



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

Engine data		Hz	50	Engine utilities	
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.)	
Power data		Hz	50	Efficiencies	
Load	%		100		
Ignition timing BTDC	degrees		16	Load	% 50 75 100
ISO standard power (mech.)	kW		209	Electrical	% 31,9 35,3 37,4
Electrical Power	kW		200	Mechanical	% 33,4 36,9 39,1
Cooling water heat	kW		99	Thermal	% 52,0 48,7 47,9
Mixture heat (high temperature circuit)	kW		21	Total (el. + th.)	% 83,9 84,0 85,3
Mixture heat (low temperature circuit)	kW		20	Electrical-thermal power ratio	0,61 0,72 0,78
Exhaust gas heat down to 120 °C	kW		136		
Useable thermal power at 120 °C exhaust gas	kW		256	Mass and volume flows	
Heat radiation of module (max.)	kW		35		
Fuel power (consumption)	kW		535	Combustion air mass flow	kg/h 1.060
Specific fuel consumption (mech.)	kWh/kWh		2,56	Combustion air volume flow	m³/h 895
Specific fuel consumption (el.)	kWh/kWh		2,68	Inlet air volume flow (max.)	m³/h 6.106
Temperatures and pressures				Fuel mass flow	kg/h 42
Exhaust gas temperature after turbine	°C		510	Fuel volume flow	m³/h 52
Exhaust gas back pressure (max.)	mbar		40	Exhaust gas mass flow, wet	kg/h 1.101
				Exhaust gas mass flow, dry	kg/h 1.032
Heating water return temperature (max)	°C		70	Exhaust gas volume flow, wet	m³/h 868
Heating water header temperature (max)	°C		90	Exhaust gas volume flow, dry	m³/h 769
Pressure loss heating circuit (max)	mbar		150		
				Heating water volume flow (max.)	m³/h 15
Underpressure at the air intake (max)	mbar		15	Technical basic conditions	
Emission values at 5% residual oxygen and dry exhaust gas				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

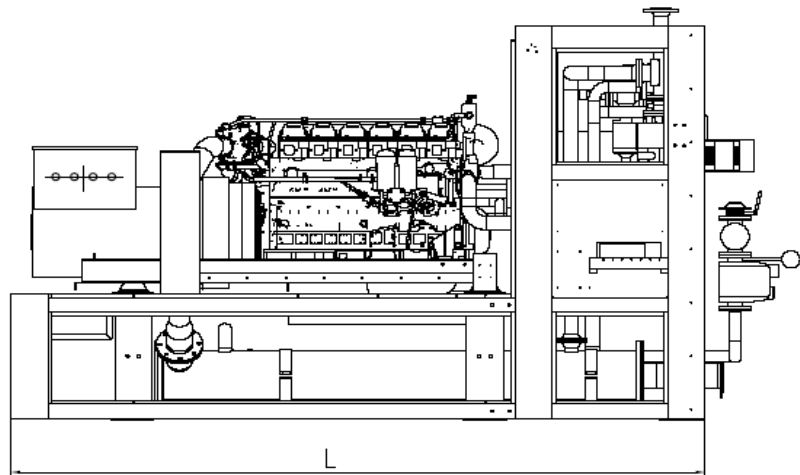
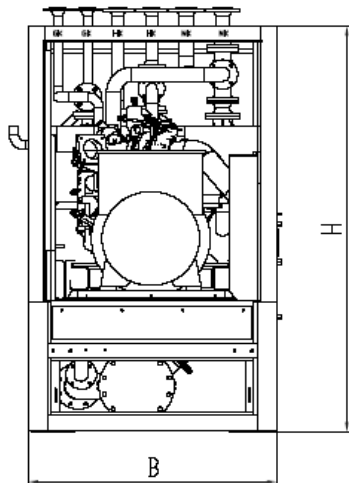
Manufacturer		Leroy Somer
Type		LSA 46.2 VL12
Nominal power at $\cos \varphi = 0,8$	kVA	250
Voltage	V	400
Frequency	Hz	50
Nominal speed	1/min	1500
Nominal current at $\cos \varphi = 0,8$	A	361
$\cos \varphi$		0,8 - 1
Efficiency (full load) at $\cos \varphi = 1$	%	95,90
Efficiency (full load) at $\cos \varphi = 0,8$	%	94,30
Reactance $X''d$	%	9,70
Reactance $X_i = X_2$	%	11,00
Mass moment of inertia	kg m ²	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

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

Modul:



Control switchboard

Power switchboard

