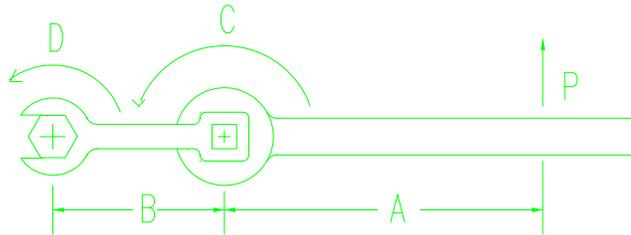


Use of Adapters

When an adapter or extension is used on a torque wrench, it increases the torque range of the wrench. The formulae for computing torque when using an adapter or extension is explained below:



A = Distance from center of torque wrench square drive to center of the puller's hand grip.

B = Distance from center of torque wrench square drive to center of drive at end of extension.

C = Torque wrench setting.

D = Torque desired at drive on end of extension.

P = Pull applied.

- 1) Since: $C=(A)(P)$ or $P=C/A$,
- 2) And: $D=(A+B)(P)$ or $P=D/(A+B)$,
- 3) Equating Ps: $C/A=D/(A+B)$ or $C=(D)(A)/(A+B)$.
- 4) Let: $B=(A)(Y)$, where Y is any number greater than or equal to zero, then 3) can be simplified (with A and B canceled) to:
- 5) $C=D/(1+Y)$

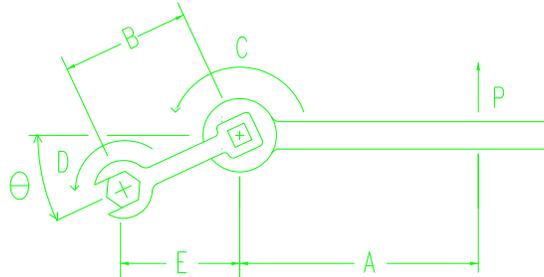
When $B=1/2A$, $Y=1/2$. Then $C=D/1.5 = (2/3)(D)$ and $D=(3/2)(C)$.

When $B=A$, $Y=1$ and $C=D/2$

For example, let's say your extension is 3" long (measurement "B"), and where you apply pull on your torque wrench is 10" from the drive (measurement "A"). $B=(A)(Y)$, from above, so $Y=B/A$, or $3/10$. You want to apply 10 ft lbs of torque to your bolt (measurement "D"), so you just plug the numbers in, do the math, and discover you need to read about 7.69 ft lbs on your torque wrench.

NOTE - After computing "C" and setting wrench to computation, measure and mark "A" where pull is applied.

It is recommended that the axis of the extension always be used in line with the axis of the torque wrench as shown above. Should it be necessary, due to obstructions, to have an angle between the two axes, then the above formula is modified as follows. Due to increasing errors cropping up, keep the angle as small as possible.



A, B, C, D & P are all the same as above.

E = Effective moment arm of the extension.

θ = Angle between extension axis and torque wrench axis.

- 6) Since: $C=(A)(P)$ or $P=C/A$,
- 7) And: $D=(A+E)(P)$ or $P=D/(A+E)$,
- 8) Equating Ps: $C/A=D/(A+E)$ or $C=(D)(A)/(A+E)$
- 9) Now: $E=B\cos \theta$
- 10) Substituting: $C=(D)(A)/(A+ B\cos \theta)$
- 11) Let: $B=AY$, where Y is the same as explained above,
- 12) Then: $C=D/(1+ Y\cos \theta)$, when $\theta=0$, $\cos \theta = 1$, then equation 12) is reduced to 5) above. When $\theta = 90$, $\cos \theta = 0$,
- 13) Then: $C=D$, regardless of length of B

The equation 13) tells us that an adapter of any length can be used if attached perpendicular to the axis of the wrench, and the torque on the end of the adapter will be equal to the torque set on the torque wrench.

NOTE - Do not use adapter extensions with ratchet head wrenches or ratchet adapters, the angle may change on you.