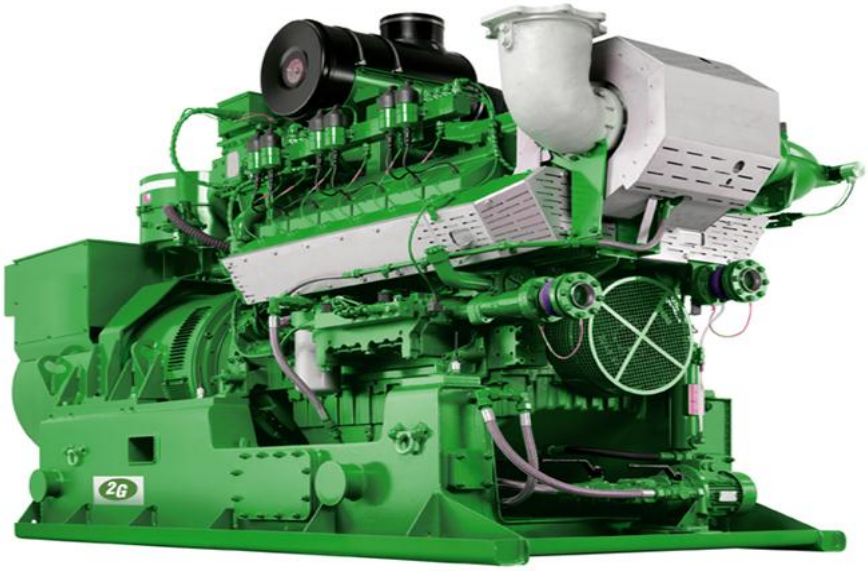


Illustration: may differ from specified module

Compact CHP ready for connection, mainly consisting of

- serially manufactured Industrial-Gas-Otto-engine
- air-cooled synchronous generator
- waste-gas heat exchanger integrated in primary cooling circuit
- oil reservoir with automatic oil feeding
- control cabinet with programmable controller and operating unit
- gas train

Integrated heat exchanger basket, mainly consisting of

- expansion tank in motor circuit and mixture circuit
- relief value in motor circuit, mixture circuit and heater circuit
- filling valves, cleanout valves and exhaust valves
- plate heat exchanger
- pumps for motor circuit, mixture circuit and heater circuit
- 3-way mixing valve for return temperature increase

Water and gas connections are executed with compensators.

Motor and generator are connected through a pluggable elastic metal plastics coupler to compensate radial offest, axial offset or angular offset. It is mounted on a framework vibration-cushionedly. Furthermor the framework is uncoupled through oscillation decoupling elements.
The control cabinet ist executed as a separate unit. All regulation and control functions as well as control elements are part of the control cabinet. Assisted by a menu-navigated display performace data and state data could be readed and adjusted easily.

The drive of the CHP is caused by a water-cooled, supercharged Otto-Gas-Engine. It is stationary engine designed for permanent operation. A micorprocessor-controlled ignition ensures an optimal adaption of the ignition point and the ignition energy to the gas quality (methane number).

The lambda control is carried out without lambda probe over the combustion chamber temperature, which is determined with the aid of a thermocouple in the cylinder. The combustion chamber temperature represents a proxy for the mixing ratio dar. Using the combustion chamber temperature, the optimum lambda value for each operating condition is set.

Besides an exceedingly high electrical efficiency, a double-staged mixture cooling, including a low temperature circuit and a high temperature circuit, leads to an ideal usage of thermal power from the mixture heat.

Technical specification

Kraft-Wärme-Kopplung

avus500c
Biogas 50% CH_4, 50% CO_2

Engine data	Hz	400
Mixture cooling to	°C	50
RPM	1/min	1.500
ISO standard power (mech.)	kW	620
Arrangement of cylinders		V
Number of cylinders		12
Bore	mm	132
Stroke	mm	160
Swept volume	l	26
direction of rotation (look on balance wheel)		links
compression ratio	ε	15,0 : 1
average effective pressure	bar	19,1
average piston speed	m/s	8

Power data	Hz	50
Load	%	100
Ignition timing	grad	variabel
ISO standard power (mech.)	kW	620
Electrical power	kW el	600
Cooling water heat	kW	314
Low temperature mixture heat	kW	51
High temperature mixture heat	kW	0
Waste gas heat up to 180°C	kW	290
useable thermal power at 180°C	kW	604
radiant heat of module (max.)	kW	72
nominal power	kW	1.441
Fuel consumption (mech.)	kWh/kWh	2,32
Fuel consumption (el.)	‹Wh/kWh el	2,40

Temperatures and pressures		
Waste gas temperature after turbine	°C	472
exhaus back pressure (max.)	mbar	50
Heating water return temperature (max.)	°C	70
Heating water flow temperature (max.)	°C	90
Pressure decrease heating circuit (max.)	mbar	200
maximum backpressure at the air intake	mbar	5

Emission value at 5% residual oxygen		
NOx	mg/Nm³	< 500
CO	mg/Nm³	< 1.000

Engine utilities		
Lubricate consumption	kg/h	0,12
Filling capacity lubricant min./max.	l	100
Filling capacity cooling water	l	43
Operating pressure (max.)	bar	2,5
Cooling water recirculated quantity (min. / max.)	m³/h	22 / 37
Cooling water temperature (inflow)	°C	78
Cooling water temperature (exit)	°C	88
Balance (inflow/exit, max.)	K	10
Mixture inflow temperature after damper (max.)	°C	50
Mixture cooling water, inflow temperature low temperature circuit (max.)	°C	40
Mixture cooling water recirculated quantity low temperature circuit (max.)	m³/h	10

Efficiencies				
	%	100	75	50
Electrical	%	41,6	40,4	38
Mechanical	%	43,0	-	-
Thermal	%	41,9	43,9	47,2
Total (el. + th.)	%	83,5	84,3	85,2
Power number		0,99	0,92	0,81

Mass flows and volume flows		
Combustion air mass flow	kg/h	2.808
Combustion air volume flow	Nm³/h	2.365
Supply air volume flow	m³/h	23.365
Combustible mass flow	kg/h	390
Combustible volume flow	m³/h	289
Waste gas mass flow, wet	kg/h	3.197
Waste gas mass flow, dry	kg/h	2.995
Waste gas volume flow, wet	m³/h	2.437
Waste gas volume flow, dry	m³/h	2.164
Heating water volume flow (max.)	m³/h	34,597

Technical basic conditions

Power conditions acc. to DIN-ISO-3046
Norm conditions: air pressure: 1000mbar,
air temperature: 25°C or 295 K, rel. humidity: 30%
Gasquality according "TR 0199-99-3017"
All data are related to full load engine running at denoted media temperatures and are subject to technical advancements.
Equipment as well as installation systems have to meet all MWM technical instructions.
When installed > 400 m and/or with intake air temperatures > 30 °C, the power reduction must be determined on a project-specific basis.

Technical specification

2G Kraft-Wärme-Kopplung

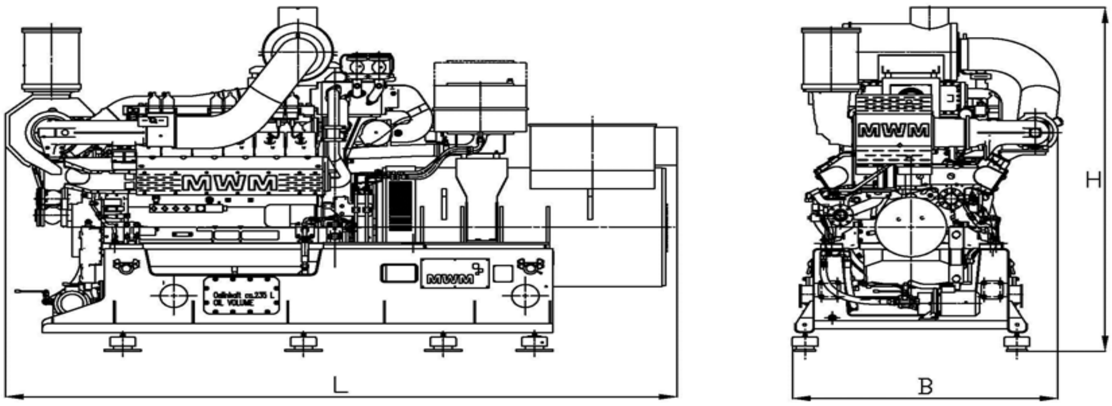
avus500c
Biogas 50% CH_4, 50% CO_2

Generator data		
Manufacturer		Marelli
Type		MJB 400 LA4
Power	kVA	750
Voltage	V	400
Frequency	Hz	50
Rated Speed	1/min	1500
Nominal current at Cos φ = 0,8	A	1.072
Cos φ		1
Efficiency (full load) at Cos φ = 1	%	96,7
Efficiency (full load) at Cos φ = 0,8	%	95,8
Reactance Xd	p.u.	175
Reactance X'd	p.u.	14,3
Reactance X"d	p.u.	6,5
Mass moment of inertia	kgm²	19,9
Stator circuit		Stern
Ambient air temperature	°C	40
Protection class		IP 23

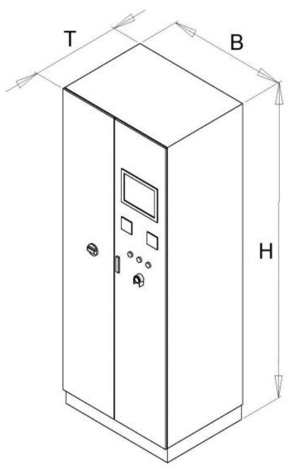
The Cos Phi can be adjusted in between 0,8 inductive (lagging) and 0,95 capacitive (leading). The precise adjustment value however should be decided by the Utility company.

Main dimensions and weights		
Module:		
Length (L)	mm	3.680
Height (H)	mm	2.245
Width (B)	mm	1.480
Weight dry (approx.)	kg	6.670
Control cabinet:		
Height (H)	mm	2.200
Width (B)	mm	1.400
Depth (T)	mm	600
Weight (approx.)	kg	250
Power switch cabinet:		
Height (H)	mm	2.100
Width (B)	mm	600
Depth (T)	mm	600
Weight (approx.)	kg	120

Modul:



Control cabinet:



Power switch cabinet: