

Positive Displacement Pump (Q, M, P)

Sample document with complete example values. It shows the report the purchased export produces for YOUR input - it is not itself a report for any part.

Project: Sample project

Part/Position: no real part

Prepared by: Sample, not released

$V = 20 \text{ cm}^3/\text{rev}$, $\Delta p = 180 \text{ bar}$ - $M = 63.66 \text{ Nm}$, $P = 9.67 \text{ kW}$

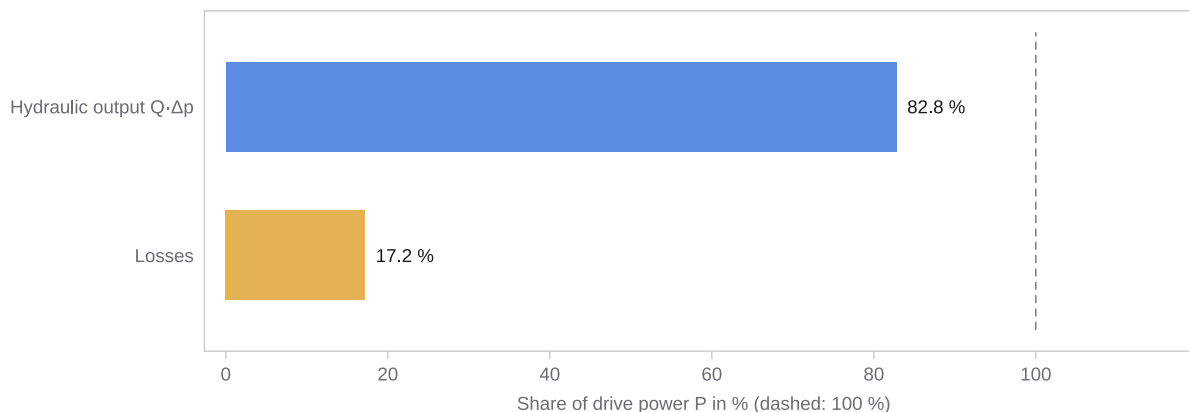
Inputs

Operating mode	Speed given (flow rate calculated)
Displacement volume V	$20 \text{ cm}^3/\text{U}$
Operating pressure Δp	180 bar
Speed n	1,450 rpm
Volumetric efficiency η_{vol}	0.92
Mechanical-hydraulic efficiency η_{mh}	0.9

Results

Overall efficiency $\eta_{\text{total}} = \eta_{\text{vol}} \cdot \eta_{\text{mh}}$	0.828
Speed n	1,450 rpm
Angular velocity ω	151.84 rad/s
Flow rate Q (effective)	26.68 l/min
Flow rate Q (effective)	1.601 m ³ /h
Theoretical flow rate $Q_{\text{th}} = V \cdot n$	29 l/min
Drive torque M	63.66 Nm
Drive power P	9,667 W
Drive power P	9.67 kW

Power flow and efficiency



Calculation basis

Positive displacement pumps (gear, piston, vane pump) deliver the displacement volume V per revolution. The effective flow rate follows from $Q = V \cdot n \cdot \eta_{\text{vol}}$; the volumetric efficiency η_{vol} accounts for internal leakage. Rearranged, this gives the required speed $n = Q / (V \cdot \eta_{\text{vol}})$.

The drive torque is $M = V \cdot \Delta p / (2 \cdot \pi \cdot \eta_{\text{mh}})$ with the pressure differential Δp and the mechanical-hydraulic efficiency η_{mh} . The drive power is $P = Q \cdot \Delta p / \eta_{\text{total}}$ with the overall efficiency $\eta_{\text{total}} = \eta_{\text{vol}} \cdot \eta_{\text{mh}}$ and is consistent with $P = M \cdot \omega$ ($\omega = 2 \cdot \pi \cdot n$). Internally, calculations use SI units (V in m³/rev, Δp in Pa, Q in m³/s).

About this sample

All values on these pages come from a freely chosen example calculation and belong to no real part. The purchased export contains the same sections with your input, your header data (project, part, prepared by) and as searchable text. Pricing and

scope: maschinenbaurechner.de/en/pricing

Note: The results are design and orientation aids. They do not replace independent verification, calculation and approval by a qualified person. The terms of use at maschinenbaurechner.de apply.