

Technical Description

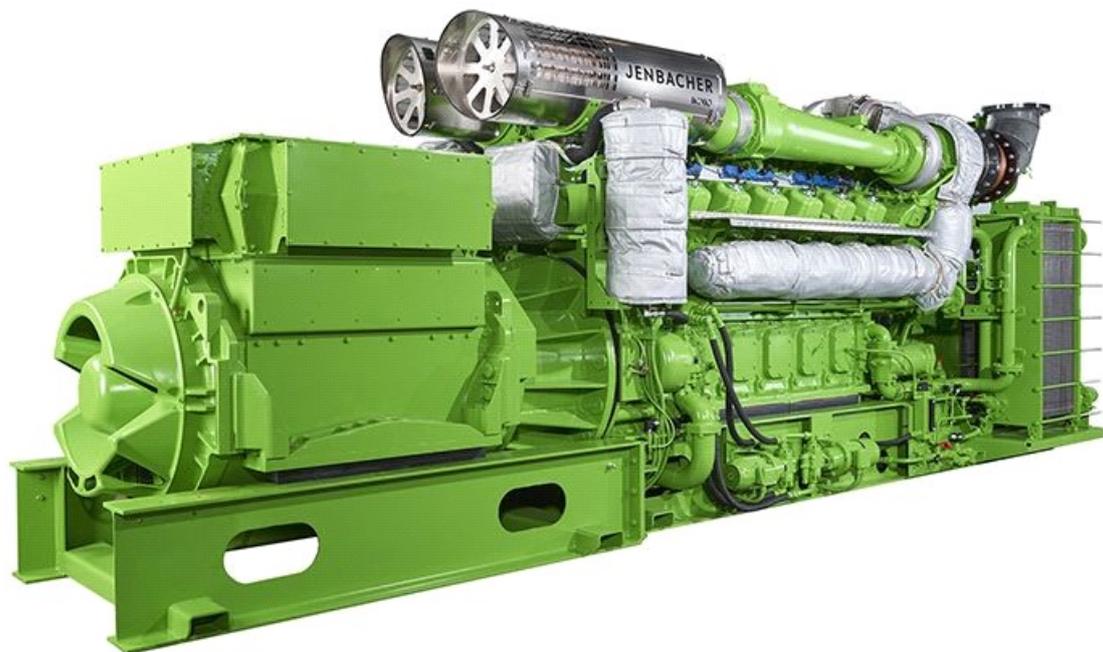
Cogeneration Unit

JMS 612 GS-N.L

Grid Parallel with Island Operation

static Grid Code

UMW Industrial Power Services Sdn. Bhd.



Electrical output	2000	kW el.
Thermal output	2074	kW

Emission values

NOx < 500 mg/Nm³ (5% O₂) | < 190 mg/Nm³ (15% O₂)

#

0.01 Technical Data (at module)

			100%	75%	50%
Power input	[2]	kW	4,525	3,511	2,458
Gas volume	*)	Nm ³ /h	476	370	259
Mechanical output	[1]	kW	2,058	1,544	1,029
Electrical output	[4]	kW el.	2,000	1,497	990
Recoverable thermal output (calculated with Glycol 3%)					
~ Intercooler 1st stage	[9]	kW	615	335	119
~ Lube oil		kW	204	177	152
~ Jacket water		kW	351	298	246
~ exhaust when cooling down 389 °C -> 120 °C		kW	904	822	655
Total recoverable thermal output	[5]	kW	2,074	1,632	1,172
Total output generated		kW total	4,074	3,129	2,162
Heat to be dissipated (calculated with Glycol 3%)					
~ Intercooler 2nd stage		kW	77	57	38
~ Lube oil		kW	---	---	---
~ Surface heat	ca. [7]	kW	148	~	~
Spec. fuel consumption of engine electric					
Spec. fuel consumption of engine electric	[2]	kWh/kWel.h	2.26	2.35	2.48
Spec. fuel consumption of engine	[2]	kWh/kWh	2.20	2.27	2.39
Lube oil consumption	ca. [3]	kg/h	0.41	~	~
Electrical efficiency			44.2%	42.6%	40.3%
Thermal efficiency			45.8%	46.5%	47.7%
Total efficiency	[6]		90.0%	89.1%	88.0%
Hot water circuit:					
Forward temperature		°C	90.0	85.7	81.3
Return temperature		°C	70.0	70.0	70.0
Hot water flow rate		m ³ /h	89.9	89.9	89.9
Fuel gas LHV		kWh/Nm ³	9.5		

*) approximate value for pipework dimensioning
 [] Explanations: see 0.10 - Technical parameters

All heat data is based on standard conditions according to attachment 0.10. Deviations from the standard conditions can result in a change of values within the heat balance and must be taken into consideration in the layout of the cooling circuit/equipment (intercooler; emergency cooling; ...).

Main dimensions and weights (at module)

Length	mm	~ 8,300
Width	mm	~ 2,200
Height	mm	~ 2,800
Weight empty	kg	~ 24,800
Weight filled	kg	~ 25,800

Connections

Hot water inlet and outlet [A/B]	DN/PN	100/10
Exhaust gas outlet [C]	DN/PN	500/10
Fuel Gas (at module) [D]	DN/PN	100/10
Water drain ISO 228	G	½"
Condensate drain	DN/PN	50/10
Safety valve - jacket water ISO 228 [G]	DN/PN	2x1½"/2,5
Safety valve - hot water	DN/PN	65/16
Lube oil replenishing (pipe) [I]	mm	28
Lube oil drain (pipe) [J]	mm	28
Jacket water - filling (flex pipe) [L]	mm	13
Intercooler water-Inlet/Outlet 1st stage	DN/PN	100/10
Intercooler water-Inlet/Outlet 2nd stage [M/N]	DN/PN	65/10

Output / fuel consumption

ISO standard fuel stop power ICFN	kW	2,058
Mean effe. press. at stand. power and nom. speed	bar	22.00
Fuel gas type		Natural gas
Based on methane number Min. methane number	MZ	65 65 d)
Compression ratio	Epsilon	10.5
Min. fuel gas pressure for the pre chamber	bar	4.06
Min./Max. fuel gas pressure at inlet to gas train	bar	4 - 8 c)
Max. rate of gas pressure fluctuation	mbar/sec	10
Maximum Intercooler 2nd stage inlet water temperature	°C	50
Spec. fuel consumption of engine	kWh/kWh	2.20
Specific lube oil consumption	g/kWh	0.20
Max. Oil temperature	°C	~ 80
Jacket-water temperature max.	°C	~ 95
Filling capacity lube oil (refill)	lit	~ 549

c) Lower gas pressures upon inquiry

d) based on methane number calculation software AVL 3.2 (calculated without N2 and CO2)

0.02 Technical data of engine

Manufacturer		JENBACHER
Engine type		J 612 GS-J111
Working principle		4-Stroke
Configuration		V 60°
No. of cylinders		12
Bore	mm	190
Stroke	mm	220
Piston displacement	lit	74.85
Nominal speed	rpm	1,500
Mean piston speed	m/s	11.00
Length	mm	4,246
Width	mm	1,886
Height	mm	2,503
Weight dry	kg	9,500
Weight filled	kg	10,300
Moment of inertia	kgm ²	56.67
Direction of rotation (from flywheel view)		left
Radio interference level to VDE 0875		N
Starter motor output	kW	13
Starter motor voltage	V	24

Thermal energy balance

Power input	kW	4,525
Intercooler	kW	692
Lube oil	kW	204
Jacket water	kW	351
exhaust when cooling down 180 °C	kW	707
exhaust when cooling down 100 °C	kW	970
Surface heat	kW	71

Exhaust gas data

Exhaust gas temperature at full load	[8]	°C	389
Exhaust gas temperature at bmep= 13.5 [bar]	[8]	°C	~ 446
Exhaust gas temperature at bmep= 11 [bar]	[8]	°C	~ 503
Exhaust gas mass flow rate, wet		kg/h	11,014
Exhaust gas mass flow rate, dry		kg/h	10,344
Exhaust gas volume, wet		Nm ³ /h	8,693
Exhaust gas volume, dry		Nm ³ /h	7,859
Max.admissible exhaust back pressure after y-pipe		mbar	50

Combustion air data

Combustion air mass flow rate		kg/h	10,695
Combustion air volume		Nm ³ /h	8,276
Max. admissible pressure drop at air-intake filter		mbar	10

basis for exhaust gas data: natural gas: 100% CH₄; biogas 65% CH₄, 35% CO₂

Sound pressure level

Aggregate a)		dB(A) re 20 μ Pa	100
31,5	Hz	dB	90
63	Hz	dB	88
125	Hz	dB	100
250	Hz	dB	95
500	Hz	dB	94
1000	Hz	dB	93
2000	Hz	dB	91
4000	Hz	dB	91
8000	Hz	dB	94
Exhaust gas b)		dB(A) re 20 μ Pa	116
31,5	Hz	dB	104
63	Hz	dB	121
125	Hz	dB	124
250	Hz	dB	116
500	Hz	dB	111
1000	Hz	dB	110
2000	Hz	dB	108
4000	Hz	dB	104
8000	Hz	dB	86

Sound power level

Aggregate	dB(A) re 1pW	122
Measurement surface	m ²	142
Exhaust gas	dB(A) re 1pW	124
Measurement surface	m ²	6.28

a) average sound pressure level on measurement surface in a distance of 1m (converted to free field) according to DIN 45635 and ISO 3744, precision class 3.

b) average sound pressure level on measurement surface in a distance of 1m according to DIN 45635 and ISO 3744, precision class 2.

The spectra are valid for aggregates up to bmep=20 bar. (for higher bmep add safety margin of 1dB to all values per increase of 1 bar pressure).

Engine tolerance \pm 3 dB

0.03 Technical data of generator

Manufacturer		Leroy-Somer e)
Type		LSA 53.2 XL11 e)
Type rating	kVA	2,477
Driving power	kW	2,058
Ratings at p.f. = 1,0	kW	2,000
Ratings at p.f. = 0.8	kW	1,981
Rated output at p.f. = 0.8	kVA	2,477
Rated reactive power at p.f. = 0.8	kVar	1,486
Rated current at p.f. = 0.8	A	130
Frequency	Hz	50
Voltage	kV	11
Speed	rpm	1,500
Permissible overspeed	rpm	1,800
Power factor (lagging - leading) (UN)		0,8 - 0,95
Efficiency at p.f. = 1,0		97.2%
Efficiency at p.f. = 0.8		96.3%
Moment of inertia	kgm ²	92.70
Mass	kg	7,750
Radio interference level to EN 55011 Class A (EN 61000-6-4)		N
Cable outlet		left
Ik" Initial symmetrical short-circuit current	kA	1.05
Is Peak current	kA	2.67
Insulation class		H
Temperature (rise at driving power)		F
Maximum ambient temperature	°C	40

Reactance and time constants at rated output (saturated)

xd direct axis synchronous reactance	p.u.	2.337
xd' direct axis transient reactance	p.u.	0.238
xd'' direct axis sub transient reactance	p.u.	0.135
x2 negative sequence reactance	p.u.	0.138
Td'' sub transient reactance time constant	ms	10
Ta Time constant direct-current	ms	30
Tdo' open circuit field time constant	s	2.03

e) JENBACHER reserves the right to change the generator supplier and the generator type. The contractual data of the generator may thereby change slightly. The contractual produced electrical power will not change.

0.04 Technical data of heat recovery

General data - Hot water circuit

Total recoverable thermal output	kW	2,074
Return temperature	°C	70.0
Forward temperature	°C	90.0
Hot water flow rate	m³/h	89.9
Nominal pressure of hot water	PN	10
min. operating pressure	bar	6.0
max. operating pressure	bar	9.0
Pressure drop hot water circuit	bar	1.25
Maximum Variation in return temperature	°C	+0/-5
Max. rate of return temperature fluctuation	°C/min	10

General data - Cooling water circuit

Heat to be dissipated (calculated with Glycol 3%)	kW	77
Return temperature	°C	50
Cooling water flow rate	m³/h	30
Nominal pressure of cooling water	PN	10
min. operating pressure	bar	0.5
max. operating pressure	bar	5.0
Loss of nominal pressure of cooling water	bar	~
Maximum Variation in return temperature	°C	+0/-5
Max. rate of return temperature fluctuation	°C/min	10

Exhaust gas heat exchanger

Type	shell-and-tube	
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PRIMARY:

Exhaust gas pressure drop approx	bar	0.02
Exhaust gas connection	DN/PN	500/10

SECONDARY:

Pressure drop hot water circuit	bar	0.20
Hot water connection	DN/PN	100/10

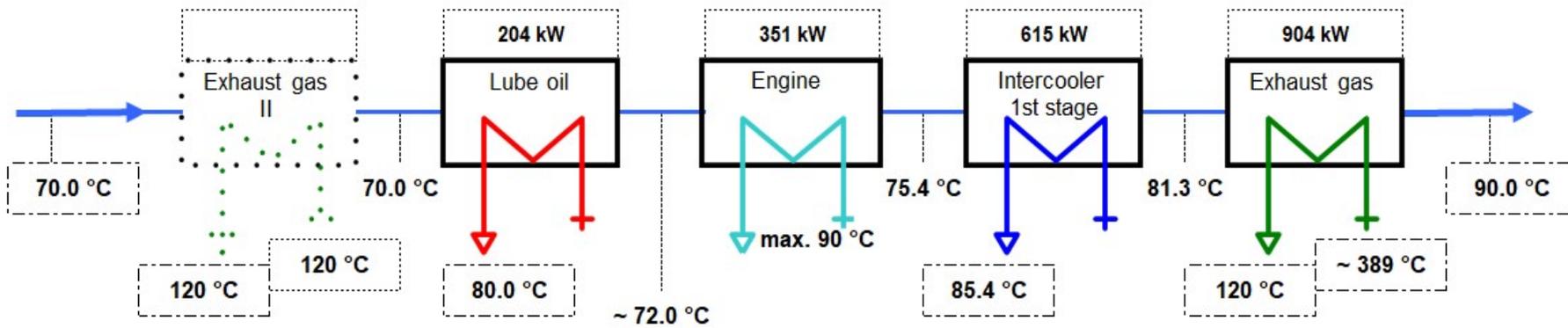
The final pressure drop will be given after final order clarification and must be taken from the P&ID order documentation.

Hot water circuit (calculated with Glycol 3%)

Recoverable thermal output = 2,074 kW

(+12/-8 % tolerance)

Hot water flow rate = 89.9 m³/h

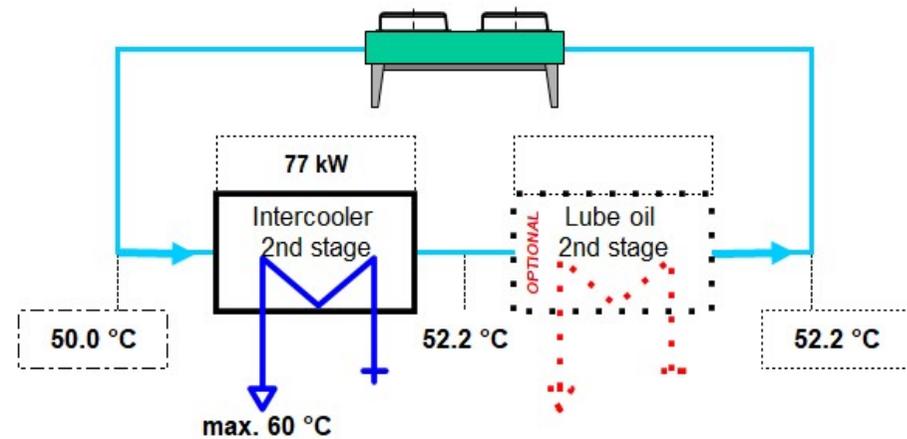


Low temperature circuit (calculated with Glycol 3%)

Heat to be dissipated = 77 kW

(+12/-8 % tolerance)

Cooling water flow rate = 30.0 m³/h



winTexte