

## Basic Technical Data

nominal electrical output	1200	kW
maximum heat output <sup>1)</sup>	1283	kW

load	50	75	100	%
maximum heat output	742	1013	1283	kW
fuel input	1519	2152	2790	kW
electrical efficiency	39,5	41,8	43,0	%
heat efficiency	48,8	47,1	46,0	%
total efficiency (fuel utilization)	88,3	88,9	89,0	%
gas consumption	234	331	429	Nm <sup>3</sup> /hr

The Basic Technical Data are applicable for the standard conditions pursuant to the "Technical instructions" document.

The minimum permanent electrical output must not drop below 50 % of the nominal output.

Gas consumption is mentioned for biogas with methane content 65%, at normal conditions (0°C, 101,325 kPa).

Gas consumption tolerance, or fuel input tolerance, at 100% load is +5%.

Tolerance of other parameters are mentioned in "Technical Instructions-Validity of Technical Data" document.

1) Maximum heat output is a sum of heat outputs of secondary circuit with exhaust gas cooled to 150°C and aftercooler circuit

## Observance of Emission Limits

emissions	NO <sub>x</sub>	CO	
with 5% of O <sub>2</sub> in exhaust gases	500	650	mg/Nm <sup>3</sup>

## Generator

type	MJB 450 LB4
producer	MARELLI
cos φ	0,8/1,0
efficiency in the working point	97,4 %
voltage	400 V
frequency	50 Hz

## Engine

type	TCG 2020 V12
producer	MWM
number of cylinders	12
arrangement of cylinders	V
bore × stroke	170/195 mm
displacement	53 dm <sup>3</sup>
compression ratio	14 : 1
speed	1500 rpm
nominal oil consumption	0,15 g/kWh
max. engine output	1232 kW

TCG 2020V12 BG65% CH<sub>4</sub> ; 30.01.2017

## Thermal System

### Secondary Circuit

heat carrier	water
circuit's heat output	1195 kW
nominal water temperature, input / output	70/90 °C
nominal temperature drop	20 °C
return water temperature, min / max	40/70 °C
nominal flow rate	14,3 kg/s
max. working pressure	600 kPa
min. pressure in system	100 kPa
water volume in CHP unit circuit	110 dm <sup>3</sup>
pressure loss at the nominal flow rate	45 kPa

### Utilization of exhaust gas output for other purposes

heat output of exhaust gases (cooling to 150°C)	562 kW
exhaust gas temperature	434 °C



**Primary Circuit**

heat carrier	water + ethylene glycol	
ethylene glycol's concentration	35	%
circuit's heat output	1195	kW
pressure reserve for interconnecting pipes <sup>1)</sup>	30	kPa
maximal connect-able volume of system outside the module of CHP unit <sup>2)</sup>	250	dm <sup>3</sup>
max. working pressure	300	kPa
water volume in CHP unit circuit <sup>3)</sup>	1500	dm <sup>3</sup>

1) pressure reserve of internal part for covering pressure losses of interconnecting pipes between module of primary circuit and exhaust gas module

2) if connected volume overstep mentioned value, it is necessary to install into system additional expansion vessel

3) total value (engine-generator, module of primary circuit and exhaust gas module without connecting pipeline)

**Aftercooler Circuit**

heat carrier	water + ethylene glycol	
ethylene glycol's concentration	35	%
circuit's heat output	88	kW
coolant temperature (outlet from CHP unit – informative)	53,0	°C
coolant temperature (inlet into CHP unit) max	50,0	°C
nominal flow rate	7,7	kg/s
pressure reserve at the nominal flow rate <sup>1)</sup>	70	kPa
highest allowed maximal hydrostatic height of system	10	m
maximal connect-able volume of system outside the module of CHP unit <sup>3)</sup>	175	dm <sup>3</sup>
max. working pressure	300	kPa
min. working pressure	50	kPa
water volume in CHP unit circuit	50	dm <sup>3</sup>

1) pressure reserve of internal part for covering pressure losses of external parts of circuit (interconnection pipeline and dry cooler)

2) if connected volume overstep mentioned value, it is necessary to install into system additional expansion vessel

**Fuel, Gas Inlet**

methane content	65	%
minimal methane content	> 45	%
low heat value	23,4	MJ/Nm <sup>3</sup>
gas pressure	6	kPa
max. pressure change under varying consumption	10	%
max. gas temperature	35	°C

**Combustion and Ventilation Air**

unused heat removed by the ventilation air	73	kW
surrounding temperature (engine and generator intake) min / max	20 - 35	°C
surrounding temperature (engine and generator intake) nominal	25	°C
amount of combustion air	4627	Nm <sup>3</sup> /hr

**Exhaust Gas and Condensate Outlet**

amount of exhaust gases	5016	Nm <sup>3</sup> /hr
exhaust gas temperature between engine-generator set and exhaust exchanger nominal / max	434/550	°C
exhaust gas temperature, nominal / max	150/180	°C
permissible pressure loss of the interconnecting and following exhaust piping	10	mbar
speed of exhaust gases at the outlet (DN 400)	17,2	m/s

**Lubricant Charges**

amount of lubrication oil in the engine	205	dm <sup>3</sup>
volume of engine additional oil tank	510	dm <sup>3</sup>
replenishment oil tank volume	350	dm <sup>3</sup>

**Noise Parameters**

version	standard	option <sup>1)</sup>
CHP unit at 1m	113	dB(A)
exhaust gas outlet at 1m from the silencer flange	80	60 dB(A)

1) noise parameters can be reduced by optimizing components to the required acoustic pressure level



**Electrical Parameters**

nominal voltage	230/400	V	
nominal frequency	50	Hz	
power factor <sup>1)</sup>	0,87		
nominal current at cos φ=0.8	2000	A	
generator circuit breaker	NW25 H1 3P		
short-circuit resistance of switchboard R1	40	kA	
short-circuit resistance of switchboards R2, R3, R4 and R5	10	kA	
contribution of the actual source to the short-circuit current	< 20	kA	
protection of power switchboard R1 closed/open	IP 31/00		
protection of control switchboard R2 closed/open	IP 31/00		
protection of frequency changers' switchboard R3 closed/open	IP 31/00		
protection of engine switchboard R4 closed/open	IP 31/00		
protection of cooling switchboard R5 closed/open	IP 66/00		
recommended superior protection	2250	A	
recommended connection cable <sup>2)</sup> (< 50m, at t<35°C)	5×NYY (3×240+120)		
<p>1) Power factor adjustable from 0,87C ÷ 1 ÷ 0,87L (range from 0.87C ÷ 1 must be verified according to the various types of generators).                      L = inductive load - overexcited                      C = capacitive load - underexcited                      Operation of the generator with a power factor of less than 0.95 causes a power limitation sets the following table:</p>			
power factor [-]	1	0,95	0,87
output [% Pnom]	100	100	98

2) The stated cables are for information only. A check calculation for temperature rise and voltage drop must be made according to the actual length, placement and type of the cable (maximum allowed voltage drop is 10 V)

**Colour Version**

engine and generator	RAL 5010 (blue)
base frame	RAL 9017 (black)

**Unit Dimensions and Weights**

	Engine generator set	Exhaust gas module	
length	5460	5420	mm
width	1870	2200	mm
height	2495	2385	mm
service weight	12070	4510	kg

	Primary circuit's module	Technological module	
length	2845	1750	mm
width	1550	1040	mm
height	2535	2150	mm
service weight	2045	330	kg

	Gas train	
length	1495	mm
width	385	mm
height	785	mm
service weight	100	kg

	Exhaust silencer	
length	4800	mm
width	ø 900	mm
height	horizontal	mm
service weight	1000	kg

Switchboards	height [mm]	width [mm]	depth [mm]
R1 <sup>(1)</sup>	2100	800/1000	800/1000
R2	2100	1600	400
R3 <sup>(2)</sup>	2100	600÷1200	500
R4 <sup>(3)</sup>	1200	800	300
R5 <sup>(4)</sup>	430÷1060	330÷855	200÷350
overall service weight	900 kg		

- 1) Dimensions depend on direction of power outlets:  
 Passing through switchboard = 2100x800x800 mm  
 One direction = 2100x800x1000 mm  
 Width of switchboard R1 may be extended in special cases.
- 2) Switchboard's width depends on size of frequency changers.
- 3) Switchboard's height depends on MWM. Standard is 1200 mm.
- 4) Switchboard's dimension depends on number of dry coolers' fans.

**Caution**

Manufacturer reserves the right to alter this document and the linked source materials.

