

HYDRAULIC FORMULAS

PUMP SIZING

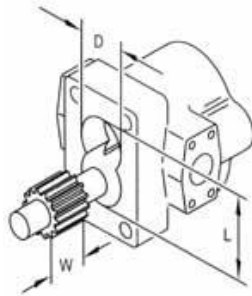
$GPM = \frac{CID \times RPM}{231}$	FIND FLOW OR PUMP IF DISPLACEMENT AND RPM ARE KNOWN	$HP = \frac{GPM \times PSI (MAX)}{1714}$	FIND REQUIRED INPUT HP IF FLOW AND MAX SYSTEM PRESSURE ARE KNOWN
$RPM = \frac{GPM \times 231}{CID}$	FIND RPM OF PUMP IF FLOW AND DISPLACEMENT ARE KNOWN	$GPM = \frac{HP \times 1714}{PSI (MAX)}$	FIND FLOW IF INPUT HP AND MAX SYSTEM PRESSURE ARE KNOWN
$CID = \frac{GPM \times 231}{RPM}$	FIND DISPLACEMENT OF PUMP IF FLOW AND RPM ARE KNOWN	$PSI (MAX) = \frac{HP \times 1714}{GPM}$	FIND ACHIEVABLE MAX PRESSURE IF INPUT HP AND FLOW ARE KNOWN
$PSI (MAX) = \frac{HP \times 1714}{CID} \div RPM \times 231$			
FIND ACHIEVABLE MAX PRESSURE IF INPUT HP, DISPLACEMENT, AND RPM ARE KNOWN			

MOTOR SIZING

$T = \frac{HP \times 5252}{RPM}$	FIND OUTPUT TORQUE (FT-LBS) OF MOTOR IF OUTPUT HP AND RPM ARE KNOWN	$T = \frac{CID \times PSI}{76}$	FIND OUTPUT TORQUE (FT-LBS) OF MOTOR IF DISPLACEMENT AND PRESSURE ARE KNOWN
$HP = \frac{T \times RPM}{5252}$	FIND OUTPUT HP OF MOTOR IF OUTPUT TORQUE (FT-LBS) AND RPM ARE KNOWN	$CID = \frac{T \times 76}{PSI}$	FIND DISPLACEMENT OF MOTOR IF TORQUE (FT-LBS) AND PRESSURE ARE KNOWN
$RPM = \frac{HP \times 5252}{T}$	FIND RPM OF MOTOR IF OUTPUT HP AND OUTPUT TORQUE (FT-LBS) ARE KNOWN	$PSI = \frac{T \times 76}{CID}$	FIND REQUIRED INPUT PRESSURE OF MOTOR IF TORQUE (FT-LBS) AND DISPLACEMENT ARE KNOWN

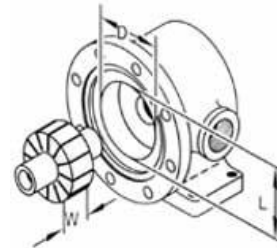
PUMP/MOTOR DISPLACEMENT

GEAR



$$CID = 6 \times W \times ((2 \times D) - L) \times \frac{L - D}{2}$$

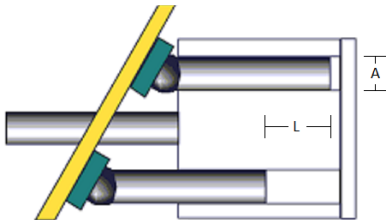
VANE



$$CID = 12 \times W \times \frac{(L + D)}{4} \times \frac{(L - D)}{2}$$

PISTON

$$CID = A \times L \times N \quad GPM = \frac{CID \times RPM}{924}$$



N = # of Pistons
A = 3.14 (R)²
L = distance of Stroke

CYLINDER EQUATIONS

AREA A = πr^2

VOLUME V = $\frac{\pi r^2 \times STROKE}{231}$

FORCE F = PSI x A

PRESSURE PSI = $\frac{F}{A}$

VELOCITY v = $\frac{231 \times GPM}{A}$