Motor Energy and Cost from Running Hours

Electrical energy and cost of pump, fan and other motors from their rating, load, efficiency, number running and running hours.

Method: Electrical energy = input power x time (definition)

Input parameters

Unit system: SI

Parameter	Value	Unit
Motors running	2.0000	
Motor rated output	90.000	kW
Load, share of rated output	80.000	%
Motor efficiency at that load	94.000	%
Running hours	24.000	h
Electricity price per kWh (your currency)	8.0000	

Calculated results

Parameter	Value	Unit
Energy used	3,676.6	kWh
Energy cost (your currency)	29,413	
Electrical input power	153.19	kW

Formula and method

$$P_{in} = \frac{n P_r \lambda}{\eta_m} \qquad E = P_{in} t \qquad C = E c_e$$

Variables

n	motors running	–
P_r	motor rated output	W
λ	load, share of rated output	–
η_m	motor efficiency at that load	–
t	running hours	s
c_e	electricity price per kWh	–
E	energy used	J
C	energy cost	–
P_{in}	electrical input power	W

Method and standards

Input power from the shaft output and the motor efficiency; energy over the running hours, shown in kWh.

Assumptions and limits

- Constant load over the period; efficiency at that load.

References

- Electrical energy = input power x time (definition)

Report details

Report reference	FCC-HV71-GXD4 (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/electrical/motors/motor-energy-run-hours

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.