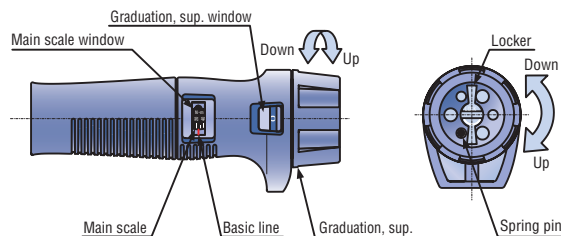


How to Set Torque

Adjustable type

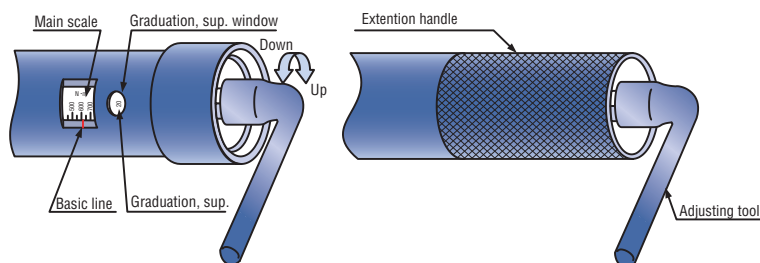
● QL(QL6N~420N), CL, YCL, A

1. Release the locker. (counter-clockwise)
2. Set torque by turning supplementary graduation confirming the value of main scale.
3. Turn the locker clockwise to lock.
(Change the pin location if necessary.)



● QLE(QLE550N~2100N), CLE, TiQLE

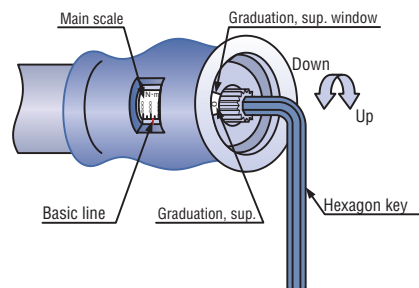
1. Insert the adjusting tool supplied as standard accessory.
2. Set torque by turning the supplementary graduation with the adjusting tool confirming the value of main scale.
3. No locking mechanism is needed for these models, because the adjusting tool is always needed to set torque.



Pre-lock preset type

● PQL(PQL25N~200N), AC, QSP3

1. Insert a hexagon key into an adjusting hole.
2. No locking mechanism is needed for these models, because the hexagon key is always needed to set torque.
(Adjusting tool for QSP3 is optional.)

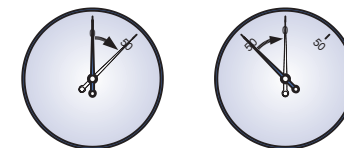


MODEL	ADJUSTING HEXAGON HOLE MM SIZE ACROSS FLATS
PQL25N	2.5
PQL50N~200N AC25N~100N	4

Dial Indication type

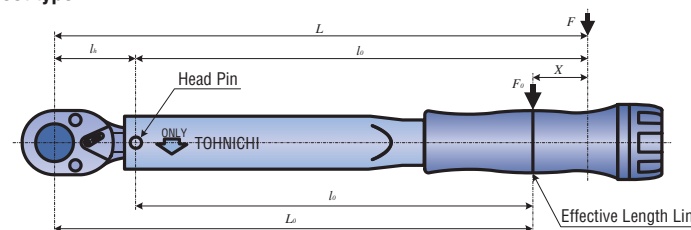
● DB, CDB, T

1. The scale on the dial gauge revolves. Press the dial case and turn to the pointer at "0".
2. Alternatively, the desired torque can be preset on the dial and then the bolt can be tightened until the pointer comes to "0".



How to apply force—steady, so as not to give momentum—

Pre-lock, preset type



The proper torque (T_0) is generated when force (F_0) is applied to the effective length line of the torque wrench.

$$T_0 = F_0 \cdot L_0 \quad \text{--- 1}$$

If force (F) is applied to different point where there is distance "X" from the effective length line, the torque (T) is :

$$T = F \cdot L \quad \text{--- 2}$$

Since the moment around Head Pin is constant from structural reason:

$$F \cdot l = F_0 \cdot l_0 \quad (F = \frac{l_0}{l} \cdot F_0) \quad \text{--- 3} \quad \frac{T}{T_0} = \frac{(L_0 - l_h)(L_0 + X)}{L_0(L_0 - l_h + X)} \quad \text{--- 6}$$

$$T = \frac{l_0}{l} \cdot F_0 \quad \text{--- 4} \quad \frac{T}{T_0} = \frac{(1 - \frac{l_h}{L_0})(1 + \frac{X}{L_0})}{(1 - \frac{l_h}{L_0} + \frac{X}{L_0})} \quad \text{--- 7}$$

$$T = T_0 \cdot \frac{l_0 \cdot L}{l \cdot L_0} \quad \because F_0 \cdot L_0 = T_0 \quad \text{--- 5}$$

$\frac{T}{T_0}$ changes as above equation by the position of force (X).

Example:

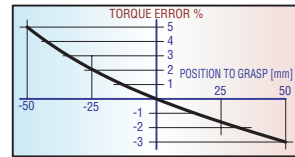
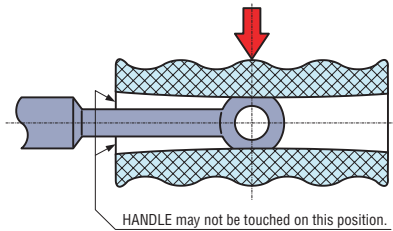
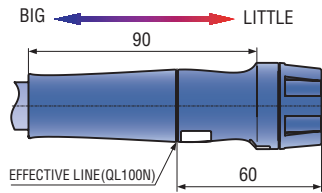
When QL28N, $L_0=600\text{mm}$, $l_h=60\text{mm}$, $X=30\text{mm}$, then

$$\frac{T}{T_0} = \frac{(1 - \frac{60}{600})(1 + \frac{30}{600})}{(1 - \frac{60}{600} + \frac{30}{600})} = 0.995$$

Therefore, 0.5% lower than the proper torque.

Torque is affected by the position where force is applied.

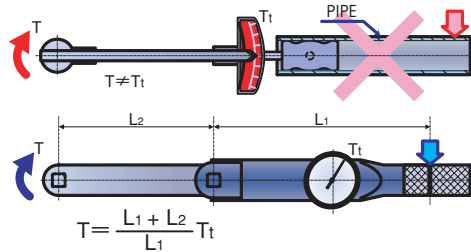
1. Beam type (F type)···Apply force to the center of handle (pin).
2. Dial type (DB,T type)···Influence of position to apply force is not so crucial.
3. Clicker type (QL,SP type)···Torque will be affected by the position where force is applied. Grasp the effective length line of handle on the center.



※Torque will change depending on the position, where force is applied.

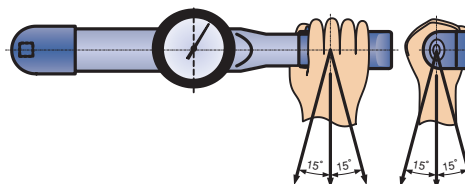
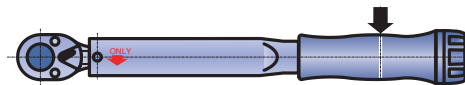
To use torque wrench with extensions.

1. Do not add extensions to the handle. The scale will not indicate the correct torque.
2. Extensions to the head is possible, however, it will require to recalculate torque.



Direction of force.

1. Clicker type (QL,SP) is designed only for the "only" direction, as indicated on each wrench.
2. Direction of force should be at right angle to the torque wrench. (Angle tolerance should be within ±15°.)



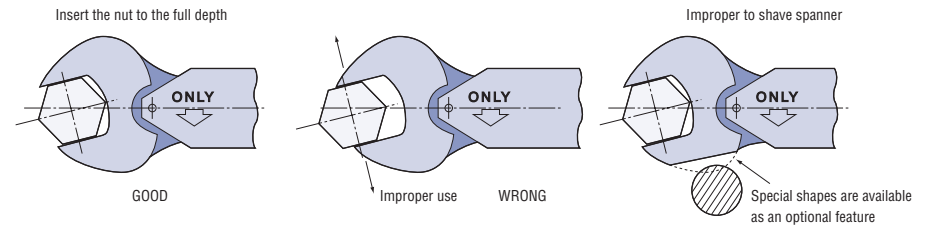
How to apply force.

1. Steady, so as not to give momentum.
2. Stop at once when you feel the "click" for clicker type (QL,SP).

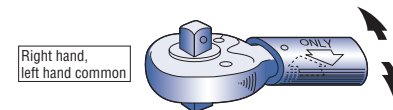
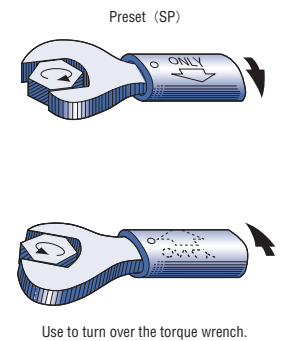
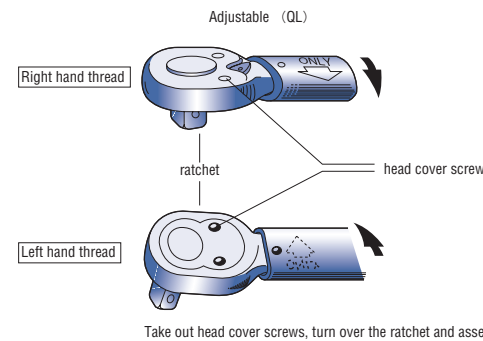
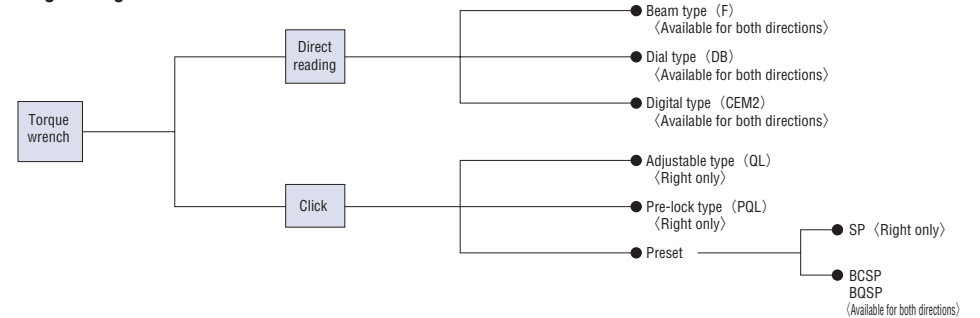
Torque wrench and loosening operation

When you loosen bolts with torque wrenches, use the wrenches within the capacity range. If you change the direction of the ratchet, check the contact of ratchet to make sure it is secure. It may be dangerous, if ratchet is not seated correctly.

Note on SP type



Tightening of left hand thread



If you use both right hand and left hand on the same application, there is no need to use two wrenches. By using a dual drive ratchet you can have both left and right hand turns in one wrench.