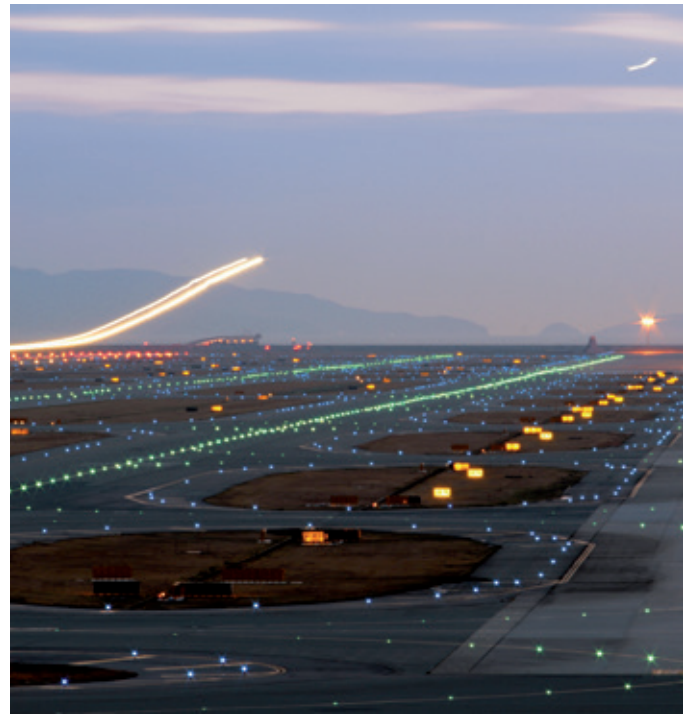
Gendrive

SOLUTION GUIDE

Edition 1/20, valid from 05/2020

A Rolls-Royce solution



LEGEND

Cooling variants
— A2A: air-to-air charge air cooling (TD)
— W2A: water-to-air charge air cooling (TB)

Emission standards:
x Fuel consumption optimized
1 NOx emission optimized (Explanation see page 85)
3 US EPA Stationary EMERG Tier 2 (40 CFR 60)
7 US EPA Stationary EMERG Tier 3 (40 CFR 60)
19 US EPA Nonroad Tier 2 compliant (40 CFR 89)
20 US EPA Nonroad Tier 3 compliant (40 CFR 89)
23 EU Nonroad St IIIA Comp (97 / 68 / EC)
24 NEA Singapore for ORDE
36 US EPA Nonroad Tier 2 compliant

Footnotes:
1) The quoted typical kVA/kWe ratings are based on typical generator efficiencies. The kVA figures are calculated with a 0.8 power factor. Typical deductions for fan drive power and generator efficiency is applied for calculation and serves as guideline only.
2) S4000 E83 with KTA or IEEE qualifications
3) 4000 G73 with 1200 rpm
4) Only for 50 Hz
5) Only for 60 Hz
6) Available on request
7) Available Q4/2020, for details please contact your sales partner
8) Available on request Q4/2020, for details please contact your sales partner

CONTENTS

PIONEERING THE POWER THAT MATTERS.

Rolls-Royce provides world-class power solutions and complete life-cycle support under our product and solution brand MTU. Through digitalization and electrification, we strive to develop drive and power generation solutions that are even cleaner and smarter and thus provide answers to the challenges posed by the rapidly growing societal demands for energy and mobility. We deliver and service comprehensive, powerful and reliable systems, based on both gas and diesel engines, as well as electrified hybrid systems. These clean and technologically-advanced solutions serve our customers in the marine and infrastructure sectors worldwide.

A solution provider
MTU systems power the largest yachts, the strongest tugboats and the biggest land vehicles and provide energy for the world's most important mission-critical applications. Through advanced solutions such as microgrids, we integrate renewable energies and manage the power needs of our customers.

Our customized service offerings help you maximize uptime and performance and are supported by our digital solutions, which enable remote monitoring, predictive maintenance and a range of other benefits that keep your systems running at their best.

For over 110 years, we have provided innovative power solutions for our customers – meeting even the most demanding drive requirements. Our products and services span a wide range of applications and power needs, with both standard and customized options.

An expert in technology
As part of Rolls-Royce, we have long been known for cutting-edge innovation and technological leadership in product development. That same spirit of innovation inspires our sustainability efforts. Our focus is on developing and implementing system solutions that both maximize efficiency and reduce emissions -- which in turn work to reduce our impact on the environment.

A passionate and reliable partner
We at Rolls-Royce spend every day working together with our customers, to deliver engines, systems and complete life-cycle solutions that best fit your needs. We understand that each application is different and has its own specific demands. Our engineers embrace the challenge of finding the perfect solution for your unique power requirements. Every step of the way – from project planning, through design, delivery and commissioning; to the lifetime care of your equipment – we are dedicated to helping you get the most from your MTU investment.

Rating definitions

FOR GENDRIVE ENGINES.

Standby/Mission critical

Standby power (3D)

Standby power applies to installations served by a reliable utility source. The standby ratings are applicable to varying loads for the duration of a power outage.

Prime power for stationary emergency (3E)

Prime power for stationary emergency provides classical standby power comparable to the application group standby power (3D). The difference is that this application group offers a 10% overload capability to cover for e.g. voltage variations or peak loads.

Data center continuous power (3F)

Data center continous power is a specific mission critical application. It is especially designed for the use in data centers as emergency standby units. “Data centre continous power” offers an economic and customer friendly solution to comply to the Uptime Institute* Tier III and Tier IV standards.

NPP standby power (3C)

The application group „NPP standby power“ (3C) applies to installations in thermal power stations. At constant or varying load, the number of generator set operating hours is unlimited. Products are qualified in accordance with IEEE and/or KTA requirements.

* The Uptime Institute is a pioneer in creating and operating knowledge communities for improving uptime effectiveness in data center facilities and information technology organizations.

Rating definitions

FOR GENDRIVE ENGINES.

Continuous/Prime/Grid stability

Continuous power + CHP (3A)

Continuous power applies to installations where one or several generator sets serve as utility. At constant or varying load, the number of generator set operating hours is unlimited. Typical application here is CHP.

Prime power (3B)

Prime power applies to installations where utility power is unavailable or unreliable. At varying load, the number of generator set operating hours is unlimited.

Grid stability power (3G)

Grid stability power is focused on providing additional short-term power to the grid (peak shaving). This application becomes relevant whenever renewable power sources like solar or wind are used that might not always be able to provide the full power demand for example during peak load times.

Rating definitions

OVERVIEW

Standby/Mission critical		
Standby power (3D)	**MTU Power Generation**	**ISO 8528-1 (ESP)**
Load	variable	variable
Load factor	**≤ 85 %**	≤ 70 %
10 % overload (ICXN)	no	not specified
Max. operating hours (per year)	**500 h**	200 h
Uptime compliant	Tier I & Tier II	not specified

Prime power for stationary emergency (3E)	**MTU Power Generation**	**ISO 8528-1 (ESP)**
Load	variable	variable
Load factor	**≤ 85 %**	≤ 70 %
10 % overload (ICXN)	**yes**	not specified
Max. operating hours (per year)	**500 h**	200 h
Uptime compliant	Tier I & Tier II	not specified

Data center continuous power (3F)	**MTU Power Generation**	**ISO 8528-1 (DCP)**
Load	continuous	continuous or variable
Load factor	≤ 100 %	≤ 100%
10 % overload (ICXN)	**yes**	not specified
Max. operating hours (per year)	unlimited [B]	unlimited
Uptime compliant	Tier I - Tier IV	not specified

NPP standby power (3C)	**MTU Power Generation**
Load	variable
Load factor	acc. to KTA & IEEE regul.
10 % overload (ICXN)	**yes**
Max. operating hours (per year)	unlimited [3]
Uptime compliant	no

Continuous/Prime/Grid stability		
Continuous power + CHP (3A)	**MTU Power Generation**	**ISO 8528-1 (COP)**
Load	constant	constant
Load factor	≤ 100 %	≤ 100 %
10 % overload (ICXN)	Gas: no Diesel: **yes**	not specified
Max. operating hours (per year)	unlimited	unlimited

Prime power (3B)	**MTU Power Generation**	**ISO 8528-1 (PRP)**
Load	variable	variable
Load factor	**≤ 75 %**	≤ 70 %
10 % overload (ICXN)	yes	yes
Max. operating hours (per year)	unlimited	unlimited

Grid stability power (3G)	**MTU Power Generation**	**ISO 8528-1 (LTP)**
Load	continuous	continuous
Load factor	≤ 100 %	≤ 100%
10 % overload (ICXN)	Gas: no Diesel: **yes**	not specified
Max. operating hours (per year)	**1000 h; 500 h with 100% load w/o interruption**	500 h

A Only available for 50Hz markets
B Unlimited hours in data center application where a reliable grid/utility is present.
3) where a reliable utility is present

GENERAL SPECIFICATIONS

Diesel engines for power generation with constant speed

- Four-stroke, direct-injection
- Water- and air cooled
- V or In-line configuration

Standard conditions for diesel engines:

Barometric pressure: 1000 mbar

Site altitude above sea level: 100 m

Ambient air temperature: 25°C

Charge-air coolant temperature:

Series 956	50°C
Series 2000	55°C for fuel consumption or for NOx emission optim., 45°C for for emission optimized
Series 4000	55°C for fuel consumption or NOx emission optim., 45°C for emission optimized
Series 4000 Ex3	45°C

Unless otherwice stated rated power available up to:

Site altitude above sea level: 400 m

Ambient air temperature: 40°C

Please note

We apply a policy of continual products and systems improvements. Please note, specifications are subject to change without notice. All dimensions are approximate. Details are subject to options selected. Please contact your local distributor for current information and binding data.

EXPLANATION OF THE ENGINE DESIGNATION

Series 956 – Example

20 V 956 TB 34

- Design index
- Application segment
- Turbocharged/charge-air cooling
- Series
- Cylinder configuration: V = V-engine
- No. of cylinders

Series 1600 / 2000 / 4000 – Example

12 V 2000 G 26 F

- 50 & 60 cycle and rating ident.
- Design index
- Application segment
- Application
- Series
- Cylinder configuration: V = V-engine; R = in-line
- No. of cylinders

Series	1600/2000/4000/956
Cooling variants	
Water-to-air charge air cooling (W2A)	2000 / 4000 / 956
Air-to-air charge air cooling (A2A)	1600 / 2000

For more information about our gendrive diesel engines please visit:
www.mtu-solutions.com

Standby/Mission critical – gendrive engines
50 Hz

- STANDBY POWER (3D)
- PRIME POWER FOR STATIONARY EMERGENCY (3E)

Standby/Mission critical – gendrive engines – 50 Hz
Standby power (3D)

448 KWM - 3308 KWM

50 HZ – 1500 RPM

	Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
	kVA	kWe	kWm	bhp	X	1	23	36	24	Variant	Package	Engine model
MTU 1600 DS	500	400	448	601	x		x		x	A2A	x	10V 1600 G70F
	550	440	493	661	x		x			A2A	x	10V 1600 G80F
	650	520	576	772	x				x	A2A	x	12V 1600 G70F
	715	572	634	850	x				x	A2A	x	12V 1600 G80F
MTU 2000 DS	715	572	635	852	x					A2A	x	12V 2000 G25
	715	572	635	852	x					W2A		12V 2000 G25
	825	660	732	982		x		x	x	A2A	x	12V 2000 G76F
	860	688	765	1026	x					A2A	x	12V 2000 G65
	860	688	765	1026	x					W2A		12V 2000 G65
	1000	800	887	1189	x					A2A	x	12V 2000 G86F
	1000	800	890	1194	x					A2A	x	16V 2000 G25
	1000	800	890	1194	x					W2A		16V 2000 G25
	1100	880	975	1307	x					A2A	x	16V 2000 G65
	1100	880	975	1307	x					W2A		16V 2000 G65
	1110	888	979	1313		x		x	x	A2A	x	16V 2000 G76F
	1250	1000	1100	1475	x					A2A	x	18V 2000 G65
	1250	1000	1100	1475	x					W2A		18V 2000 G65
	1250	1000	1100	1475	x					A2A	x	16V 2000 G86F
	1400	1120	1235	1656	x					A2A	x	18V 2000 G76F
MTU 4000 DS	1800	1440	1575	2112	x				x	W2A		12V 4000 G74F
	2000	1600	1750	2347	x				x	W2A		12V 4000 G84F
	2300	1840	1930	2588	x			x	x	W2A		12V 4000 G94F
	2250	1800	1965	2635	x				x	W2A		16V 4000 G74F
	2500	2000	2185	2930	x				x	W2A		16V 4000 G84F
	2850	2280	2387	3201	x			x	x	W2A		16V 4000 G94F
	2800	2240	2420	3245	x				x	W2A		20V 4000 G64F
	3100	2480	2670	3581	x				x	W2A		20V 4000 G74F
	3300	2640	2850	3822	x				x	W2A		20V 4000 G84F
	3600	2880	3088	4141	x			x	x	W2A		20V 4000 G94F
	4000	3200	3308	4436	x			x	x	W2A		20V 4000 G94LF [6]

Standby/Mission critical – gendrive engines – 50 Hz
Prime power for stationary emergency (3E)

407 KWM - 3007 KWM

50 HZ – 1500 RPM

	Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
	kVA	kWe	kWm	bhp	X	1	23	36	24	Variant	Package	Engine model
MTU 1600 DS	450	360	407	546	x	x	x		x	A2A	x	10V 1600 G10F
	500	400	448	601	x	x	x		x	A2A	x	10V 1600 G20F
	590	472	524	703	x	x			x	A2A	x	12V 1600 G10F
	650	520	576	772	x	x			x	A2A	x	12V 1600 G20F
MTU 2000 DS	750	600	665	892	x	x		x	x	A2A	x	12V 2000 G16F
	800	640	709	951	x	x		x	x	A2A	x	12V 2000 G26F
	910	728	806	1081	x	x		x	x	A2A	x	16V 2000 G16F
	1000	800	890	1194	x	x		x	x	A2A	x	16V 2000 G26F
	1135	908	1000	1341	x	x		x	x	A2A	x	16V 2000 G36F
	1250	1000	1102	1478	x	x		x	x	A2A	x	18V 2000 G26F
MTU 4000 DS	1600	1280	1420	1904	x	x			x	W2A		12V 4000 G14F
	1800	1440	1575	2112	x	x			x	W2A		12V 4000 G24F
	2100	1680	1755	2353	x			x	x	W2A		12V 4000 G34F
	2100	1680	1798	2411	x	x			x	W2A		16V 4000 G14F
	2250	1800	1965	2635	x	x			x	W2A		16V 4000 G24F
	2600	2080	2170	2910	x			x	x	W2A		16V 4000 G34F
	2500	2000	2200	2950	x	x			x	W2A		20V 4000 G14F
	2800	2240	2420	3245	x	x			x	W2A		20V 4000 G24F
	3000	2400	2590	3473	x	x			x	W2A		20V 4000 G34F
	3630	2904	3007	4032	x			x	x	W2A		20V 4000 G44LF [6]

Standby/Mission critical – gendrive engines
50 Hz

- DATA CENTER CONTINUOUS POWER (3F)
- NPP STANDBY POWER (3C)

Standby/Mission critical – gendrive engines – 50 Hz
Data center continuous power (3F)

407 KWM - 3007 KWM

50 HZ – 1500 RPM

	Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
	kVA	kWe	kWm	bhp	X	1	23	36	24	Variant	Package	Engine model
MTU 1600 DS	450	360	407	546	x	x	x		x	A2A	x	10V 1600 G10F
	500	400	448	601	x	x	x		x	A2A	x	10V 1600 G20F
	590	472	524	703	x	x		x	x	A2A	x	12V 1600 G10F
	650	520	576	772	x	x		x	x	A2A	x	12V 1600 G20F
MTU 2000 DS	1000	800	890	1194	x	x		x	x	A2A	x	16V 2000 G26F
	1250	1000	1102	1478	x	x		x	x	A2A	x	18V 2000 G26F
MTU 4000 DS	1600	1280	1420	1904	x	x			x	W2A		12V 4000 G14F
	1800	1440	1575	2112	x	x			x	W2A		12V 4000 G24F
	2100	1680	1755	2353	x			x	x	W2A		12V 4000 G34F [7]
	2100	1680	1798	2411	x	x			x	W2A		16V 4000 G14F
	2250	1800	1965	2635	x	x			x	W2A		16V 4000 G24F
	2600	2080	2170	2910	x			x	x	W2A		16V 4000 G34F [7]
	2500	2000	2200	2950	x	x			x	W2A		20V 4000 G14F
	2800	2240	2420	3245	x	x			x	W2A		20V 4000 G24F
	3000	2400	2590	3473	x	x			x	W2A		20V 4000 G34F
	3390	2712	2807	3764	x			x	x	W2A		20V 4000 G44F [7]
	3630	2904	3007	4032	x			x	x	W2A		20V 4000 G44LF [8]

Standby/Mission critical – gendrive engines – 50 Hz
NPP standby power (3C)

1560 KWM - 6500 KWM

50 HZ – 1500 RPM

	Typical generator set output [1]	Rating		Emissions standards					Cooling		Engine
	kWe	kWm	bhp	X	1	23	36	24	Variant	Package	Engine model
MTU 4000 DS	1500	1560	2092	x					W2A		12V 4000 E63 [2]
	2000	2080	2789	x					W2A		16V 4000 E63 [2]
	2500	2600	3487	x					W2A		20V 4000 E63 [2]
MTU 956 DS	3600	3750	5029	x					W2A		12V 956 TB33
	4800	5000	6705	x					W2A		16V 956 TB33
	6300	6500	8717	x					W2A		20V 956 TB34

Continuous/Prime/Grid stability – gendrive engines
50 Hz

- CONTINUOUS POWER (3A)
- PRIME POWER (3B)
- GRID STABILITY POWER (3G)

Continuous/Prime/Grid stability – gendrive engines – 50 Hz
Continuous power (3A)

515 KWM - 2200 KWM

50 HZ – 1500 RPM

	Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
	kVA	kWe	kWm	bhp	X	1	23	36	24	Variant	Package	Engine model
MTU 2000 DS	575	460	515	691	x					A2A	x	12V 2000 G65
	575	460	515	691	x					W2A		12V 2000 G65
	740	592	655	878	x					A2A	x	16V 2000 G65
	740	592	655	878	x					W2A		16V 2000 G65
	750	600	665	892	x					A2A	x	12V 2000 B26F
	800	640	709	951	x					A2A	x	16V 2000 B26F
	810	648	720	966	x					A2A	x	18V 2000 G65
	810	648	720	966	x					W2A		18V 2000 G65
	1000	800	887	1189	x					A2A	x	18V 2000 B26F
MTU 4000 DS	1480	1184	1310	1757	x					W2A		12V 4000 B24F
	1875	1500	1635	2193	x					W2A		16V 4000 G24F
	2275	1820	2000	2682	x					W2A		20V 4000 B24F
	2500	2000	2200	2950	x					W2A		20V 4000 B34F

Continuous/Prime/Grid stability – gendrive engines – 50 Hz
Prime power (3B)

407 KWM - 2807 KWM

50 HZ – 1500 RPM

	Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
	kVA	kWe	kWm	bhp	X	1	23	36	24	Variant	Package	Engine model
MTU 1600 DS	450	360	407	546	x	x	x		x	A2A	x	10V 1600 G10F
	500	400	448	601	x	x	x		x	A2A	x	10V 1600 G20F
	590	472	524	703	x	x			x	A2A	x	12V 1600 G10F
	650	520	576	772	x	x			x	A2A	x	12V 1600 G20F
MTU 2000 DS	650	520	580	778	x	x				A2A	x	12V 2000 G25
	650	520	580	778	x					W2A		12V 2000 G25
	750	600	665	892	x	x		x	x	A2A	x	12V 2000 G16F
	780	624	695	932	x	x				A2A	x	12V 2000 G65
	780	624	695	932	x					W2A		12V 2000 G65
	800	640	709	951	x	x		x	x	A2A	x	12V 2000 G26F
	910	728	806	1081	x	x		x	x	A2A	x	16V 2000 G16F
	910	728	810	1086	x	x				A2A	x	16V 2000 G25
	910	728	810	1086	x					W2A		16V 2000 G25
	1000	800	890	1194	x	x				A2A	x	16V 2000 G65
	1000	800	890	1194	x					W2A		16V 2000 G65
	1000	800	890	1194	x	x		x	x	A2A	x	16V 2000 G26F
	1135	908	1000	1341	x	x		x	x	A2A	x	16V 2000 G36F
	1135	908	1000	1341	x	x				A2A	x	18V 2000 G65
	1135	908	1000	1341	x					W2A		18V 2000 G65
	1250	1000	1102	1478	x	x		x	x	A2A	x	18V 2000 G26F
MTU 4000 DS	1365	1092	1205	1616	x	x			x	W2A		12V 4000 G14RF
	1600	1280	1420	1904	x	x			x	W2A		12V 4000 G14F
	1800	1440	1575	2112	x	x			x	W2A		12V 4000 G24F
	2100	1680	1798	2411	x	x			x	W2A		16V 4000 G14F
	2250	1800	1965	2635	x	x			x	W2A		16V 4000 G24F
	2500	2000	2200	2950	x	x			x	W2A		20V 4000 G14F
	2800	2240	2420	3245	x	x			x	W2A		20V 4000 G24F
	3000	2400	2590	3473	x	x			x	W2A		20V 4000 G34F
	3250	2600	2807	3764	x			x	x	W2A		20V 4000 G44F

Continuous/Prime/Grid stability – gendrive engines – 50 Hz
Grid stability power (3G)

890 KWM - 2590 KWM

50 HZ – 1500 RPM

	Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
	kVA	kWe	kWm	bhp	X	1	23	36	24	Variant	Package	Engine model
MTU 2000 DS	1000	800	890	1194	x	x		x	x	A2A	x	16V 2000 G26F
	1250	1000	1102	1478	x	x		x	x	A2A	x	18V 2000 G26F
MTU 4000 DS	1600	1280	1420	1904	x	x			x	W2A		12V 4000 G14F
	1800	1440	1575	2112	x	x			x	W2A		12V 4000 G24F
	2100	1680	1798	2411	x	x			x	W2A		16V 4000 G14F
	2250	1800	1965	2635	x	x			x	W2A		16V 4000 G24F
	2500	2000	2200	2950	x	x			x	W2A		20V 4000 G14F
	2800	2240	2420	3245	x	x			x	W2A		20V 4000 G24F
	3000	2400	2590	3473	x	x			x	W2A		20V 4000 G34F

Standby/Mission critical – gendrive engines
60 Hz

- STANDBY POWER (3D)
- PRIME POWER FOR STATIONARY EMERGENCY (3E)

Standby/Mission critical – gendrive engines – 60 Hz
Standby power (3D)

511 KWM - 3490 KWM

60 HZ – 1800 RPM

	Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
	kWe	kVA	kWm	bhp	X	19	3	20	7	Variant	Package	Engine model
MTU 1600 DS	450	563	511	685				x	x	A2A	x	10V 1600 G70S
	500	625	561	752		x	x			A2A	x	10V 1600 G80S
	550	688	613	822		x	x			A2A	x	12V 1600 G70S
	600	750	668	896		x	x			A2A	x	12V 1600 G80S
MTU 2000 DS	710	888	780	1046		x	x			A2A	x	12V 2000 G45
	710	888	780	1046		x	x			W2A		12V 2000 G45
	800	1000	890	1194		x	x			A2A	x	12V 2000 G85
	800	1000	890	1194		x	x			W2A		12V 2000 G85
	925	1156	1010	1354		x	x			A2A	x	16V 2000 G45
	925	1156	1010	1354		x	x			W2A		16V 2000 G45
	1000	1250	1097	1471	x	x	x			W2A		16V 2000 G76S
	1000	1250	1115	1495		x	x			A2A	x	16V 2000 G85
	1000	1250	1115	1495		x	x			W2A		16V 2000 G85
	1200	1500	1310	1757		x	x			A2A	x	18V 2000 G85
	1200	1500	1310	1757		x	x			W2A		18V 2000 G85
	1250	1563	1371	1839	x	x	x			W2A		16V 2000 G86S
	1250	1563	1371	1839	x	x	x			A2A	x	18V 2000 G76S
MTU 4000 DS	1600	2000	1736	2328	x	x	x			W2A		12V 4000 G74S
	1750	2188	1910	2561	x	x	x			W2A		12V 4000 G84S
	2100	2625	2280	3058	x	x	x			W2A		16V 4000 G74S
	2300	2875	2500	3353	x	x	x			W2A		16V 4000 G84S
	2550	3188	2740	3674	x	x	x			W2A		16V 4000 G94S
	2550	3188	2740	3674	x	x	x			W2A		20V 4000 G64S
	2800	3500	3010	4036	x	x	x			W2A		20V 4000 G74S
	3250	4063	3490	4680	x	x	x			W2A		20V 4000 G94S

Standby/Mission critical – gendrive engines – 60 Hz
Prime power for stationary emergency (3E)

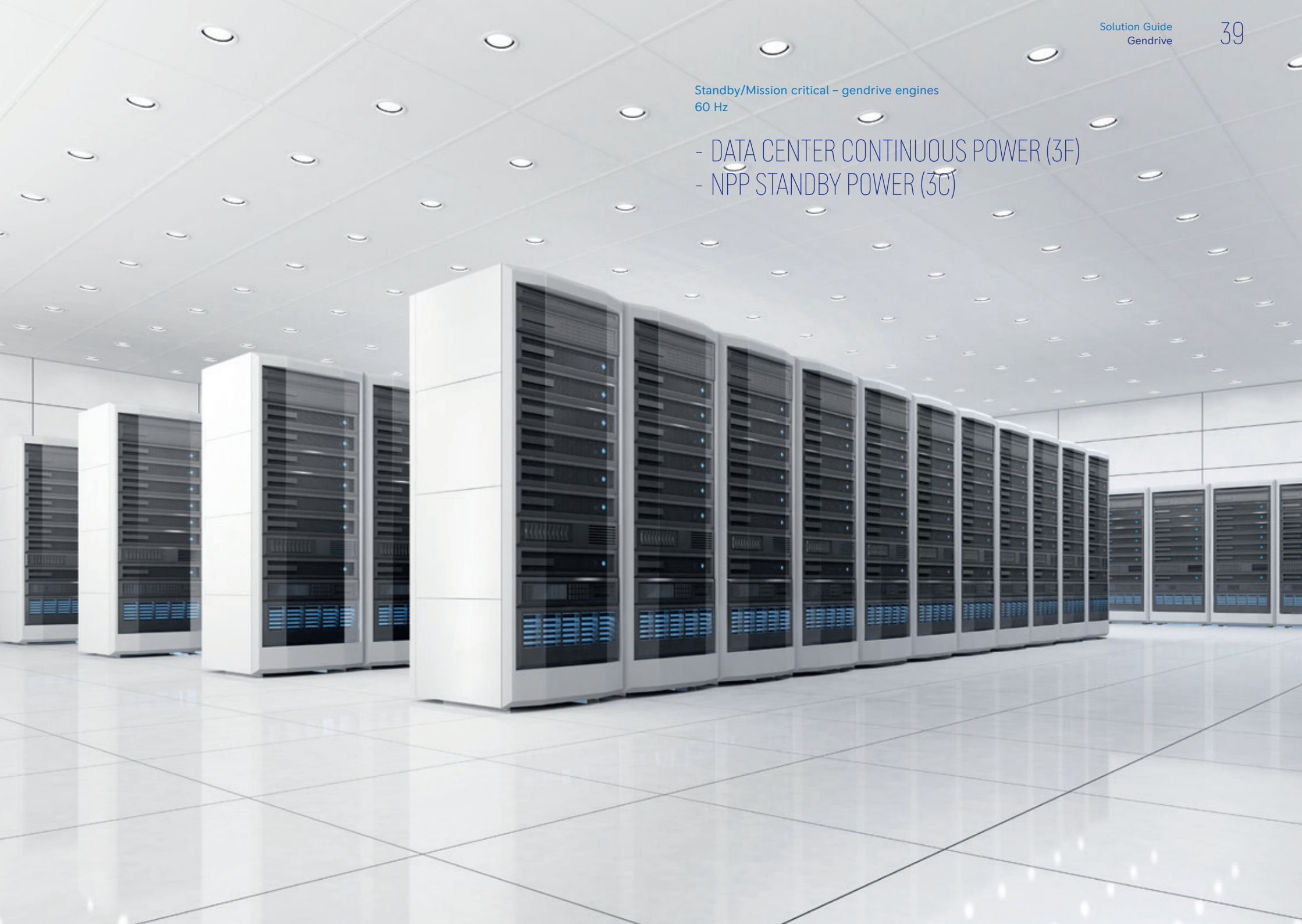
511 KWM - 3010 KWM

60 HZ – 1800 RPM

	Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
	kWe	kVA	kWm	bhp	X	19	3	20	7	Variant	Package	Engine model
MTU 1600 DS	450	563	511	685			x			A2A	x	10V 1600 G20S
	500	625	561	752			x			A2A	x	12V 1600 G10S
	550	688	608	815			x			A2A	x	12V 1600 G20S
MTU 4000 DS // MTU 2000 DS	910	1138	998	1338			x			W2A		16V 2000 G26S
	1400	1750	1520	2038			x			W2A		12V 4000 G14S
	1600	2000	1736	2328			x			W2A		12V 4000 G24S
	1850	2313	2020	2709			x			W2A		16V 4000 G14S
	2100	2625	2280	3058			x			W2A		16V 4000 G24S
	2300	2875	2490	3339			x			W2A		20V 4000 G14S
	2550	3188	2740	3674			x			W2A		20V 4000 G24S
	2800	3500	3010	4036			x			W2A		20V 4000 G44S

Standby/Mission critical – gendrive engines
60 Hz

- DATA CENTER CONTINUOUS POWER (3F)
- NPP STANDBY POWER (3C)



Standby/Mission critical – gendrive engines – 60 Hz
Data center continuous power (3F)

465 KWM - 3010 KWM

60 HZ - 1800 RPM

MTU 1600 DS // MTU 2000 DS // MTU 4000 DS

Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
kWe	kVA	kWm	bhp	X	19	3	20	7	Variant	Package	Engine model
415	519	465	624	x					A2A	x	10V 1600 G10S
450	563	511	685		x	x			A2A	x	10V 1600 G20S
500	625	561	752		x	x			A2A	x	12V 1600 G10S
550	688	608	815		x	x			A2A	x	12V 1600 G20S
910	1138	998	1338	x	x	x			W2A		16V 2000 G26S
1400	1750	1520	2038	x	x	x			W2A		12V 4000 G14S
1600	2000	1736	2328	x	x	x			W2A		12V 4000 G24S
1850	2313	2020	2709	x	x	x			W2A		16V 4000 G14S
2100	2625	2280	3058	x	x	x			W2A		16V 4000 G24S
2300	2875	2490	3339	x	x	x			W2A		20V 4000 G14S
2550	3188	2740	3674	x	x	x			W2A		20V 4000 G24S
2800	3500	3010	4036	x	x	x			W2A		20V 4000 G44S

Standby/Mission critical – gendrive engines – 60 Hz
NPP standby power (3C)

1680 KWM - 2800 KWM

60 HZ – 1800 RPM

Typical generator set output [1]		Rating		Emissions standards				
kWe		kWm	bhp	X	19	3	20	7
1500		1680	2253	x				
2000		2240	3004	x				
2500		2800	3755	x				

Cooling		Engine
Variant	Package	Engine model
W2A		12V 4000 E83 [2]
W2A		16V 4000 E83 [2]
W2A		20V 4000 E83 [2]

Continuous/Prime/Grid stability – gendrive engines
60 Hz

- CONTINUOUS POWER (3A)
- PRIME POWER (3B)
- GRID STABILITY POWER (3G)

Continuous/Prime/Grid stability – gendrive engines – 60 Hz
Continuous power (3A)

870 KWM - 2490 KWM

60 HZ - 1800 RPM

Typical generator set output [1]		Rating		Emissions standards				
kWe	kVA	kWm	bhp	X	19	3	20	7
790	988	870	1167		x			
1040	1300	1140	1529		x			
1100	1375	1190	1596	x				
1300	1625	1420	1904	x				
1500	1875	1680	2253	x				
1775	2219	1950	2615	x				
2030	2538	2230	2990	x				
2300	2875	2490	3339	x				

Cooling		Engine
Variant	Package	Engine model
W2A		12V 4000 G73 [3]
W2A		16V 4000 G73 [3]
W2A		12V 4000 B14S
W2A		12V 4000 B24S
W2A		16V 4000 B14S
W2A		16V 4000 B24S
W2A		20V 4000 B24S
W2A		20V 4000 B44S

Continuous/Prime/Grid stability – gendrive engines – 60 Hz
Prime power (3B)

465 KWM - 3010 KWM

60 HZ - 1800 RPM

	Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
	kWe	kVA	kWm	bhp	X	19	3	20	7	Variant	Package	Engine model
MTU 1600 DS	415	519	465	624	x					A2A	x	10V 1600 G10S
	450	563	511	685		x				A2A	x	10V 1600 G20S
	500	625	561	752		x				A2A	x	12V 1600 G10S
	550	688	608	815		x				A2A	x	12V 1600 G20S
MTU 2000 DS	640	800	710	952		x				A2A	x	12V 2000 G45
	640	800	710	952		x				W2A		12V 2000 G45
	735	919	810	1086		x				A2A	x	12V 2000 G85
	735	919	810	1086		x				W2A		12V 2000 G85
	830	1038	915	1227		x				A2A	x	16V 2000 G45
	830	1038	915	1227		x				W2A		16V 2000 G45
	910	1138	998	1338	x	x				W2A		16V 2000 G26S
	925	1156	1010	1354		x				A2A	x	16V 2000 G85
	925	1156	1010	1354		x				W2A		16V 2000 G85
	1100	1375	1191	1597		x				A2A	x	18V 2000 G85
	1100	1375	1191	1597		x				W2A		18V 2000 G85
MTU 4000 DS	1000	1250	1105	1482		x				W2A		12V 4000 G73 [3]
	1260	1575	1390	1864		x				W2A		16V 4000 G73 [3]
	1400	1750	1520	2038	x	x				W2A		12V 4000 G14S
	1600	2000	1736	2328	x	x				W2A		12V 4000 G24S
	1850	2313	2020	2709	x	x				W2A		16V 4000 G14S
	2100	2625	2280	3058	x	x				W2A		16V 4000 G24S
	2300	2875	2490	3339	x	x				W2A		20V 4000 G14S
	2550	3188	2740	3674	x	x				W2A		20V 4000 G24S
	2800	3500	3010	4036	x	x				W2A		20V 4000 G44S

Continuous/Prime/Grid stability – gendrive engines – 60 Hz
Grid stability power (3G)

998 KWM - 3010 KWM

60 HZ – 1800 RPM

	Typical generator set output [1]		Rating		Emissions standards					Cooling		Engine
	kWe	kVA	kWm	bhp	X	19	3	20	7	Variant	Package	Engine model
MTU 2000 DS	910	1138	998	1338	x	x				W2A		16V 2000 G26S
MTU 4000 DS	1400	1750	1520	2038	x	x				W2A		12V 4000 G14S
	1600	2000	1736	2328	x	x				W2A		12V 4000 G24S
	1850	2313	2020	2709	x	x				W2A		16V 4000 G14S
	2100	2625	2280	3058	x	x				W2A		16V 4000 G24S
	2300	2875	2490	3339	x	x				W2A		20V 4000 G14S
	2550	3188	2740	3674	x	x				W2A		20V 4000 G24S
	2800	3500	3010	4036	x	x				W2A		20V 4000 G44S

Standby/Mission critical – gendrive engines (switchable)
50/60 Hz

- STANDBY POWER (3D)

Standby/Mission critical – gendrive engines (switchable) – 50/60 Hz
Standby power (3D)

1575 KWM - 2500 KWM

50/60 HZ – 1500/1800 RPM

Typical generator set output [1]				Rating				Emissions standards			
50 Hz		60 Hz		50 Hz		60 Hz					
kVA	kWe	kWe	kVA	kWm	bhp	kWm	bhp	X	1	36	24
1800	1440	1600	2000	1575	2112	1736	2328	x			
2000	1600	1750	2188	1750	2347	1910	2561	x			
2250	1800	2100	2625	1965	2635	2280	3058	x			
2500	2000	2300	2875	2185	2930	2500	3353	x			

Cooling		Engine
Variant	Package	Engine model
W2A		12V 4000 G74X [6]
W2A		12V 4000 G84X [6]
W2A		16V 4000 G74X [6]
W2A		16V 4000 G84X [6]

Continuous/Prime/Grid stability – gendrive engines (switchable)
50/60 Hz

- CONTINUOUS POWER (3A)
- PRIME POWER (3B)

Continuous/Prime/Grid stability – gendrive engines (switchable) – 50/60 Hz
Continuous power (3A)

1310 KWM - 1950 KWM

50/60 HZ – 1500/1800 RPM

Typical generator set output [1]				Rating				Emissions standards			
50 Hz		60 Hz		50 Hz		60 Hz					
kVA	kWe	kWe	kVA	kWm	bhp	kWm	bhp	X	1	36	24
1485	1188	1300	1625	1310	1757	1420	1904	x			
1865	1492	1775	2219	1635	2193	1950	2615	x			

Cooling		Engine
Variant	Package	Engine model
W2A		12V 4000 B24X [6]
W2A		16V 4000 B24X [6]

Continuous/Prime/Grid stability – gendrive engines (switchable) – 50/60 Hz
Prime power (3B)

448 KWM - 2280 KWM

50/60 HZ – 1500/1800 RPM

MTU 1600 DS

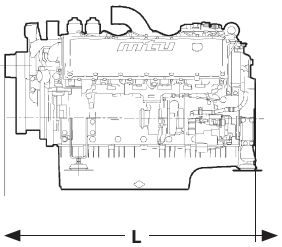
MTU 4000 DS // MTU 2000 DS

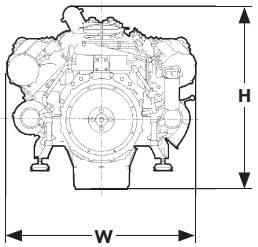
Typical generator set output [1]				Rating				Emissions standards				Cooling		Engine
50 Hz		60 Hz		50 Hz		60 Hz								
kVA	kWe	kWe	kVA	kWm	bhp	kWm	bhp	X	1	36	24	Variant	Package	Engine model
500	400	450	563	448	601	511	685	x				A2A	x	10V 1600 B40S
590	472	500	625	524	703	561	752	x				A2A	x	12V 1600 B30S
650	520	550	688	576	772	608	815	x				A2A	x	12V 1600 B40S
800	640	650	813	709	951	716	960	x [5]	x [4]	x [4]		A2A	x	12V 2000 B76
1000	800	910	1138	890	1194	998	1338	x [5]	x [4]	x [4]		A2A	x	16V 2000 B76
1250	1000	1000	1250	1102	1478	1097	1471	x [5]	x [4]	x [4]		A2A	x	18V 2000 B76
1600	1280	1400	1750	1420	1904	1520	2038	x [5]	x [4]			W2A		12V 4000 G14X [6]
1800	1440	1600	2000	1575	2112	1736	2328	x [5]	x [4]			W2A		12V 4000 G24X [6]
2100	1680	1850	2313	1798	2411	2020	2709	x [5]	x [4]			W2A		16V 4000 G14X [6]
2250	1800	2100	2625	1965	2635	2280	3058	x [5]	x [4]			W2A		16V 4000 G24X [6]

TECHNICAL ENGINE DATA

Technical engine data

SERIES 1600 GX0





Emissions standards

Fuel consumption optimized, NOx emission optimized, US EPA stationary EMERG Tier 2, US EPA stationary EMERG Tier 3, EU Nonroad St IIIA Comp, US EPA Nonroad Tier 2 compliant, US EPA Nonroad Tier 3 compliant, NEA Singapore for ORDE

Diesel engines for power generation

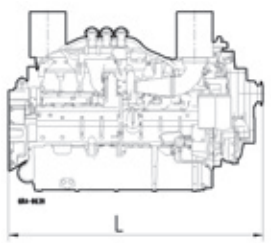
Engine	Cylinder data			Dimensions, max	Mass, max
	Bore/Stroke mm (in)	Cyl. displac. l (cu in)	Total displac.	L x W x H mm (in)	(dry) kg (lbs.)
10V 1600 Gx0 – A2A 10 Cyl./90°V	122/150 (4.8/5.9)	1.75 (107)	17.5 (1068)	1598 x 1318 x 1327 (63 x 52 x 52)	1694 [1] (3735)
12V 1600 Gx0 – A2A 12 Cyl./90°V	122/150 (4.8/5.9)	1.75 (107)	21.0 (1282)	1763 x 1318 x 1327 (69 x 52 x 52)	1855 [1] (4090)

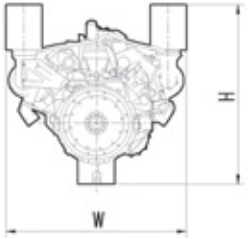
Specifications are subject to change without notice. All dimensions are approximate, for complete information refer to installation drawing. For further information consult your local distributor/dealer.

1) Guideline value

Technical engine data

SERIES 2000 GX5





Emissions standards

Fuel consumption optimized, NOx emission optimized, US EPA stationary EMERG Tier 2, US EPA Nonroad Tier 2 compliant

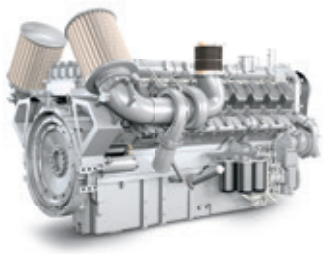
Diesel engines for power generation

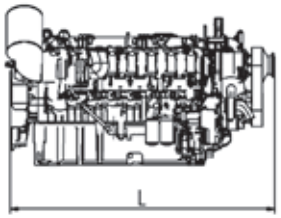
Engine	Cylinder data			Dimensions, max	Mass, max
	Bore/Stroke mm (in)	Cyl. displac. l (cu in)	Total displac.	L x W x H mm (in)	(dry) kg (lbs.)
12V 2000 Gx5 – A2A 12 Cyl./90°V	130/150 (5.1/5.9)	1.99 (121)	23.9 (1458)	1882 x 1580 x 1570 (74 x 62 x 62)	2490 (5490)
12V 2000 Gx5 – W2A 12 Cyl./90°V	130/150 (5.1/5.9)	1.99 (121)	23.9 (1458)	1836 x 1580 x 1585 (72 x 62 x 62)	2570 (5665)
16V 2000 Gx5 – A2A 16 Cyl./90°V	130/150 (5.1/5.9)	1.99 (121)	31.8 (1947)	2226 x 1580 x 1572 (88 x 62 x 62)	3100 (6834)
16V 2000 Gx5 – W2A 16 Cyl./90°V	130/150 (5.1/5.9)	1.99 (121)	31.8 (1947)	2180 x 1580 x 1585 (86 x 62 x 62)	3180 (7011)
18V 2000 Gx5 – A2A 18 Cyl./90°V	130/150 (5.1/5.9)	1.99 (121)	35.8 (2185)	2398 x 1580 x 1603 (94 x 62 x 63)	3500 (7716)
18V 2000 Gx5 – W2A 18 Cyl./90°V	130/150 (5.1/5.9)	1.99 (121)	35.8 (2185)	2352 x 1580 x 1619 (93 x 62 x 64)	3580 (7893)

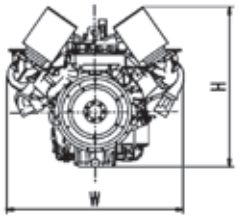
Specifications are subject to change without notice. All dimensions are approximate, for complete information refer to installation drawing. For further information consult your local distributor/dealer.

Technical engine data

SERIES 2000 GX6







Emissions standards

Fuel consumption optimized, NOx emission optimized, NEA Singapore for ORDE, US EPA Stationary EMERG Tier 2, US EPA Nonroad Tier 2 compliant

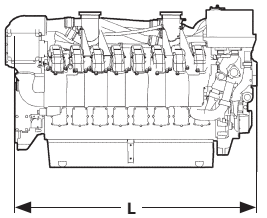
Diesel engines for power generation

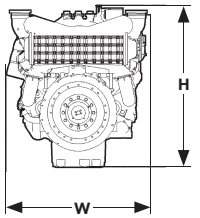
Engine	Cylinder data			Dimensions, max	Mass, max
	Bore/Stroke mm (in)	Cyl. displac. l (cu in)	Total displac.	L x W x H mm (in)	(dry) kg (lbs.)
12V 2000 Gx6 – A2A 12 Cyl./90°V	135/156 (5.3/6.13)	2.23 (136)	26.76 (1633)	2086 x 1522 x 1470 (82 x 60 x 58)	2640 (5820)
16V 2000 Gx6 – A2A 16 Cyl./90°V	135/156 (5.3/6.13)	2.23 (136)	35.68 (2177)	2436 x 1570 x 1420 (96 x 62 x 56)	3100 (6834)
16V 2000 Gx6 – W2A 16 Cyl./90°V	135/156 (5.3/6.13)	2.23 (136)	35.68 (2177)	2278 x 1568 x 1420 (90 x 62 x 56)	3140 (6923)
18V 2000 Gx6 – W2A 18 Cyl./90°V	135/156 (5.3/6.13)	2.23 (136)	40.14 (2450)	2611 x 1572 x 1420 (103 x 62 x 56)	3320 (7319)

Specifications are subject to change without notice. All dimensions are approximate, for complete information refer to installation drawing. For further information consult your local distributor/dealer.

Technical engine data

SERIES 4000 GX4





Emissions standards

Fuel consumption optimized, NOx emission optimized, US EPA Stationary EMERG Tier 2, US EPA Nonroad Tier 2 compliant, NEA Singapore for ORDE

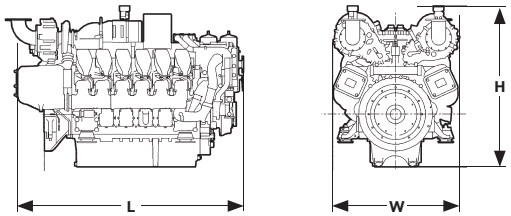
Diesel engines for power generation

Engine	Cylinder data			Dimensions, max	Mass, max
	Bore/Stroke mm (in)	Cyl. displac. l (cu in)	Total displac.	L x W x H mm (in)	(dry) kg (lbs.)
12V 4000 Gx4 – W2A 12 Cyl./90°V	170/210 (6.7/8.3)	4.77 (291)	57.2 (3491)	2495 x 1661 x 2182 (98 x 65 x 86)	6200 (13669)
16V 4000 Gx4 – W2A 16 Cyl./90°V	170/210 (6.7/8.3)	4.77 (291)	76.3 (4655)	2981 x 1661 x 2182 (117 x 65 x 86)	7700 (16976)
16V 4000 G34F/ G94F – W2A 16 Cyl./90°V	170/210 (6.7/8.3)	4.77 (291)	76.3 (4655)	2981 x 1661 x 2182 (117 x 65 x 86)	8502 (17752)
20V 4000 Gx4 – W2A 20 Cyl./90°V	170/210 (6.7/8.3)	4.77 (291)	95.4 (5822)	3486 x 1701 x 2172 (137 x 67 x 86)	9290 (20481)
20V 4000 G44F/LF/ G94F/LF – W2A 20 Cyl./90°V	170/210 (6.7/8.3)	4.77 (291)	95.4 (5822)	3479 x 1700 x 2252 (137 x 67 x 89)	9650 (21275)

Specifications are subject to change without notice. All dimensions are approximate, for complete information refer to installation drawing. For further information consult your local distributor/dealer.

Technical engine data

SERIES 4000 EX3



Emissions standards
Fuel consumption optimized

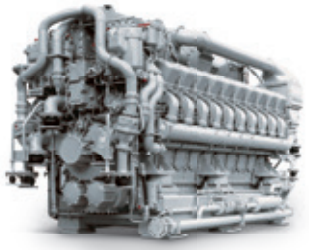
Diesel engines for power generation

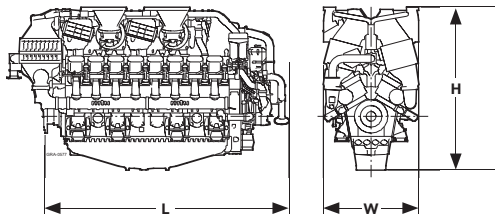
Engine	Cylinder data			Dimensions, max	Mass, max
	Bore/Stroke mm (in)	Cyl. displac. l (cu in)	Total displac.	L x W x H mm (in)	(dry) kg (lbs.)
12V 4000 Ex3 – W2A 12 Cyl./90°V	170/210 (6.7/8.3)	4.77 (291)	57.2 (3491)	2530 x 1580 x 2065 (100 x 62 x 81)	7300 (16100)
16V 4000 Ex3 – W2A 16 Cyl./90°V	170/210 (6.7/8.3)	4.77 (291)	76.3 (4655)	3000 x 1580 x 2065 (122 x 62 x 81)	8800 (19400)
20V 4000 Ex3 – W2A 20 Cyl./90°V	170/210 (6.7/8.3)	4.77 (291)	95.4 (5822)	3470 x 1510 x 2050 (137 x 60 x 81)	10680 (23545)

Specifications are subject to change without notice. All dimensions are approximate, for complete information refer to installation drawing. For further information consult your local distributor/dealer.

Technical engine data

SERIES 956 TB33/34





Emissions standards
Fuel consumption optimized

Diesel engines for power generation

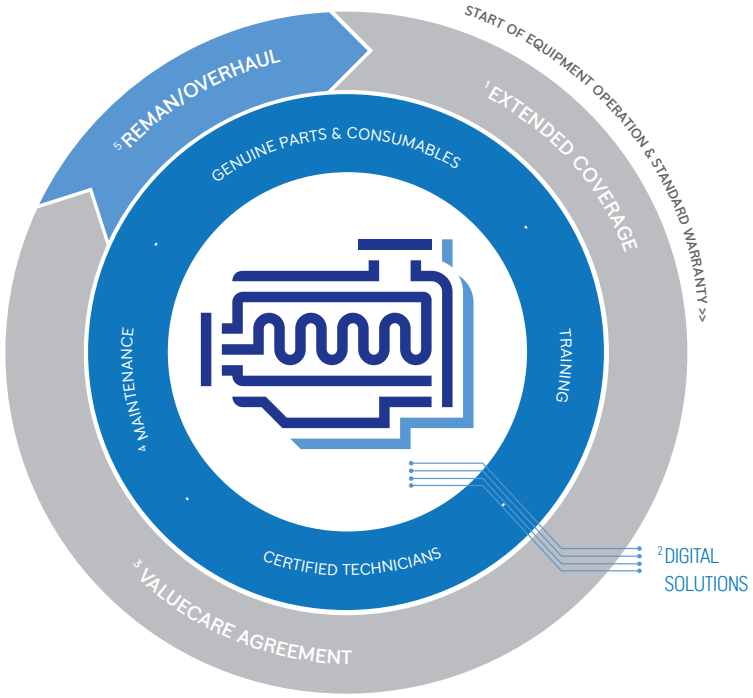
Engine	Cylinder data			Dimensions, max	Mass, max
	Bore/Stroke mm (in)	Cyl. displac. l (cu in)	Total displac.	L x W x H mm (in)	(dry) kg (lbs.)
12V 956 TB33 - W2A 12 Cyl./60°V	230/230 (9.1/9.1)	9.56 (583)	114.7 (7000)	3715 x 1660 x 2755 (146 x 65 x 109)	16690 (36795)
16V 956 TB33 - W2A 16 Cyl./60°V	230/230 (9.1/9.1)	9.56 (583)	152.9 (9331)	4400 x 1660 x 2850 (173 x 65.0 x 112)	17350 (44313)
20V 956 TB34 - W2A 20 Cyl./60°V	230/230 (9.1/9.1)	9.56 (583)	191.2 (11688)	5100 x 1660 x 2940 (201 x 65 x 116)	23560 (51941)

Specifications are subject to change without notice. All dimensions are approximate, for complete information refer to installation drawing. For further information consult your local distributor/dealer.

Complete lifecycle solutions.

ENSURE A LONG, RELIABLE LIFE.

As your equipment ages, its needs—and yours—change. Our full portfolio of service solutions wrap around your investment, providing 360 degrees of customized support, for optimal value at every stage of life.



1 Avoid the unexpected with added protection beyond the standard warranty.
2 Make better decisions faster with digitally-enhanced tools.
3 Maximize availability and optimize lifecycle costs with a ValueCare Agreement.
4 Improve system performance and extend equipment life with on-demand support.
5 Keep a good thing going with factory reman/overhaul solutions.

Complete lifecycle solutions.

RELY ON OUR EXPERTISE.

To give your equipment a long and productive life, choose a partner you can trust. Only factory-certified technicians know how to get the job done right using proven service methods, factory-specified maintenance schedules and genuine OEM parts.

From preventive maintenance to complete overhaul, we are your true lifecycle partner. Whatever level of support you need, our global network of factory-trained professionals knows all about your equipment and is ready to help you maximize performance and minimize lifecycle costs.

Never compromise
MTU engines and systems are built to last with legendary high standards. When it's time for service, don't settle for anything less. Protect the life of your equipment with professional certified service technicians and genuine OEM parts and consumables—the only options that live up to our standards for craftsmanship, quality and performance. To get the most from your equipment, there are no shortcuts. For maximum reliability, performance and uptime, choose a name you can trust.

If you need us a little:
On-Demand Support—including professional inspections and preventive maintenance recommendations from us—helps you identify and address problems early, save on repairs or unexpected downtime, and optimize your equipment's performance and longevity. Inspections include visual assessment, test run and leak check, on-site oil and coolant analysis, diagnostic evaluation and reporting.

If you need us a lot:
ValueCare Agreements make it easy to keep your business running smoothly and reduce total cost of ownership by maximizing uptime, optimizing lifecycle costs and helping you avoid equipment-related business disruptions through preventive maintenance.

ValueCare Agreements

FOCUS ON YOUR OPERATIONS. LEAVE THE REST TO US.

You've got a tough job. With us as your partner, you'll you get the power, performance and peace of mind to get it done right. Our digitally connected power systems, wrapped in ValueCare Agreements, make it easy to keep your business running smoothly and reduce total cost of ownership by maximizing uptime, optimizing lifecycle costs and helping you avoid equipment-related business disruptions through preventive maintenance.

Service solutions designed around your priorities

ValueCare Agreements make it easy to optimize lifecycle costs, maximize uptime and devote more time and resources to your core business, with tailored solutions to move your business forward.

MTU ValueCare Agreements help you:

- Increase operational uptime
- Guarantee parts availability and service quality
- Predict equipment-related costs
- Optimize maintenance planning
- Get connected 24/7

Gold

Maximize operational uptime

- Operational uptime commitment to meet or exceed your availability targets
- Regular supervision by local service partner (e.g. monitoring of parts stock)
- 24/7 emergency assistance with on-site support
- Monthly reports, including availability and average repair times
- Asset health monitoring
- Annual performance meetings and trend analysis with us to address technical updates, engine fleet data, operational optimization and more

Gold also includes all benefits of Silver & Bronze levels

Silver

Eliminate unexpected maintenance costs

- Proactive maintenance planning, troubleshooting and remote engine health monitoring
- Fixed pricing per operating hour for maintenance and repairs
- Key corrective maintenance components always in-stock at our main warehouses
- 24/7 standby service with remote technical support
- Quarterly reports, including reliability analysis (mean time between failure)

Silver also includes all benefits of Bronze level

Bronze

Ensure parts availability and price stability

- Digital connectivity (Go! Connect) and platform access (Go! Manage)
- Automated delivery of parts (preventive) at a predefined rate based on operating hours
- Preventive maintenance labor options to fit your business needs
- Dedicated support for technical issues
- Quarterly reporting of completed and upcoming maintenance and costs
- Annual on-site engine health check by our technician

Digital Solutions

THE FUTURE IS DIGITAL.

Fueled by your system's data—and supplemented with our exclusive expertise, smart analytics and extensive database—digital solutions magnify the power of your investment.

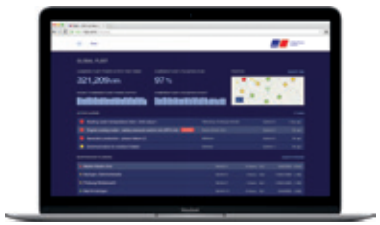
From proactive failure prevention and intelligent troubleshooting to instant failure support and smart maintenance planning, digital solutions unlock the full potential of your system.

mtu Go! Act

Service in your pocket
Designed to support on-site operators, Go! Act:
- Receives push notification of failure codes from connected assets
- Provides crew members with vital information about failure codes
- Supports event reporting with convenient photo capture functionality
- Enables direct communication with fleet managers or our Customer Assistance Center

mtu Go! Manage

Monitor your fleet
Built for fleet managers, Go! Manage:
- Provides a live overview of fleet, asset and engine conditions
- Displays active and closed alarms
- Enables interaction and communication with on-site staff via Go! Act
- Shows maintenance schedule, with completed tasks clearly marked
- Supports remote troubleshooting via multigraph



Remanufactured Products

EXCHANGE AND SAVE.

Factory remanufactured products deliver the same high standards of performance, service life and quality as new products, along with identical warranty coverage—at a fraction of the cost. And with design and model-related updates, they also feature similar technological advancements. Developed by R&D engineers, the remanufacturing process saves you time and money, while benefiting the environment through the reuse of materials. To help you work efficiently, a wide range of remanufactured parts, engines and systems are available worldwide.

Reduce lifecycle costs.
As you evaluate your long-term power needs, you must consider a variety of factors. Factory remanufactured products are a smart solution, helping you reduce the total lifecycle cost of your equipment.

Save time.
Factory remanufactured products put your equipment back to work faster than an overhaul, which reduces downtime, service time and indirect costs such as storage.

Maintain standards.
All products are remanufactured to our strict standards by our certified technicians at our regional reman centers. Only we can remanufacture our parts, engines or systems to original factory specifications.

Protect the environment.
Since remanufacturing is an efficient use of resources and energy, factory remanufactured products benefit the environment as well.

Service Network

LOCAL SUPPORT. WORLDWIDE.

The most important part of your power system isn't a part at all—it's your local service team. With more than 1,200 service locations worldwide—backed by regional Parts Logistics Centers in Europe, Asia and America—you can count on responsive support by expert technicians, wherever work takes you.
To find your local service partner, visit **www.mtu-solutions.com.**

Always on call, 24/7
Whether it's connecting you with a local service partner or assigning an urgent problem to a dedicated team of our experts, we're ready to assist you—wherever you are, whatever you need.

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Asia/Pacific +65 6860 9669
North and Latin America +1 248 560 8888
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EXHAUST EMISSIONS

Many countries have implemented environmental legislation to protect people from consequences of polluted air. For this reason an increasing number of countries regulate emissions from specific mobile and stationary sources. Emission standards may apply internationally, nationally and/or for specific areas. The enforcement of an emission legislation may depend for example on the area where the equipment is used and the way it is operated.

The emission legislations may be categorized by power range and/or cylinder capacity. Emission legislations generally require a certificate which states compliance. Stationary applications may require on-site approvals (on-site emission test) depending on the particular emission legislation.

Please find as follows examples of emission standards which apply to the PowerGen Industry. For details please consult the applicable legislation and/or permitting authority.

PowerGen emission legislation may differentiate between stationary, mobile, constant and variable speed applications.

Mobile applications are often subject to nonroad mobile machinery emission limits.

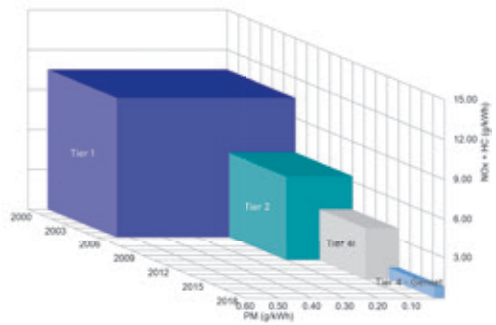
Stationary emission legislation differentiates between emergency standby and non-emergency applications. Usually non-emergency applications have more stringent emission limits. Engines for emergency standby applications are often limited by operating hours per year. The operating hour limitation may be defined differently from country to country.

Especially PowerGen applications may be subject to more stringent regional or municipal emission limits (e.g. Non-Attainment Areas).

Emission legislation for PowerGen applications is highly fragmented, e.g. US EPA, EU NRMM, NOx emission optimized, NEA Singapore.

EXHAUST EMISSIONS

Sample for emission stages in PowerGen industry:
EPA
EPA NRMM > 560 kW - Genset



Examples for emission level description:
- US EPA Nonroad Tier 4 (40CFR1039)
  –> certified
- US EPA Nonroad Tier 2 Comp (40CFR89)
  –> compliant with emission legislation - not certified
- US EPA Nonroad Tier 2 Comp
  –> compliant and corresponding to emission limit values - not certified

Explanation “NOx emission optimized”

Series 1600
— NOx emission optimized (NOx < 1500 mg/Nm³ @ 5% O_2)

Series 2000
— NOx emission optimized (NOx < 1500 mg/Nm³ @ 5% O_2)
— NOx emission optimized (NOx < 2000 mg/Nm³ @ 7% O_2)

Series 4000
— NOx emission optimized (NOx < 1700 mg/Nm³ @ 5% O_2)

Please note

That the engines and systems (only) comply with country or region specific emission requirements and have appropriate emission certification(s) which are explicitly stated in respective technical specifications. Any Export/Import/Operation of the engine in countries or regions with different applicable emission law requirements is at the customers responsibility.

NOTES

Further special solution guides

- Marine
- Rail
- C&I, Agricultural, Mining
- Oil & Gas
- PowerGen

Conversion table

NUMBERS TO BACK YOU UP.

1 kW	= 1.360 PS	g	= 9.80665 m/s^2
1 kW	= 1.341 bhp	Л	= 3.14159
1 bhp	= 1.014 PS	e	= 2.71828
1 oz	= 28.35 g		
1 lb	= 453.59 g	1 lb	= 16 oz
1 short ton	= 907.18 kg	1 short ton	= 2000 lbs
1 lb/bhp	= 447.3 g/PSh	1 ft lb	= 1.356 Nm
1 lb/bhp	= 608.3 g/kWh	1 ft/min	= 0.00508 m/s
1 gal/bhp (US)	= 4264 g/kWh	pDiesel	= 0.83 kg/l
1 kWh	= 860 kcal	1 lb/sqin	= 0.069 bar (1 psi)
1 cal	= 4.187 J	1 mm Hg	= 1.333 mbar (133.3 Pa)
1 BTU	= 1.055 kJ	1 mm H_2O	= 0.0981 mbar (9.81 Pa)
1 inch	= 2.540 cm	T (K)	= t (°C) + 273.15
1 sq. inch	= 6.542 cm^2	t (°C)	= 5/9 x (t (°F) -32)
1 cu. inch	= 16.387 cm^3	t (°C)	= 5/4 x t (°R)
1 foot	= 3.048 dm	1 foot	= 12 inches
1 sq. foot	= 9.290 dm^2	1 yard	= 3 feet
1 mile	= 1.609 km	1 mile	= 5280 feet
1 naut. mile	= 1.853 km	1 naut. mile	= 6080 feet
1 UK Gallon	= 4.546 l	1 US Barrel	= 0.159 m^3
1 US Gallon	= 3.785 l		= 42 US Gallons
Energy:	1 J = 1 Ws = 1 VAs = 1 Nm		
Power:	1 W = 1 VA = 1 Nm/s		
Force:	1 N = 1 kgm/s^2		
Pressure:	1 Pa = 1 N/m^2 (1 bar = 10^5 Pa)		
MEP (bar)	$= \frac{P_{cyl}(kW) \times 1200}{n(1/min) \times V_{cyl}(l)}$		
Torque (Nm)	$= \frac{P_{ges}(kW) \times 30000}{n(1/min) \times \pi}$		

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