

Combined Heat & Power Units

Turboden Heat Recovery (HR) Units - Typical Range of Operation and Performances



		TURBODEN 6/7 HR (DX)		TURBODEN 10 to 14 HR		TURBODEN 18 to 24 HR		TURBODEN 27 to 40 HR		TURBODEN 50 to 100 HR	
		Range of Operation	Reference Case TD 6 HR	Range of Operation	Reference Case TD 10 HR	Range of Operation	Reference Case TD 22 HR SPLIT	Range of Operation	Reference Case TD 40 HR SPLIT	Range of Operation	Reference Case TD 100 HR
INPUT* - Thermal oil											
Thermal Oil Inlet Temperature	°C	240-300	270	240-310	290	240-310	285	250-315	315	240-310	280
Thermal Oil Outlet Temperature	°C	170-120	140	170-120	145	170-120	120	170-120	130	150-110	140
Thermal Power Input	MW	2.5-4.0	3.0	5.0-7.0	5.54	8.0-12.0	11.21	13.0-22.0	21.4	24.0-50.0	49.8
Thermal Oil Inlet Temperature	°F	464-572	518	464-590	554	464-590	545	482-599	599	464-590	536
Thermal Oil Outlet Temperature	°F	338-248	284	338-248	293	338-248	248	338-248	266	302-230	284
Thermal Power Input	MMBtu/hr	8.53-13.65	10.24	17.06-23.88	18.90	27.30-40.95	38.25	44.36-75.07	73.02	81.89-170.61	169.92
OUTPUT** - Cooling water											
Typical Cooling water temperature (in/out)	°C	25/35	25/35	25/35	26/38	25/40	22/40	20/45	22/54	25/40	32/47
Thermal power to condenser	MW	2.0-3.5	2.4	4.0-5.0	4.4	6.0-9.5	9.0	10.0-17.5	17.2	19.2-40.0	39.4
Typical Cooling water temperature (in/out)	°F	77/95	77/95	77/95	79/100	77/104	72/104	68/113	72/129	77/104	90/117
Thermal power to condenser	MMBtu/hr	6.82-11.94	8.19	13.65-17.06	15.01	20.47-32.42	30.71	34.12-59.71	58.69	65.51-136.49	134.4
Performances											
Gross electric power	kW	500-800	600	900-1600	1108	1700-2500	2120	2600-4500	4000	4800-10500	10400
Gross electric efficiency***		17%-20%	20%	17%-20%	20%	17%-22%	19%	17%-21%	19%	17%-22%	21%
Captive power consumption	kW	18-36	25	36-70	46	60-100	80	100-200	200	200-800	780
Net active electric power output	kW	480-760	575	850-1550	1062	1650-2400	2040	2500-4000	3800	4500-9800	9620
Net electric efficiency***		16%-19%	19%	16%-21%	19%	16%-21%	18%	16%-20%	18%	16%-21%	19%
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	50Hz, 6kV 60Hz, 4160V	50Hz, 6kV 60Hz, 4160V
Cooling systems		closed loop water cooling or wet tower		closed loop water cooling or wet tower		closed loop water cooling or wet tower		closed loop water cooling or wet tower		wet tower or aircondenser	
Typical Delivery time (FCA)	MO	9-11		9-11		9-11		11-13		12-14	

NOTE TO RANGE OF OPERATION: no specific relation between range extreme values exists (e.g. using the rightest values of one column may not necessarily lead to real technical outcomes)

* Turboden units up to TURBODEN 40 HR can be equipped with the "Split System", a heat exchanger allowing additional low temperature heat recovery to increase the power production. The "Split System" heat exchanger may use thermal oil / pressurized water as heat transfer fluid

** Cooling water temperatures are selected keeping into account specific site requirements, e.g. average air temperature, water availability (to use either dry or wet heat dissipation system), possibility of CHP mode (in this specific case water up to 90°C can be generated by the ORC).

*** Electric efficiency depends on several factors, primarily Heat and Cooling Source Temperatures and thermal media. Our sales specialists will support you to optimise the solutions, evaluating specific heat source features (thermal oil, steam, pressurized water, exhaust gas) and cooling devices (dry/wet water loops, CHP, air condensing)

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

(DX) Available Direct Heat Exchange for direct heat recovery from internal combustion engines exhaust gas



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