

## Technical Data Sheet

93800052824\_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		77 / 91	
mg/m <sup>3</sup> i.N.		< 250	
°C		43	
°C		423	
		not included	
m / mbar	100	/	1000
°C		25	
%		30	
		VDE-AR-N 4110	

Energy balance	%	100	75	50
Electrical Power <sup>2) 3)</sup>	kW	2535	1901	1268
Energy input <sup>4) 5)</sup>	kW	5955	4561	3202
Thermal output total <sup>6)</sup>	kW	1411	1038	723
Thermal output engine (block, lube oil, 1st stage mixture cooler) <sup>6)</sup>	kW	1411	1038	723
Thermal output mixture cooler 1st stage <sup>6)</sup>	kW			
Thermal output mixture cooler 2nd stage <sup>6)</sup>	kW	217	137	83
Exhaust heat ( 120 °C ) <sup>6)</sup>	kW	( 1290 )	( 1089 )	( 857 )
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>	%	42.6	41.7	39.6
Total efficiency	%	87.9	88.3	89.0
Power consumption <sup>7)</sup>	kW			

### Combustion air / Exhaust gas

Combustion air volume flow <sup>1)</sup>	m <sup>3</sup> i.N./h	10046	7563	5075
Combustion air mass flow	kg/h	12973	9767	6554
Exhaust gas volume flow, wet <sup>1)</sup>	m <sup>3</sup> i.N./h	10546	7947	5345
Exhaust gas volume flow, dry <sup>1)</sup>	m <sup>3</sup> i.N./h	9442	7101	4751
Exhaust gas mass flow, wet	kg/h	13409	10101	6788
Exhaust temperature after turbocharger	°C	423	459	514

### Reference fuel <sup>8)</sup>

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

### Fuel requirements <sup>9)</sup>

Minimum methane number	MN		70
Range of heating value: design / operation range without power derating	kWh/m <sup>3</sup> i.N.		10.0 - 10.5 / 8.4 - 11.0

### Exhaust gas emissions <sup>5) 8)</sup> Compliance with emissions standards only for ≥ 1268 kWel

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.	< 90
VOC (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	

### Otto-gas engine, lean burn operation with turbocharging

Number of cylinders / configuration		20	/	V
Engine type			20V4000L64FNER	
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			12.5	
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	

### Generator

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	

### Engine cooling water system

Coolant temperature (in / out), design	°C		77 / 91		
Coolant flow rate, constant <sup>13) 14)</sup>	m <sup>3</sup> /h		93.9		
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	bar / m <sup>3</sup> /h	2.89	/	56.1
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 <sup>13) 14)</sup>	m <sup>3</sup> /h			
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	kPa / m <sup>3</sup> /h		/
Min. coolant flow rate / min. operation gauge pressure	m <sup>3</sup> /h / bar			
Max. operation pressure (coolant water)	bar			

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<b>Mixture cooler 1st stage, external</b>				
Coolant temperature (in / out), design	°C			
Coolant volumetric flow, design, constant <sup>13) 14)</sup>	m³/h			
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	bar / m³/h	/	
Min. coolant flow rate / min. operation gauge pressure	m³/h / bar		/	
Max. operation pressure before mixture cooler	bar			
<b>Mixture cooling 2nd stage, external</b>				
Coolant temperature (in / out), design	°C	43 / 47.3		
Coolant volumetric flow, design, constant <sup>13) 14)</sup>	m³/h	47.1		
Pressure drop, design <sup>14)</sup>	Cv value <sup>13) 15)</sup>	bar / m³/h	1.08	/ 46.4
Max. operation pressure before mixture cooler	bar		6	
<b>Heating circuit interface</b>				
Engine coolant temperature (in / out), design	°C			
Heating water temperature (in / out), design	°C			
Heating water flow rate, design <sup>14) 16)</sup>	m³/h			
Pressure drop, design <sup>14)</sup>	Cv value <sup>15) 16)</sup>	bar / m³/h	/	
Max. operation gauge pressure (heating water)	bar			
<b>Room ventilation</b>				
Genset ventilation heat <sup>17)</sup>	kW		147	
Inlet air temperature: (min./design/max.)	°C		20 / 25 / 30.0	
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>	m³ i.N./h		30500	
<b>Gearbox</b>	%	100	75	50
Efficiency	%	-	-	-
<b>Starter battery</b>				
Nominal voltage / power / capacity required	V / kW / Ah		24 / 2 x 9 / --	
<b>Filling quantities</b>				
Lube oil for engine	dm³		450	
Coolant in engine	dm³		310	
Coolant in mixture cooler	dm³		25	
Heating water for plate heat exchanger <sup>20)</sup>	dm³			
Lube oil for gearbox	dm³			
<b>Gas regulation line</b>				
Nominal size / gas pressure min. - max. (at gas regulation line inlet)	DN / mbar - mbar	100	/	190 - 250
<b>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</b>				
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		
<b>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</b>				
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		
<b>Dimensions (aggregate)</b>				
Length	mm		~ 6500	
Width	mm		~ 2000	
Height	mm		~ 2400	
Gross weight (dry weight)	kg		~ 20750 (~ 20000)	
<b>Power derating</b>				
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

- 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) Generator (at nominal power) 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, according to ISO 8528-10 and ISO 6798.  
Resonance effects of the connected exhaust line can influence the exhaust noise sound pressure level
- 22) Max. admissible cos phi depending on voltage in accordance with the requirements of the valid 'Standard specifications and regulations'