

Technical Data Sheet

93800051562_V01_en_PK

Voltage / Frequency

Cooling water temperature (in / out)

NOx emissions (dry, 5 % O₂)

Mixture cooler 1st stage water temperature (in)

Mixture cooler 2nd stage water temperature (in)

Exhaust gas temperature

Catalytic converter

Special equipment

Elevation above sea level

Combustion air temperature

Relative combustion air humidity

Standard specifications and regulations

MTU 20V4000 GS

GG20V4000A1



V / Hz	400	/	50
°C		78 / 90	
mg/m ³ i.N.		< 500	
°C			
°C		53	
°C		471	
		not included	
m / mbar	100	/	1000
°C		45	
%		35	

Energy balance	%	100	75	50
Electrical Power ^{2) 3)}	kW	1948	1461	974
Energy input ^{4) 5)}	kW	4620	3548	2486
Thermal output total ⁶⁾	kW	1079	821	579
Thermal output engine (block, lube oil, 1st stage mixture cooler) ⁶⁾	kW	1079	821	579
Thermal output mixture cooler 1st stage ⁶⁾	kW			
Thermal output mixture cooler 2nd stage ⁶⁾	kW	79	51	32
Exhaust heat (120 °C) ⁶⁾	kW	(1109)	(898)	(667)
Engine power ISO 3046-1 ²⁾	kW	2000	1499	1003
Generator efficiency at power factor = 1	%	97.4	97.4	97.1
Electrical efficiency ⁴⁾	%	42.2	41.2	39.2
Total efficiency	%	89.5	89.6	89.3
Power consumption ⁷⁾	kW			

Combustion air / Exhaust gas

Combustion air volume flow ¹⁾	m ³ i.N./h	7671	5772	3923
Combustion air mass flow	kg/h	9906	7454	5066
Exhaust gas volume flow, wet ¹⁾	m ³ i.N./h	7927	5969	4062
Exhaust gas volume flow, dry ¹⁾	m ³ i.N./h	7316	5500	3733
Exhaust gas mass flow, wet	kg/h	10246	7715	5250
Exhaust temperature after turbocharger	°C	471	496	529

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		80
Range of heating value: design / operation range without power derating	kWh/m ³ i.N.		10.0 - 10.5 / 8.3 - 11.0

Exhaust gas emissions ^{5) 8)}

NOx, stated as NO ₂ (dry, 5 % O ₂)	mg/m ³ i.N.	< 500	
CO (dry, 5 % O ₂)	mg/m ³ i.N.	< 1000	
HCHO (dry, 5 % O ₂)	mg/m ³ i.N.		
VOC (dry, 5 % O ₂)	mg/m ³ i.N.		

Otto-gas engine, lean burn operation with turbocharging

Number of cylinders / configuration		20	/	V
Engine type			20V4000L32FN	
Engine speed	1/min		1500	
Bore	mm		170.0	
Stroke	mm		210.0	
Displacement	dm ³		95.3	
Mean piston speed	m/s		10.5	
Compression ratio			12.1	
BMEP at nominal engine speed min-1	bar	16.8		
Lube oil consumption ¹⁰⁾	dm ³ /h	0.68		
Exhaust back pressure min. - max. after module	mbar - mbar		30 - 60	

Generator

Rating power (temperature rise class F) ¹¹⁾	kVA		2483
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 / 1.0
Voltage tolerance / frequency tolerance	%		± 5 / ± 5

Engine cooling water system

Coolant temperature (in / out), design	°C		78 / 90
Coolant flow rate, constant ^{13) 14)}	m ³ /h		83.0
Pressure drop, design ¹⁴⁾	Cv value ^{13) 15)}	bar / m ³ /h	2.37 / 54.7
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)}	m ³ /h		
Pressure drop, design ¹⁴⁾	Cv value ^{13) 15)}	kPa / m ³ /h	/
Min. coolant flow rate / min. operation gauge pressure	m ³ /h / bar		/
Max. operation pressure (coolant water)	bar		

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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 cooling 2nd stage, external				
Coolant temperature (in / out), design	°C	53 / 55.1		
Coolant volumetric flow, design, constant ^{13) 14)}	m³/h	34.3		
Pressure drop, design ¹⁴⁾	Cv value ^{13) 15)}	bar / m³/h	0.6	/ 45.3
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		113	
Inlet air temperature: (min./design/max.)	°C		30 / 35 / 40	
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		23500	
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		350	
Coolant in engine	dm³		310	
Coolant in mixture cooler	dm³		23	
Heating water for plate heat exchanger ²⁰⁾	dm³			
Lube oil for gearbox	dm³			
Gas regulation line				
Nominal size / gas pressure min. - max. (at gas regulation line inlet)	DN / mbar - mbar	100	/	150 - 250
Engine sound level ²¹⁾ (1 meter distance, free field) +3 dB(A) for total A-weighted level tolerance				
Frequency	Hz	63	125	250
Sound pressure level	dB	84.6	91.9	88.9
Frequency	Hz	1000	2000	4000
Sound pressure level	dB	92.9	89.8	84.6
	Lin dB	99.8		
Sum of pressure levels	dB(A)	98.0		
Sound power level	dB(A)	117.9		
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
Sound pressure level	dB	117.1	118.0	109.7
Frequency	Hz	1000	2000	4000
Sound pressure level	dB	88.0	89.4	88.0
	Lin dB	121.0		
Sum of pressure levels	dB(A)	105.4		
Sound power level	dB(A)	118.4		
Dimensions (aggregate)				
Length	mm		~ 5900	
Width	mm		~ 2000	
Height	mm		~ 2400	
Gross weight (dry weight)	kg		~ 18700 (~ 18000)	
Power derating				
Elevation			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)