Pump Motor Rating (kW with Margin)

Motor rating for a pump: power absorbed from flow, head and efficiency, plus the motor margin, rounded up to the next IEC standard motor rating.

Method: ANSI/HI 1.6 (power definitions); IEC 60072-1 (standard motor ratings)

Input parameters

Unit system: SI

Parameter	Value	Unit
Power absorbed from	Flow, head and efficiency	
Flow	30.000	m^3/h
Total head	45.000	m
Liquid density	998.00	kg/m^3
Pump efficiency From the pump maker's curve at the duty point. 68 % is a typical maker's value for this size; some makers offer better. Default from FireCAD design practice; enter your specification's value.	68.000	%
Pump shaft power (from the maker's data)	41.000	kW
Motor margin over the power absorbed 18 % for pump motors. Default from FireCAD design practice; enter your specification's value.	18.000	%

Calculated results

Parameter	Value	Unit
Standard motor rating (IEC 60072-1)	7.5000	kW
Minimum motor rating (absorbed + margin)	6.3688	kW
Power absorbed at the pump shaft	5.3973	kW
Hydraulic power	3.6701	kW

Formula and method

$$P_h = \rho\, g\, Q\, H \qquad P_s = \frac{P_h}{\eta_p} \ \text{(or } P_{s,in} \text{ entered)} \qquad P_{m,min} = P_s\,(1 + m_m)$$

Variables

basis	power from flow and head, or shaft power entered	–
Q	flow	m^3/s
H	total head	m
ρ	liquid density	kg/m^3
η_p	pump efficiency	–
$P_{s,in}$	shaft power from the maker's data	W
m_m	motor margin	–
P_{std}	standard motor rating	W
$P_{m,min}$	minimum motor rating	W
P_s	power absorbed at the pump shaft	W
P_h	hydraulic power	W
g	standard gravity, 9.806 65	m/s^2

Method and standards

Power definitions of ANSI/HI 1.6; standard ratings of IEC 60072-1 (up to 1 000 kW) and the ISO 3 R20 preferred numbers above.

The default efficiency (68 %) and motor margin (18 %) are FireCAD design practice (owner, 2026-11-10); both are inputs.

Assumptions and limits

- Power at the duty point only; the end-of-curve power is not checked. For pumps that can run out to the end of their curve, check the power there too.
- Direct drive; divide by the coupling or gearbox efficiency first if there is one.
- Service factor, starting duty and ambient derating of the motor are not included.

References

• ANSI/HI 1.6 (power definitions)
• IEC 60072-1 (standard motor ratings)

Report details

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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-motor-rating

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.