Technical Data Sheet

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MTU 16V4000 GS

GG16V4000A1

Voltage / Frequency	V / Hz	**400**	**/**	**50**
Cooling water temperature (in / out)	°C		**78 / 90**	
NOx emissions (dry, 5 % O_2)	mg/m³ i.N.		**< 500**	
Mixture cooler 1st stage water temperature (in)	°C			
Mixture cooler 2nd stage water temperature (in)	°C		**40**	
Exhaust gas temperature	°C		**426**	
Catalytic converter			**not included**	
Special equipment				
Altitude above sea level	m / mbar	**100**	**/**	**1000**
Combustion air temperature	°C		**25**	
Relative combustion air humidity	%		**30**	
Standard specifications and regulations				

Energy balance	**%**	**100**	**75**	**50**
Electrical Power [2) 3)]	kW	1718	1289	859
Energy input [4) 5)]	kW	3991	3067	2153
Thermal output total [6)]	kW	974	735	508
Thermal output engine (block, lube oil, 1st stage mixture cooler) [6)]	kW	974	735	508
Thermal output mixture cooler 1st stage [6)]	kW			
Thermal output mixture cooler 2nd stage [6)]	kW	113	78	56
Exhaust heat (120 °C) [6)]	kW	(821)	(688)	(520)
Engine power ISO 3046-1 [2)]	kW	1760	1321	885
Generator efficiency at power factor = 1	%	97.6	97.6	97.1
Electrical efficiency [4)]	%	43.0	42.0	39.9
Total efficiency	%	88.0	88.4	87.6
Power consumption [7)]	kW			
Combustion air / Exhaust gas				
Combustion air volume flow [1)]	m³ i.N./h	6697	5004	3423
Combustion air mass flow	kg/h	8649	6462	4421
Exhaust gas volume flow, wet [1)]	m³ i.N./h	6918	5174	3543
Exhaust gas volume flow, dry [1)]	m³ i.N./h	6390	4771	3260
Exhaust gas mass flow, wet	kg/h	8940	6687	4578
Exhaust temperature after turbocharger	°C	426	459	487
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	MZ		80	
Range of heating value: design / operation range without power derating	kWh/m³ i.N.		10.0 - 10.5 / 8.0 - 11.0	
Exhaust gas emissions [5) 8)]				
NOx, stated as NO_2 (dry, 5 % O_2)	mg/m³ i.N.	< 500		
CO (dry, 5 % O_2)	mg/m³ i.N.	< 1000		
HCHO (dry, 5 % O_2)	mg/m³ i.N.			
VOC (dry, 5 % O_2)	mg/m³ i.N.			
Otto-gas engine, lean burn operation with turbocharging				
Number of cylinders / configuration		16	/	V
Engine type			16V4000L33FN	
Engine speed	1/min		1500	
Bore	mm		170.0	
Stroke	mm		210.0	
Displacement	dm³		76.3	
Mean piston speed	m/s		10.5	
Compression ratio			12.8	
BMEP at nominal engine speed min-1	bar	18.5		
Lube oil consumption [10)]	dm³/h	0.6		
Exhaust back pressure min. - max. after module	mbar - mbar		30 - 60	
Generator				
Rating power (temperature rise class F) [11)]	kVA		2280	
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 / 0.95	
Voltage tolerance / frequency tolerance	%		± 10 / ± 5	
Engine cooling water system				
Coolant temperature (in / out), design	°C	78 / 90		
Coolant flow rate, constant [13) 14)]	m³/h	75.6		
Pressure drop, design [14)] Cv value [13) 15)]	bar / m³/h	2.79	/	46.0
Max. operation pressure (coolant before engine)	bar		6.0	
Exhaust gas heat exchanger (EGHE)				
Exhaust gas temperature (out)	°C			
Coolant temperature (in / out), design	°C			
Coolant volumetric flow, constant [13) 14)]	m³/h			
Pressure drop, design [14)] Cv value [13) 15)]	kPa / m³/h		/	
Min. coolant flow rate / min. operation gauge pressure	m³/h / bar		/	
Max. operation pressure (coolant water)	bar			

Mixture cooler 1st stage, external						
Coolant temperature (in / out), design		°C				
Coolant volumetric flow, design, constant [13) 14)]		m³/h				
Pressure drop, design [14)]	Cv value [13) 15)]	bar / m³/h		/		
Min. coolant flow rate / min. operation gauge pressure		m³/h / bar		/		
Max. operation pressure before mixture cooler		bar				
Mixture cooler 2nd stage, external						
Coolant temperature (in / out), design		°C	40 / 43.7			
Coolant volumetric flow, design, constant [13) 14)]		m³/h	28.9			
Pressure drop, design [14)]	Cv value [13) 15)]	bar / m³/h	0.96	/	30.2	
Max. operation pressure before mixture cooler		bar		6		
Heating circuit interface						
Engine coolant temperature (in / out), design		°C				
Heating water temperature (in / out), design		°C				
Heating water flow rate, design [14) 16)]		m³/h				
Pressure drop, design [14)]	Cv value [15) 16)]	bar / m³/h		/		
Max. operation gauge pressure (heating water)		bar				
Room ventilation						
Genset ventilation heat [17)]		kW		88		
Inlet air temperature: (min./design/max.)		°C		20 / 25 / 30		
Min. engine room temperature [18)]		°C		15		
Max. temperature difference ventilation air (in / out)		K		20		
Min. supply air volume flow rate (combustion + ventilation) [19)]		m³ i.N./h		19000		
Gearbox		**%**	**100**	**75**	**50**	
Efficiency		%	-	-	-	
Starter battery						
Nominal voltage / power / capacity required		V / kW / Ah		24 / 2 x 9 / --		
Filling quantities						
Lube oil for engine		dm³		250		
Coolant in engine		dm³		270		
Coolant in mixture cooler		dm³		22		
Heating water for plate heat exchanger [20)]		dm³				
Lube oil for gearbox		dm³				
Gas regulation line						
Nominal size / gas pressure min. - max.		DN / mbar - mbar	80	/	180 - 250	
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			
Undampened 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		mm		~ 5500		
Width		mm		~ 2000		
Height		mm		~ 2300		
Gross weight (dry weight)		kg		~ 15500 (~ 15000)		
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 1013 mbar 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. 1000 m height of location and max. 40 °C 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 m³/h at a pressure drop of 1 bar. 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)

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