

# Combined Heat & Power Units

## Turboden High Efficiency (HRS) Units Standard Sizes and Typical Performances



		TURBODEN 12 HRS - 1MW		TURBODEN 12 HRS		TURBODEN 24 HRS		TURBODEN 32 HRS	
		with split*	without split	with split*	without split	with split*	without split	with split*	without split
<b>INPUT - Thermal oil</b>									
Nominal temperature "HT" loop (in/out)	°C	305/209	305/204	305/210	305/206	310/215	310/212	310/215	310/214
Thermal power input "HT" loop	kW	3817	4043	4425	4817	8850	9634	12015	13075
Nominal temperature "LT" loop (in/out)	°C	209/130	-	210/130	-	215/135	-	215/135	-
Thermal power input "LT" loop	kW	338	-	392	-	784	-	1060	-
Overall thermal power input	kW	4155	4043	4817	4817	9634	9634	13075	13075
Nominal temperature "HT" loop (in/out)	°F	581/408	581/399	581/410	581/403	419/275	-	419/275	-
Thermal power input "HT" loop	MMBtu/hr	13.02	13.08	15.1	16.44	30.2	32.87	40.01	44.61
Nominal temperature "LT" loop (in/out)	°F	408/266	-	410/266	-	419/275	-	419/275	-
Thermal power input "LT" loop	MMBtu/hr	1.15	-	1.34	-	2.68	-	3.62	-
Overall thermal power input	MMBtu/hr	14.18	13.80	16.44	16.44	32.87	32.87	44.61	44.61
<b>OUTPUT - Cooling water</b>									
Cooling water temperature (in/out)	°C	25/35	25/35	25/35	25/35	24/37	24/37	25/40	25/40
Thermal power to the cooling water circuit	kW	3151	3040	3662	3632	7256	7310	9977	9897
Cooling water temperature (in/out)	°F	77/95	77/95	77/95	77/95	75/99	75/99	77/104	77/104
Thermal power to the cooling water circuit	MMBtu/hr	10.75	10.37	12.5	12.39	24.76	24.94	34.04	33.77
<b>PERFORMANCE</b>									
Gross electric power	kW	1000	1000	1156	1188	2270	2336	3109	3193
Gross electric efficiency		24.1%	24.7%	24.0%	24.7%	23.6%	24.2%	23.8%	24.4%
Captive power consumption	kW	36	36	46	49	87	92	119	125
Net active electric power output	kW	964	964	1110	1139	2183	2244	2990	3067
Net electric efficiency		23.2%	23.8%	23.0%	23.6%	22.7%	23.3%	22.9%	23.5%
Electric generator**		50Hz, 400V 60Hz, 480V	50Hz, 400V 60Hz, 480V	50Hz, 400V 60Hz, 480V	50Hz, 400V 60Hz, 480V	50Hz, 660V 60Hz, 4160V	50Hz, 660V 60Hz, 4160V	50Hz, 6kV 60Hz, 4160V	50Hz, 6kV 60Hz, 4160V
Plant size		Multiple skid	Multiple skid	Multiple skid	Multiple skid	Multiple skid	Multiple skid	Multiple skid	Multiple skid
Biomass consumption***	kg/h	1816	1944	2105	2316	4211	4632	5715	6286
Typical delivery times (FCA)		9-11	9-11	9-11	9-11	9-11	9-11	11-13	11-13

\* The Turboden split system allows maximisation of electric power production for a given biomass consumption.

\*\* Induction or synchronous, medium voltage available upon request. If reduction gear is required, electric efficiency is reduced of about 1.5%.

\*\*\* Assuming a low heating value of biomass = 2,6 kWh/kg and boiler efficiency = 0,88 in case of ORC with split , = 0,80 in case of ORC without split. The thermal oil boiler is not included in the Turboden scope of supply.



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