

# 2G - Biogas 65/35 - 35°C - 50°C - NOx 500



## Technical data

2000 kWel; 480 V, 60 Hz; Acc. to gas analysis

### Design conditions

Comb. air temperature / rel. Humidity:	[°C] / [%]	25 / 60
Altitude:	[m]	100
Exhaust temp. after heat exchanger:	[°C]	180
NO <sub>x</sub> Emission (tolerance - 8%):	[mg/Nm <sup>3</sup> @5%O <sub>2</sub> ]	500

### Fuel gas data: <sup>2)</sup>

Methane number:	[ - ]	134
Lower calorific value:	[kWh/Nm <sup>3</sup> ]	6,48
Gas density:	[kg/Nm <sup>3</sup> ]	1,16
Acc. to gas analysis		
Analysis: CO <sub>2</sub>	[Vol%]	35,00
N <sub>2</sub>	[Vol%]	0,00
O <sub>2</sub>	[Vol%]	0,00
H <sub>2</sub>	[Vol%]	0,00
CO	[Vol%]	0,00
CH <sub>4</sub>	[Vol%]	65,00
C <sub>2</sub> H <sub>4</sub>	[Vol%]	0,00
C <sub>2</sub> H <sub>6</sub>	[Vol%]	0,00
C <sub>3</sub> H <sub>6</sub>	[Vol%]	0,00
C <sub>3</sub> H <sub>8</sub>	[Vol%]	0,00
C <sub>4</sub> H <sub>8</sub>	[Vol%]	0,00
C <sub>4</sub> H <sub>10</sub>	[Vol%]	0,00
C <sub>5</sub> H <sub>12</sub>	[Vol%]	0,00
C <sub>x</sub> H <sub>y</sub>	[Vol%]	0,00
H <sub>2</sub> S	[Vol%]	0,00

### Genset:

Engine:	<b>TCG2020V20</b>
Speed:	[1/min] 1500
Configuration / number of cylinders:	[ - ] V / 20
Bore / Stroke / Displacement:	[mm]/[mm]/[dm <sup>3</sup> ] 170 / 195 / 89
Compression ratio:	[ - ] 14,0
Mean piston speed:	[m/s] 9,8
Mean lube oil consumption at full load:	[g/kWh] 0,2
Engine-management-system:	[ - ] TEM EVO
Generator:	<b>Marelli MJB 560 LA4</b>
Voltage / voltage range / cos Phi:	[V] / [%] / [-] 480 / ±5 / 1
Speed / frequency:	[1/min] / [Hz] 1800 / 60
Gear box:	<b>Eisenbeiss GU 360</b>
Lube oil volume of gear box:	[dm <sup>3</sup> ] 90

### Energy balance

Load:	[%]	100	75	50
Electrical power COP acc. ISO 8528-1:	[kW]	<b>2000</b>	<b>1500</b>	<b>1000</b>
Engine jacket water heat:	[kW ±8%]	1089	811	562
Intercooler LT heat:	[kW ±8%]	132	99	70
Lube oil heat:	[kW ±8%]			
Exhaust heat with temp. after heat exchanger:	[kW ±8%]	841	725	574
Exhaust temperature:	[°C ±25°C]	433	468	507
Exhaust mass flow, wet:	[kg/h]	10795	8128	5618
Combustion mass air flow:	[kg/h]	9957	7480	5157
Radiation heat engine / generator:	[kW ±8%]	73 / 62	70 / 56	67 / 50
Fuel consumption:	[kW+5%]	4686	3627	2576
Electrical / thermal efficiency:	[%]	42,7 / 41,2	41,4 / 42,4	38,8 / 44,1
Total efficiency:	[%]	83,9	83,8	82,9

### System parameters <sup>1)</sup>

Ventilation air flow (comb. air incl.) with ΔT = 15K	[kg/h]	52900
Combustion air temperature minimum / design:	[°C]	5 / 25
Exhaust back pressure from / to:	[mbar]	30 / 50
Maximum pressure loss in front of air cleaner:	[mbar]	5
Zero-pressure gas control unit selectable from / to: <sup>2)</sup>	[mbar]	20 / 200
Pre-pressure gas control unit selectable from / to: <sup>2)</sup>	[bar]	0,5 / 10
Starter battery 24V, capacity required:	[Ah]	430
Starter motor:	[kWel.] / [VDC]	15 / 24
Lube oil content engine / base frame:	[dm <sup>3</sup> ]	300 / 685
Dry weight engine / genset:	[kg]	8070 / 21250

### Cooling system <sup>5)</sup>

Glycol content engine jacket water / intercooler:	[% Vol.]	0 / 35
Water volume engine jacket / intercooler:	[dm <sup>3</sup> ]	210 / 25
KVS / Cv value engine jacket water / intercooler:	[m <sup>3</sup> /h]	58 / 52
Jacket water coolant temperature in / out:	[°C]	80 / 93
Intercooler coolant temperature in / out:	[°C]	50 / 53
Engine jacket water flow rate from / to:	[m <sup>3</sup> /h]	60 / 85
Water flow rate engine jacket water / intercooler:	[m <sup>3</sup> /h]	74 / 40
Water pressure loss engine jacket water / intercooler:	[bar]	1,6 / 0,6

1) See also "Layout of power plants":

2) See also Techn. Circular 0199-99-3017

5) Gear oil cooling within intercooler coolant circuit

3332329BB

Frequency band f [Hz]	25	31,5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	L <sub>WA</sub> [dB(A)]	S [m <sup>2</sup> ]
<b>Air-borne noise <sup>3)</sup></b> L <sub>W, Terz</sub> [dB(lin)]	97,8	99,4	102,8	106,7	107,4	113,1	112,8	119	116,5	116,3	115,8	111,5	112,1	114	112,3	111,1	112,5	111,2	111,5	111,8	109,1	107,4	107	107	109,9	119,2	107	99,2	99,5	123,7	172
<b>Exhaust noise <sup>4)</sup></b> L <sub>W, Terz</sub> [dB(lin)]	118,6	117,9	121,4	127,3	126,9	126,8	126,5	140,9	126,3	129,9	130,9	125,2	126,3	126,5	125,9	125,9	125	123,3	123,9	123,8	123,2	126,3	116,4	115,5	115,2	114,1	114,6	112,6	110,8	135,8	15,5 <sup>5)</sup>

3) DIN EN ISO 3746 (σ<sub>Ro</sub>=±4 dB)

4) Measured in exhaust pipe (f ≤ 250Hz: ±5dB; f > 250Hz: ±3dB)

L<sub>W</sub>: Sound power level

S: Area of measurement surface (S<sub>c</sub>=1m<sup>2</sup>)

5) DIN 45635-11, Appendix A