

Technical Data Sheet

93800051008_V01_en_US

Voltage / Frequency

Cooling water temperature (in / out)

NOx emissions (dry)

Mixture cooler 1st stage water temperature (in)

Mixture cooler 2nd stage water temperature (in)

Exhaust gas temperature

Catalytic converter

Special equipment

Altitude above sea level

Combustion air temperature

Relative combustion air humidity

Standard specifications and regulations

MTU 16V4000 GS

GG16V4000A2



V / Hz	480	/	60
°F		172 / 194	
g/bhp-hr		1.0	
°F		127	
°F		894	
		not included	
		Gearbox	
ft / psi	328	/	14.5
°F		95	
%		60	

Energy balance	%	100	75	50
Electrical Power ^{2) 3)}	kWe	1550	1163	775
Energy input ^{4) 5)}	kBTU/hr	13241	10198	7145
Thermal output total ⁶⁾	kBTU/hr	3207	2442	1752
Thermal output engine (block, lube oil, 1st stage mixture cooler) ⁶⁾	kBTU/hr	3207	2442	1752
Thermal output mixture cooler 1st stage ⁶⁾	kBTU/hr			
Thermal output mixture cooler 2nd stage ⁶⁾	kBTU/hr	290	191	113
Exhaust heat (248 °F) ⁶⁾	kBTU/hr	(3217)	(2633)	(1930)
Engine power ISO 3046-1 ²⁾	bhp	2146	1613	1082
Generator efficiency at power factor = 1	%	97.5	97.4	97.0
Electrical efficiency ⁴⁾	%	40.0	38.9	37.0
Total efficiency	%	88.5	88.7	88.6
Power consumption ⁷⁾	kWe			

Combustion air / Exhaust gas

Combustion air volume flow ¹⁾	ft³/min	3746	2839	1941
Combustion air mass flow	lb/hr	18120	13730	9389
Exhaust gas volume flow, wet ¹⁾	ft³/min	3873	2938	2011
Exhaust gas volume flow, dry ¹⁾	ft³/min	3573	2705	1849
Exhaust gas mass flow, wet	lb/hr	18766	14231	9742
Exhaust temperature after turbocharger	°F	894	942	991

Reference fuel ⁸⁾

Natural gas			CH ₄ >95 Vol. %
Sewage gas			not applicable
Biogas			not applicable
Landfill gas			not applicable

Fuel requirements ⁹⁾

Minimum methane number	MN	60
Range of heating value: design / operation range without power derating	BTU/ft³	995.2 - 1043.5 / 966.2 - 1256.1

Exhaust gas emissions ^{5) 8) 23)}

NOx, stated as NO ₂ (dry)	g/bhp-hr	1.0
CO (dry)	g/bhp-hr	2.0
HCHO (dry)	g/bhp-hr	
VOC (dry)	g/bhp-hr	0.7

Otto-gas engine, lean burn operation with turbocharging

Number of cylinders / configuration		16	/	V
Engine type			16V4000L32FNER	
Engine speed	rpm		1500	
Bore	in		6.7	
Stroke	in		8.3	
Displacement	in³		4656.1	
Mean piston speed	ft/sec		34.4	
Compression ratio			10.5	
BMEP at nominal engine speed min-1	psi	243.3		
Lube oil consumption ¹⁰⁾	gal/hr	0.1		
Exhaust back pressure min. - max. after module	in H ₂ O - in H ₂ O		12 - 24	

Generator

Rating power (temperature rise class F) ¹¹⁾	kVA			
Insulation class / temperature rise class			H / F	
Winding pitch			2/3	
Protection			IP 23	
Max. allowable p.f. inductive (overexcited) / capacitive (underexcited) ¹²⁾			0.8 / 1	
Voltage tolerance / frequency tolerance	%		± 5 / ± 5	

Engine cooling water system

Coolant temperature (in / out), design	°F	172 / 194		
Coolant flow rate, constant ^{13) 14)}	gal/min	321.0		
Pressure drop, design ¹⁴⁾	psi / gal/min	42	/	192.1
Max. operation pressure (coolant before engine)	psi		87.0	

Exhaust gas heat exchanger (EGHE)

Exhaust gas temperature (out)	°F			
Coolant temperature (in / out), design	°F			
Coolant volumetric flow, constant ^{13) 14)}	gal/min			
Pressure drop, design ¹⁴⁾	in H ₂ O / gal/min		/	
Min. coolant flow rate / min. operation gauge pressure	gal/min / psi		/	
Max. operation pressure (coolant water)	psi			

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Mixture cooler 1st stage, external					
Coolant temperature (in / out), design		°F			
Coolant volumetric flow, design, constant ^{13) 14)}		gal/min			
Pressure drop, design ¹⁴⁾	Cv value ^{13) 15)}	psi / gal/min		/	
Min. coolant flow rate / min. operation gauge pressure		gal/min / psi		/	
Max. operation pressure before mixture cooler		psi			
Mixture cooler 2nd stage, external					
Coolant temperature (in / out), design		°F	127 / 132.0		
Coolant volumetric flow, design, constant ^{13) 14)}		gal/min	127.2		
Pressure drop, design ¹⁴⁾	Cv value ^{13) 15)}	psi / gal/min	5	/	217.0
Max. operation pressure before mixture cooler		psi		87	
Heating circuit interface					
Engine coolant temperature (in / out), design		°F			
Heating water temperature (in / out), design		°F			
Heating water flow rate, design ^{14) 16)}		gal/min			
Pressure drop, design ¹⁴⁾	Cv value ^{15) 16)}	psi / gal/min		/	
Max. operation gauge pressure (heating water)		psi			
Room ventilation					
Genset ventilation heat ¹⁷⁾		kBTU/hr		373	
Inlet air temperature: (min./design/max.)		°F		86 / 95 / 104	
Min. engine room temperature ¹⁸⁾		°F		59	
Max. temperature difference ventilation air (in / out)		°F		36	
Min. supply air volume flow rate (combustion + ventilation) ¹⁹⁾		ft³/min		12949	
Gearbox		%	100	75	50
Efficiency		%	99.3	99.2	99.0
Starter battery					
Nominal voltage / power / capacity required		V / kW / Ah		24 / 2 x 9 / --	
Filling quantities					
Lube oil for engine		gal		66	
Coolant in engine		gal		71	
Coolant in mixture cooler		gal		6	
Heating water for plate heat exchanger ²⁰⁾		gal			
Lube oil for gearbox		gal		24	
Gas regulation line					
Nominal size / gas pressure min. - max.		NPS / psi - psi	4	/	2.32 - 3.63
Engine sound level ²¹⁾ (1 meter distance, free field) +3 dB(A) for total A-weighted level tolerance					
Frequency		Hz	63	125	250 500
Sound pressure level		dB	78.3	86.3	89.0 91.5
Frequency		Hz	1000	2000	4000 8000
Sound pressure level		dB	92.1	90.8	99.4 91.7
		Lin dB	102.0		
Sum of pressure levels		dB A	101.8		
Sound power level		dB	121.6		
Undamped exhaust noise ²¹⁾ (1 meter distance to outlet within 90°, free field) +3 dB(A) for total A-weighted level tolerance					
Frequency		Hz	63	125	250 500
Sound pressure level		dB	116.9	118.4	108.6 102.9
Frequency		Hz	1000	2000	4000 8000
Sound pressure level		dB	97.3	96.1	91.9 76.1
		Lin dB	121.1		
Sum of pressure levels		dB A	106.5		
Sound power level		dB	118.7		
Dimensions (aggregate)					
Length		in		~ 264	
Width		in		~ 87	
Height		in		~ 102	
Gross weight (dry weight)		lb		~ 38405 (~ 36927)	
Power derating					
Altitude				specific to the project	
Combustion air temperature				specific to the project	
Mixture cooler coolant temperature (in)				specific to the project	
Methane number				specific to the project	
Boundary conditions and consumables					
Systems and consumables have to conform to the following actual company standards:			A001067		
1) Normal cubic meter at 15 psi and T = 273 K					
2) Prime power operation will be designed specific to the project					
3) Generator gross power at nominal voltage, power factor = 1 and nominal frequency					
4) According to ISO 3046 (+ 5 % tolerance), using reference fuel used at nominal voltage, power factor = 1 and nominal frequency					
5) Emission values during grid parallel operation					
6) Thermal output at layout temperature; tolerance +/- 8 %					
7) Power consumption of all electrical consumers which are mounted at the module / genset					
8) Deviations from the layout parameters respectively the reference fuel can have influence on the obtained efficiency and exhaust emissions					
9) Functional capability					
10) Reference value at nominal load (without amount of oil exchange)					
11) Genset max. 3281 ft height of location and max. 104 °F intake air temperature; else power derating					
12) Max. allowable cos phi at nominal power (view of producer)					
13) Stated values for cooling fluid composition 65% water and 35% glycol, adaption for use of other cooling fluid composition necessary The system design must consider the tolerance.					
14) Pressure loss at reference flow rate					
15) The Cv value declares the volumetric flow in gal/min at a pressure drop of 1 psi. Min. and max. flow rate limits are defined.					
16) Stated values for pure water, adaption for other cooling fluid composition necessary					
17) Only generator- and surface losses					
18) Frost-free conditions must be guaranteed					
19) Amount of ventilation air must be adapted to the gas safety concept					
20) Assemblies including pipe work					
21) All sound pressure levels at nominal load					
22) Max. admissible cos phi depending on voltage in accordance with the requirements of the BDEW Mittelspannungsrichtlinie (German Medium Voltage Directive)					
23) Emissions compliant to 40CFR60 subpart JJJJ table 1, non-certified engine					

EDAM / EDA7

EDAM / EDAT

Foundation specifications for

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Engine power, mechanical
Special equipment

MTU 16V4000 GS

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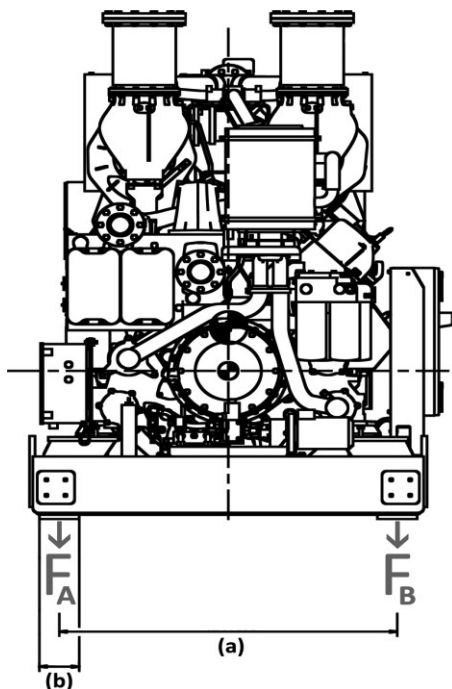


kW	1600
-	Gearbox

Genset		Value
Engine type	-	16V4000L32FNER
Engine speed	1/min	1500
Torque	kNm	8.5
Genset weight	kg	17420
Distance of resilient mats (a)	mm	1300
Number of resilient mats	-	6
Gear ratio of transmission	-	1.2
Generator		
Voltage	V	480
Rating power (temperature rise class F) ¹⁾	kVA	2189
Engine speed	1/min	1800
Subtransient reactance	%	17.603
Safety factor	-	1.5
Short-circuit torque	kNm	125.5
Static load on foundation (weight)		
Genset load	kN	170.9
Load per side	kN	85.5
Load per resilient mat	kN	28.5
Dynamic load on foundation (imbalance)		
Load per resilient mat	kN	0.6
Load on foundation imposed by short-circuit torque ⁵⁾		
Load imposed by short-circuit torque	kN	96.5
Overall load on foundation		
Load on A side	kN	182.0
Load on B side	kN	-11.0

ATTENTION:

- The maximum admissible height difference of the individual support surfaces is ± 2 mm over 3 m foundation length.



Symbolic illustration

Important information

- The design of the foundation or the load-bearing ceiling (planning, quality, reinforcement etc.) is not part of the scope of delivery. We recommend to source this scope of work to an experienced architect and/or construction company.
- The foundation shall be made of high-quality concrete, if required steel concrete. The concrete shall be poured in a single, continuous operation. The foundation surface shall be screeded in longitudinal and transverse directions using a plate and a level but not corrected by plastering.
- All MTU engines provide full theoretical mass balance.
- Based on the measurement results, the dynamic load resulting from imbalance and transferred from the base frame to foundation was determined as max. 2 % of the static foundation load.
- The stated loads are to be considered for a two-pole short-circuit torque of the generator. This load acts regardless of the direction of rotation alternately with the rotation frequency on both base frame sides (A + B) and is decayed after approx. 0.5 sec.
- It is recommended to mount the genset on resilient mats in order to reduce structure-borne noise. The exact arrangement is specified in the planning drawings. The length l of the resilient mat depends on the admissible load.