Chilled or Hot Water Energy (BTU Meter)

Cooling or heating power and energy from water flow and supply and return temperatures, as a BTU or energy meter computes it, with water from IF97.

Method: Q = ρ V̇ (h_r − h_s) with IAPWS-IF97 density and enthalpy (EN 1434 heat meter principle)

Input parameters

Unit system: SI

Parameter	Value	Unit
Water flow (measured)	250.00	m³/h
Supply temperature	7.0000	°C
Return temperature	12.500	°C
Flow meter location	Return line	
Operating time	3,000.0	h
Line pressure (absolute)	5.0000	bar

Calculated results

Parameter	Value	Unit
Mass flow	249.91	t/h
Power	1,601.5	kW
Power in TR	455.37	TR
Energy over the time	4,804.4	MWh

Notes for this case

- Density taken where the flow is measured; a meter must use matched temperature sensors, as small ΔT errors dominate.

Formula and method

$$\dot{Q} = \rho \dot{V} |h(T_r) - h(T_s)|, \quad E = \dot{Q}\, t$$

Variables

$\dot{V}$	Water flow (measured)	m³/s
T_s	Supply temperature	K
T_r	Return temperature	K
meter	Flow meter location	-
t	Operating time	s
p	Line pressure (absolute)	Pa
$\dot{m}$	Mass flow	kg/s
$\dot{Q}$	Power	W
$\dot{Q}_{TR}$	Power in TR	W
E	Energy over the time	J

Method and standards

Energy balance.

Assumptions and limits

- Steady flow over the period.

References

- Q = ρ V̇ (h_r − h_s) with IAPWS-IF97 density and enthalpy (EN 1434 heat meter principle)

Report details

Report reference	FCC-CETZ-TEHX (the same inputs always give the same reference)
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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/hvac/chillers/btu-meter-energy

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.