DEUTZ POWER SYSTEMS

# TCG 2020

**1050–2070 kW at 1500 min$^{-1}$ (50 Hz)**

# Technical data 50 Hz – Natural gas applications

**$NO_X$ <= 500 mg /$m_n^3$ [1)]**

**Minimum methane number MN 80**
**dry exhaust manifolds**

| Engine type | | | TCG 2020 V12 | TCG 2020 V16 | TCG 2020 V20 |
|---|---|---|---|---|---|
| Engine power [2)] | | kW | 1200 | 1600 | 2070 |
| Speed | | $min^{-1}$ | 1500 | 1500 | 1500 |
| Mean effective pressure | | bar | 18.1 | 18.1 | 18.7 |
| Exhaust temperature | approx. | °C | 430 | 430 | 430 |
| Exhaust mass flow wet | approx. | kg/h | 6053 | 8259 | 10600 |
| Combustion air mass flow [2)] | approx. | kg/h | 5852 | 7987 | 10252 |
| Combustion air temperature minimum/design | | °C | 20/25 | 20/25 | 20/25 |
| Ventilation air flow [3)] | approx. | kg/h | 29228 | 39452 | 50577 |
| **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)] | | $dm^3$ | 630 | 865 | 1080 |
| Typical mean lube oil consumption [5)] | | g/kWh | 0.15 | 0.15 | 0.15 |
| **Generator** | | | | | |
| Efficiency [6)] | | % | 97.4 | 97.4 | 97.3 |
| **Energy balance** | | | | | |
| Electrical power [6)] | | kW | 1169 | 1558 | 2014 |
| Jacket water heat | ±8% | kW | 581 | 795 | 1011 |
| Intercooler LT heat [7)] | ±8% | kW | 112 | 148 | 186 |
| Exhaust cooled to 120 °C | ±8% | kW | 578 | 789 | 1013 |
| Engine radiation heat | | kW | 45 | 60 | 75 |
| Generator radiation heat | | kW | 31 | 42 | 56 |
| Fuel consumption [8)] | +5% | kW | 2718 | 3666 | 4705 |
| Electrical efficiency | | % | 43.0 | 42.5 | 42.8 |
| Thermal efficiency | | % | 42.6 | 43.2 | 43.0 |
| Total efficiency | | % | 85.6 | 85.7 | 85.8 |
| **System parameters** | | | | | |
| Engine jacket water flow rate min./max. | | $m^3/h$ | 36/56 | 50/65 | 65/85 |
| 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 | 80/92 | 80/92 | 80/92 |
| – with glycol [10)] | | °C | (80/92) | (80/92) | (80/92) |
| Intercooler coolant temperature [10)] | | °C | 40/42.8 | 40/43.7 | 38/42.1 |
| 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 | 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/$m_n^3$ [1)]**
**Sewage gas (65 % $CH_4$ / 35 % $CO_2$)**
**Biogas (60 % $CH_4$ / 32 % $CO_2$, rest $N_2$),**
**Landfill gas (50 % $CH_4$ / 27 % $CO_2$, rest $N_2$)**

**Minimum heating value (LHV) = 5.0 kWh/$m_n^3$**
**dry exhaust manifolds**

| **Engine type** | | | **TCG 2020 V12** | **TCG 2020 V16** | **TCG 2020 V20** |
|---|---|---|---|---|---|
| Engine power [2)] | | kW | 1050 | 1400 | 1750 |
| Speed | | $min^{-1}$ | 1500 | 1500 | 1500 |
| Mean effective pressure | | bar | 15.8 | 15.8 | 15.8 |
| Exhaust temperature | approx. | °C | 470 | 470 | 475 |
| Exhaust mass flow wet | approx. | kg/h | 5351 | 7234 | 9062 |
| Combustion air mass flow [2)] | approx. | kg/h | 4906 | 6639 | 8318 |
| Combustion air temperature minimum/design | | °C | 20/25 | 20/25 | 20/25 |
| Ventilation air flow [3)] | approx. | kg/h | 27485 | 36130 | 45609 |
| **Generator** | | | | | |
| Efficiency [6)] | | % | 97.2 | 97.4 | 97.3 |
| **Energy balance** | | | | | |
| Electrical power [6)] | | kW | 1021 | 1364 | 1703 |
| Jacket water heat | ±8 % | kW | 536 | 712 | 858 |
| Intercooler LT heat [7)] | ±8 % | kW | 98 | 131 | 173 |
| Exhaust cooled to 150 °C | ±8 % | kW | 534 | 721 | 919 |
| Engine radiation heat | | kW | 45 | 60 | 75 |
| Generator radiation heat | | kW | 29 | 36 | 47 |
| Fuel consumption [8)] | +5 % | kW | 2489 | 3329 | 4158 |
| Electrical efficiency | | % | 41.0 | 41.0 | 41.0 |
| Thermal efficiency | | % | 43.0 | 43.0 | 42.7 |
| Total efficiency | | % | 84.0 | 84.0 | 83.7 |
| **System parameters** | | | | | |
| Engine jacket water flow rate min./max. | | $m^3/h$ | 36/56 | 50/65 | 65/85 |
| 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 | 81/92 | 81/92 | 81/92 |
| – with glycol [10)] | | °C | (81/92) | (81/92) | (81/92) |
| Intercooler coolant temperature [10)] | | °C | 50/52.5 | 50/53.3 | 50/53.8 |
| 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 | 430 | 430 | 430 |
| Air bottle, volume/pressure [11)] | | $dm^3$/bar | — | — | 2000/30 |

1) Exhaust emissions with oxidizing catalyst:
$NO_X$ < 0.50 g $NO_2/m_n^3$ dry exhaust gas at 5 % $O_2$
CO < 0.3 g $CO/m_n^3$ dry exhaust gas at 5 % $O_2$
Formaldehyde < 0.06 g/$m_n^3$ dry exhaust gas at 5 % $O_2$
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, heat exchangers and base frame lube oil tank
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
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 119.2 dB(A) | dB(lin) | 116.0 | 121.5 | 120.5 | 118.0 | 110.0 | 109.5 | 108.0 | 107.0 |
| Air-borne noise 102.9 dB(A) | dB(lin) | 102.0 | 95.2 | 95.8 | 95.9 | 96.5 | 95.4 | 94.8 | 97.4 |
| **Engine type TCG 2020 V16** | | | | | | | | | |
| Exhaust noise 120.1 dB(A) | dB(lin) | 117.0 | 127.0 | 118.5 | 116.0 | 113.5 | 112.5 | 110.0 | 103.0 |
| Air-borne noise 107.6 dB(A) | dB(lin) | 102.0 | 90.4 | 94.6 | 94.3 | 96.5 | 96.3 | 98.6 | 106.8 |
| **Engine type TCG 2020 V20** | | | | | | | | | |
| Exhaust noise 123.9 dB(A) | dB(lin) | 120.0 | 129.0 | 122.0 | 119.0 | 118.0 | 117.0 | 114.0 | 108.0 |
| Air-borne noise 107.1 dB(A) | dB(lin) | 103.6 | 102.2 | 96.7 | 99.7 | 101.4 | 100.5 | 98.7 | 99.9 |

Exhaust noise in 1 m, ∢45°, ± 2.5 dB(A)
Air-borne noise in 1 m from the side, ± 1 dB(A)

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

**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 | 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

Version 01/08/E

## 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.