

# IV. Conversion Factors, Formula and Definition

## ◆ Conversion Factors

	Formula	Note
Displacement	1 cm <sup>3</sup> = 0.061 in <sup>3</sup>	
Pressure	1 MPa = 145 psi	
Flow	1 L/min = 0.264 gpm	US gallon
Torque	1 Nm = 0.74 lb ft	
Power	1 kW = 1.341 hp	
Weight	1 kg = 2.205 lb	

## ◆ Formula

	Metric system		Imperial system	
<b>Output flow</b>	$Q = q \times N \times \eta_v / 1000$	L/min	$Q = q \times N \times \eta_v / 231$	gal/min
<b>Input torque</b>	$T = q \times \Delta P / 2\pi / \eta_m$	Nm	$T = q \times \Delta P / 24\pi / \eta_m$	lbf-ft
<b>Input power</b>	$L = T \times N / 9550 = Q \times \Delta P / 60 / \eta_t$	kW	$L = T \times N / 5252 = Q \times \Delta P / 1714 / \eta_t$	hp

## ◆ Definition

q	= Pump displacement / rev.	cm <sup>3</sup> (in <sup>3</sup> )
L	= Input power	kW (hp)
N	= Speed	min <sup>-1</sup> (rpm)
N <sub>max</sub>	= Maximum speed at maximum displacement	min <sup>-1</sup> (rpm)
ΔP	= P <sub>high</sub> - P <sub>low</sub> (Differential pressure)	MPa (psi)
P <sub>high</sub>	= High pressure	MPa (psi)
P <sub>low</sub>	= Low pressure	MPa (psi)
P <sub>rated</sub>	= Rated pressure	MPa (psi)
P <sub>peak</sub>	= Peak pressure	MPa (psi)
P <sub>c</sub>	= charge pressure	MPa (psi)
T	= Input torque	Nm (lbf-ft)
T <sub>max</sub>	= Maximum input torque	Nm (lbf-ft)
η <sub>v</sub>	= Pump volumetric efficiency	
η <sub>m</sub>	= Pump mechanical efficiency	
η <sub>t</sub>	= Pump total efficiency	