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TCG 2020

1200 – 2000 kW_{el} at 1500 min⁻¹ (50 Hz)

MWM
Energy. Efficiency. Environment.

Technical data 50 Hz – Natural gas applications

NO_x ≤ 500 mg /m_n^{3 11}

Minimum methane number MN 80
dry exhaust manifolds

Engine type		TCG 2020 V12	TCG 2020 V16	TCG 2020 V20
Engine power ²⁾	kW	1235	1605	2056
Speed	min ⁻¹	1500	1500	1500
Mean effective pressure	bar	18.6	18.1	18.6
Exhaust temperature	approx. °C	414	423	424
Exhaust mass flow wet	approx. kg/h	6407	8422	10688
Combustion air mass flow ²⁾	approx. kg/h	6203	8155	10349
Combustion air temperature minimum/design	°C	20/25	20/25	20/25
Ventilation air flow ³⁾	approx. kg/h	29356	38242	49239

Engine parameters				
Bore/stroke	mm	170/195	170/195	170/195
Displacement	dm ³	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 ⁴⁾	dm ³	205	265	300
Typical mean lube oil consumption ⁵⁾	g/kWh	0.20	0.20	0.20

Generator				
Efficiency ⁶⁾	%	97.2	97.2	97.3

Energy balance				
Electrical power ⁶⁾	kW	1200	1560	2000
Jacket water heat	± 8% kW	606	790	978
Intercooler LT heat ⁷⁾	± 8% kW	106	134	178
Exhaust cooled to 120 °C	± 8% kW	591	796	1012
Engine radiation heat	kW	40	52	70
Generator radiation heat	kW	35	45	56
Fuel consumption ⁸⁾	+ 5% kW	2750	3606	4583
Electrical efficiency	%	43.7	43.3	43.7
Thermal efficiency	%	43.5	44.0	43.3
Total efficiency	%	87.2	87.3	87.0

System parameters				
Engine jacket water flow rate min./max.	m ³ /h	36/56	50/65	60/85
Engine K _{V5} -value ⁹⁾	m ³ /h	42	46	66
Intercooler coolant flow rate	m ³ /h	35	35	40
Intercooler K _{V5} -value ⁹⁾	m ³ /h	30	30	72
Engine jacket water volume	dm ³	111	151	210
Intercooler coolant volume	dm ³	28	28	52
Engine jacket water temperature max. ¹⁰⁾	°C	80/93	80/93	80/93
– with glycol ¹⁰⁾	°C	(80/93)	(80/93)	(80/93)
Intercooler coolant temperature ¹⁰⁾	°C	38/40.7	38/41.4	38/41.9
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...200	20...200	20...200
Starter battery 24 V, capacity required	Ah	430	430	430
Air bottle, volume/pressure ¹¹⁾	dm ³ /bar	—	—	2000/30

Technical data 50 Hz – Sewage, bio and landfill gas applications

NO_x ≤ 500 mg/m_n³¹⁾
 Sewage gas (65 % CH₄ / 35 % CO₂)
 Biogas (60 % CH₄ / 32 % CO₂, rest N₂)
 Landfill gas (50 % CH₄ / 27 % CO₂, rest N₂)

Minimum heating value (LHV) = 5.0 kWh/m_n³
 dry exhaust manifolds

Engine type		TCG 2020 V12	TCG 2020 V16	TCG 2020 V20
Engine power ²⁾	kW	1235	1605	2056
Speed	min ⁻¹	1500	1500	1500
Mean effective pressure	bar	18.6	18.1	18.6
Exhaust temperature	approx. °C	443	447	445
Exhaust mass flow wet	approx. kg/h	6458	8447	10765
Combustion air mass flow ²⁾	approx. kg/h	5947	7778	9914
Combustion air temperature minimum/design	°C	20/25	20/25	20/25
Ventilation air flow ³⁾	approx. kg/h	29308	38112	48881

Generator				
Efficiency ⁶⁾	%	97.2	97.2	97.3

Energy balance				
Electrical power ⁶⁾	kW	1200	1560	2000
Jacket water heat	± 8 % kW	636	840	1050
Intercooler LT heat ⁷⁾	± 8 % kW	95	130	165
Exhaust cooled to 150 °C	± 8 % kW	619	815	1035
Engine radiation heat	kW	40	52	69
Generator radiation heat	kW	35	45	56
Fuel consumption ⁸⁾	+ 5 % kW	2858	3745	4762
Electrical efficiency	%	42.0	41.7	42.0
Thermal efficiency	%	43.9	44.2	43.8
Total efficiency	%	85.9	85.9	85.8

System parameters				
Engine jacket water flow rate min./max.	m ³ /h	36/56	50/65	60/85
Engine K _{VS} -value ⁹⁾	m ³ /h	42	46	66
Intercooler coolant flow rate	m ³ /h	35	35	40
Intercooler K _{VS} -value ⁹⁾	m ³ /h	30	30	72
Engine jacket water volume	dm ³	111	151	210
Intercooler coolant volume	dm ³	28	28	52
Engine jacket water temperature max. ¹⁰⁾	°C	80/93	80/93	80/93
– with glycol ¹⁰⁾	°C	(80/93)	(80/93)	(80/93)
Intercooler coolant temperature ¹⁰⁾	°C	50/52.4	50/53.3	50/53.7
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...200	20...200	20...200
Starter battery 24 V, capacity required	Ah	430	430	430
Air bottle, volume/pressure ¹¹⁾	dm ³ /bar	—	—	2000/30

1) Exhaust emissions with oxidizing catalyst:
 NO_x < 0.50 g NO_x/m³ dry exhaust gas at 5 % O₂
 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) Including pipes and heat exchangers
 5) This values are the mean lube oil consumption between maintenance steps which include an E 60 service.

Also the procedures defined in the TPI 1111-E-06-02 and the Technical Circular TR 0199-99-2105 are to be carefully followed.
 6) At 50 Hz, U = 0.4 kV, power factor = 1; in medium voltage, electrical efficiency may be reduced
 7) At 40 °C water inlet (50 °C for biogas)
 8) With a tolerance of + 5 %
 9) The K_{VS}-value is the parameter for the pressure loss in the cooling system (= flowrate for 1 bar pressure loss)

10) Inlet/outlet
 11) Option air starter motor for V 20
 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		TCG 2020 V12	TCG 2020 V16	TCG 2020 V20
Length	mm	5500	6300	7300
Width	mm	1800	1800	1800
Height	mm	2500	2500	2600
Dry weight genset	kg	10400	13800	17300

Noise emissions* 50 Hz Noise frequency band	Hz	63	125	250	500	1000	2000	4000	8000
Engine type TCG 2020 V12									
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
Engine type TCG 2020 V16									
Exhaust noise 120 dB (A)	dB (lin)	117	127	119	116	114	113	110	103
Air-borne noise 107.6 dB (A)	dB (lin)	102	90	95	94	97	96	99	107
Engine type TCG 2020 V20									
Exhaust noise 123.9 dB (A)	dB (lin)	120	129	122	119	118	117	114	108
Air-borne noise 107.1 dB (A)	dB (lin)	104	102	97	100	101	101	99	100

Exhaust noise at 1 m, $\pm 45^\circ$, ± 2.5 dB (A)

Air-borne noise at 1 m from the side, ± 1 dB (A)

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

Your benefits

- Package of favorable 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 performance.
- 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.

Characteristics

- 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.
- Microprocessorcontrolled 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.

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