

# Technical Data Sheet

93800052465\_V01\_en\_GB

Voltage / Frequency

Cooling water temperature (in / out)

NOx emissions (dry, 5 % O<sub>2</sub>)

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	11000	/	50
°C		78 / 90	
mg/m <sup>3</sup> i.N.		< 250	
°C		43	
°C		419	
°C		not included	
		SRD	
m / mbar	100	/	1000
°C		25	
%		30	
		VDE-AR-N 4110	

<b>Energy balance</b>	%	100	75	50
Electrical Power <sup>2) 3)</sup>	kW	2535	1901	1268
Energy input <sup>4) 5)</sup>	kW	5915	4495	3126
Thermal output total <sup>6)</sup>	kW	1322	960	640
Thermal output engine (block, lube oil, 1st stage mixture cooler) <sup>6)</sup>	kW	1322	960	640
Thermal output mixture cooler 1st stage <sup>6)</sup>	kW			
Thermal output mixture cooler 2nd stage <sup>6)</sup>	kW	188	127	79
Exhaust heat ( 120 °C ) <sup>6)</sup>	kW	( 1210 )	( 1008 )	( 770 )
Engine power ISO 3046-1 <sup>2)</sup>	kW	2600	1952	1310
Generator efficiency at power factor = 1	%	97.5	97.4	96.8
Electrical efficiency <sup>4)</sup>	%	42.9	42.3	40.6
Total efficiency	%	85.7	86.1	85.7
Power consumption <sup>7)</sup>	kW			

<b>Combustion air / Exhaust gas</b>				
Combustion air volume flow <sup>1)</sup>	m <sup>3</sup> i.N./h	9851	7332	4988
Combustion air mass flow	kg/h	12721	9469	6442
Exhaust gas volume flow, wet <sup>1)</sup>	m <sup>3</sup> i.N./h	10201	7602	5175
Exhaust gas volume flow, dry <sup>1)</sup>	m <sup>3</sup> i.N./h	9412	7000	4756
Exhaust gas mass flow, wet	kg/h	13159	9805	6676
Exhaust temperature after turbocharger	°C	419	453	492

<b>Reference fuel <sup>8)</sup></b>				
Natural gas			CH <sub>4</sub> >95 Vol.%	
Sewage gas			not applicable	
Biogas			not applicable	
Landfill gas			not applicable	

<b>Fuel requirements <sup>9)</sup></b>				
Minimum methane number	MN		80	
Range of heating value: design / operation range without power derating	kWh/m <sup>3</sup> i.N.		10.0 - 10.5 / 8.5 - 11.0	

<b>Exhaust gas emissions <sup>5) 8)</sup> Compliance with emissions standards only for ≥ 1268 kWel</b>				
NOx, stated as NO <sub>2</sub> (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	< 250		
CO (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	< 1000		
HCHO (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	< 135		
VOC (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.			

<b>Otto-gas engine, lean burn operation with turbocharging</b>				
Number of cylinders / configuration		20	/	V
Engine type			20V4000L64	
Engine speed	1/min		1500	
Bore	mm		170.0	
Stroke	mm		210.0	
Displacement	dm <sup>3</sup>		95.3	
Mean piston speed	m/s		10.5	
Compression ratio			14.0	
BMEP at nominal engine speed min-1	bar	21.8		
Lube oil consumption <sup>10)</sup>	dm <sup>3</sup> /h	0.44		
Exhaust back pressure min. - max. after module	mbar - mbar		30 - 60	

<b>Generator</b>				
Rating power (temperature rise class F) <sup>11)</sup>	kVA		3724	
Insulation class / temperature rise class			F / F	
Winding pitch			2/3	
Protection			IP23	
Max. allowable p.f. inductive (overexcited) / capacitive (underexcited) <sup>12)</sup>			0.8 / 0.95	
Voltage tolerance / frequency tolerance	%		± 10 / ± 5	

<b>Engine cooling water system</b>				
Coolant temperature (in / out), design	°C	78 / 90		
Coolant flow rate, constant <sup>13) 14)</sup>	m <sup>3</sup> /h	102.6		
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	3.52	/	55.6
Max. operation pressure (coolant before engine)	bar		6.0	

<b>Exhaust gas heat exchanger (EGHE)</b>				
Exhaust gas temperature (out)	°C			
Coolant temperature (in / out), design	°C			
Coolant volumetric flow, constant <sup>13) 14)</sup>	m <sup>3</sup> /h			
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>			
Min. coolant flow rate / min. operation gauge pressure	m <sup>3</sup> /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 <sup>13) 14)</sup>	m <sup>3</sup> /h			
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	bar / m <sup>3</sup> /h	/	
Min. coolant flow rate / min. operation gauge pressure	m <sup>3</sup> /h / bar		/	
Max. operation pressure before mixture cooler	bar			
Mixture cooling 2nd stage, external				
Coolant temperature (in / out), design	°C	43 / 47.0		
Coolant volumetric flow, design, constant <sup>13) 14)</sup>	m <sup>3</sup> /h	43.9		
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	bar / m <sup>3</sup> /h	1.08	/ 43.2
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 <sup>14) 16)</sup>	m <sup>3</sup> /h			
Pressure drop, design <sup>14)</sup>	Cv value <sup>15) 16)</sup>	bar / m <sup>3</sup> /h	/	
Max. operation gauge pressure (heating water)	bar			
Room ventilation				
Genset ventilation heat <sup>17)</sup>	kW		179	
Inlet air temperature: (min./design/max.)	°C		20 / 25 / 30	
Min. engine room temperature <sup>18)</sup>	°C		15	
Max. temperature difference ventilation air (in / out)	K		20	
Min. supply air volume flow rate (combustion + ventilation) <sup>19)</sup>	m <sup>3</sup> i.N./h		35000	
Gearbox				
Efficiency	%	100	75	50
Efficiency	%	-	-	-
Starter battery				
Nominal voltage / power / capacity required	V / kW / Ah		24 / 2 x 9 / --	
Filling quantities				
Lube oil for engine	dm <sup>3</sup>		450	
Coolant in engine	dm <sup>3</sup>		310	
Coolant in mixture cooler	dm <sup>3</sup>		25	
Heating water for plate heat exchanger <sup>20)</sup>	dm <sup>3</sup>			
Lube oil for gearbox	dm <sup>3</sup>			
Gas regulation line				
Nominal size / gas pressure min. - max. (at gas regulation line inlet)	DN / mbar - mbar	100	/	190 - 250
Engine sound level <sup>21)</sup> (1 meter distance, free field) +3 dB(A) for total A-weighted level tolerance; + 5 dB for single octave level				
Frequency	Hz	63	125	250 500
Sound pressure level	dB	93.1	95.1	91.5 95.0
Frequency	Hz	1000	2000	4000 8000
Sound pressure level	dB	93.5	92.8	91.8 99.7
Linear total sound pressure level	Lin dB	104.0		
A-weighted total sound pressure level	dB(A)	102.0		
A-weighted total sound power level	dB(A)	122.5		
Undampened exhaust noise <sup>21)</sup> (1 meter distance to outlet within 90°, free field) +3 dB(A) for total A-weighted level tolerance; + 5 dB for single octave level				
Frequency	Hz	63	125	250 500
Sound pressure level	dB	118.4	118.9	108.8 100.5
Frequency	Hz	1000	2000	4000 8000
Sound pressure level	dB	91.9	91.5	91.8 84.1
Linear total sound pressure level	Lin dB	122.0		
A-weighted total sound pressure level	dB(A)	106.5		
A-weighted total sound power level	dB(A)	119.5		
Dimensions (aggregate)				
Length	mm		~ 6300	
Width	mm		~ 2000	
Height	mm		~ 2400	
Gross weight (dry weight)	kg		~ 20750 (~ 20000)	
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:			A001072	
<ol style="list-style-type: none"> <li>Normal cubic meter at 1013 mbar and T = 273 K</li> <li>Prime power operation will be designed specific to the project</li> <li>Generator gross power at nominal voltage, power factor = 1 and nominal frequency</li> <li>According to ISO 3046 (+ 5 % tolerance), using reference fuel used at nominal voltage, power factor = 1 and nominal frequency</li> <li>Emission values during grid parallel operation</li> <li>Thermal output at layout temperature; tolerance +/- 8 %</li> <li>Power consumption of all electrical consumers which are mounted at the module / genset</li> <li>Deviations from the layout parameters respectively the reference fuel can have influence on the obtained efficiency and exhaust emissions</li> <li>Functional capability</li> <li>Reference value at nominal load (without amount of oil exchange)</li> <li>Generator (at nominal power) max. 1000 m height of location and max. 40 °C intake air temperature; else power derating</li> <li>Max. allowable cos phi at nominal power (view of producer)</li> <li>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.</li> <li>Pressure loss at reference flow rate</li> <li>The Cv value declares the volumetric flow in m<sup>3</sup>/h at a pressure drop of 1 bar. Min. and max. flow rate limits are defined.</li> <li>Stated values for pure water, adaption for other cooling fluid composition necessary</li> <li>Only generator- and surface losses</li> <li>Frost-free conditions must be guaranteed</li> <li>Amount of ventilation air must be adapted to the gas safety concept</li> <li>Assemblies including pipe work</li> <li>All sound pressure levels at nominal load, according to ISO 8528-10 and ISO 6798. Resonance effects of the connected exhaust line can influence the exhaust noise sound pressure level</li> <li>Max. admissible cos phi depending on voltage in accordance with the requirements of the valid 'Standard specifications and regulations'</li> </ol>				