JENBACHER

JENBACHER TYPE 4

An efficiency milestone

Based on the proven design concepts of Types 3 and 6, the modern Jenbacher Type 4 engines in the 800 to 1,560 kW power range are characterized by a high-power density and outstanding efficiency. The enhanced control and monitoring provide easy preventive maintenance, high reliability and availability.

Reference installations

J416—AGR Fenland Glasshouse, UK

AGR's Fenland Glasshouse and energy center includes a combined heat and power (CHP) plant comprising three high-efficiency Jenbacher engines that deliver electricity, while an exhaust cooling system delivers recovered CO_2 to help the plants grow. Additionally, an innovative 33 MWth heat pump system provides renewable hot water heating for the facility.

Engines	1 x J416, 1 x J620, 1 x J624
Electrical output	9 MW
Thermal output	11.2 MW
Energy source	Pipeline gas
Commissioning	2022

J420—Heslerhof, Germany

With the installation of a Jenbacher J420 engine and investments into a large buffer storage tank and a gas storage tank, the biogas plant at the Heslerhof farm in Germany was converted into a renewable storage power plant with flexible, power market-driven operation. The farm generates its own power, which is used to supply all the electricity it requires, and surplus power is fed into the grid at attractive feed-in tariffs at market rates.

Engine	1 x J420
Electrical output	1.56 MW
Thermal output	1.8 MW
Energy source	Biogas
Commissioning	2021

J420—Chok Yuen Yong Industry Co., LTD, Thailand

Five Jenbacher J420 biogas-fueled engines produce more than enough electric power to supply Chok Yuen Yong Industry Co., LTD's tapioca starch factory. The excess electricity produced by the engines—about 1,000 kW—is supplied to the public grid to further reduce the facility's power costs.

Engines	5 x J420
Electrical output	7.1 MW
Thermal output	5.2 MW
Energy source	Biogas
Commissioning	2012, 2017

J420—Hefei Xiaomiao Organic Waste Treatment Center Project, China

At the Hefei Xiaomiao Organic Waste Treatment Center Project, organic waste is pretreated and turned into biogas through anaerobic digestion at a nearly 67,000-square-meter facility. Two Jenbacher J420 biogas-fueled gensets power the facility and also supply power to the local grid.

Engines	2 x J420
Electrical output	3 MW
Thermal output	1.2 MW
Energy source	Biogas
Commissioning	2021

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Technical features

Feature	Description	Advantages
Heat recovery	Flexible arrangement of heat exchanger, two stage oil plate heat exchanger on demand	— High thermal efficiency, even at high and fluctuating return temperatures
Gas dosing valve	Electronically controlled gas dosing valve with high degree of control accuracy	— Very quick response time — Rapid adjustment of air/gas ratio — Large adjustable calorific value range
Four-valve cylinder head	Enhanced swirl and channel geometry using advanced calculation and simulation methods (CFD)	— Reduced charge-exchange losses — Central spark-plug position resulting in optimal cooling and combustion conditions
Crack connecting rod	Applying a technology—tried and tested in the automotive industry—in our powerful stationary engines	— High dimensional stability and accuracy — Reduced connecting rod bearing wear — Easy to maintain

Technical data

Configuration			V 70°
Bore (mm)			145
Stroke (mm)			185
Displacement / cylinder (lit)			3.06
Speed (rpm)			1,800/1,200 (60 Hz) 1,500 (50 Hz)
Mean piston speed (m/s)			7.4 (1,200 1/min) 9.3 (1,500 1/min) 11.2 (1,800 1/min)
Scope of supply			Generator set, cogeneration system, generator set / cogeneration in container
Applicable gas types			Natural gas, flare gas, biogas, landfill gas, sewage gas, special gases (e.g., coal mine gas, coke gas, wood gas, pyrolysis gas)
Engine type		J412	J416	J420
No. of cylinders		12	16	20
Total displacement (lit)		36.7	48.9	61.1

		Dimensions l x w x h (mm)
Generator set	J412	5,400 x 1,800 x 2,200
	J416	6,200 x 1,800 x 2,200
	J420	7,100 x 1,900 x 2,200
Cogeneration system	J412	6,000 x 1,800 x 2,200
	J416	6,700 x 1,800 x 2,200
	J420	7,100 x 1,800 x 2,200
Container[1] 40-foot	J412	12,200 x 3,000 x 2,700 – 5,300
	J416	12,200 x 3,000 x 2,700 – 5,300
	J420	12,200 x 3,000 x 2,700 – 5,300
		Weights empty (kg)
Generator set	J412	11,200
	J416	13,500
	J420	17,200
Cogeneration system	J412	11,800
	J416	14,100
	J420	17,800

Outputs and efficiencies

Natural gas		1,500 1/min | 50 Hz					1,800 1/min | 60 Hz					1,200 1/min | 60 Hz				
NO_x<	Type	Pel (kW)[2]	Pth (kW)[3]	ηel (%)[2]	ηth (%)[3]	ηtot (%)	Pel (kW)[2]	Pth (kW)[3]	ηel (%)[2]	ηth (%)[3]	ηtot (%)	Pel (kW)[2]	Pth (kW)[3]	ηel (%)[2]	ηth (%)[3]	ηtot (%)
500 mg/m³$_N$	J412	902	928	43.4	44.6	88.0	853	960	41.7	46.9	88.6	630	618	42.8	41.9	84.7
	J416	1,201	1,244	43.4	44.9	88.3	1,142	1,281	41.8	46.9	88.7	846	824	43.0	41.9	85.0
	J416	1,003	1,029	43.5	44.6	88.1	-	-	-	-	-	-	-	-	-	-
	J420	1,562	1,649	43.7	46.1	89.9	1,427	1,602	41.8	46.9	88.8	1,057	1,029	43.0	41.9	84.9
	J420	1,562	1,833	42.4	49.7	92.1	-	-	-	-	-	-	-	-	-	-
250 mg/m³$_N$	J412	902	967	42.2	45.2	87.4	853	1,003	40.7	47.9	88.5	630	641	41.8	42.5	84.4
	J416	1,201	1,285	42.3	45.2	87.5	1,142	1,338	40.9	47.9	88.7	846	856	42.1	42.6	84.7
	J416	1,003	1,045	42.9	44.7	87.6	-	-	-	-	-	-	-	-	-	-
	J420	1,501	1,605	42.7	45.6	88.4	1,427	1,648	41.1	47.5	88.7	1,057	1,085	41.7	42.8	84.6
	J420	1,562	1,906	41.4	50.5	91.9	-	-	-	-	-	-	-	-	-	-

Biogas		1,500 1/min | 50 Hz					1,800 1/min | 60 Hz				
NO_x<	Type	Pel (kW)[2]	Pth (kW)[3]	ηel (%)[2]	ηth (%)[3]	ηtot (%)	Pel (kW)[2]	Pth (kW)[3]	ηel (%)[2]	ηth (%)[3]	ηtot (%)
500 mg/m³$_N$	J412	751	750	42.2	42.2	84.3	-	-	-	-	-
	J412	902	916	42.7	43.3	86.0	853	916	41.2	44.2	85.4
	J412	935	914	43.3	42.3	85.6	-	-	-	-	-
	J416	1,004	994	42.5	42.1	84.6	-	-	-	-	-
	J416	1,201	1217	42.7	43.3	86.0	1,142	1,220	41.4	44.2	85.5
	J416	1,248	1,225	43.3	42.4	85.7	-	-	-	-	-
	J420	1,501	1,518	42.8	43.3	86.1	1,427	1,527	41.3	44.2	85.6
	J420	1,562	1,538	43.3	42.6	85.9	-	-	-	-	-
250 mg/m³$_N$	J412	902	930	42.0	43.4	85.4	853	933	40.5	44.3	84.8
	J416	1,205	1,240	42.1	43.4	85.5	1,142	1,237	40.6	44.0	84.7
	J420	1,501	1,544	42.2	43.4	85.6	1,427	1,556	40.6	44.3	85.0

[1] The dimensions refer to the standard base models with horizontal exhaust silencer.
[2] Technical data according to ISO 3046
[3] Total heat output with a tolerance of +/- 8%, exhaust gas outlet temperature 120°C, for biogas gas outlet temperature 180°C

All data according to full load and subject to technical development and modification. Further engine versions available on request.

In general, "Ready for H_2" Jenbacher units can be converted to operate on up to 100% hydrogen in the future. Details on the cost and timeline for a future conversion may vary and need to be clarified individually.

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