Pump Flow Estimate from Measured Power and Head

Estimated pump flow from the measured electrical power and differential head with assumed pump and motor efficiencies, for pumps without a flowmeter.

Method: Q = P_e η_m η_p / (ρ g H)

Input parameters

Unit system: SI

Parameter	Value	Unit
Measured electrical input	30.000	kW
Measured differential head	35.000	m
Pump efficiency (from the curve at the estimated duty)	72.000	%
Motor efficiency at this load	93.000	%
Liquid density	998.00	kg/m³

Calculated results

Parameter	Value	Unit
Shaft power	27.900	kW
Estimated flow	211.12	m³/h

Notes for this case

• An estimate: the result is only as good as the efficiencies. Iterate with the pump curve: read η at the estimated flow and recalculate.

Formula and method

$$Q = \frac{P_e \, \eta_m \, \eta_p}{\rho g H}$$

Variables

P_e	Measured electrical input	W
H	Measured differential head	m
η_p	Pump efficiency (from the curve at the estimated duty)	-
η_m	Motor efficiency at this load	-
ρ	Liquid density	kg/m³
P_s	Shaft power	W
Q	Estimated flow	m³/s

Method and standards

Energy balance reversed.

Assumptions and limits

- Efficiencies known.

References

• Q = P_e η_m η_p / (ρ g H)

Report details

Report reference	FCC-B3H0-M93V (the same inputs always give the same reference)
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Release checks	3 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/mechanical/pumps/pump-flow-from-power

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.