Hydraulic Formula Sheet

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Abstract

This sheet shows the most basic hydraulic calculations. It holds the basic and most often used calculations for hydraulic actuators, pumps and quantities like power and flow. It also shows the basic calculation to determine the flow over a proportional valve when the pressure drop over the proportional valve is different than shown in the datasheet.

	SI Units		Alternative Units	
Calculation of:	**Formula**	**Units**	**Formula**	**Units**
Power	$P = \Delta p\, Q$	P in [W] Δp in $[N/m^2]$ Q in $[m^3/s]$	$P = \frac{\Delta p\, Q}{600}$	P in [kW] Δp in [bar] Q in [L/min]
Flow	$Q = V_{sl}\, n$	Q in $[m^3/s]$ V_{sl} in $[m^3/turn]$ n in [turns/s]	$Q = \frac{V_{sl}\, n}{1000}$	Q in [L/min] V_{sl} in $[cm^3/turn]$ n in [rpm]
Area	$A = \frac{1}{4}\, \pi\, d^2$	A in $[m^2]$ d in $[m]$	$A = \frac{1}{4}\, \pi\, d^2$	A in $[cm^2]$ d in $[cm]$
Force (cylinder)	$F = p\, A$	F in $[N]$ p in $[N/m^2]$ A in $[m^2]$	$F = p\, A\, 10$	F in $[N]$ p in $[bar]$ A in $[cm^2]$
Torque (motor, pump)			$T = \frac{\Delta p\, V_{sl}}{20\, \pi}$	T in $[Nm]$ Δp in $[bar]$ V_{sl} in $[cm^3/turn]$
Torque (motor, pump)			$T = \frac{9550\, P}{n}$	T in $[Nm]$ P in $[kW]$ n in $[rpm]$
Prop valve			$Q_{act} = Q_n \sqrt{\frac{p_{act}}{p_n}}$	Q_{act} in $[L/min]$ Q_n in $[L/min]$ p_{act} in $[bar]$ p_n in $[bar]$

Table 1: Cheat sheet for basic hydraulic calculations