

Product range 2010

Biogas – Combined Heat and Power Units,
100 kW up to 955 kW electrical power



50 Hz Biogas/ Sewage Gas/ Landfill Gas CHP Units

BSM Type

CHP unit with high electrical efficiency above 39%. The turbo- charged engines have low temperature (LT) cooling circuits for mixture cooling with heat dissipation into the open air. The exhaust gases are cooled down to 180 °C in exhaust gas heat exchangers.

Emissions according to the limits as per German TA-Luft 2002: NO_x < 500 mg/Nm³; CO < 1000 mg/Nm³

KSM Type (preferably used in Sewage Gas plants)

CHP unit with high total efficiency above 87%. The turbo- charged engines have mixture cooling circuits with heat transfer to the heating system. The exhaust gases are cooled down to 120 °C.

Emissions according to the limits as per German TA-Luft 2002: NO_x < 500 mg/Nm³; CO < 1000 mg/Nm³

Electrical power 100 kW up to 500 kW

Compact modules with SCHMITT ENERTEC gas engines , series SE-MB

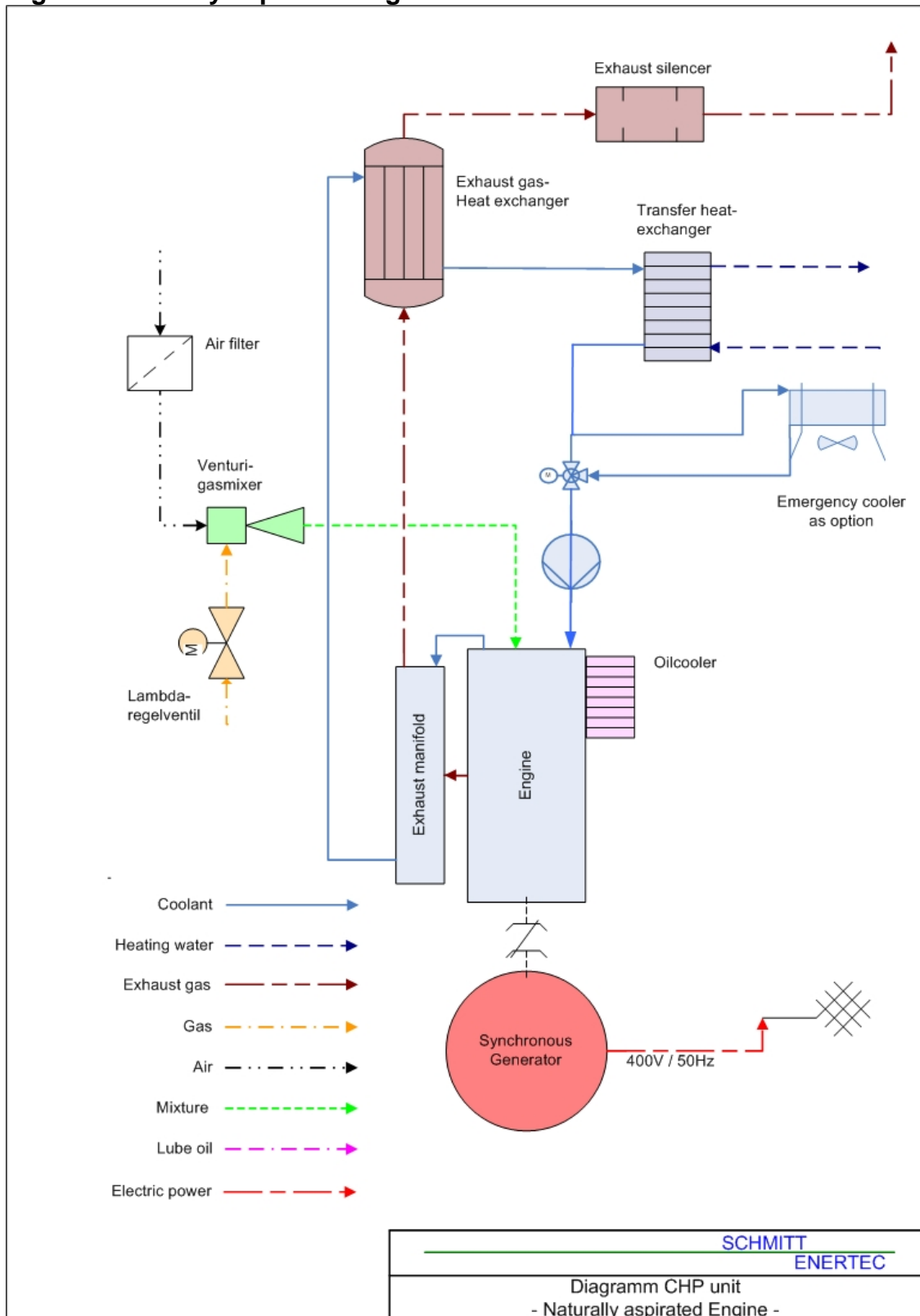
CHP-Type	Engine (Gas-Otto-engine) naturally aspirated: Lambda = 1 Lean- burn: turbo charged cyl./ configuration ^{1),2)}	Electrical power ³⁾ (kW)	Electrical efficiency ³⁾ (%)	Thermal output ⁴⁾ (kW) Exhaust temp. 180°C	Fuel input ⁵⁾ (kW)
FMB-125-BSM/KSM	8 / V – nat.	101	33,8	164	299
FMB-200-BSM/KSM	6 / L - turbo int.	160	37,9	223	422
FMB-230-BSM/KSM	6 / L - turbo ext.	185	39,9	215	464
FMB-255-BSM/KSM	8 / V - turbo int.	200	36,4	273	549
FMB-285-BSM/KSM	8 / V - turbo ext.	233	38,1	262	612
FMB-320-BSM/KSM	8 / V - turbo ext.	260	40,8	289 ⁶⁾	637
FMB-375-BSM/KSM	12 / V - turbo int.	300	36,9	439	813
FMB-430-BSM/KSM	12 / V - turbo ext.	350	38,9	371	900
FMB-500-BSM/KSM	12 / V - turbo ext.	400	40,2	456 ⁶⁾	995
Higher power on request					

Legend:

- 1) L = In line engine
V = V 90° engine
- 2) int. = internal mixture cooling
ext. = external mixture cooling
nat. = naturally aspirated
turbo = turbo- charged
- 3) at pf cos phi=1, no over load
- 4) Tolerance +/- 8 %
exhaust gas temp. 180°C Other temperatures depending on the gas quality
- 5) +/- 5%; Methane contents in Biogas > 55% Vol
- 6) 120 °C exhaust temp. (only in conjunction with gas cleaning and 20 ppm H2S)

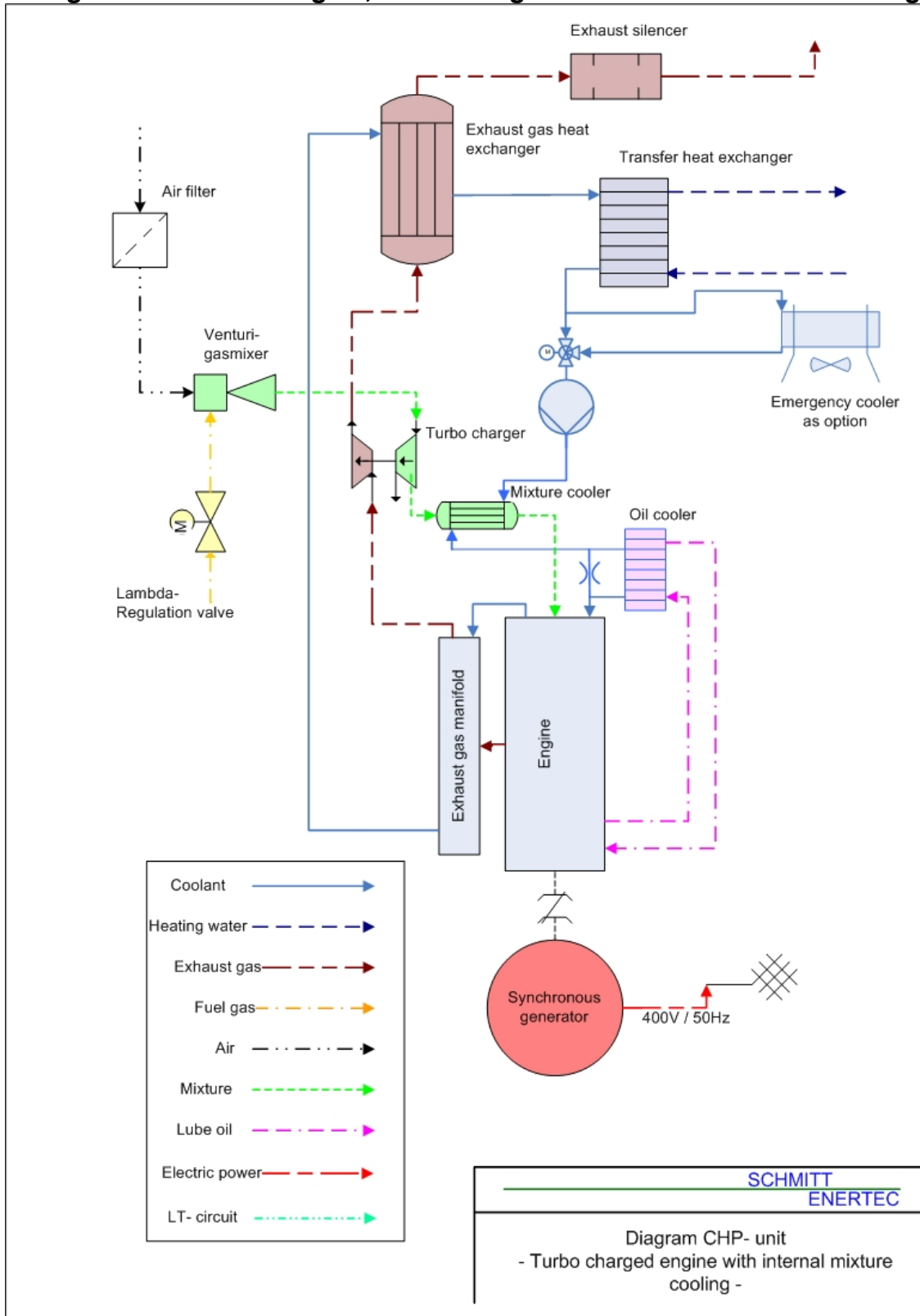


Flow diagram: Naturally aspirated engine



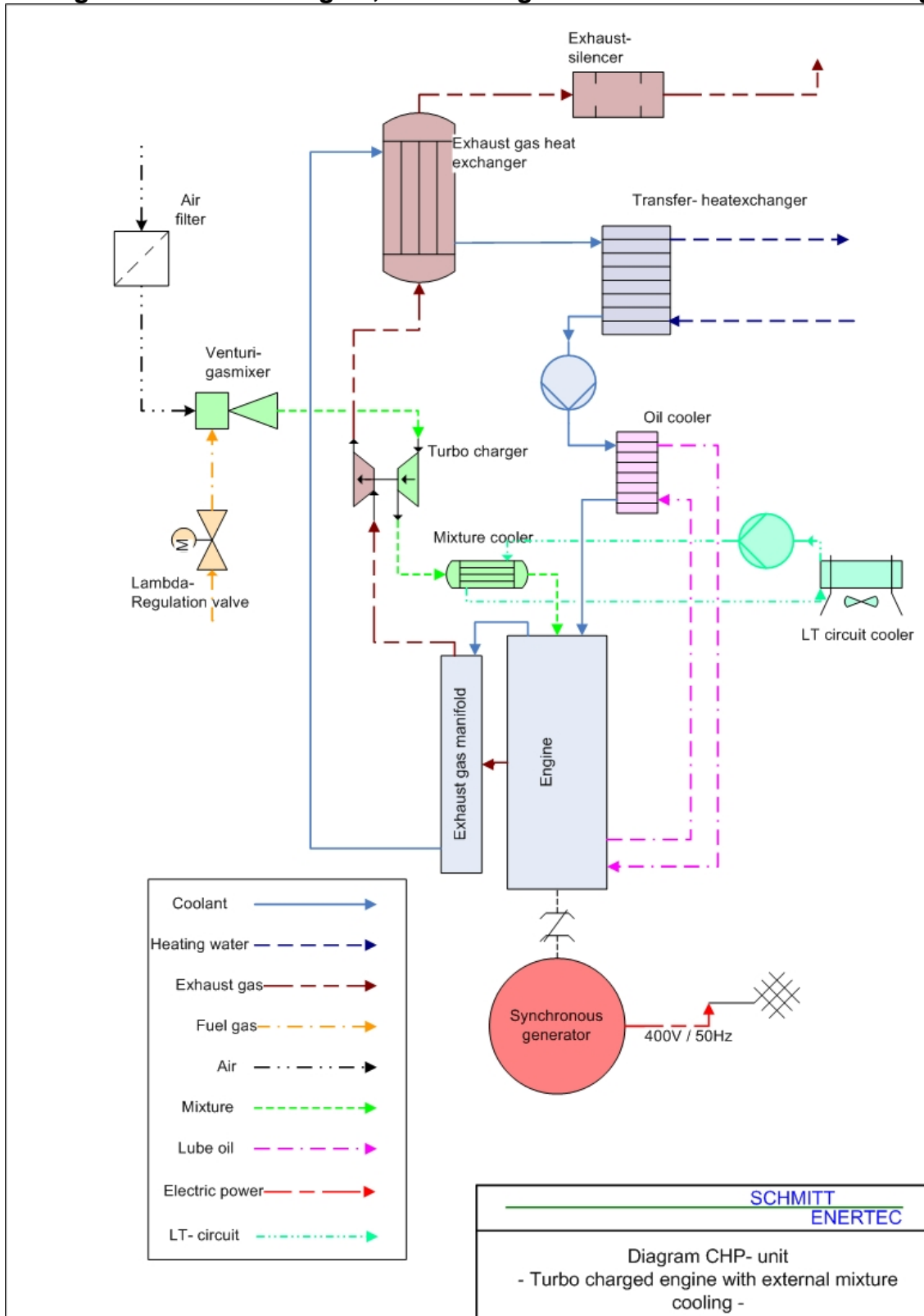


Flow diagram: Lean burn engine, turbo charged with internal mixture cooling

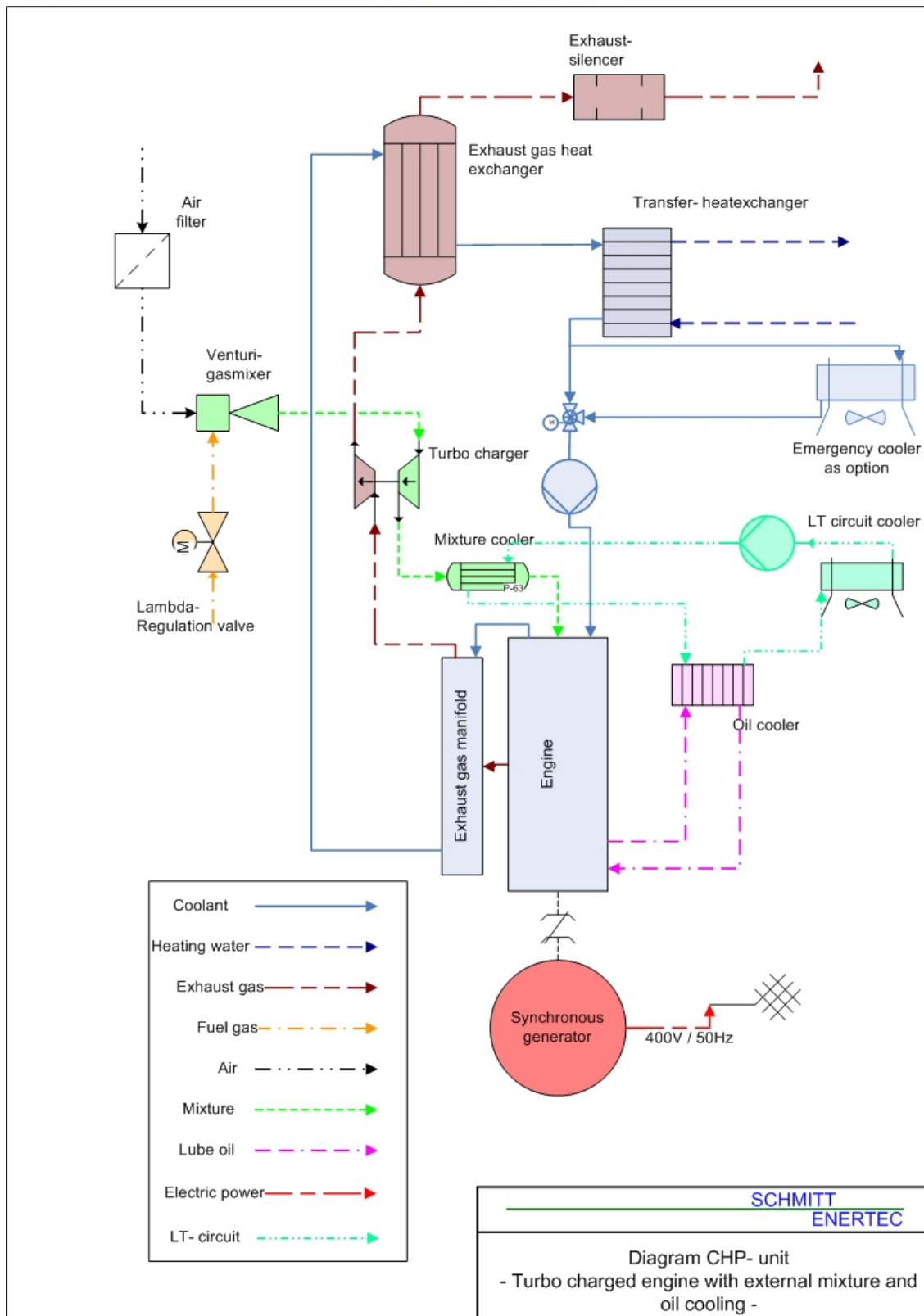




Flow diagram: Lean burn engine, turbo charged with external mixture cooling



Flow diagram: Lean burn engine turbo charged with external mixture and oil cooling



Standard scope of supply

Engine

- Industrial engine for continuous operation, speed 1500 1/min

Ignition:

- Processor controlled condenser ignition system, contact- less with electronic controller, dead centre sensor for cylinder No. 1 and each one ignition coil and spark plug per cylinder

Gas train:

- to DVGW, ready piped on the set

Gas mixer:

- Venturi gas- air- mixer

Throttle:

- Throttle flap with actuator

Turbo charging / mixture cooling (turbo- charged engines only)

- Turbo charger
- Guascor V-engine: One turbocharger per cylinder bank
- Internal mixture cooling: Mixture cooling heat transferred to the engine cooling circuit (coolant inlet to mixture cooler: 80 ° C)
- External mixture cooling: Mixture cooling heat transferred to an external LT cooling circuit and dissipated into the open air. (coolant inlet to mixture cooler: 50 ° C)

Transfer heat exchanger:

- For transfer of the CHP heat to an external heating water system
- Brazed plate- type heat exchanger, stainless steel 1.4401
- Primary circuit: approx. 95°C / 80°C
- Secondary circuit: approx. 70°C / 90°C

Mixture cooler (turbo- charged engines only)

- Shell and tube type heat exchanger
- External mixture cooling: Mixture cooling heat transferred to an external LT cooling circuit and dissipated into the open air. (Return water entering mixture cooler: 55 ° C,)



Exhaust gas heat exchanger:

- Shell and tube type heat exchanger of stainless steel 1.4571

Cooling water pump:

- Electric motor driven centrifugal pump set

Temperature control:

- Electronically controlled three-way valve as flow divider to the transfer heat exchanger
- Electronically controlled three-way mixing valve after emergency cooler (optional)

LT cooler (turbo charged engines only with external mixture cooler):

- External cooler for dissipation of surplus LT-heat to the open ambient air

Further components:

- Diaphragm expansion tank
- Safety valve
- Pressure gauge
- Temperature sensors
- Compensators

Coolant:

- Glycole- water- mixture with 40% Glycol

Control

The PLC based control unit of the set is integrated in the sheet steel switchboard elastically mounted on the base frame, ready wired. Moreover the CHP control unit can also provide the control for external systems or load sharing for two or more generators running in parallel (master, optional)

Synchronizing control

The multiple synchronizing control ensures the safe CHP switching to the utility grid.

Hot water temperature control (as an option)

- Continuous control of the hot water return temperature by a control valve in the hot water circuit. At hot water inlet temperatures below 70 °C hot water from the outlet is mixed to the inlet



Lambda control

3-point-stepper-motor-control operating the mixture control valve effecting operation of the engine with optimum fuel- air ratio giving the best conversion rates in the 3-way catalyst

Base frame, noise protection housing, auxiliary equipment

Base frame:

- Engine-/ generator unit elastically mounted on common torsion resistant welded steel base frame, with fitted hydraulic components, auxiliaries and control-/ switchboard
- Leak oil pan under the engine collecting the total oil volume, with level sensor
- Elastic mounting pads under the base frame for erection of the set on site foundation or clean rigid surface

Noise protection housing:

- Housing fitted on the base frame
- Steel frame with sheet steel cladding panels, side cladding easily removable for maintenance, partially with windows
- Electric motor driven fan for housing ventilation
- Air intake from the bottom of the set, with filter
- Flow sensor for ventilation supervision

Exhaust gas silencer:

- Exhaust gas silencer fitted in the base frame
- Stainless steel 1.4571
- Noise pressure level at exhaust gas outlet: 75 dB(A)

Auxiliary equipment:

- Battery 24 V DC for starting and control power supply
- Battery charger 24 V DC
- Lube oil topping up tank fitted in the housing
- Topping up control by level sensors in the oil pan
- Tank capacity dimensioned for operating time in between the maintenance intervals
- Electric motor driven lube oil priming pump
- The priming pump can be used for draining the oil pan by switching over of the ball valve fitted in the lube oil pipe