOUR SHIELD SAFETY DESIGN

The ITW GSE 7400 eGPU has a four shield safety design with safety built in to each layer. Each cell contains resistance for internal shorts circuit. The module can withstand deformation. The battery pack is fail-safe, and waterproof too. In testing, it can withstand free falls from a height of 6 meters (19.6 feet). And finally, the outermost layer is crush safe. It has a total of four shields which form an effective protective layer against hazardous impacts of a mechanical, electrical, and thermal nature.



In compliance with EN 62619-SIL2

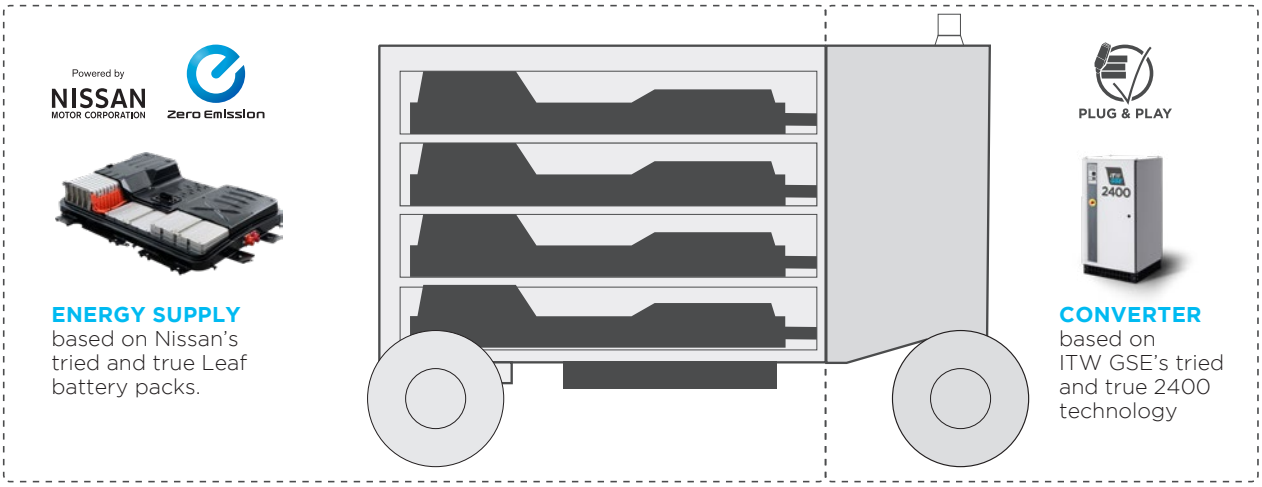
A WELL-PROVEN SOLUTION

THE ITW GSE 7400 eGPU COMBINES TWO KNOWN TECHNOLOGIES INTO ONE INNOVATIVE GPU

The ITW GSE 7400 eGPU is powered by 2-4 fourth-generation Nissan Leaf battery packs. Each pack has a capacity of 40 kWh. This is the same type of battery found in all Nissan-branded electric vehicles. Since 2010, over 500,000 of these vehicles have been sold, with more than 90,000 in 2017 alone.

WELL-PROVEN GPU

At the other end of the eGPU is ITW GSE's well-proven 2400 solid-state converter. This combination of two tried and true technologies has created the rock-solid eGPU. The GPU is, of course, equipped with our patented Plug & Play system and can therefore deliver a unique voltage at the aircraft plug.



SAME EASY-TO-USE PLATFORM AS ALL OTHER ITW GSE PRODUCTS

Like all ITW GSE products, the 7400 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 communality.

SPECIFICATIONS
ITW GSE 7400 eGPU

Zero Emission

June 2018 - M:11023

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

Charging Time :

	Pre-Fuse		
Battery Packs	**32 A**	**63 A**	**125 A**
2 x	3h 36min	3h 18 min	3h 18 min
3 x	5h 30 min	3h 18 min	3h 18 min
4 x	7h 18 min	3h 42 min	3h 18 min

Values based @ 3x400 V and 20°C ambient

Output
- Rated power: 90 kVA PF 0.8–1
- 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

Weight
- Mobile unit:
  4 batteries: 2,200 kg (4,850 lbs)
  3 batteries: 1,900 kg (4,189 lbs)
  2 batteries: 1,600 kg (3,527 lbs)

Turnarounds as Function of Time and Aircraft

Based on average measured consumption. Subject to aircraft configuration.		2 Packs (80 kWh) Time at gate in minutes			3 Packs (120 kWh) Time at gate in minutes			4 Packs (160 kWh) Time at gate in minutes		
		40	60	80	40	60	80	40	60	80
Aircraft Narrow Body 1 x 90 kVA Unit	CRJ-900LR	8.1	5.4	4.1	12.2	8.1	6.1	16.2	10.8	8.1
	A320-200	7.7	5.1	3.8	11.5	7.7	5.7	15.3	10.2	7.7
	A321-200	3.8	2.5	1.9	5.6	3.8	2.8	7.5	5.0	3.8
	B737-800	4.8	3.2	2.4	7.2	4.8	3.6	9.6	6.4	4.8
Aircraft Wide Body 2 x 90 kVA Unit	A340		3.1	2.3		4.7	3.5		6.3	4.7

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

ITW GSE 7400 eGPU
ISO 6858:2017
EN 62619 - SIL2
IN COMPLIANCE WITH

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)

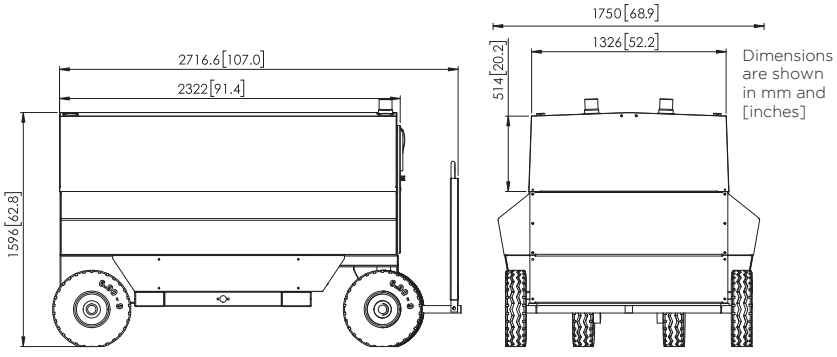
Efficiency
- 400 Hz converter and charger part > 0.95

Miscellaneous
- MTTR: max. 20 minutes
- Color: RAL 7035 (standard)

Standard Features/Equipment:
- Plug & Play
- Max. input current setting (e.g. 125 A, 63 A or 32 A) via display
- Amber beacon for operation (incl. charging)
- Blue beacon for low battery
- Towbar interlock for 50/60 Hz input

Overload Ratings
- As per ISO 6858:2017- type 1 equipment

Standard Options Available
- 28 VDC TRU (Transformer Rectifier Unit)
- Input cable and plug according to clients specifications
- 4 x 50 mm² output cable (AWG 1/0) (with over current protection)
- 4 x 70 mm² output cable (AWG 2/0)
- Towbar interlock – 400 Hz output
- DIN40 towing eye
- Clearance light
- Netbiter (data/location over GSM/GPS)
- Coming soon is the ability to use one 7400 as a power supply for another 7400 in case of unexpectedly long turnaround time



Specifications are subject to change without prior notice

It's all about connections

ITW GSE