

Technical Data Sheet

93800052518_V01_en_GB

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 16V4000 GS

GG16V4000A1



V / Hz	400	/	50
°C		78 / 92	
mg/m ³ i.N.		< 500	
°C			
°C		58	
°C		421	
		not included	
		SRD	
m / mbar	100	/	1000
°C		35	
%		60	

Energy balance	%	100	75	50
Electrical Power ^{2) 3)}	kW	2028	1521	1014
Energy input ^{4) 5)}	kW	4622	3522	2445
Thermal output total ⁶⁾	kW	1173	870	602
Thermal output engine (block, lube oil, 1st stage mixture cooler) ⁶⁾	kW	1173	870	602
Thermal output mixture cooler 1st stage ⁶⁾	kW			
Thermal output mixture cooler 2nd stage ⁶⁾	kW	93	53	24
Exhaust heat (120 °C) ⁶⁾	kW	(974)	(806)	(606)
Engine power ISO 3046-1 ²⁾	kW	2080	1560	1045
Generator efficiency at power factor = 1	%	97.5	97.5	97.0
Electrical efficiency ⁴⁾	%	43.9	43.2	41.5
Total efficiency	%	90.3	90.8	90.9
Power consumption ⁷⁾	kW			
Combustion air / Exhaust gas				
Combustion air volume flow ¹⁾	m ³ i.N./h	7673	5733	3877
Combustion air mass flow	kg/h	9909	7404	5007
Exhaust gas volume flow, wet ¹⁾	m ³ i.N./h	8064	6031	4084
Exhaust gas volume flow, dry ¹⁾	m ³ i.N./h	7207	5379	3632
Exhaust gas mass flow, wet	kg/h	10250	7664	5189
Exhaust temperature after turbocharger	°C	421	452	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	MN		80	
Range of heating value: design / operation range without power derating	kWh/m ³ i.N.		10.0 - 10.5 / 8.0 - 11.0	
Exhaust gas emissions ^{5) 8)} Compliance with emissions standards only for ≥ 1014 kWel				
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.	< 800		
HCHO (dry, 5 % O ₂)	mg/m ³ i.N.	< 75		
VOC (dry, 5 % O ₂)	mg/m ³ i.N.			
Otto-gas engine, lean burn operation with turbocharging				
Number of cylinders / configuration		16	/	V
Engine type			16V4000L64FNER	
Engine speed	1/min		1500	
Bore	mm		170.0	
Stroke	mm		210.0	
Displacement	dm ³		76.3	
Mean piston speed	m/s		10.5	
Compression ratio			12.5	
BMEP at nominal engine speed min-1	bar	21.8		
Lube oil consumption ¹⁰⁾	dm ³ /h	0.35		
Exhaust back pressure min. - max. after module	mbar - mbar		30 - 60	
Generator				
Rating power (temperature rise class F) ¹¹⁾	kVA		2800	
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 / 92		
Coolant flow rate, constant ^{13) 14)}	m ³ /h	78.1		
Pressure drop, design ¹⁴⁾	bar / m ³ /h	3.15	/	44.7
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	58 / 60.5	
Coolant volumetric flow, design, constant ^{13) 14)}		m³/h	34.3	
Pressure drop, design ¹⁴⁾	Cv value ^{13) 15)}	bar / m³/h	0.48	/ 50.6
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		115
Inlet air temperature: (min./design/max.)		°C		30 / 35 / 40.0
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		24000

Gearbox

Efficiency		%	100	75	50
		%	-	-	-

Starter battery

Nominal voltage / power / capacity required		V / kW / Ah		24 / 2 x 9 / --
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Filling quantities

Lube oil for engine		dm³		330
Coolant in engine		dm³		270
Coolant in mixture cooler		dm³		25
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
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Engine sound level²¹⁾ (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	84.8	90.5	90.0	93.0
Frequency	Hz	1000	2000	4000	8000
Sound pressure level	dB	92.5	91.8	99.2	101.4
Linear total sound pressure level	Lin dB	104.8			
A-weighted total sound pressure level	dB(A)	104.4			
A-weighted total sound power level	dB(A)	124.1			

Undampened exhaust noise²¹⁾ (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	113.9	119.8	111.9	104.5
Frequency	Hz	1000	2000	4000	8000
Sound pressure level	dB	97.1	96.8	94.0	83.9
Linear total sound pressure level	Lin dB	121.6			
A-weighted total sound pressure level	dB(A)	108.0			
A-weighted total sound power level	dB(A)	121.0			

Dimensions (aggregate)

Length	mm	~ 5300
Width	mm	~ 2000
Height	mm	~ 2300
Gross weight (dry weight)	kg	~ 17700 (~ 17000)

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
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- Normal cubic meter at 1013 mbar and T = 273 K
- Prime power operation will be designed specific to the project
- Generator gross power at nominal voltage, power factor = 1 and nominal frequency
- According to ISO 3046 (+ 5 % tolerance), using reference fuel used at nominal voltage, power factor = 1 and nominal frequency
- Emission values during grid parallel operation
- Thermal output at layout temperature; tolerance +/- 8 %
- Power consumption of all electrical consumers which are mounted at the module / genset
- Deviations from the layout parameters respectively the reference fuel can have influence on the obtained efficiency and exhaust emissions
- Functional capability
- Reference value at nominal load (without amount of oil exchange)
- Generator (at nominal power) max. 1000 m height of location and max. 40 °C intake air temperature; else power derating
- Max. allowable cos phi at nominal power (view of producer)
- 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.
- Pressure loss at reference flow rate
- 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.
- Stated values for pure water, adaption for other cooling fluid composition necessary
- Only generator- and surface losses
- Frost-free conditions must be guaranteed
- Amount of ventilation air must be adapted to the gas safety concept
- Assemblies including pipe work
- 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
- Max. admissible cos phi depending on voltage in accordance with the requirements of the valid 'Standard specifications and regulations'