

ITW GSE

# 1400 <sup>28 VDC</sup> GPU

Rating 600 & 400 A



## LOOKING FOR A SMALL POWERFUL UNIT?

Easy to manoeuvre and not space demanding neither in its mobile nor fixed version. Then the ITW GSE 1400 solid-state GPU is the answer.

The solid-state technology means that wear and tear is limited to a minimum since there are no rotating parts. The result is a very reliable and dependable unit that is built to last for a long time. In case of service or repair, the canopy can be completely removed within minutes, thus leaving full access to all parts.

## INTUITIVE AND EASY-TO-USE INTERFACE

The icon based operator interface is common for all ITW GSE products. It is easy and intuitive and guarantees you correct operation.

The daily operator only has to press the combined start/stop button - nothing more. But he can monitor various parameters such as voltage and current at the display screen. For set-up and maintenance purposes, there is a deeper level dedicated for the technician.

## DOWNLOADS AND UPDATES

The software-based control system means that the ITW GSE 1400 GPU can easily be updated in the future simply by transferring new software from a USB stick/flash drive. Power log and Black Box files for analysis can be downloaded the same way.



It's all about connections



# SPECIFICATIONS

## ITW GSE 1400 28 VDC Ground Power Unit

### Input

- Voltage range:  
3 x 400 V -10/+15%  
3 x 460 V -10/+20%
- Frequency: 50/60 Hz  $\pm$  5%
- Rectification: 6 pulse
- Line current: 29 A
- Power factor: 0.91
- Inrush current: None, soft start

### Output

- Current: 600 A continuously  
(can be limited to 400 A upon request)
- Engine Start Capability:  
28 V @ 2000A
- Voltage: 28 VDC (or as adjusted)
- Ripple: less than 2% at full load
- Voltage regulation:  
<0.5% from no load to full load
- Voltage compensation:  
3 V @ 600 A  
Manual or voltage feed-back  
via interlock

### Weight

- Fixed unit approx.  
120 kg (264 lbs.)
- Mobile unit approx.  
240 kg (264 lbs.)

### Efficiency

- Overall efficiency: 0.87
- Stand by losses: 130W
- No load losses: 330W

### Environmental

- Operating temperature:  
-40°C to +56°C (-40°F to +135°F)
- Relative humidity 10-100%  
non condensing
- Noise level <65 dB(A)@1m

### Overload ratings

- | 600 A    | 400 A                 |
|----------|-----------------------|
| • 1200 A | 800 A for 30 seconds  |
| • 1800 A | 1200 A for 10 seconds |
| • 2100 A | 1400 A for 5 seconds  |
| • 2400 A | 1600 A for 2 seconds  |

### Miscellaneous

- MTBF (proven): 100,000 hours
- Ventilation system: min. 25,000 hours
- MTTR: max. 20 minutes
- Communication: TCP/IP, USB

### Protection

- Protection class: IP55 (electronic section)
- Over/under voltage at in/output
- Over temperature
- Internal voltage error
- Short circuit at output
- Trip in case that:
- U<20 VDC for more than 4 seconds
- U>32 VDC for more than 4 seconds
- U>40 VDC for more than 150 ms

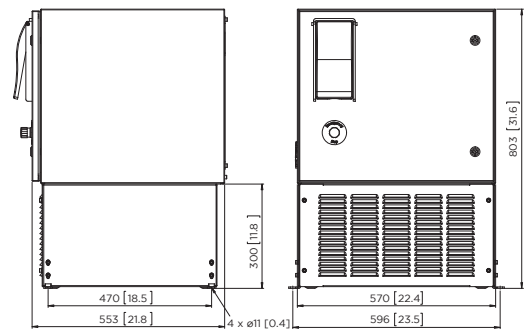
### Options

- Cables upon request

### Norms and Standards

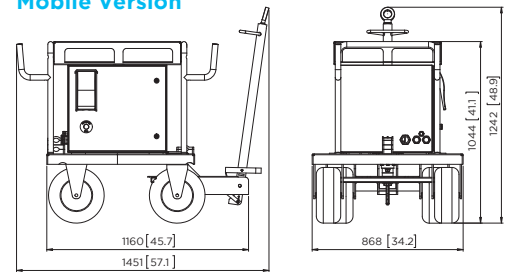
- ISO 6858 Aircraft ground support electrical supplies – General requirements
- BS 2G 219 General requirements for ground support equipment
- MIL-704F Aircraft electric power characteristics
- EN 1915 - 1 & 2 (Machinery - General safety requirements)
- EN 12312-20 (Machinery - Specific safety requirements)
- EN 60204-1 (Machinery - Electrical safety)
- EN 62040-1-1 LVD - Safety standards
- EN 61558-2-6 LVD - Safety standards
- EN 61000-6-2 EMC - Immunity standard
- EN 61000-6-4 EMC - Emission standards

### Fixed Version



Dimensions are shown in mm and [inches]

### Mobile Version



Dimensions are shown in mm and [inches]



The ITW GSE 1400 is light and small; the fixed version is only 80 cm high!

Should you want cables with your ITW GSE 1400 unit, we can of course supply those as well.

ITW GSE

# 2400 COMPACT GPU

30-45-60-90-120-140-180 kVA solid-state GPU



**PLUG & PLAY**  
UNIQUE VOLTAGE QUALITY



It's all about connections





# OPTIMAL POWER AT THE AIRCRAFT

At ITW GSE, we monitor the market and are at the forefront of new aircraft requirements and market developments. This has been an objective since we introduced our first 400 Hz unit to the market. And it still is ! Therefore, the ITW GSE 2400 Compact is designed to fulfil the ISO 6858 standard regarding voltage imbalance and phase displacement at the aircraft plug.

## **SMALL, SIMPLE, RELIABLE AND ROBUST**

The 2400 series is the market's best choice when it comes to solid-state, point-of-use units. It is small and simple, reliable and robust. It has all kinds of outstanding technical qualities from the unique output voltage, the smart ITW GSE user interface, soft-ware update via USB and the standard overload capabilities that matches all types of aircraft.

## **UNIQUE VOLTAGE QUALITY AT THE PLUG MEANS ON-TIME DEPARTURES**

Fixed installations often include a mix of long

symmetrical and asymmetrical output cables as well as connection boxes that makes it difficult to keep the required voltage quality at the aircraft connector. This is exactly where ITW GSE's patented Plug & Play voltage compensation system makes a difference. The Plug & Play system is based on a true individual phase regulation combined with a predetermined model of the actual cable installation. Therefore, the 2400 GPU provides an outstanding voltage quality at the connector thus ensuring on-time departures and happy passengers!

## **FURTHER BENEFITS OF THE ITW GSE 2400**

- 400% overload
- 90 kW continuous at an ambient temperature of 56°C
- Clean input power with a unity power factor and a current THD less than 5% due to the magnetic wave-shaping topology
- TCP / IP connection to BMS as standard

# SPECIFICATIONS

## ITW GSE 2400 30-45-60-90 kVA solid-state GPU

### Input

Type	Amps (0.8)	Amps (1.0)	Hertz	Voltage
30 kVA	63 A	78 A	45-65	230 ±15%
	38 A	48 A	45-65	400 ±15%
	30 A	37 A	45-65	480 ±10%
	25 A	32 A	45-65	600 ±10%
45 kVA	91 A	114 A	45-65	230 ±15%
	58 A	71 A	45-65	400 ±15%
	48 A	59 A	45-65	480 ±10%
	39 A	47 A	45-65	600 ±10%
60 kVA	75 A	93 A	45-65	400 ±15%
	63 A	78 A	45-65	480 ±10%
	50 A	62 A	45-65	600 ±10%
90 kVA	111 A	140 A	45-65	400 ±15%
	93 A	117 A	45-65	480 ±10%
	74 A	94 A	45-65	600 ±10%

- Rectification: Magnetic wave-shaping
- Line current distortion: 90 kVA <5%, 60 kVA < 9%, 45 kVA < 10%, 30 kVA < 12%
- Power factor: 90 kVA: 1 @ nominal load  
45-60 kVA: 0,99 30 kVA: 0,97
- Inrush current: None

### Output

- Rated Power: 30-45-60-90 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 load and up to 30% unbalanced load
- Voltage recovery:  $\Delta U$  <8% and rec. time <10 ms at 100% load change
- Total harm. content: <2% at linear load (typ. 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 load  
120° ± 2° for 30% unbal. load

### Protection

- Protection class: IP55
- No break power transfer
- Over/under voltage at output
- Overload
- Internal high temperature
- Control voltage error
- Short circuit at output
- GPU enable
- 90% switch interlock
- Neutral voltage supervision
- Broken neutral supervision
- Leakage current supervision

### Weight

- Fixed & PBB units: 310 kg (683 lbs.)
- Mobile units: 460 kg (1,014 lbs.)

### Efficiency

- Overall efficiency: 0,94 at 35-90 kVA load PF 0,8  
0,90 at 25 kVA load PF 0,8
- Stand by losses: 65 W
- No load losses: 2,2 kW

### Environmental

- Operating temperature: -40°C to 56°C (-40°F to +132°F) (+60°C (+140°F) at Aircraft Load)
- Relative humidity 10-100%
- Noise level <65 dB(A)@1m - typically 60 dB(A)

### Overload Ratings

- 125% for 600 seconds
- 150% for 60 seconds
- 200% for 30 seconds
- 300% for 10 seconds
- 400% for 1 second

### Miscellaneous

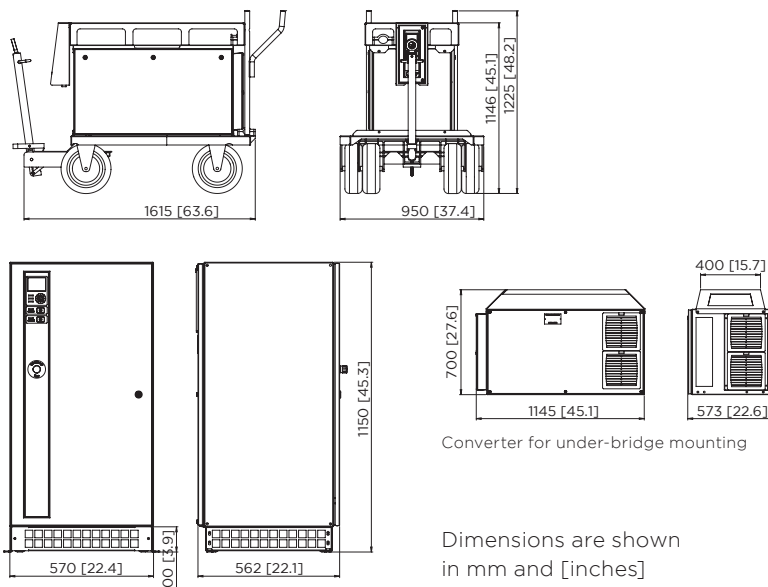
- MTTR: max. 20 minutes
- Colour: RAL 7035 (standard)

### Available Standard Options

- 28 VDC, 600 A output (ARU) Kindly refer to page "Power two aircraft with just one GPU"
- Additional base module
- Additional output contactor
- Terminal extension for 2 pcs. of 7 core cable
- Remote control box
- Lockable door
- Door switch
- RS485 interface
- Military interlock
- Dry Contacts
- ITW GSE service tool

### Norms and Standards

- See next page



Dimensions are shown in mm and [inches]



# ITW GSE 2400 120-140-180 kVA solid-state GPU

## Input

Type	Amps (0.8)	Amps (1.0)	Hertz	Voltage
120 kVA	150	190	45-65	400 ± 15%*
	130	160	45-65	480 ± 10%*
	105	130	45-65	600 ± 15%*
140 kVA	175	220	45-65	400 ± 15%*
	150	185	45-65	480 ± 10%*
	120	150	45-65	600 ± 15%*
180 kVA	230	285	45-65	400 ± 15%*
	190	240	45-65	480 ± 10%*
	150	190	45-65	600 ± 15%*

\* Values adjusted to next 5A value

- Rectification: Magnetic wave-shaping
- Line current distortion: 120 kVA: 9%, 140 kVA: 7%, 180 kVA: 5%
- Power factor: 120 - 140 kVA: 0,99  
180 kVA: 1 @ nominal load
- Inrush current: None

## Output

- Rated Power: 120-140-180 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 load and  
up to 30% unbalanced load
- Voltage recovery:  $\Delta U$  <8% and rec.  
time <10 ms at 100% load change
- Total harm. content: <2% at linear

## Norms and Standards (valid for 30 to 180 kVA units)

- DFS400 Specification for 400 Hz aircraft power
- ISO 6858 Aircraft ground support electric supplies
- BS 2G 219 General requirements for ground support equipment
- MIL-STD-704F Aircraft electric power characteristics
- SAE ARP 5015 Ground equipment 400 Hz ground power performance requirement
- EN2282 Aerospace series characteristics of aircraft electrical supplies
- EN62040-1-1 General & safety requirement
- EN61558-2-6 General & safety requirement
- EN61000-6-4 Electromagnetic compatibility Generic emission standard
- EN61000-6-2 Generic immunity standard
- EN1915-1&2 Machinery; general safety requirements
- EN12312-20 Machinery; specific safety requirements
- Listed per UL1012 (Only valid for 230/480/600V versions)

load (typ. 1,5%) <2% at non linear load according to ISO 1540

- Crest factor:  $1,414 \pm 3\%$
- Voltage modulation: <1,0%
- Phase angle symmetry:  
 $120^\circ \pm 1^\circ$  for balanced load  
 $120^\circ \pm 2^\circ$  for 30% unbal. load

## Protection

- Protection class: IP55 input & output zones
- No break power transfer
- Over/under voltage at output
- Overload
- Internal high temperature
- Control voltage error
- Short circuit at output
- GPU enable
- 90% switch interlock
- Neutral voltage supervision
- Leakage current supervision

## Weight

- Fixed & PBB units: 650 kg (1,433 lbs.)

## Efficiency

- Overall efficiency:  
0.93 at 180 kVA load PF 0.8-1
- Stand by losses: 150 W
- No load losses: 4,4 kW

## Environmental

- Operating temperature:  
 $-40^\circ\text{C}$  to  $+56^\circ\text{C}$  ( $-40^\circ\text{F}$  to  $+132^\circ\text{F}$ )  
( $+60^\circ\text{C}$  ( $+140^\circ\text{F}$ ) at Aircraft Load)
- Relative humidity 10-100%
- Noise level < 65 dB(A) @1m

## Overload Ratings

- 125% for 600 seconds
- 150% for 60 seconds
- 200% for 30 seconds
- 300% for 10 seconds
- 400% for 1 second

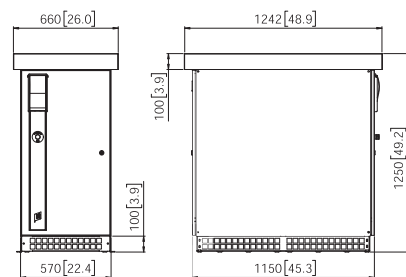
## Miscellaneous

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

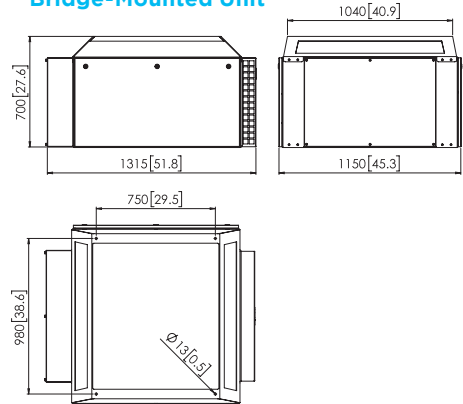
## Available Standard Options

- Additional base module
- Single output configuration
- Terminal extension for 2 pcs.  
of 7 core cable
- Remote control box
- Lockable door
- Door switch
- RS485 interface
- Military interlock
- Dry Contacts
- ITW GSE service tool

## Fixed Unit



## Bridge-Mounted Unit

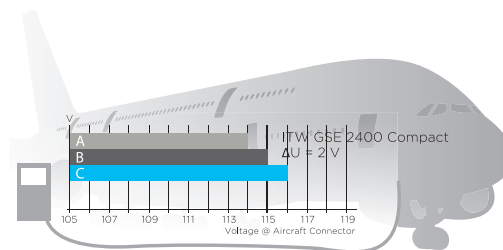


Dimensions are shown in mm and [inches]

## UNIQUE VOLTAGE QUALITY

The output voltage quality of the ITW GSE 2400 Compact is unique due to the patented Plug & Play system. The ITW GSE 2400 is designed to fulfil the ISO 6858 standard that requires max. phase unbalance of less than 4 V and a phase angle of  $120^\circ \pm 2.5^\circ$ .

The example to the right shows the voltage of the 3 phases at 35% unbalanced load @ PF 0.8 by use of a typical cable consisting of 65 m of 7x35 mm<sup>2</sup> installation cable and 26 m of 4x70 mm<sup>2</sup> flexible cable.



The ITW GSE 2400 Compact fulfils the ISO 6858 standard

## SUPPLY ALL AIRCRAFT INCL. PF1

The ITW GSE 2400 Compact is a true Power factor 1 ground power unit that allows for 400% overload meaning that it can be used for all types of aircraft from the narrow-body to the wide-body incl. B787/A350/A380.



## THE ITW GSE OPERATOR INTERFACE

The ITW GSE operator interface is easy and intuitive. This is your guarantee for correct operation and on-time aircraft departures. The operator interface is common from one ITW GSE product to another. Therefore, airport staff familiar with one ITW GSE product can easily switch to another as the icons and display are the same. The operator only has to press the combined start/stop button. Also, he can monitor various parameters such as voltage and current at the display screen. For easy set-up and maintenance purposes, there is a deeper level dedicated for the technician.



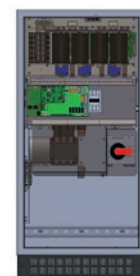
## MAXIMUM PERSONAL SAFETY

- Protective covers behind access doors to prevent accidental exposure to "live" parts
- Supervision of neutral conductor rupture & leakage current
- Supervision of neutral voltage
- Detection of hazardous voltages at aircraft frame (by supervision of interlock voltage)
- Avoidance of hazardous voltages in control wires through prevention of insulation failures in cable or plug



## EASY CABLE CONNECTION

Connection of the rigid in- and output cables is easy since there is room for a very good manoeuvrability at the bottom of the cabinet. Further, we have integrated a robust bar at the bottom for cable relief. Access to the vital parts of the converter is extremely easy since those parts have all been positioned right behind the front door in a well-arranged way.



## DOWNLOADS AND UPDATES

The software-based control system means your ITW GSE 2400 Compact can be updated and given additional capabilities in the future, simply by transferring new software from a USB stick/flash drive. Service log files and maintenance data can also be transferred the same way for analysis and to help ensure more efficient back-office procedures and more effective facility management.



# POWER TWO AIRCRAFT WITH JUST ONE GPU?

Yes – Choose option  
ITW GSE 2400 Combi Compact Unit



www.itwgse.com

Often, the same parking position accommodates a large mix of aircraft during a day. Typically, a parking position would require a 400 Hz source in the morning where the bigger aircraft are docking – but 28 V during other times of the day. Is this your requirement, the 2400 Compact Combi unit is the answer.

The combi unit is capable of delivering 400 Hz and regulated 28 VDC power, simultaneously and independently! The 28 V Active Rectifier Unit (ARU) - available as a standard option - delivers superior voltage quality at the aircraft plug without jeopardising the 400 Hz voltage. It goes without saying that the ITW GSE 2400 Compact Combi will power your aircraft, whether a narrow body or a turbo prop, whenever you need it!

## Output Specifications, 28 VDC ARU

- Voltage: 28 VDC  
Max. output power for complete unit is limited to the nominal rating of the 400 Hz part of the unit
- Current: 600 A (400 A) continuously
- Voltage regulation: < 0,5%
- Voltage ripple: < 2%
- Voltage transient recovery  
Complies with ISO 6858 / MIL-704F
- Overload capability: 600 A (400 A)  
1200 A (800 A) for 30 seconds  
1800 A (1200 A) for 10 seconds  
2100 A (1400 A) for 5 seconds  
2400 A (1600 A) for 2 seconds  
To protect the aircraft, the output voltage is decreased by 2 V per 600 A (400 A) in the overload range 600-2400 A (400-1600 A)  
Complies with ISO 6858

## Setup:

- Output voltage: 19-33 V
- Voltage compensation: 0-3 V (600/400 A)
- Current limit: 300-2400 A in steps (600 A units)  
200-1600 A in steps (400 A units)

## Protection

- Rectifier temperature too high
- Short circuit at output
- Over and under voltage at output  
U < 20 VDC for more than 4 seconds  
U > 32 VDC for more than 4 seconds  
U > 40 VDC for more than 150 ms

## Weight

- Fixed Combi Compact: 410 kg (903 lbs.)
- Mobile Combi Compact: 585 kg (1,290 lbs.)

## Environmental

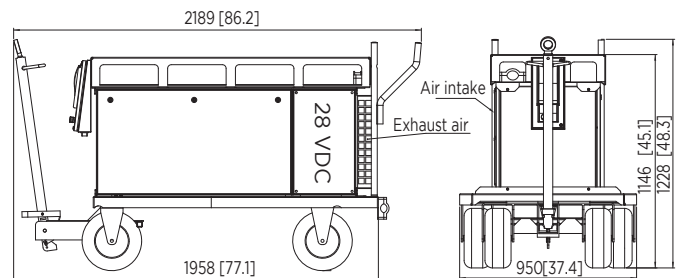
- Operating temperature -40°C to +45°C (-40°F to 113°F)

## Available Ratings

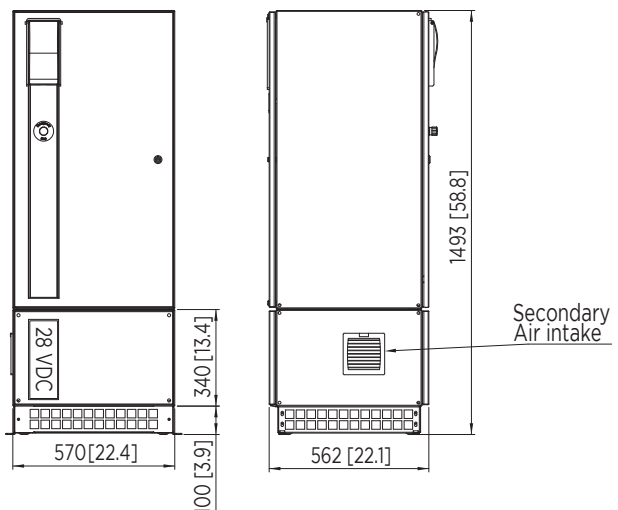
- 30 kVA with 28 VDC ARU
- 45 kVA with 28 VDC ARU
- 60 kVA with 28 VDC ARU
- 90 kVA with 28 VDC ARU

All available in fixed and mobile versions

## Mobile Version



## Fixed Version



Dimensions are shown  
in mm and (inches)