
E-RATIONAL ORC-4000

BEP Europe (Burke E. Porter, www.bepco.com) - through its Energy & Infrastructure Division – “E-Rational” (www.e-rational.net) is delivering a cost-effective solution to convert low temperature heat into clean energy power without emissions. Our state-of-the-art Organic Rankine Cycle (ORC) technology combined with the usage of industrial grade components makes E-Rational’s ORCs user-friendly, robust and economically viable.

E-Rational’s ORC machine has been designed for a maximized combined uptime and efficiency with a minimized operational and maintenance cost. This resulted in a containerized modular machine, CE-compliant, with plug-and-play connections for easy installation.

The ORC-4000 machine absorbs up to 4,000 kW (13.65 MMBTU/h) thermal heat in a temperature range between 80°C and 150°C (176 °F – 302 °F). The ORC units are heat powered by hot water, thermal oil or low pressure steam coming from:

- Waste heat flows from industrial processes, e.g. cooling cycles from chemical plants, glass-, steel-, & food- industry, power plants, etc..
- Unused heat in District Heating networks
- Biomass furnaces and CHP/COGEN or biogas installations
- Geothermal wells

Depending on the operating conditions, E-Rational’s ORC-4000 series are offered with different types of expander-generator sets with typical outputs ranging from 250 kWe to 500 kWe.



E-Rational is a division of BEP Europe N.V.

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ORC-4000		Containerized modular Organic Rankine Cycle machine	
Generator type	Asynchronous, 2 pole, 3 phase, 400V, 50-60 Hz		
Generator Power Range	250kWe - 315kWe - 370kWe - 400kWe - 450kWe – 500kWe		
Expander	E-Rational (single screw, radial inflow)		
Heat Exchangers	Plate heat exchangers		
Applied EG-Norms:			
Machine directive	2006/42/EG		
EMC Directive	2004/108 EG		
Low voltage directive	2006/95/EG		
Pressure Equipment Directive	97/23/EG		
Electrical Enclosures	IP55		
Control system	PLC, Web Based Remote Monitoring		
Dimensions (L x W x H)	12,192mm x 2,438mm x 2,896 mm	40' x 8' x 9'6"	
Operating Mass (kg)	±18,000 kg	±57,300 Lbs	
Operating Conditions (ambient temperature)	-20°C to +50°C	-4 °F to 122 °F	
Temperature Heat input	80°C - 150°C	176 °F – 302 °F	
Maximum heat input	4,000 kWth	13.65 MMBTU/h	
Heat source	Hot water Thermal oil Low Pressure steam		
ORC working Fluid (depending on conditions)	Honeywell r245fa® Solkatherm SES36®		
Hydraulic connection heat source	2 Flanges DN300 PN16		
Hydraulic connection cooling	2 Flanges DN300 PN16		
Cooling system	Cold water Cooling tower Air cooler		
Housing	Outdoor installation possible		
Noise level	<75 dB at 10 m		
Emissions	No Emission No fuel consumption		

TYPICAL PERFORMANCES

HEAT SOURCE: Hot water 4,000 kWth - 171 m³/h (13.65 MMBTU/h - 757 GPM)
COOLING: Cold water

Temperature heat source		Gross power production	
		Cold water out 20°C (68 °F)	Cold water out 30°C (86 °F)
90°C	194 °F	288 kWe	260 kWe
100°C	212 °F	336 kWe	300 kWe
110°C	230 °F	364 kWe	324 kWe
120°C	248 °F	404 kWe	364 kWe
130°C	266 °F	444 kWe	404 kWe
140°C	284 °F	484 kWe	448 kWe

HEAT SOURCE: Low Pressure Steam 4,000 kWth - 6.12 Tons/h - 1.7 kg/s (13.65 MMBTU/h - 13,493 Lbs/h)
COOLING: Cold water out 20°C (68°F)

Steam Pressure		Saturated Steam Temperature		Gross power production
1.5 bara	21.76 psi	111°C	232 °F	396 kWe
2.0 bara	29.01 psi	120°C	248 °F	435 kWe
2.8 bara	40.61 psi	131°C	268 °F	470 kWe
4.0 bara	58.02 psi	143°C	289 °F	497 kWe

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