

# TCG 2020. The gas engine.

1050-2000 kW at 1500 min<sup>-1</sup> (50 Hz)



## These are the characteristics of the TCG 2020:

- State-of-the art 12, 16 and 20 cylinder V-engines.
- Air-fuel turbocharging and two-stage intercooling.
- Single cylinder heads with four-valve technology.
- Centrally arranged industrial spark plug with intensive plug seat cooling.
- Microprocessor-controlled high-voltage ignition system.
- One ignition coil per cylinder.
- Electronic control and monitoring of genset operation through TEM.
- Exhaust emissions controlled according to combustion chamber temperature.

## Your benefits:

- ▶ Package of favourable investment and low operating costs.
- ▶ Low energy consumption thanks to maximum primary energy utilization.
- ▶ Long service intervals and ease of service guarantee additional cost savings.
- ▶ Efficient energy conversion with outstanding efficiencies.
- ▶ Intercooling permits maximum power even when using gases with low methane numbers.
- ▶ Reliable control and monitoring with high safety standards ensure optimum combustion and maximum engine protection.
- ▶ All governing, service, control and monitoring functions are easy and comfortable to operate.

## ► Technical data 50 Hz

$\text{NO}_x \leq 500 \text{ mg/m}_n^{3 \cdot 1)}$

### Naturalgas applications

Minimum methane number MN: 80  
dry exhaust manifold

Engine type		TCG 2020 V12	TCG 2020 V16	TCG 2020 V20
Engine power <sup>2)</sup>	kW	1200	1600	2000
Speed	min <sup>-1</sup>	1500	1500	1500
Mean effective pressure	bar	18.1	18.1	18.1
Exhaust temperature	approx. °C	440	440	430
Exhaust mass flow wet	approx. kg/h	6425	8575	10668
Combustion air mass flow <sup>2)</sup>	approx. kg/h	6218	8300	10326
Combustion air temperature minimum/design	°C	20/25	20/25	20/25
Ventilation air flow <sup>3)</sup>	approx. kg/h	25084	33375	49013
<b>Generator</b>				
Efficiency <sup>4)</sup>	%	97.2	97.2	97.1
<b>Energy balance</b>				
Electrical power <sup>4)</sup>	kW	1166	1555	1942
Jacket water heat	± 8 % kW	595	795	956
Intercooler LT heat <sup>5)</sup>	± 8 % kW	110	145	179
Exhaust cooled to 120°C	± 8 % kW	634	845	1018
Exhaust cooled to 150°C	± 8 % kW	575	766	919
Engine radiation heat	kW	45	60	104
Generator radiation heat	kW	34	45	58
Fuel consumption <sup>6)</sup>	+ 5 % kW	2793	3724	4619
Specific fuel consumption <sup>6)</sup>	+ 5 % kWh/kWh	2.33	2.33	2.31
Electrical efficiency	%	41.7	41.8	42.0
Thermal efficiency	%	44.0	44.0	42.7
Total efficiency	%	85.7	85.8	84.7
<b>System parameters</b>				
Engine jacket water flow rate min./max.	m <sup>3</sup> /h	36/56	50/65	70/85
Engine $K_{vs}$ -value <sup>7)</sup>	m <sup>3</sup> /h	44	50	66
Intercooler coolant flow rate	m <sup>3</sup> /h	40	40	40
Intercooler $K_{vs}$ -value <sup>7)</sup>	m <sup>3</sup> /h	42.9	42.9	72
Engine jacket water volume	dm <sup>3</sup>	111	151	210
Intercooler coolant volume	dm <sup>3</sup>	28	28	52
Engine jacket water temperature max. <sup>8)</sup>	°C	80/92	80/92	80/92
– with glycol <sup>8)</sup>	°C	(80/92)	(80/92)	(80/92)
Intercooler coolant temperature <sup>8)</sup>	°C	40/–	40/–	40/–
Exhaust backpressure min./max.	mbar	30/50	30/50	30/50
Maximum pressure loss in front of air cleaner	mbar	5	5	5
Gas flow pressure, fixed between (pressure variation +/- 10 %)	mbar	20...100	20...100	20...100
Starter battery 24 V, capacity required	Ah	286	420	–
Air bottle, volume/pressure	dm <sup>3</sup> /bar	–	–	2000/30
Dry weight engine	kg	4200	5800	7800
Dry weight genset	kg	10500	13500	17580
<b>Engine type</b>				
Bore/stroke	mm	170/195	170/195	170/195
Displacement	dm <sup>3</sup>	53.1	70.8	88.5
Compression ratio		13.5 : 1	13.5 : 1	13.5 : 1
Mean piston speed	m/s	9.8	9.8	9.8
Lube oil content <sup>9)</sup>	dm <sup>3</sup>	630	865	1080
Lube oil consumption mineral oil <sup>10)</sup>	+ 20 % g/kWh	0.3	0.3	0.3

## ► Technical data 50 Hz

$\text{NO}_x \leq 500 \text{ mg/m}_n^3$

**Sewage gas application (65 % CH<sub>4</sub>/35 % CO<sub>2</sub>)**  
**Landfill gas application (50 % CH<sub>4</sub>/27 % CO<sub>2</sub>, rest N<sub>2</sub>)**

**Minimum heating value (LHV) = 5.0 kWh/m<sub>n</sub><sup>3</sup>**  
**dry exhaust manifold**

<b>Engine type</b>		<b>TCG 2020 V12</b>	<b>TCG 2020 V16</b>	<b>TCG 2020 V20</b>
Engine power <sup>2)</sup>	kW	1050	1400	1750
Speed	min <sup>-1</sup>	1500	1500	1500
Mean effective pressure	bar	15.8	15.8	15.8
Exhaust temperature	approx. °C	485	484	475
Exhaust mass flow wet	approx. kg/h	5643	7532	9210
Combustion air mass flow <sup>2)</sup>	approx. kg/h	5037	6724	8208
Combustion air temperature minimum/design	°C	20/25	20/25	20/25
Ventilation air flow <sup>3)</sup>	approx. kg/h	22470	29411	46178
<b>Generator</b>				
Efficiency <sup>4)</sup>	%	97.3	97.5	96.9
<b>Energy balance</b>				
Electrical power <sup>4)</sup>	kW	1022	1365	1696
Jacket water heat	± 8 % kW	544	725	878
Intercooler LT heat <sup>5)</sup>	± 8 % kW	96	128	167
Exhaust cooled to 120°C	± 8 % kW	641	855	1017
Exhaust cooled to 150°C	± 8 % kW	588	785	931
Engine radiation heat	kW	45	60	105
Generator radiation heat	kW	28	35	54
Fuel consumption <sup>6)</sup>	+ 5 % kW	2561	3414	4229
Specific fuel consumption <sup>6)</sup>	+ 5 % kWh/kWh	2.44	2.44	2.42
Electrical efficiency	%	39.9	40.0	40.1
Thermal efficiency	%	46.3	46.3	44.8
Total efficiency	%	86.2	86.3	84.9
<b>System parameters</b>				
Engine jacket water flow rate min./max.	m <sup>3</sup> /h	36/56	50/65	70/85
Engine K <sub>VS</sub> -value <sup>7)</sup>	m <sup>3</sup> /h	44	50	66
Intercooler coolant flow rate	m <sup>3</sup> /h	40	40	40
Intercooler K <sub>VS</sub> -value <sup>7)</sup>	m <sup>3</sup> /h	42,9	42,9	72
Engine jacket water volume	dm <sup>3</sup>	111	151	210
Intercooler coolant volume	dm <sup>3</sup>	28	28	52
Engine jacket water temperature max. <sup>8)</sup>	°C	81/92	81/92	81/92
– with glycol <sup>8)</sup>	°C	(81/92)	(81/92)	(81/92)
Intercooler coolant temperature <sup>8)</sup>	°C	50/–	50/–	50/–
Exhaust backpressure min./max.	mbar	30/50	30/50	30/50
Maximum pressure loss in front of air cleaner	mbar	5	5	5
Gas flow pressure, fixed between (pressure variation +/- 10%)	mbar	20...100	20...100	20...100
Starter battery 24 V, capacity required	Ah	286	420	–
Air bottle, volume/pressure	dm <sup>3</sup> /bar	–	–	2000/30
Dry weight engine	kg	4200	5800	7800
Dry weight genset	kg	10500	13500	17580

1) Exhaust emissions with oxidizing catalyst:  
 $\text{NO}_x < 0.50 \text{ g NO}_2/\text{m}_n^3$  dry exhaust gas at 5 % O<sub>2</sub>  
 $\text{CO} < 0.3 \text{ g CO}/\text{m}_n^3$  dry exhaust gas at 5 % O<sub>2</sub>  
 Formaldehyde < 0.06 g/m<sub>n</sub><sup>3</sup> dry exhaust gas at 5 % O<sub>2</sub>

2) Engine power ratings and combustion air volume flows acc. to ISO 3046/1.

3) Intake air flow at delta T = 15 K including combustion air.

4) At 50 Hz, U = 0.4 kV, power factor = 1.

5) At 40°C water inlet (50°C for biogas).

6) With a tolerance of + 5 %.

7) The K<sub>VS</sub>-value is the parameter for the pressure loss in the cooling system (= flowrate for 1 bar pressure loss).

8) Inlet/outlet.

9) Including pipes and heat exchangers.

10) At full load.

Data for special gas and dual gas operation on request.

The values given in this data sheet are for information purposes only and not binding.

The information given in the offer is decisive.

## ► Dimensions 50 Hz



Genset		Length	Width	Height
TCG 2020 V12	mm	4700	1750	2500
TCG 2020 V16	mm	5700	1750	2500
TCG 2020 V20	mm	6300	1750	2550

## ► Noise emissions\* 50 Hz

Noise frequency band	Hz	63	125	250	500	1000	2000	4000	8000	
<b>Engine type TCG 2020 V12</b>										
Exhaust noise	119 dB (A)	dB (lin)	116	122	121	118	110	110	108	107
Air-borne noise	103 dB (A)	dB (lin)	102	95	96	96	97	95	95	97
<b>Engine type TCG 2020 V16</b>										
Exhaust noise	120 dB (A)	dB (lin)	117	127	119	116	114	113	110	103
Air-borne noise	108 dB (A)	dB (lin)	113	90	95	94	97	96	99	107
<b>Engine type TCG 2020 V20</b>										
Exhaust noise	124 dB (A)	dB (lin)	120	129	122	119	118	117	114	108
Air-borne noise	107 dB (A)	dB (lin)	104	102	97	100	101	101	99	100

Exhaust noise at 1 m,  $\sphericalangle$  45°,  $\pm$  2.5 dB (A)

Air-borne noise at 1 m from the side,  $\pm$  1 dB (A)

\* Values apply to natural gas applications, measured as noise pressure level.



We move your world.

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