

# Technical Data Sheet

93800050451\_V03\_en\_GB

Voltage / Frequency

Cooling water temperature (in / out)

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

Intercooler 1st stage water temperature (in)

Intercooler 2nd stage water temperature (in)

Exhaust gas temperature

Catalytic converter

Special equipment

Altitude above sea level <sup>2)</sup>

Intake air temperature

Relative intake air humidity

Standard specifications and regulations

**GB2028N5**

16V4000L64



V / Hz	400	50
°C	78 / 90	
mg/m <sup>3</sup> i.N.	< 500	
°C		
°C	43	
°C	416	
	not included	
m / mbar	100	1000
°C	25	
%	30	

<b>Energy balance</b>	%	100	75	50
Electrical Power COP, ISO 8528-1 <sup>2) 3)</sup>	kW	2028	1521	1014
Energy input <sup>4) 5)</sup>	kW	4573	3501	2443
Thermal output total <sup>6)</sup>	kW	965	706	474
Thermal output engine (block, lube oil, 1st stage intercooler) <sup>6)</sup>	kW	965	706	474
Thermal Output Intercooler 1st stage <sup>6)</sup>	kW			
Thermal Output Intercooler 2nd stage <sup>6)</sup>	kW	127	90	60
Exhaust heat ( 120 °C ) <sup>6)</sup>	kW	( 936 )	( 786 )	( 597 )
Engine power ISO 3046-1 <sup>2)</sup>	kW	2080	1560	1045
Generator efficiency at power factor = 1	%	97.5	97.5	97
Electrical efficiency <sup>4)</sup>	%	44.3	43.4	41.5
Total efficiency	%	85.9	86.1	85.3
CHP coefficient		2.1	2.15	2.14
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	7748	5822	3980
Combustion air mass flow	kg/h	10006	7519	5140
Exhaust gas volume flow, wet <sup>1)</sup>	m <sup>3</sup> i.N./h	8002	6018	4116
Exhaust gas volume flow, dry <sup>1)</sup>	m <sup>3</sup> i.N./h	7406	5562	3798
Exhaust gas mass flow, wet	kg/h	10342	7777	5320
Exhaust temperature after turbocharger	°C	416	449	484
<b>Reference fuel <sup>8)</sup></b>				
Natural gas			H	
Sewage gas			not applicable	
Biogas			not applicable	
Landfill gas			not applicable	
<b>Fuel requirements <sup>9)</sup></b>				
Minimum methane number	MZ		80	
Range of heating value: design / operation range	kWh/m <sup>3</sup> i.N.		10.0 - 10.5 / 8.0 - 11.0	
<b>Exhaust gas emissions <sup>5) 8)</sup></b>				
NOx, stated as NO <sub>2</sub> (dry, 5 % O <sub>2</sub> )	mg/m <sup>3</sup> i.N.	< 500		
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.	< 102		
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		16	/	V
Engine type			16V4000L64	
Engine speed	1/min		1500	
Bore	mm		170	
Stroke	mm		210	
Displacement	dm <sup>3</sup>		76.3	
Mean piston speed	m/s		10.5	
Compression ratio			14	
BMEP at nominal engine speed min-1	bar	21.8		
Lube oil consumption <sup>10)</sup>	dm <sup>3</sup> /h	0.35		
Exhaust back pressure min. - max. after engine	mbar - mbar		30.0 - 60.0	
<b>Generator</b>				
Rating power (temperature rise class F) <sup>11)</sup>	kVA		2800	
Insulation class / temperature rise class			H / F	
Winding pitch			2/3	
Protection			IP 23	
Max. allowable p.f. inductive (overexcited) / capacitive (underexcited) <sup>12)</sup>			0.8 / 0.95	
Voltage tolerance / frequency tolerance	%		± 10.0 / ± 5.0	
<b>Engine cooling water system</b>				
Coolant temperature (in / out)	°C	78 / 90		
Coolant flow rate <sup>13) 14)</sup>	m <sup>3</sup> /h	82.4		
Pressure drop <sup>14)</sup> Cv value <sup>13) 15)</sup>	bar / m <sup>3</sup> /h	3.6	/	43.2
Max. operation pressure (coolant before engine)	bar		6	
<b>Exhaust gas heat exchanger (EGHE)</b>				
Exhaust gas temperature (out)	°C			
Coolant temperature (in / out)	°C	/		
Coolant volumetric flow <sup>13) 14)</sup>	m <sup>3</sup> /h			
Pressure drop <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 (coolant water)	bar			

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**Intercooler 1st stage, external**

Coolant temperature (in / out)	°C			
Coolant volumetric flow <sup>13) 14)</sup>	m³/h			
Pressure drop <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 in front of intercooler		bar		

**Intercooler 2nd stage, external**

Coolant temperature (in / out)	°C	43 / 46		
Coolant volumetric flow <sup>13) 14)</sup>	m³/h	35		
Pressure drop <sup>14)</sup>	Cv value <sup>13) 15)</sup>	bar / m³/h	0.4	/ 58.4
Max. operation pressure in front of intercooler		bar		6

**Heating circuit interface**

Engine coolant temperature (in / out)	°C			
Heating water temperature (in / out)	°C			
Heating water flow rate <sup>14) 16)</sup>	m³/h			
Pressure drop <sup>14)</sup>	Cv value <sup>15) 16)</sup>	bar / m³/h	/	
Max. operation gauge pressure (heating water)		bar		

**Room ventilation**

Genset ventilation heat <sup>17)</sup>	kW		128	
Combustion 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>	m³ i.N./h		26000	

**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	250		
Coolant for engine	dm³	270		
Coolant for intercooler LT / HT	dm³	25		
Heating water for plate heat exchanger <sup>20)</sup>	dm³			
Lube oil for gearbox	dm³			

**Gas regulation line**

Nominal size / gas pressure min. - max.	DN / mbar - mbar	100	180 - 250	
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**Engine sound level <sup>21)</sup> (1 meter distance, free field) +3 dB(A) for total A-weighted level tolerance**

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
	Lin dB	104.8			
Sum of pressure levels	dB A	104.4			
Sound power level	dB A	124.1			

**Undampened exhaust noise <sup>21)</sup> (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	107.4	109.1	104.3	98.2
Frequency	Hz	1000	2000	4000	8000
Sound pressure level	dB	90.5	89.7	86.3	73.5
	Lin dB	112.7			
Sum of pressure levels	dB A	100.8			
Sound power level	dB A	113.4			

**Dimensions (Aggregate)**

Length	mm	~ 5500
Width	mm	~ 2000
Height	mm	~ 2300
Gross weight (dry weight)	kg	~ 17750 (~ 17000)

**Power derating**

Altitude	specific to the project
Intake air temperature	specific to the project
Intercooler 2nd stage coolant temperature	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:	DK-BS-0002
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- 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

- 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 COP

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