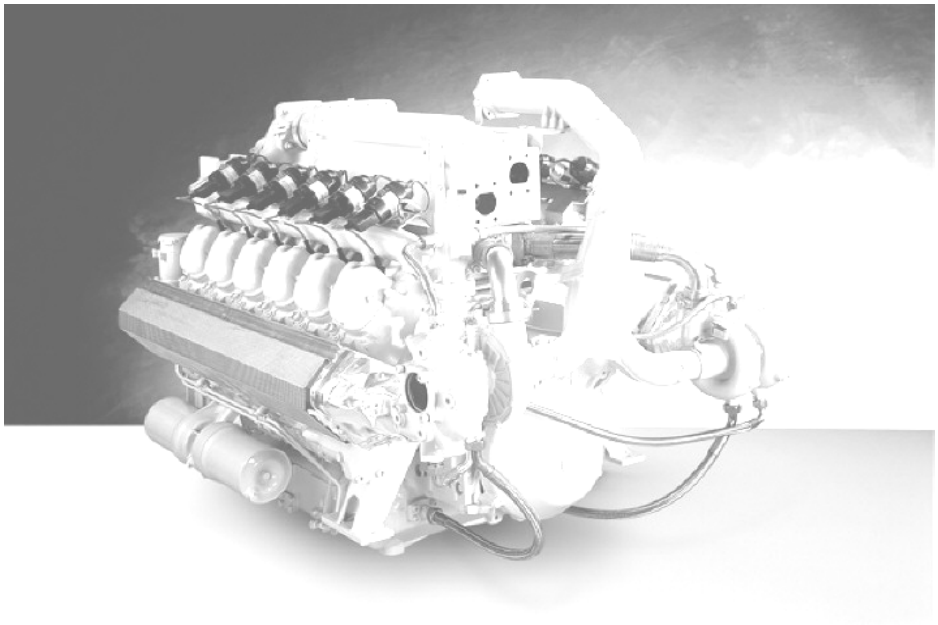
Technical description
CHP MODULE

Module: **IET 360 BIO V01**

Engine: **2842 LE 322**



El. Power:	**360 kW**
Th. Power:	**435 kW**
NOx	**500 mg/Nm3**
CO	**650 mg/Nm3**
NMHC	**150 mg/Nm3**

Technical main data				
Gas LHV:	kWh/Nm³	6		
Data at		Full load	Partial load	
Load		100%	75%	50%
Power input	kW	922	742	580
Gas volume	Nm³/h	154	124	97
Mechanical output	kW	375	280	190
Electrical output	kW el.	360	270	180
Thermal output				
~ Fuel mixture	kW	32	24	14
~ Cooling water + oil	kW	205	200	190
~ Exhaust gas while cooling to 120 °C	kW	198	143	96
Total of usable thermal output	kW total	435	367	300
Total of transferred output	kW total	795	637	480
Thermal output to be carried off				
~ radiation heat	kW	30		
~ residual heat	kW	20		
Specific gas consumption	kWh/kWh	2.46	2.65	3.05
Lubrication oil consumption	kg/h	0.11		
Electrical efficiency	%	39.05%	36.39%	31.03%
Thermal efficiency	%	47.18%	49.46%	51.72%
Total efficiency level	%	86.23%	85.85%	82.76%
Hot water circuit:				
Hot water supply temperature max.	°C	90		
Hot water return temperature max.	°C	70		
Hot water flow rate (+/-8%)	m³/h	18.8		

Dimensions		
Length	mm	4000
Width	mm	1800
Height	mm	2200
Weight empty	Kg	5100
Weight filled	Kg	5250

Connections		
Hot water inlet and outlet at transfer heat exchanger	DN/PN	65/16
Exhaust gas outlet	DN/PN	200/10
Fuel gas inlet	DN/PN	80/16
Fuel gas on engine	DN/PN	80/16
Cooling water discharge	G	1/2"
Condensate drain	G	20 mm
Safety valve jacked water	G	1 1/2"
Lube oil refill	G	3/4"
Lube oil discharge	G	3/4"
Refilling sleeve pipe	G	3/4"
Exchange mixture inlet and outlet	DN/PN	32/16

Engine data		
Manufacturer		MAN
Engine type		E 2842 LE 322
Mode of operation		4-Takt
Cylinder configuration		V-Motor
Number of cylinders		12
Bore	mm	128
Stroke	mm	142
Displacement	lit	21.93
Rated speed	1/min	1500
Average piston speed	m/s	7.1
Lube oil filling capacity	lit	90
Jacked water quantity	lit	23
Length	mm	1570
Width	mm	1142
Height	mm	1155
Engine weight empty	kg	1420
Engine weight filled	kg	1555
direction of rotation		links
Flywheel flange		SAE 1
RF interference level acc. to VDE 0875		G
Starter motor power	kW	6.5
Starter motor voltage	V	24

Thermal power		
Power input	kW	922
Mixture	kW	32
Jacked water and oil	kW	205
Total exhaust gas	kW	285
Exhaust gas cooled to 180°	kW	181
Exhaust gas cooled to 150°	kW	198
Exhaust gas cooled to 100°	kW	227
Radiation heat	kW	30
Rest	kW	20

Exhaust data		
Exhaust gas temperature at full load	°C	490
Exhaust gas mass flow, wet	kg/h	1808
Exhaust gas mass flow, dry	kg/h	1663
Exhaust gas volume, wet	Nm³/h	1410
Exhaust gas volume, dry	Nm³/h	1231
max. exhaust gas back pressure after engine	mbar	40

Combustion air data		
Combustion air mass flow	kg/h	1622
Combustion air volume	Nm³/h	1257
max. back pressure on air filter	mbar	30

Power / Consumption		
ISO standard full stop power (ISO)	kW	375
average actual pressure	bar	13.87
Fuel gas type		BIOGAS
Methane number	MZ	100
Compression ratio	Epsilon	12
min/max pressure at gas inlet to gas train	mbar/mbar	50/100
max. fluctuation of gas pressure	%	+/- 10 mbar
max. fluctuation of gas pressure per time unit	mbar/30sec	3
max. mix inlet temperature into engine	°C	50
spec. fuel consumption	kWh/kWh	2.46
spec. lube oil consumption	kg/h	0.11
Max. oil temperature	°C	110
Max. engine jacked water temperature	°C	90

Sound emission		
Engine*)	dB(A)	105
63 Hz	dB	62.4
125 Hz	dB	71.3
250 Hz	dB	93.1
500 Hz	dB	91.1
1000 Hz	dB	96.6
2000 Hz	dB	94
4000 Hz	dB	92.5
8000 Hz	dB	88.8
Exhaust gas**)	dB(A)	138
63 Hz	dB	95.5
125 Hz	dB	109.8
250 Hz	dB	106.5
500 Hz	dB	110.2
1000 Hz	dB	122.1
2000 Hz	dB	108.9
4000 Hz	dB	107.6
8000 Hz	dB	90

Technical data alternator		
Manufacturer		Stamford
Type		HCI 534 C2
Nominal Power	kVA	500
Engine power	kW	360
Active power cos phi=1,0	kW	346
Active power cos phi=0,8	kW	346
Apparent power cos phi=0,8	kVA	432
Current cos phi=0,8	A	626
Frequency	Hz	50
Voltage	V	400
RPM	1/min	1500
Run away speed	1/min	2250
Power factor ind.		0,8-1,0
Efficiency cos phi=1,0	%	96.2
Efficiency cos phi=0,8	%	95.1
Inertia	kgm²	7.61
Weight	kg	1420
RF suppression level acc. To VDE 0875		N
Man. Type		B3/B5
Protection class		IP23
Insulation class		H
max. ambient temperature	°C	40
Total harmonic distortion factor at idle	%	<1,5

Reactance and Time Constant		
xd direct axis synchronous reactance	p.u.	2.02
xd' direct axis transient reactance	p.u.	0.1
xd" direct axis subtransient reactance	p.u.	0.07
Td" time constant direct - current	ms	18
Tdo' open circuit field time constant	s	2.2

Technical data Hot Water Circuit		
Type		Plate heat exchanger
Total recoverable thermal output	kW	205
(mix, oil, jacked water, exhaust gas)		
HOT WATER CIRCUIT:		
water outlet temperature	°C	80
water inlet temperature	°C	70
Hot water flow rate (+/- 8%)	m³/h	18.8
Hot water nominal pressure max.	bar	16
Pressure drop hot water circuit	bar	0.3
max. variation in return temperature	°C	+3/ -20
max. rate of return temperature fluctuation	°C/min	10
ENGINE COOLING SYSTEM		
Jacked water inlet temperature	°C	80
Jacked water outlet temperature	°C	86
Cooling water flow rate	m³/h	37.9

Jacked water circuit
Oilcooler and engine are in the internal cooling circuit.

Exhaust heat exchanger		
Type		Tube heat exchanger
Nominal power	kW	198
Exhaust Gas		
Exhaust gas inlet temperature	°C	490
Exhaust gas outlet temperature	°C	150
Exhaust gas volume	Nm³/h	1410
Exhaust gas pressure drop	mbar	15
Water circuit		
Engine cooling water inlet temperature	°C	80
Engine cooling water outlet temperature	°C	90
Engine cooling water flow rate	m³/h	18.8
Engine cooling water pressure drop	mbar	15

Mixture heat exchanger		
Type		tube heat exchanger
Nominal Power	kW	30
Cooling water inlet temperature	°C	48
Cooling water outlet temperature	°C	45
Cooling water flow rate	m^3/h	9.7
Cooling water pressure drop	bar	0.3
Nominal pressure	bar	3
Connections Cooling water Inlet / Outlet	DN/PN	32/16

- subject to technical changes -