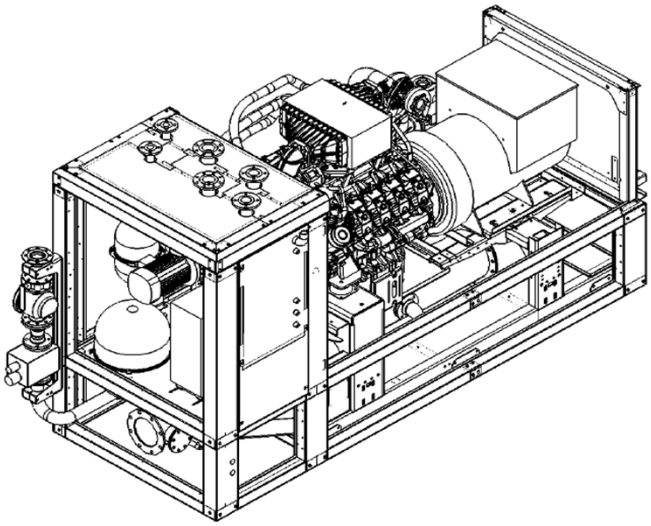
Technical specification - preliminary

agenitor® 408

Gas type: natural gas (10 kWh/Nm³)



Picture: Symbolically, might differ from the described 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
- Oxikat integrated in waste-Gas heat exchanger
- 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 valve 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

Water and gas connections are executed with compensators. All water-side connections are directed upwards above the heat exchanger basket.

Engine and generator are connected through a pluggable elastic metal-plastic coupler to compensate raidal offset, axial offset or angular offset. It is mounted on a framework vibration-cushionedly.
Furthermore the framework is uncoupled through oscillation decoupling elements.

The control cabinet is 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 touch-screen performance 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. A mircoprocessor-controlled ignition ensures an optimal adaption of the ignition point and the ignition energy to the gas quality (methane number).

The lambda control is covered without a special probe. The value is calculated with the variables of the actual power, charge pressure and the gas mix temperature. The lambda value is calculated for the optimum of each operation status.

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.

The oil level control is carried out by a sight glass with oil level deficit indication, which is connected with the oilpan.

Engine data	Hz	50
Mixture cooling to	℃	50
RPM	1/min	1.500
ISO standard power (mech.)	kW	374
Air ration (Lambda)	λ	1,91
Configuration	V - Arrangement	
No of cylinders		8
Bore	mm	130
Stroke	mm	157
Swept volume	l	16,7
Direction of rotation (look on balance wheel)		left
body of balance wheel		SAE 1
tooth rim with number of teeth	Z	137
compression ratio	ε	13,3 : 1
average effective pressure	bar	18,0
average piston speed	m/s	7,85

Power data	Hz	50
Load	%	100
ISO standard power (mech.)	kW	374
Electrical power	kW	360
Cooling water heat	kW	134
Mixture heat (high temperature circuit)	kW	49
Mixture heat (low temperature circuit)	kW	31
Waste gas heat up to 120℃	kW	207
useable thermal powert at 120℃	kW	389
radiant heat of module (max.)	kW	50
nominal power	kW	847
Fuel consumption (mech.)	kWh/kWh	2,26
Fuel consumption (el.)	kWh/kWh	2,35

Temperatures and pressures		
Waste gas temperatur after turbine	℃	444
Heating water return temperature (max)	℃	70
Heating water flow temperature (max)	℃	90
Pressure decrease heating circuit internally	mbar	200
maximum backpressure at the air intake	mbar	15

Engine utilities		
Lubricate consumption	g/kWh	0,2
Filling capacity lubricant (min./max.)	l	48 / 60
Filling capacity cooling water	l	40
Operating pressure (max.)	bar	2
Cooling water recirculated quantity (min.)	m³/h	26,8
Cooling water temperature (min.)	℃	80
Cooling water temperature (max.)	℃	88
Balance (inflow/exit, max.)	K	6
Mixture inflow temperature after damper (max.)	℃	50
Mixture cooling water, inflow temperature low temperature circuit (max.)	℃	45
Mixture cooling water recirculated quantity low temperature circuit (max.)	m³/h	10,4
Mixture cooling water, inflow termperature high temperature circuit (max.)	℃	86
Mixture cooling water recirculated quantity high temperature circuit (max.)	m³/h	16,2

Efficiencies				
Load	**%**	**50**	**75**	**100**
Electrical	%	39,4	41,4	42,5
Mechanical	%	41,2	43,0	44,2
Thermal	%	52,7	47,7	46,0
Total (el. + th.)	%	92,1	89,1	88,5
Power classification number		0,75	0,87	0,92

Mass flows and volume flows		
Combustion air mass flow	kg/h	2.000
Combustion air volume flow	m³/h	1.689
Supply air volume flow (min.)	m³/h	11.595
Combustible mass flow	kg/h	66
Combustible volume flow	m³/h	83
Waste gas mass flow, wet	kg/h	2.066
Waste gas mass flow, dry	kg/h	1.974
Waste gas v olume flow, wet	m³/h	1.623
Waste gas volume flow, dry	m³/h	1.466
Heating water volume flow (max.)	m³/h	22,3

Technical basic conditions

Power conditions acc. To DIN-ISO-3046
(The tolerance of the nominal energy input is +5% at nominal output. The tolerance for the usable thermal capacity is 7% at the nominal output.)
Norm conditions: air pressure: 1000 mbar, air temperature: 25℃, rel. Humidity: 30%. Gasquality according "2G TA 04 Gas". 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 technical instructions of 2G. Power reduction due to installation at altitude > 400m a.s.l. and/or air suction temperature > 30℃ shall be specifically determine d for each project.

Generator data

Manufacturer	Leroy Sommer	
Type	LSA 47.2 L9	
Power at Cos φ = 0,8	kVA	450
Voltage	V	400
Frequency	Hz	50
Rated speed	1/min	1500
Nominal current at Cos φ = 0,8	A	650
Cos φ		0,8-1
Efficiency (full load) at Cos φ = 1	%	96,4
Efficiency (full load) at Cos φ = 0,8	%	95,0
Reactance X"d	%	17,7
Reactance Xi = X2	%	14,1
Mass moment of inertia	kg m²	8,32
Stator circuit		Stern
Ambient air temperature	℃	40
Protection class		IP 23

Cos φ has to be between 0,8 and 1,0 within

Sound emissions engine

Engine surface noise (A-weighted)	dB(A)	104,6
Exhaust orifice noise according to DIN 45635-11 (linear weighted)	dB(A)	124,6

Emission value at 5% residual oxygen

NOx	mg/Nm³	< 500
CO	mg/Nm³	< 1000
CO(with catalyst)	mg/Nm³	< 300

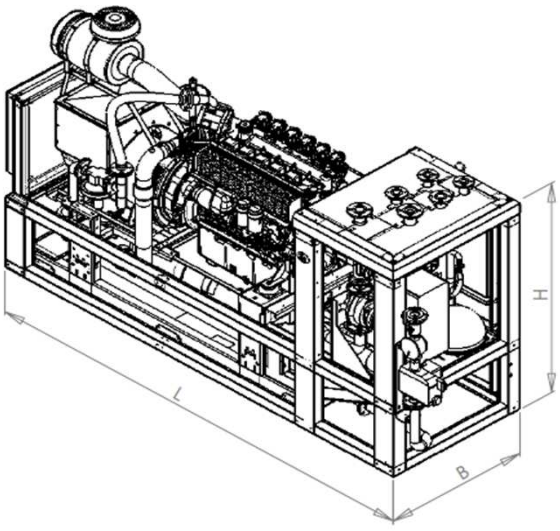
Piping connection

Gas		
Interfaces	-	DN 50
Gas pressure at rated load min.	mbar	20
Heating		
Interfaces	-	DN 65
Pressure reserve ca.	mbar	300
Exhaust		
Interfaces	-	DN 200
exhaust back pressure after turbine max.	mbar	40

Main dimensions and weights

Module		
Length (L)	mm	3.940
Height (H)	mm	2.300
Width (B)	mm	1.500
Weight (approx.)	kg	5.560
Control cabinet		
Height (H)	mm	2.000
Width (B)	mm	800
Depth (T)	mm	600
Weight (approx.)	kg	200
Power switch cabinet		
Height (H)	mm	2000
Width (B)	mm	600
Depth (T)	mm	500
Weight (approx.)	kg	150

Module



Control- and power cabinet