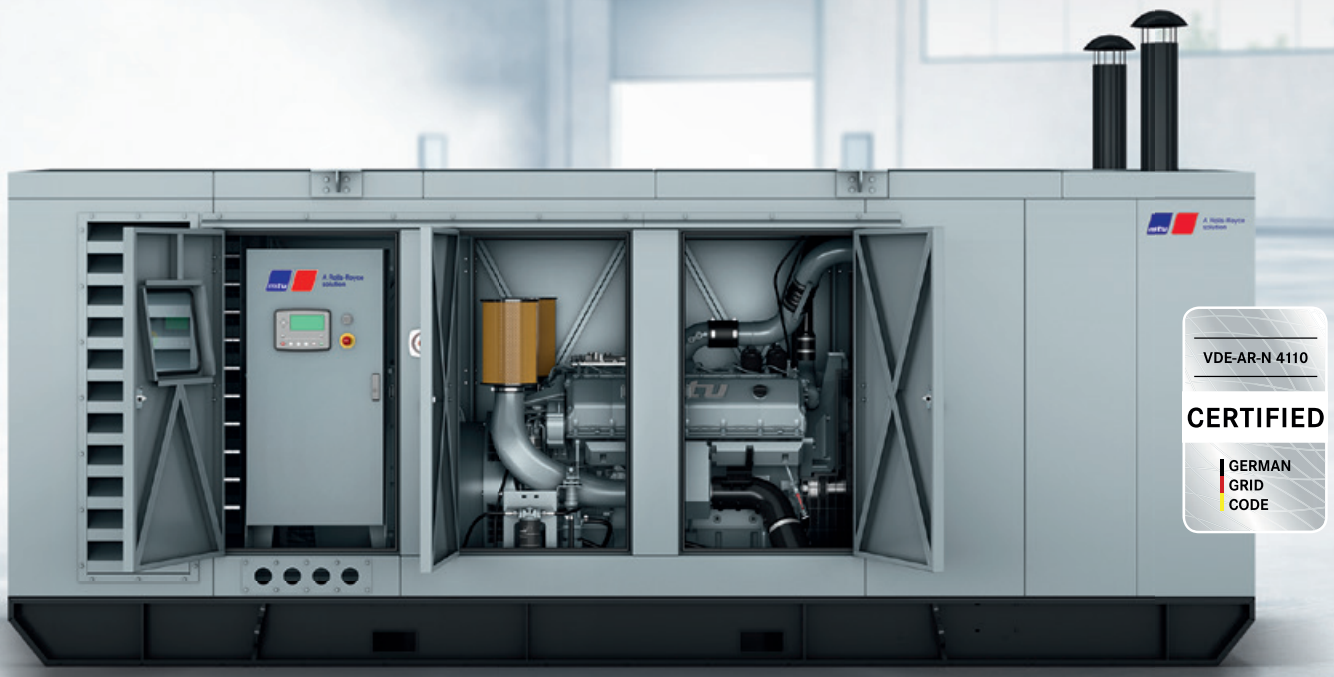


Power Generation I ***mtu*** Series 1600 Generator Sets I 450–1.000 kVA I 50Hz

POWERFUL, FLEXIBLE, ECONOMICAL, FUTURE-PROOF.

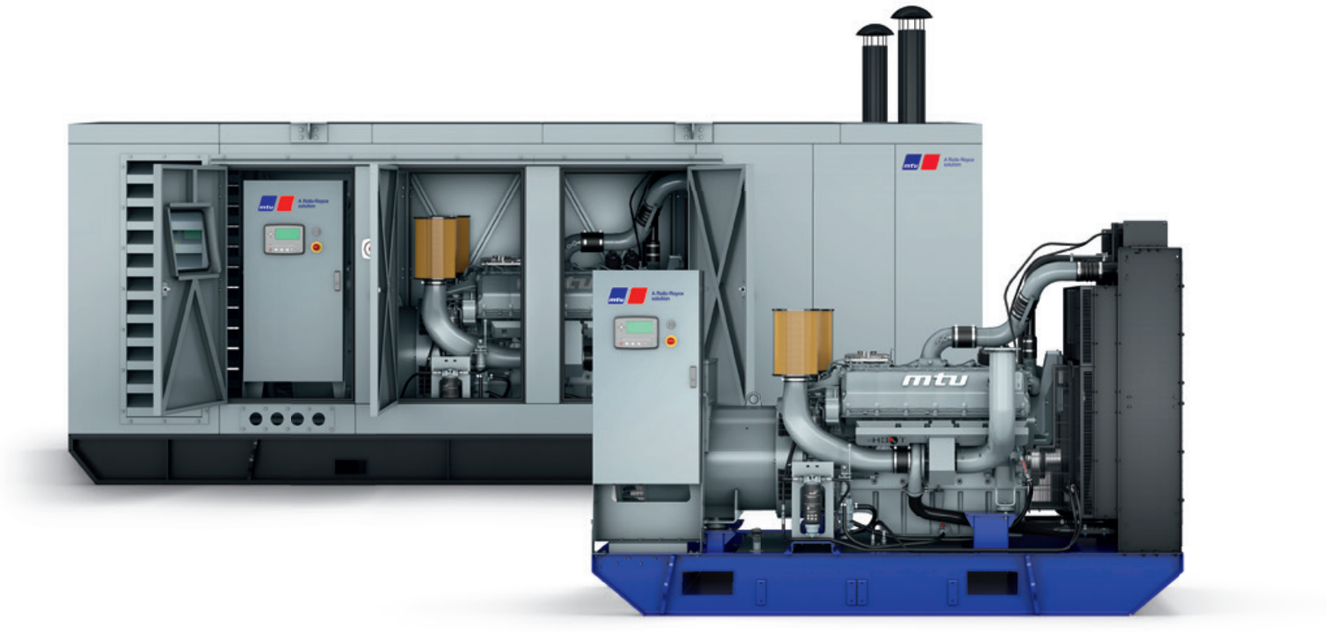
WAY TO NET ZERO Renew-able fuel

A Rolls-Royce solution

APPLICATION & POWER RATING OVERVIEW

From mission critical hospitals and construction sites to telecommunications centers and remote sites, different jobs have different needs. With a full line of optional accessories and weather proof enclosures with different sound levels, the ***mtu*** Series 1600 can be easily configurated to fit your exact or project-specific requirements.
All our products meet the highest standards for quality and safety and meet or even exceed all performance related industry norms.

Available from a single source, they are also production-tested to work together as integrated systems, ensuring exceptional reliability and performance.
We back our quality products with service. ***mtu*** distributors and dealers are ready to serve all your power needs. Your local distributor is factory-trained to service your power generation systems during their entire lifecycle and beyond.



mtu 12V1600 DS enclosed and open power units.

Our rating and application overview.
All major ISO 8528-1 ratings are covered by ***mtu*** Series 1600 for each type of application.

Application		Continuous/Prime/ Grid Stability	Standby & Mission Critical		
					
ISO rating compliance		ISO 8528-1 PRP Prime Power	ISO 8528-1 ESP Emergency Standby Power		ISO 8528-1 DCP Data Center Power
mtu ratings		Prime Power **3B**	Standby Power **3D**	Prime Power for Stationary Emergency **3E** NEW	Data Center Continuous Power **3F** NEW
	Load Factor	≤ 75%	≤ 85%	≤ 85%	≤ 100%
	Overload Capability	10% (1 hour in 12)	–	10% (1 hour in 12)	10% (1 hour in 12)
	Operating Hours	unlimited	500h/year or for the duration of an emergency	500h/year or for the duration of an emergency	unlimited
	Time Before Overhaul (TBO)	12,000h or 18 years (which ever comes first)			
	Uptime Institute Tier Compliance	Tier I - II	Tier I - II	Tier I - II	Tier I - IV

Series 1600 portfolio
Diesel Generator Set Ratings | 50Hz [kVA]

Cylinder	Genset Model	Engine Model	Standby Power (3D) ISO - ESP	Engine Model	Prime Power (3B) ISO - PRP	Prime Power for Stationary Emergency (3E) NEW ISO - ESP	Data Center Continuous Power (3F) NEW ISO - DCP
10V	***mtu*** 10V1600 DS500	10V1600 G70F	500 kVA	10V1600 G10F	450 kVA	450 kVA	450 kVA
	mtu 10V1600 DS540	10V1600 G80F	540 kVA	10V1600 G20F	500 kVA	500 kVA	500 kVA
12V	***mtu*** 12V1600 DS650	12V1600 G70F	650 kVA	12V1600 G10F	590 kVA	590 kVA	590 kVA
	mtu 12V1600 DS715	12V1600 G80F	715 kVA	12V1600 G20F	650 kVA	650 kVA	650 kVA
soon	***mtu*** 12V1600 DS825	12V1600 G71F	825 kVA	12V1600 G11F	750 kVA	750 kVA	750 kVA
soon	***mtu*** 12V1600 DS880	12V1600 G81F	880 kVA	12V1600 G21F	800 kVA	800 kVA	800 kVA
soon	***mtu*** 12V1600 DS1000	12V1600 G91F	1000 kVA	12V1600 G31F	900 kVA	900 kVA	900 kVA

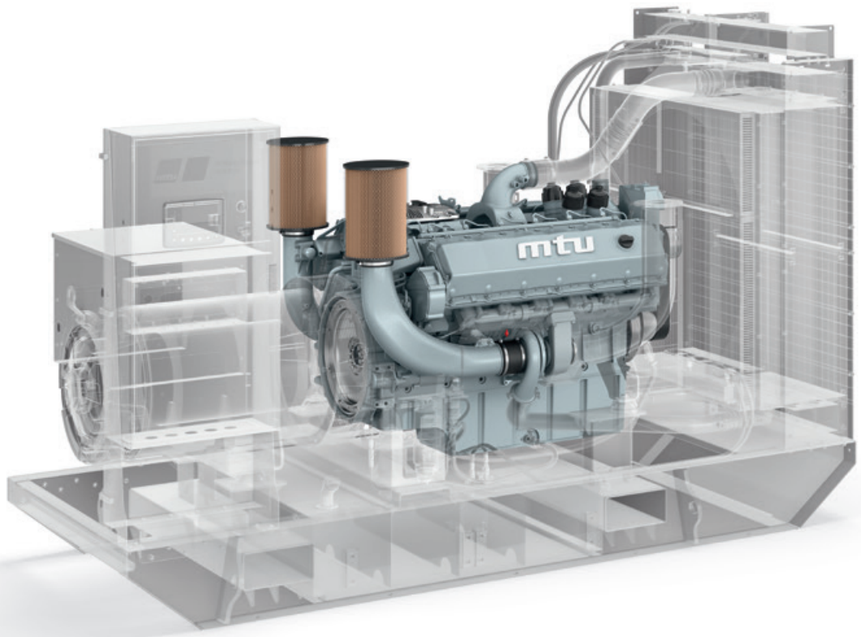
POWER DENSITY REDEFINED

New 12V1600 Gx1 range – up to 40% more power

The new generation of ***mtu*** Series 1600 GenDrive diesel engines are now available in a new 12V1600 Gx1 range. This new range of engines complements the S1600 generator sets portfolio and extends the power range up to 1000 kVA. With their outstanding power-to-size ratio, the new generator sets offer the highest power density in their class.

In combination with the other advantages of the ***mtu*** Series 1600 generator set design, we have developed a new generator that will benefit end users and system integrators in all project phases, from planning, to simulation, to installation and during the entire lifespan of the equipment.

The 12V1600 Gx1 engines are the result of a sophisticated development process bundling all of Rolls-Royce's core competencies in R&D, thermodynamics, analytics, simulation and testing – engine development expertise built up over more than 100 years.



POWERFUL NEW FEATURES

Increasing the power output of an existing platform by up to 40% while achieving our highest quality and performance standards is an ambitious target. That is why the ***mtu*** Series 1600 engine platform was fundamentally redesigned, optimized, and reinforced.

1. More displacement (+7%)
Increased bore (126mm) to achieve power increase and robustness

2. Improved pistons
Redesigned steel pistons for more power and increased robustness

3. Redesigned cylinder head
Improved for higher thermal robustness

4. New turbocharging system
– Specific 50Hz & 60Hz turbochargers to maximise power and load acceptance
– Higher efficiency
– Turbine speed sensors
– Electrically actuated bypass flap to balance air mass
– Larger air filters

5. Optimized injection system
For increased maximum power, better performance and clean emission behaviour

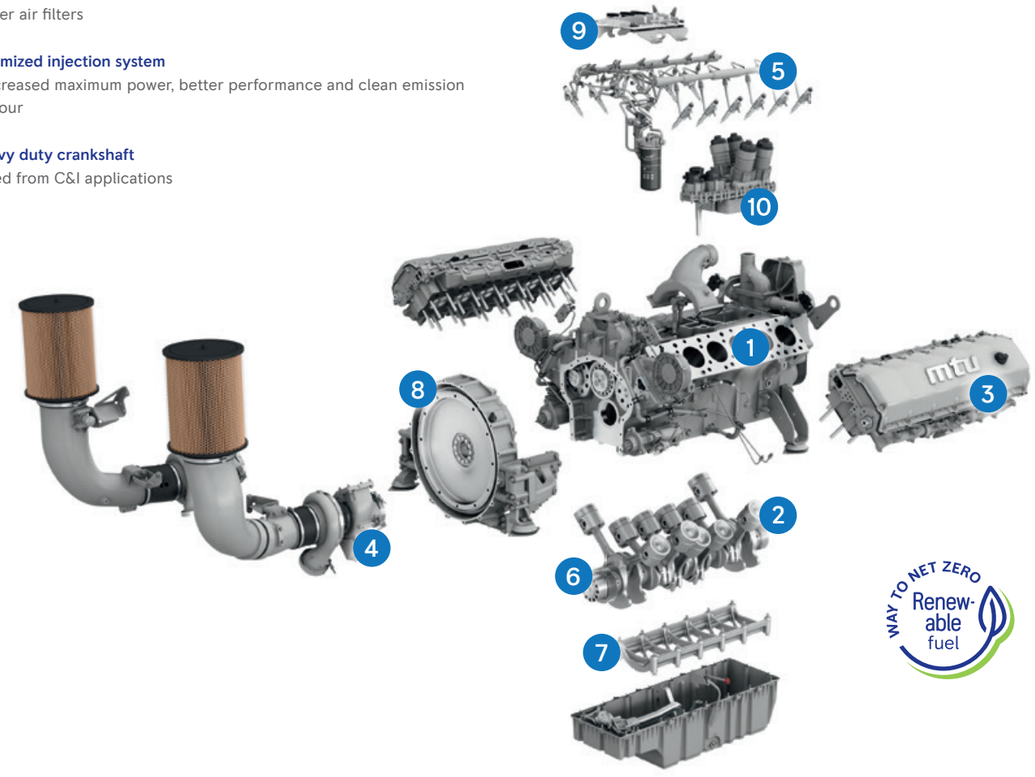
6. Heavy duty crankshaft
Adapted from C&I applications

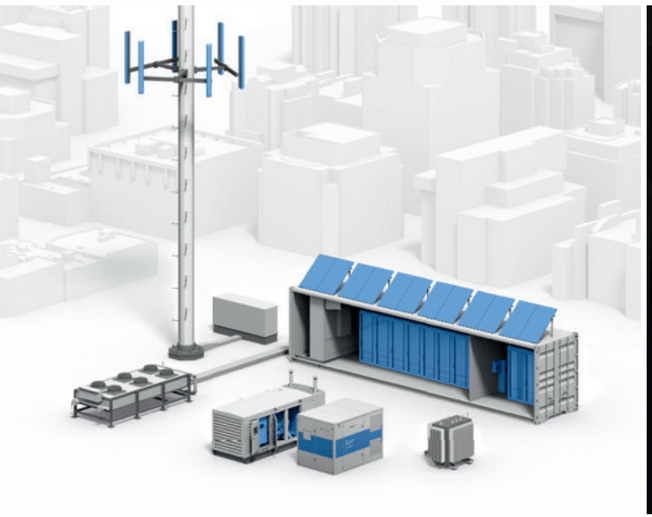
7. Reinforced crankcase
Additional stiffening frame to minimize torsional vibrations

8. Reinforced flywheel housing
– SAEO flywheel for larger alternators
– Additional support bearing and external oil supply
– Additional cradles to increase engine stiffness

9. Upgraded Engine Control Unit
ECU9 for optimized digital engine management and safety functions

10. New crankcase ventilation
To maintain turbo charger efficiency over lifetime





For the full power spectrum scan here

READY FOR EVERY CHALLENGE

From industrial factories to data centers and from hospitals to power stations, the global demand for energy continues to rise. The new Series 1600 50Hz diesel generator sets meet your requirements and deliver the necessary power supply at any location and at any time.

Wide range of applications - full flexibility.
Customers around the world trust in us to provide reliable power for a wide range of applications, in all types of conditions. Originally designed and developed for power generation applications, our new Series 1600 50Hz generator set portfolio covers diesel generator sets in the 450 - 1.000 kVA power range.

They are compliant with state-of-the-art industry codes and standards and also approved for renewable liquid fuels The gensets are compact, powerful, robust and easy to integrate any future energy landscape - just where you need them.

Highest performance
The ***mtu*** Series 1600 generator sets have the best in class power density, industry leading load factors and superior load acceptance capabilities.

Full flexibility
The ***mtu*** Series 1600 portfolio offers the best solution for all kinds of applications and requirements.

Ecological footprint
mtu Series 1600 generator sets are approved for renewable fuels such as HVO to reduce greenhouse gas emissions and are preferctly suitable for hybrid applications.

Low life-cycle costs
The holistic ***mtu*** service concept, optimized maintenance schedules & the ***mtu*** Overhaul Solution keep the life cycle costs of ***mtu*** Series 1600 engines at a minimum.

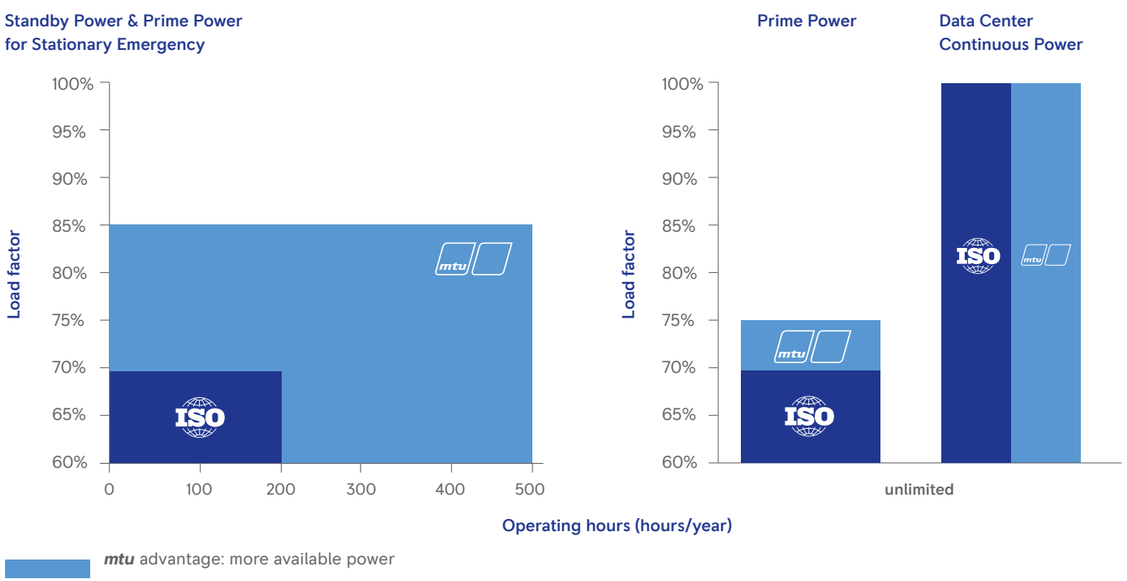
HIGHEST PERFORMANCE

The most important requirement of an emergency standby generator set: Full electrical power with industry-leading load factors available within a few seconds.

All emergency power demands have complex energy needs and fast availability of electricity is crucial. That's why we have designed our systems to offer more available power within only a few seconds. We offer load factors up to 100% which exceed the established industry norms and ISO power rating with extended yearly operating hours. This way, we can deliver sophisticated power solutions with even more actual available power than other manufacturers with the same nominal power — whatever the circumstances.

With the latest introduction of the Data Center Continuous Rating our ***mtu*** Series 1600 products are also in compliance with the high requirements of the Uptime Institute Tier I - IV certification as well as ISO 8528 Data Center Power (DCP). Thousands of ***mtu*** system solutions provide peace of mind all around the world.

Comparing our load factors and operating hours to ISO 8528 requirements



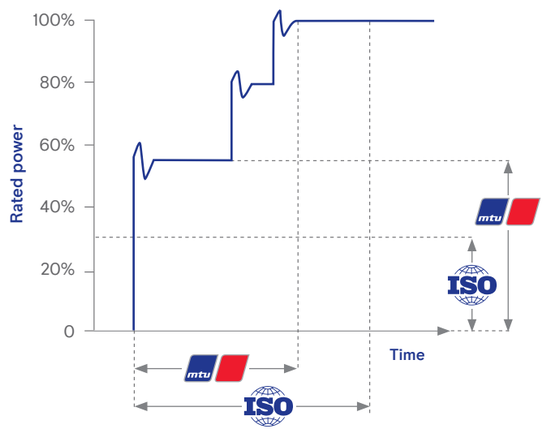
mtu advantage: more available power

Higher load factors and more operating hours offer more available power than ISO-rated engines with the same nominal engine output.

Product highlights

- Superior load acceptance: Full power available within a few seconds
- Overachieving ISO 8528-5 performance class G2 & G3 performance and power quality requirements for transient load operation and recovery time
- Overachieving ISO 8528-5 performance class G2 & G3 load steps
- First load step >50% possible while keeping ISO 8528-5 G3 frequency and voltage limits
- NFPA 110 one-step block load acceptance

Illustrative S1600 ramp-up curve



Extremely fast load acceptance

Higher load steps possible for fast availability

Minimal frequency and voltage deviations

ECOLOGICAL FOOTPRINT

The ***mtu*** Series 1600 is ideally suitable for hybrid applications. With the approval for renewable fuels, the VDE Grid Code certification and best-in-class low load capabilities these generator sets offer many ways to minimize the environmental impact.

Grid Code compliance

Fluctuating renewable energy sources are supplying an increasing share of energy to the world's power grids. Against this backdrop, grid operators face the challenge to keep the grid stable and secure the supply of utility power. To deal with this, grid operators define standards in the form of so-called "Grid Codes" which all energy producers are obliged to follow.

One of the standards is represented by the German Grid Code VDE-AR-N 4110 (based on the European Network Code on Requriements for Grid Connection of Generators NCRfG).
It defines e.g. the requirements for generators regarding power quality, static as well as dynamic grid support or (re-) connection conditions for generators running in parallel with the grid.

All ***mtu*** S1600 generator sets are available with the VDE grid code certification and are therefore suitable for grid parallel operation for monthly test runs or to gain additional revenues through grid services such as frequency control reserve. With this certification, end users benefit through cost savings during the design, simulation, building and connecting phase of each energy project.

Renewable fuels

The increasing availability of synthetic renewable liquid fuels now provides the solution to benefit from both, the reliability and economic efficiency of diesel generators as well significant greenhouse gas (GHG) and emission reductions to achieve important sustainability and decarbonization goals.

Synthetic sustainable fuels are produced out of biogenic resources, such as used cooking oils or, waste and residue fat fractions coming from the food and animal industry, These feedstocks are processed through a hydrotreatment process into a synthetic paraffinic fuel, commonly referred to as renewable diesel or hydrogenated/ hydrotreated vegetable oil (HVO).

Since the carbon cycle is closed, end users hardly emit additional greenhouse gases into the atmosphere and can simply operate conventional diesel generator sets with nearly net zero carbon emissions. All ***mtu*** Series 1600 generator sets are approved for synthetic fuels according to EN15940, such as HVO). For detailed information please contact your local ***mtu*** support.

Further benefits of HVO (acc. to EN15940)

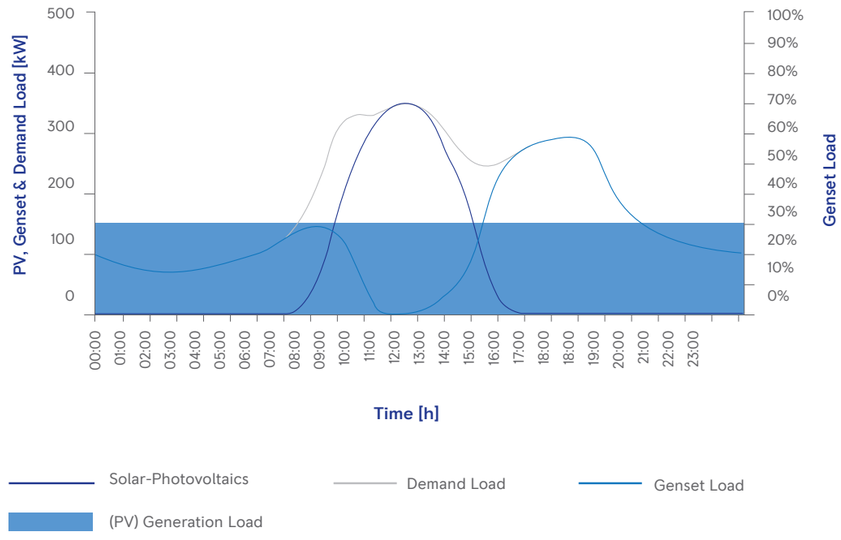
- **Significant reduction of greenhouse gas emissions (CO_2) with HVO:** Improved ecological footprint & corporate image
- **Simple drop-in fuel:** no engine hard- or software adaptions necessary. Blends are possible.
- **No effect on service & maintenance intervals:** Standard warranty conditions apply.
- **Approved for for S1600 generator sets:** all emission optimizations & power ratings
- **Reduction of harmful pollutants:** up to -80% particulate matter (PM) & up to -8% nitrous oxides (NO_x)
- **Same performances:** same maximum power, load acceptance and fuel consumption
- **Positive chemical properties:** higher cetane-number an d better water seperation (hydrophobic)
- **Long storage capability:** High reliability under cold conditions and high oxidation stability (no FAME), depending on fuel supplier

Low load capability

Besides having a grid code certification for grid parallel operation, the utilization of ***mtu*** S1600 generator sets can increase the share of solar PV generation in hybrid applications.
Many engine generators struggle with underloading concerns (e.g. wet-stacking or oil sobbering) if the load on generator set is falling below 30%. As a consequence, risks of generator malfunction or even failure may occur. ***mtu*** S1600 generator sets on the other side can be operated in idle mode for extended time periods.
Using this capability in hybrid power plants, the share of renewable energy generation in a hybrid can be increased to cover the full demand load, while the generator set is still always available in idle mode to provide grid stability as well as instantaneously dispatchable power in case the renewable share suddenly drops.

mtu advantage: extended low-load operation area 0-30%

Illustrative load profiles of a Diesel-PV hybrid system



- Lower fuel costs
- Lower CO_2 emissions
- Highest grid availability
- Increased grid stability

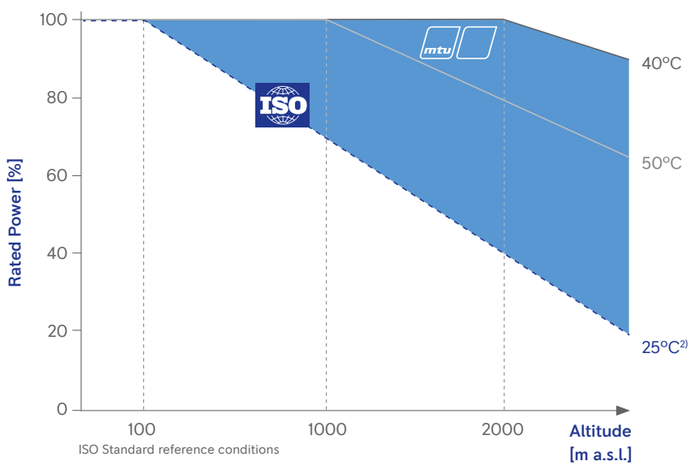
FULL FLEXIBILITY

The ***mtu*** Series 1600 offers the widest flexibility by being available in all major ISO ratings. The generator sets are also highly robust against derating when operated under hot and harsh ambient conditions.

Our ***mtu*** Series 1600 gensets operate trouble-free even under extreme conditions. They have proven their capabilities again and again in continuous operation and with full loads in the heat, cold, and dust, as well as with frequent load changes. This ensures that our systems offer maximum resilience. In addition to their well-known longevity, their low-maintenance construction and long service intervals also ensure cost-effectiveness. They minimize expenses and downtime and ensure that all equipment is fully operational whenever it is needed.
The thermodynamics of our ***mtu*** Series 1600 engines are specifically designed for power generation purposes and therefore they produce less vibrations for a longer equipment life.

Product highlights
- 40°C ambient temperature: Full power up to (at least) 2000m above sea level without derating[1)]
- 50°C ambient temperature: Full power up (at least) 1000m above sea level without derating[1)]
- Exceeding ISO 8528-1, ISO 3046 & ISO 15550 standard reference conditions
- Radiator fan designed for up to 50°C ambient temperature
- Optional heavy duty air filters for dusty environments

Illustrative condition-based power output curves



Highly robust against derating under hot ambient conditions

Exact power calculation via ESCM tool (Engine Site Condition Management)

Highest possible power output under all site conditions

Engine and thermo-dynamics specifically designed for power generation

1) fuel consumption optimized engines
2) Illustrative line, ISO does only specify the given standard reference conditions, but no derating behavior

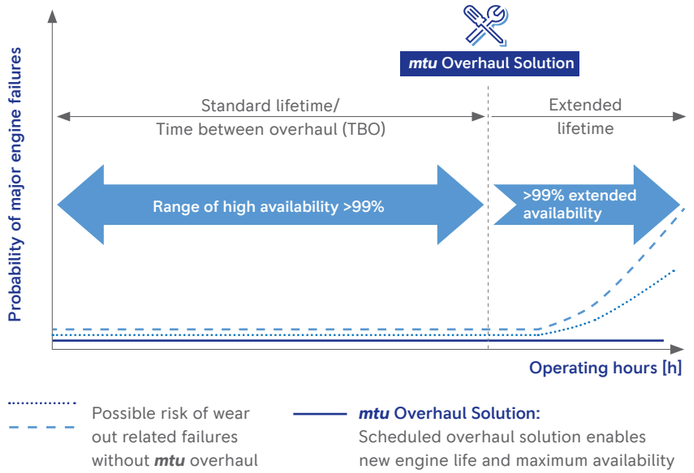
LOW LIFE-CYCLE COSTS

Optimized maintenance schedules, optional extended coverages and the ***mtu*** lifetime extension kit keep the life-cycle costs of the Series 1600 generator sets at a minimum.

Extended lifetime through time-based overhaul concept
mtu Series 1600 gensets are well known for their low life-cycle costs. They show best-in-class values for low fuel consumption and resilience. With our time-based overhaul concept for the Series 1600, there is also no need for intermediate overhauls or replacement of major engine components during the engine's lifetime.

Once the standard end-of-life is reached, we now offer our scheduled Series 1600 Overhaul Solution that provides the same peace of mind as a traditional overhaul, but at a fraction of the cost. Before the probability of wear-out related failures increases, time-worn components are replaced, ensuring the same availability as before. A removal or reinstallation of the system is not required, only an exchange of selected engine components.

Optimized maintenance and overhaul concept



New engine life with 6,000+ operating hours or 12 years

Maximum availability through extra long service intervals and no need for intermediate overhaul or replacement of major engine components

Short downtime: removal and reinstallation of the engine is not required, only exchange of select engine components

Reduced life-cycle costs through low fuel consumption, high reliability and optimized maintenance concept

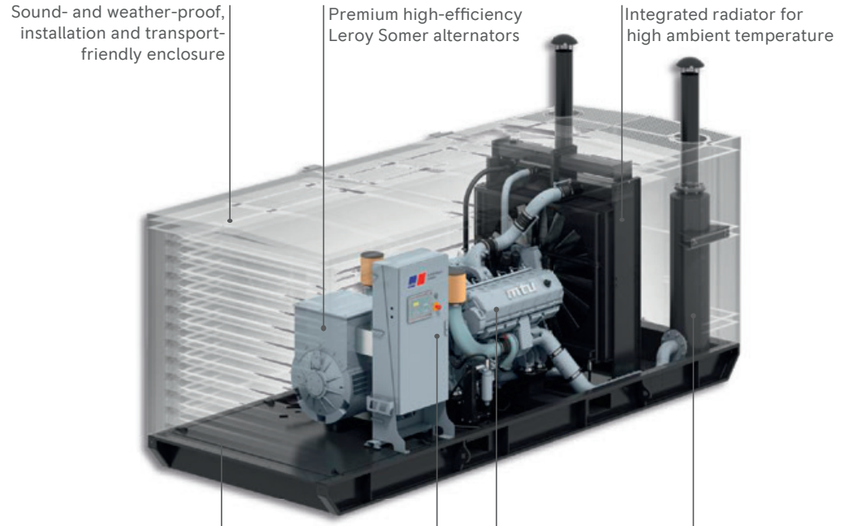
Sustainable and resource saving solution

MOVING DATA CENTERS TOWARDS THE EDGE

The new *mtu* Series 1600 generators cover all requirements to support the future data center infrastructure.

Rapidly growing markets like autonomous driving, the industrial internet of things (IIoT) and smart cities exponentially increase the demand for low-latency, secure computing and storage resources. Besides the emerging 5G network, increasingly more computing capabilities located closer to the point of data consumption, the so called “edge” are required.

Edge data centers are smaller and distributed data centers and close this latency gap between traditional hyperscale, core or cloud data centers and end users to enable ultra fast response times. They effectively combine data sovereignty and security with an increased reliability through its distributed resilience.



- All-in-one, factory-tested, scalable, plug & play solution
- Approved for renewable fuels: reduced GHG (CO2) emissions
- and renewables integration Uptime Tier I-IV & ISO-8528 DCP compliant
- Best in class power density
- Superior low-load capability for hybrid generation

Time to market, scalability and cost effectiveness are crucial to build an edge data center network. Therefore, they often come in prefabricated and modular (PFM) enclosures, containers or sometimes even building layouts with up to 5MW IT capacity.

With the *mtu* Series 1600 generators edge data center providers, owners and operators achieve significant cost and installation time reductions. They are compliant to all requirements of Uptime Tier I-IV certification levels as well as to the ISO 8528-1 Data Center Power (DCP) with load factors up to 100% and unlimited yearly operating hours. They are available as Open Power Units (OPU) with a superior power density for the integration into buildings or as extremely flexible Enclosed Power Units (EPU) to seamlessly combine with PFM modules. The integrated enclosure design includes a baseframe-integrated fuel tank, genset controller for island or mains parallel operation, circuit breakers, exhaust silencers and a cooling system which is capable of up to 50°C ambient temperatures. The weather- and sound-proof enclosure comes in a transport- and installation-friendly design which includes lifting lugs, forklift pockets and a super-silent sound attenuation. Thus, it can easily be transported on a standard truck or shipped in 20” ISO standard container to keep delivery times and the installation costs at a minimum. Optionally available redundant starters, heavy duty air filters and advanced fuel filtration systems make it a highly robust, fully-scalable plug and play power module, that embodies the backbone for the movement of the data center infrastructure towards the edge.

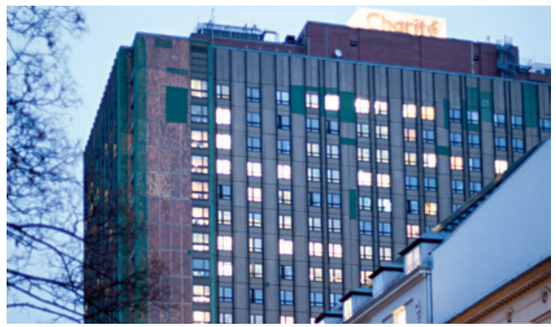
RELIABLE PERFORMANCE FOR ALL APPLICATIONS

From power plants and data centers to hospitals and office buildings, the Series 1600 gensets provide power for standardized backup, mission critical standby, continuous prime and peak applications. Four examples from around the world demonstrate the reliability of our systems.

Who: 80 Collins Street Precinct
What: 1 x ***mtu*** 10V1600 emergency backup power for the hotel and 2 x ***mtu*** 12V4000 for back-up supply of the shopping mall and office tower
Where: Melbourne, Australia

80 Collins Street is a premium office and business space for world-leading companies that rises above the Melbourne Central Business District's Paris End. Alongside iconic luxury retailers and curated experiences, it is a new address that will engage the city, bringing to life a transformative new destination. The building includes a boutique hotel with 9,500 square meters, a retail shopping mall with 5,000 square meter and an office tower with 42,000 square meters, that offers spectacular views of Melbourne through the Port Phillip Bay.

The reason for the customers decision was an attractive package containing engineering, supply, installation and commissioning support via our partner Penske Power Systems The entire development was extremely cost driven and Series 1600 was chosen because of its ease of integration, its low life-cycle costs and outstanding fuel economy.



Who: Charité University Hospital
What: Emergency power supply of the hospital site Campus Charité provided by 2 x ***mtu*** 12V4000 DS and 2 x ***mtu*** 12V1600 DS gensets
Where: Berlin, Germany

Learn more

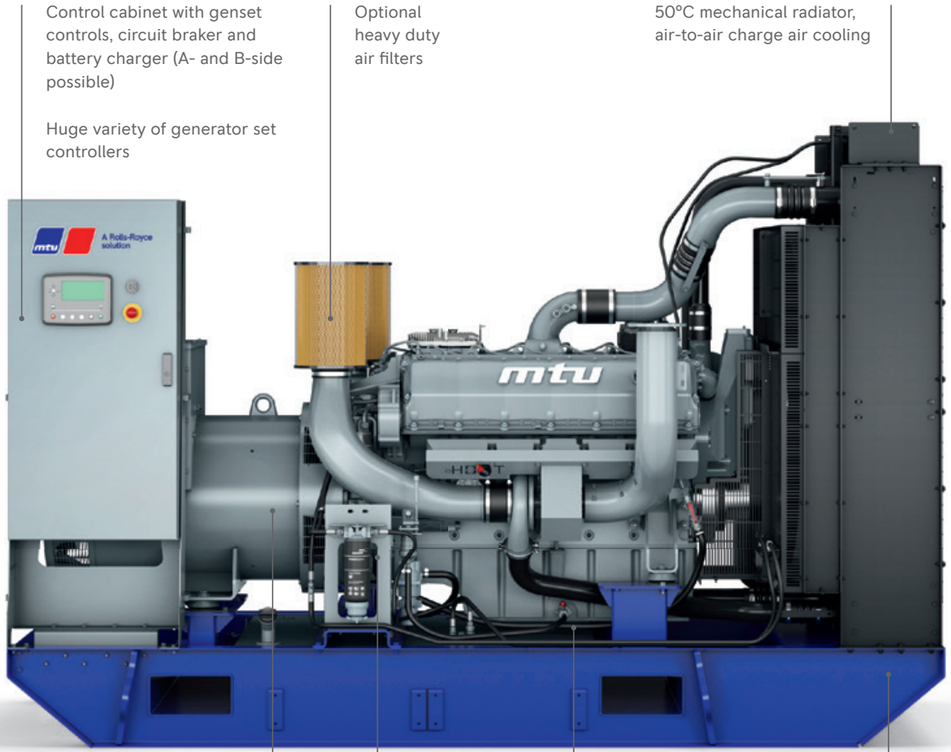
The Charité University Hospital treats about half a million patients a year and is Berlin's third largest electricity consumer. ***mtu*** supplied the hospital with a turnkey system including two 12V4000 diesel gensets, cooling, fuel and exhaust systems, air supply and extraction system and control system. Additionally, ***mtu*** supplied two 12V1600 engines due to their best in class load-acceptance, which got integrated in two container systems.
mtu was responsible for planning the project including construction and control systems and incorporating strict noise abatement regulations and exhaust emission limits. The backup systems now ensure the electricity supply for the main diagnostic suite and the nuclear medicine, dermatology, psychiatry, neurology and pathological diagnostics departments. Emergency startup only requires one starter system, the other acts as redundant backup for additional safety.

Who: Cavern Technologies
What: 4 x ***mtu*** 10V1600 DS with tailor-made master control panel and paralleling switchgear
Where: Lenexa, Kansas, USA

Learn more

In a natural limestone bunker five times stronger than concrete, 40 meters beneath the surface, Cavern Technologies offers data center services with an extra level of security. The enterprise has met rapid growth in demand from banking, healthcare, insurance, legal and technology companies by more than doubling the size of its facilities. The extra power needed comes from four customized ***mtu*** Series 1600 backup diesel generators.
The Series 1600 generator sets are engineered specifically for gen-drive applications and provide exceptional reliability, high power density and fuel efficiency.
Three of the units were installed in 2014, each outfitted with a tailor-made master control panel and set to run in parallel.
In 2017, after three years of dependable backup power supply, ***mtu*** customized, delivered and seamlessly installed an additional backup diesel generator set within two weeks.
The systems are designed for proper load and complex function management from an integrated single source allowing Cavern Technologies to deliver on its customer guarantee of beyond 99.995 percent uptime.

OPEN POWER UNITS



mtu **12V1600 open power unit.**

Scope of supply - Open Power Unit

Engine
- ■ mtu Series 1600 diesel engine
- ■ Battery chare alternator
- ■ Coolant circulation pump
- ■ Engine mounted fan drive
- ■ Prime Power (3B)
- □ Standby Power (3D)
- □ Prime Power for Stationary Emergency (3E)
- □ Data Center Continuous Power (3F)

Alternator
- ■ premium high efficiency Leroy Somer alternator
- ■ 3-Phase, single bearing, synchronous, brushless, self regulating, self ventilating, self exciting (AREP)
- ■ Digital voltage regulation (DVR)
- ■ Insulation class: H
- ■ Ingress protection: IP 23
- ■ Low voltage 400V
- □ Low voltage 380V
- □ Low Voltage 415V
- □ Anti-condesation heater
- □ Oversized alternator (only for VDE option)

Cooling system
- ■ 50°C base frame monunted front-type radiator for jacket water and charge air cooling
- ■ Integrated Air-to-Air charge air cooling unit (A2A)
- ■ Low coolant level sensor
- ■ Integrated expansion tank
- □ Duct Flange

Genset Controller & Contol Panel
- ■ Control panel with measurement devices and genset controller (B-Side)
- ■ Genset contoller for island operation
- □ Control panel with measurement devices and genset controller (A-Side, only for OPU)
- □ Genset controller for island parallel operation
- □ Genset controller for mains parallel operation
- □ Without genset controller
- □ Modbus RTU-TCP Gateway/Ethernet or bus system

Circuit Braker
- ■ 4 pole Schneider Electric circuit breaker, manual, motorized with controller (inside control panel)
- □ Without circuit breaker (only for VDE option)

Starting and Charging System
- ■ 1 x 24V electrical starter
- ■ Electric battery charger (inside control panel)
- □ 2 x 24V redundant electric starters
- □ Starting batteries with battery rack, battery disconnector and cabling
- □ Electric coolant preheating unit with circulating pump, non-return flap and thermostat

Fuel system
- ■ Common rail fuel injection system
- ■ Fuel pre-filter
- ■ Standard engine interface
- □ Heavy duty fuel prefilter with water separator
- □ Fuel cooler radiator mounted
- □ Integrated, removable fuel tank with 470l capacity (only for OPU)

Oil system
- ■ Dip stick
- ■ Oil drain
- ■ Pre-filled with premium engine oil
- □ Lube oil extraction handpump

Air intake system
- ■ Exhaust turbochargers
- ■ Standard dry type air filters
- ■ Charge air intercooler
- ■ Air intake pipework
- □ Heavy-duty two stage air filters with mechanic dust evacuation

Exhaust System
- ■ Standard engine interface
- □ Exhaust elbows
- □ Exhaust bellows
- □ Exhaust silencers 10 db(A)
- □ Exhaust silencers 30 db(A)
- □ Exhaust silencers 40 db(A)

Base frame
- ■ Resilient mounting for engine and alternator
- ■ Lifting lugs
- ■ Forklift pockets
- ■ Fits in 20“ ISO standard container
- ■ Integrated oil pan

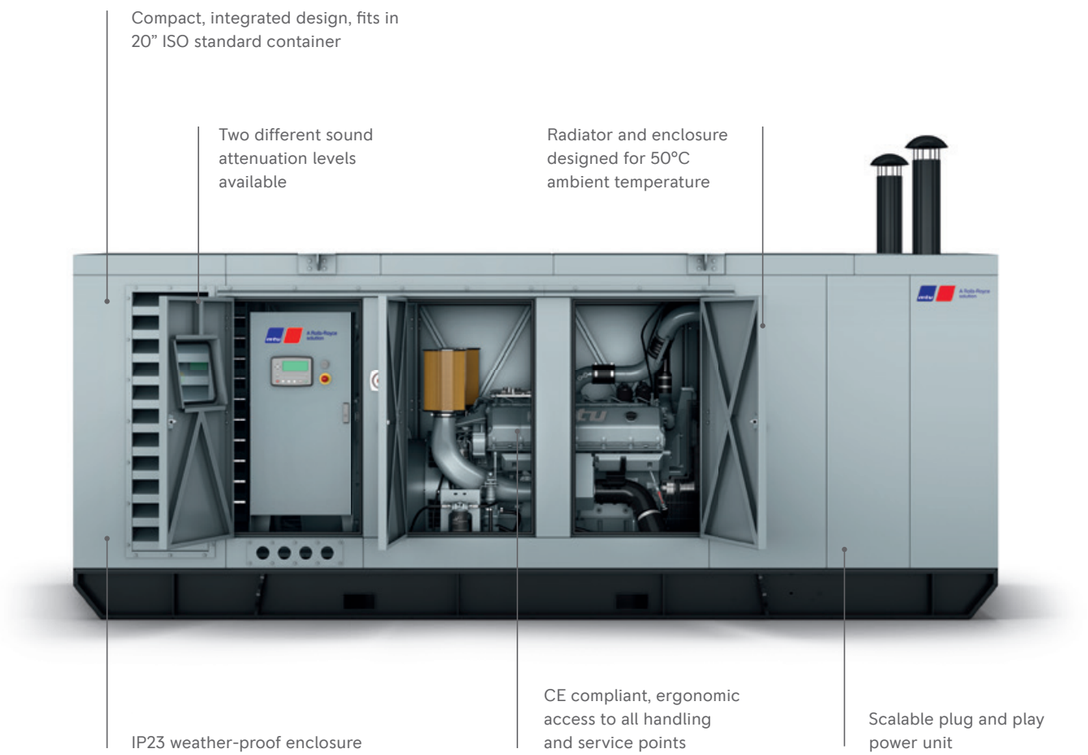
Certificates
- ■ CE certificate
- ■ Maintenance schedule, fluids & lubricants specification, genset & components manuals
- □ VDE-AR-4110 German Grid Code Compliance (only for OPU, no circuit breaker)

Packing
- ■ Standard packing
- □ Long term packing/seaworthy packing

Accessories
- □ Lifetime Extension Kit
- □ Spare parts package

■ Represents standard scope of supply
□ Represents optional scope of supply

ENCLOSED POWER UNITS



mtu 12V1600 DS enclosed power unit.

Scope of supply - Enclosed Power Unit

Enclosure
- ■ IP23 weather proof
- ■ Forklift pockets
- ■ Fits in 20“ ISO standard container
- ■ Integrated oil pan
- ■ Control panel with genset controller
- ■ Circuit breaker (B-Side)
- ■ Integrated exhaust system with silencers inside the enclosure
- ■ Basic sound attenuation “Silent” 77 db(A)
- □ Advanced sound attenuation “Super-Silent” 70db(A)

Engine
- ■ mtu Series 1600 diesel engine
- ■ Battery chare alternator
- ■ Coolant circulation pump
- ■ Engine mounted fan drive
- ■ Prime Power (3B)
- □ Standby Power (3D)
- □ Prime Power for Stationary Emergency (3E)
- □ Data Center Continuous Power (3F)

Alternator
- ■ premium high efficiency Leroy Somer alternator
- ■ 3-Phase, single bearing, synchronous, brushless, self regulating, self ventilating, self exciting (AREP)
- ■ Digital voltage regulation (DVR)
- ■ Insulation class: H
- ■ Ingress protection: IP 23
- ■ Low voltage 400V
- □ Low voltage 380V
- □ Low Voltage 415V
- □ Anti-condesation heater
- □ Oversized alternator (only for VDE option)

Cooling system
- ■ 50°C base frame monunted front-type radiator for jacket water and charge air cooling
- ■ Integrated Air-to-Air charge air cooling unit (A2A)
- ■ Low coolant level sensor
- ■ Integrated expansion tank
- □ Duct Flange

Genset Controller & Contol Panel
- ■ Control panel with measurement devices and genset controller (B-Side)
- ■ Genset contoller for island operation
- □ Genset controller for island parallel operation
- □ Genset controller for mains parallel operation
- □ Modbus RTU-TCP Gateway/Ethernet or bus system

Circuit Braker
- ■ 4 pole Schneider Electric circuit breaker, manual, motorized with controller (inside control panel, B-side)

Starting and Charging System
- ■ 1 x 24V electrical starter
- ■ Electric battery charger (inside control panel)
- □ 2 x 24V redundant electric starters
- □ Starting batteries with battery rack, battery disconnector and cabling
- □ Electric coolant preheating unit with circulating pump, non-return flap and thermostat

Fuel system
- ■ Common rail fuel injection system
- ■ Fuel pre-filter
- ■ Standard engine interface
- ■ Integrated fuel tank with 800l capacity
- □ Heavy duty fuel prefilter with water separator
- □ Fuel cooler radiator mounted

Oil system
- ■ Dip stick
- ■ Oil drain
- ■ Pre-filled with premium engine oil
- □ Lube oil extraction handpump

Air intake system
- ■ Exhaust turbochargers
- ■ Standard dry type air filters
- ■ Charge air intercooler
- ■ Air intake pipework
- □ Heavy-duty two stage air filters with mechanic dust evacuation

Certificates
- ■ CE certificate
- ■ Maintenance schedule, fluids & lubricants specification, genset & components manuals

Packing
- ■ Standard packing
- □ Long term packing/seaworthy packing

Accessories
- □ Lifetime Extension Kit
- □ Spare parts package

■ Represents standard scope of supply
□ Represents optional scope of supply

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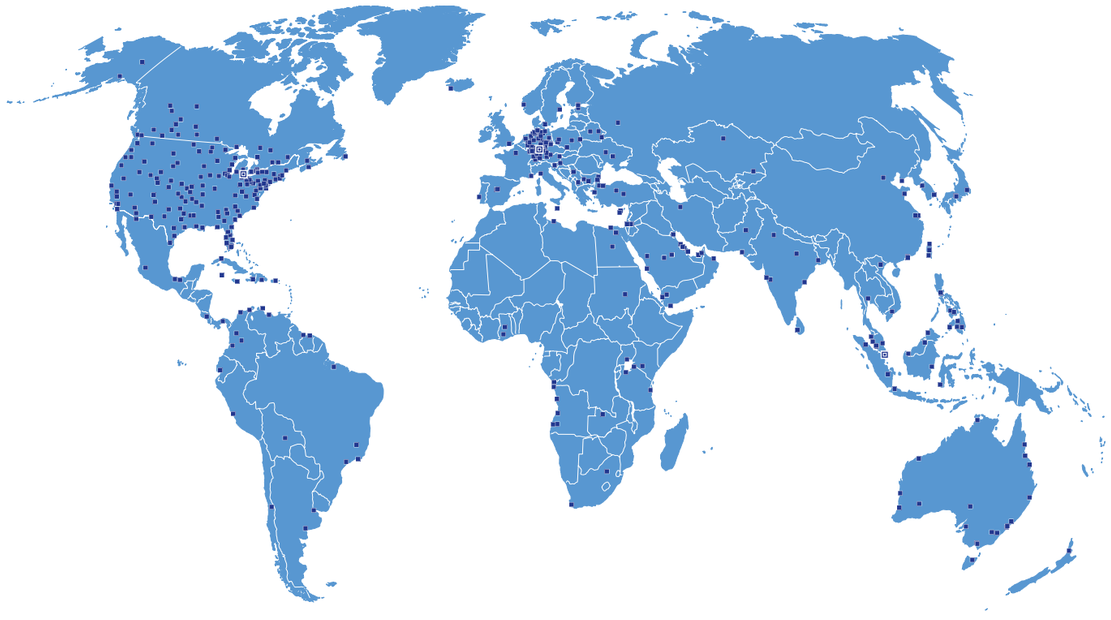

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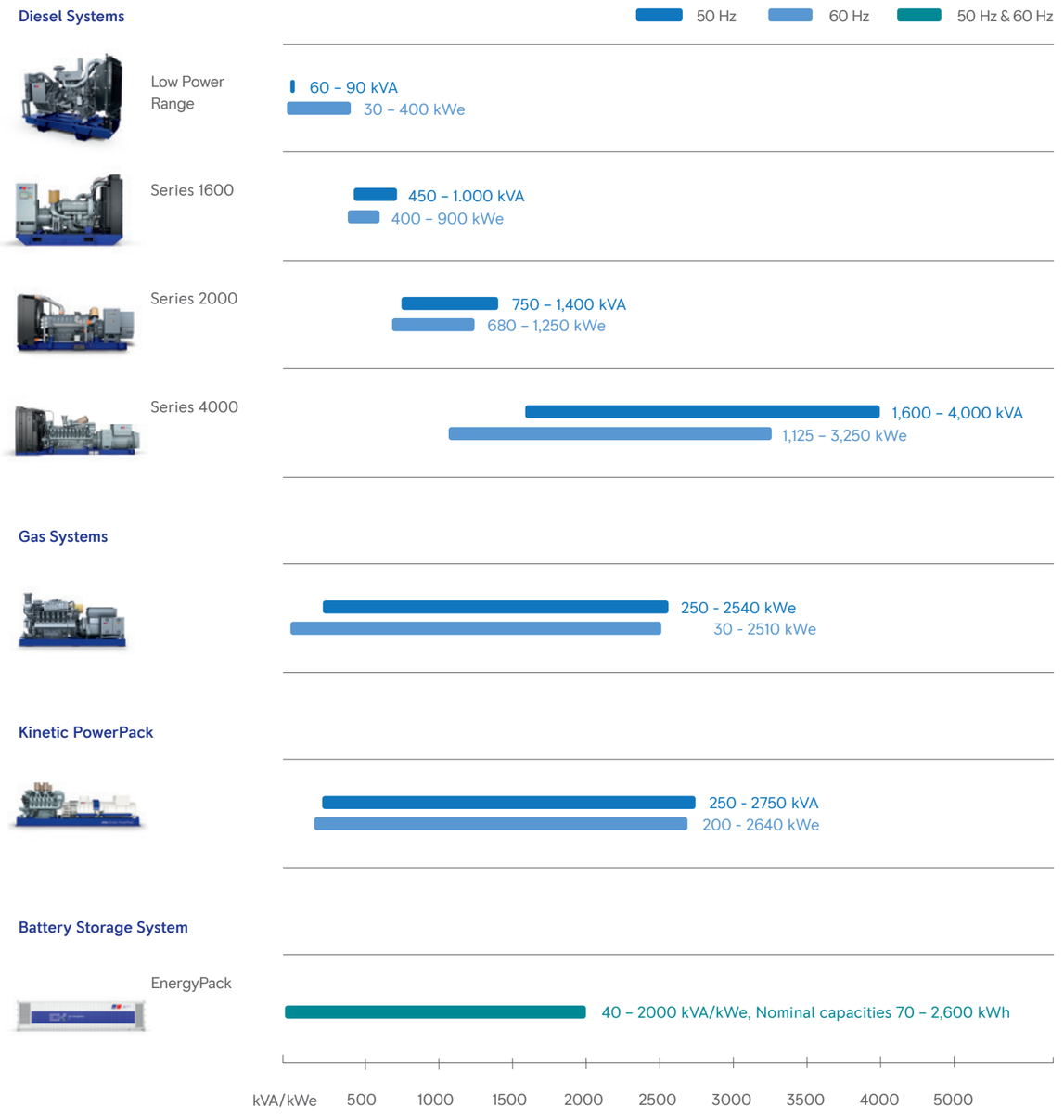

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