



Picture: symbolic - may deviate from module described

**Compact CHP module ready for connection, mainly consisting of**

- Gas-Otto-engine from industriale series production
- air-cooled, self-excited, brushless synchronous generator
- exhaust gas heat exchanger integrated in primary cooling water circuit
- oxidising catalyst integrated in exhaust gas heat exchanger
- oil reservoir with automatic oil top-up device
- control cabinet with programmable logi control and operating panel
- gas pressure regulation and safety ramp

**Integrated heat recovery system assembly, mainly consisting of**

- expansion tank for engine and mixture cooling circuit
- safety valve in engine, mixture and heating circuit
- filling, drain and bleeding valves
- transfer plate heat exchanger
- pumps for engine, mixture and heating circuit
- 3-way mixing valve for return temperature increase

Water and gas connections are equipped with compensators. All water-side connections above the heat recovery assembly are directed upwards.

Engine and alternator are linked by a pluggable elastic metal-plastics coupling to compensate radial, axial and angular disalignment and mounted on vibration damping elements on the module baseframe.

Moreover the module baseframe is isolated from the installation surface by anti-oscillation elements.

The control cabinet is executed as a separate unit. All regulation and control functions as well as operational controls are integrated. The menu-navigated touch-screen allows to read and adjust all performance and status data.

The CHP module is driven by a water-cooled, supercharged Gas-Otto engine designed for stationary continuous operation. The microprocessor-controlled ignition system ensures the optimal adaption of ignition timing and energy to the gas quality (methane no.).

Lambda control is carried *without* lambda probe by using a calculation programme, which sets the optimal lambda value for every operational status based on actual power, charging pressure and mixture temperature.

The twin-stage mixture cooling (optional) with low and high temperature circuit ensures an exceptionally high electrical efficiency as well as an optimal utilization of thermal power of the mixture heat.

The oil level control is carried out by a sight glass connected to the oil pan with low oil level indication. A 35 litres oil reservoir ensures automatic oil topping-up between oil changing intervals

<b>Engine data</b>		<b>Hz</b>	<b>50</b>	<b>Engine utilities</b>		
Mixture cooling to	°C		50	Specific lubricating oil consumption	g/kWh	0,8
Nominal speed	1/min		1500	Filling capacity lubricating oil	l	70
ISO standard power (mech.)	kW		209			0
Stoichiometric ratio (Lambda)	λ		1,6	Filling capacity cooling water	l	16
Arrangement of cylinders			row	Operating pressure (max.)	bar	2
Number of Cylinders			6	Cooling water flow	l/min	321
Bore	mm		128	Cooling water temperature min.	°C	80
Stroke	mm		166	Cooling water temperature max.	°C	88
Swept volume	l		12,82	Difference (inlet/outlet max.)	K	6
Sense of rotation (viewing on flywheel)			left	Mixture inlet temperature after throttle valve max.	°C	50
Housing of flywheel			SAE 1	Mixture cooling water inlet temperature.	°C	40
tooth rim with number of teeth	Z		160	low temperature circuit (max.)		
				Mixture cooling water flow	l/min	162
compression ratio	ε		11,0 : 1	low temperature circuit (max.)		
mean effective pressure	bar		13,11	Mixture cooling water inlet temperature	°C	85
average piston speed	m/s		8,3	high temperature circuit (max.)		
				Mixture cooling water flow	l/min	170
				high temperature circuit (max.)		
<b>Power data</b>		<b>Hz</b>	<b>50</b>	<b>Efficiencies</b>		
Load	%		100	<b>Load</b>	<b>%</b>	<b>50 75 100</b>
Ignition timing BTDC	degrees		16	Electrical	%	31,9 35,3 37,4
ISO standard power (mech.)	kW		209	Mechanical	%	33,4 36,9 39,1
Electrical Power	kW		200	Thermal	%	52,0 48,7 47,9
Cooling water heat	kW		99	Total (el. + th.)	%	83,9 84,0 85,3
Mixture heat (high temperature circuit)	kW		21	Electrical-thermal power ratio		0,61 0,72 0,78
Mixture heat (low temperature circuit)	kW		20			
Exhaust gas heat down to 120 °C	kW		136	<b>Mass and volume flows</b>		
Useable thermal power at 120 °C exhaust gas	kW		256	Combustion air mass flow	kg/h	1.060
Heat radiation of module (max.)	kW		35	Combustion air volume flow	m³/h	895
Fuel power (consumption)	kW		535	Inlet air volume flow (max.)	m³/h	6.106
Specific fuel consumption (mech.)	kWh/kWh		2,56	Fuel mass flow	kg/h	42
Specific fuel consumption (el.)	kWh/kWh		2,68	Fuel volume flow	m³/h	52
<b>Temperatures and pressures</b>				Exhaust gas mass flow, wet	kg/h	1.101
Exhaust gas temperature after turbine	°C		510	Exhaust gas mass flow, dry	kg/h	1.032
Exhaust gas back pressure (max.)	mbar		40	Exhaust gas volume flow, wet	m³/h	868
Heating water return temperature (max)	°C		70	Exhaust gas volume flow, dry	m³/h	769
Heating water header temperature (max)	°C		90	Heating water volume flow (max.)	m³/h	15
Pressure loss heating circuit (max)	mbar		150			
Underpressure at the air intake (max)	mbar		15	<b>Technical basic conditions</b>		
<b>Emission values at 5% residual oxygen and dry exhaust gas</b>				Standard reference conditions acc. to DIN-ISO-3046/I		
NOx	mg/Nm³		< 500	Air pressure: 1000 mbar		
CO	mg/Nm³		< 300	Air temperature: 25 °C or 295 K, rel. Hu mididity: 30%		
				Gas quality accorcing "2G TA 04 Gas Quality"		
				All data are referred to engine full load at the indicated media temperatures and are subject to technical progress. Operating media and balance of plant have to be carried in accordance with 2G's technical instructions. Power reduction due to installation at altitude <400m a.s.l. and/or air suction temperature <30°C shall be specifically determined for each project.		

**Generator data**

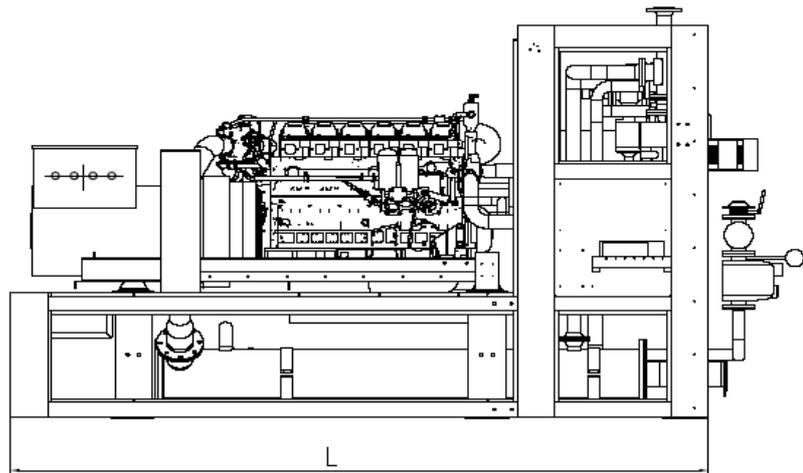
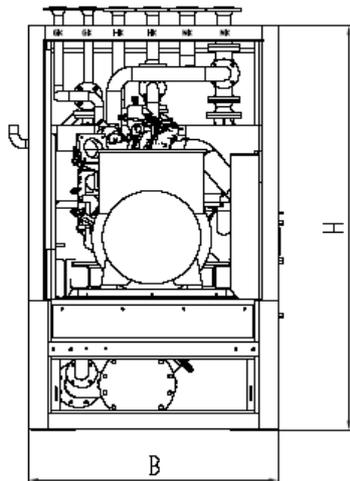
Manufacturer		Leroy Somer
Type		LSA 46.2 VL12
Nominal power at $\cos \varphi = 0,8$	kVA	250
Voltage	V	400
Frequency	Hz	50
Nominal speed	1/min	1500
Nominal current at $\cos \varphi = 0,8$	A	361
$\cos \varphi$		0,8 - 1
Efficiency (full load) at $\cos \varphi = 1$	%	95,90
Efficiency (full load) at $\cos \varphi = 0,8$	%	94,30
Reactance $X''d$	%	9,70
Reactance $X_i = X_2$	%	11,00
Mass moment of inertia	kg m <sup>2</sup>	2,80
Stator circuit		star
Ambient air temperature	°C	40
Protection class		IP 23

$\cos \varphi$  shall be between 0,8 and 1,0 over the entire power range.

**Main dimensions and weights**

<b>Module:</b>			
Length (L):	mm	3.720	
Height (H):	mm	2.210	
Width (B):	mm	1.300	
Weight (approx.):	kg	3.800	
<b>Control switchboard</b>			
Height (H)	mm	2.000	
Width (B)	mm	800	
Depth (T)	mm	600	
Weight (approx.):	kg	200	
<b>Power switchboard</b>			
Height (H)	mm	2.000	
Width (B)	mm	600	
Depth (T)	mm	500	
Weight (approx.):	kg	200	

**Modul:**



**Control switchboard**

**Power switchboard**

