**Instructions for Mounting Gear Operators on Milwaukee Valve Butterfly Valves (BFV's)**

## Mounting of Gear Operator onto BFV's Prior to Valve Installation

1. Place valve in vice or similar device, making sure to protect liner from damage. **The orientation of the valve is important – ensure that the valve's size & pressure rating (cast into the body) are facing towards you. SEE FIGURE 1.**
2. Install hand wheel onto gear shaft and install solid pin through hand wheel hub. Pin can only be swaged in the side of the hub with the larger hole.
3. Turn gear operator to full open position.
4. Turn valve to full open position. Care must be used if using a wrench on the stem. An adjustable wrench (no teeth) is recommended for this.
    a. Note; in valve sizes 14" & above, a key way and key are used. Make sure the key is in position in the key way.
5. Align the gear's drive bushing with the valve shaft and lower gear onto valve (**SEE FIGURES 2 & 3**). **The orientation of the gear on the valve is important – ensure that the two adjustment screws/stop are facing you and the gear's hand wheel shaft extends to the right (SEE FIGURE 4).**
6. Install bolts & lock washers through bottom of valve's mounting plate into bottom of gear operator. If required, the cycling of the hand wheel a quarter turn will improve access of bolting into gear.
7. Ensure smooth operation of the gear and valve and verify OPEN & CLOSED positions (both gear and valve). If required, adjust the stops (see steps 1 – 7 below).

### Travel/End Stop Adjustments (Gear Mounted on BFV & Prior to Valve Installation)

1. Maintain the valve/gear orientation as outlined in **steps 1 & 5 above** (*mounting gears onto valves prior to valve installation*).
    a. With the adjustment screws facing you and the gear operator hand wheel shaft extending to the right, the adjustment screw on the left (#1) is for adjusting the OPENING position, while the screw on the right (#2), adjusts the CLOSING position **(SEE FIGURE 4).**
2. Gear operators have two sets of screws in each adjustment hole.
    a. Removing the first set, which are the **LOCK SCREWS** (smaller in length) provides access to the **TRAVEL STOP ADJUSTMENT SCREWS** (longer in length). (**SEE FIGURES 5 & 6**).
    b. Remove the lock screws. You will see another Allen/hex head screw. These are the adjustment or travel stops (**SEE FIGURE 7**).
3. Turn BOTH the OPEN & CLOSED adjustment screws counter clockwise (CCW) 2-4 turns.
4. Turn the gear's hand wheel until the valve is fully open (as verified by the disc's position).
5. With the valve in the fully OPEN position, adjust screw #1 clockwise (CW) until it stops. Cycle gear's hand wheel to **verify disc position** (**SEE FIGURE 8**).
6. Now turn the valve/operator to the fully CLOSED position & adjust screw #2 CW until it stops. Cycle gear's handwheel to **verify disc position** (**SEE FIGURE 9**).
    a. NOTE: Some small adjustments may be needed to both stops prior to reinstalling the lock screws. Follow steps 3 – 6 if needed.
7. Insert LOCK SCREWS & tighten.

## Travel/End Stop Adjustments (Gear Mounted on BFV after Installation in Pipeline)

NOTE: As with all mechanical devices, some adjustment and maintenance may be needed during the device's lifetime in service. If gear operator adjustment needs to occur while the gear/BFV unit is installed in the pipeline, care must be taken for worker safety. **Follow all applicable LOCK OUT/TAG OUT procedures and ensure that movement of the BFV's disc will not interrupt or interfere with the service(s) for which the valve is installed in. It is recommended that the pipeline be depressurized or (at minimum) have static pressure only (no flow).**

1. Ensure that all **LOCK OUT/TAG OUT** guidelines and procedures are followed.
2. Depressurize the system or isolate the valve/operator to be adjusted so that no media is flowing within the pipeline.
3. Maintain the valve/gear orientation as outlined in **steps 1 & 5 above** (*mounting gears onto valves prior to valve installation*).
    a. With the adjustment screws facing you and the gear operator hand wheel shaft extending to the right, the adjustment screw on the left (#1) is for adjusting the OPENING position, while the screw on the right (#2), adjusts the CLOSING position. **(SEE FIGURE 4).**
4. Determine the position of the BFV's disc by removing the gear operator's position indicator plate (**SEE FIGURES 10, 11 & 12**).
    a. The disc position is equal to the flat portion of the stem's "double D" section.
        i. If stem's flats are **parallel to the piping**, then the disc is in the **OPEN** position (**SEE FIGURE 11**).
        ii. If the stem's flats are **perpendicular to the piping**, then the disc is in the **CLOSED** position (**SEE FIGURE 12**).
5. Adjust travel stops per steps 6 – 11 below:
6. Gear operators have two sets of screws in each adjustment hole.
    a. Removing the first set, which are the **LOCK SCREWS** (smaller in length) provides access to the **TRAVEL STOP ADJUSTMENT SCREWS** (longer in length). (**SEE FIGURES 5 & 6**).
    b. Remove the lock screws. You will see another Allen/hex head screw. These are the adjustment or travel stops (**SEE FIGURE 7**).
7. Turn BOTH the OPEN & CLOSED adjustment screws counter clockwise (CCW) 2-4 turns.
8. Turn the gear's hand wheel until the valve is fully open (as verified by the stem/disc's position).
9. With the valve in the fully OPEN position, adjust screw #1 clockwise (CW) until it stops. Cycle gear's hand wheel to **verify stem/disc position**.
10. Now turn the valve/operator to the fully CLOSED position & adjust screw #2 CW until it stops. Cycle gear's handwheel to **verify stem/disc position.**
    a. NOTE: Some small adjustments may be needed to both stops prior to reinstalling the lock screws. Follow steps 3 – 6 if needed.
11. Insert LOCK SCREWS & tighten.


FIGURE 1

**Orientation of BFV** – Valve SIZE & PRESSURE ratings are facing you

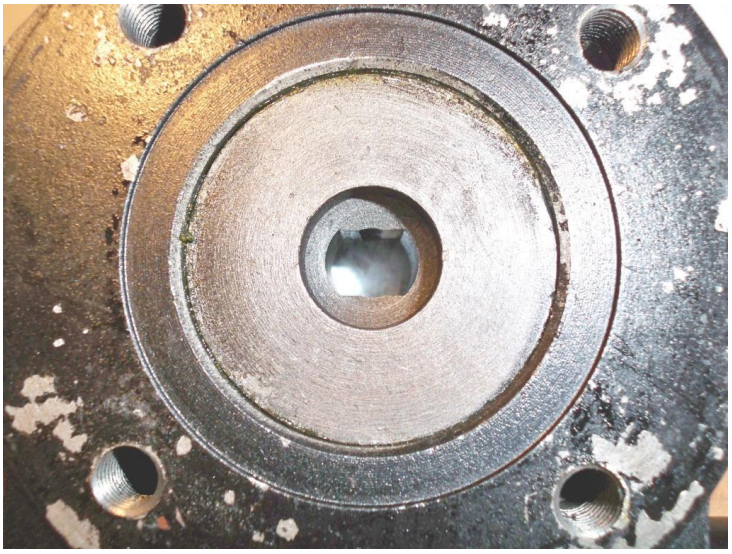

FIGURE 2

Bottom of gear operator & drive bushing

***Note "double D" pattern.***

FIGURE 3

Top of BFV stem showing stem's "double D"


FIGURE 4

Proper orientation of gear operator.

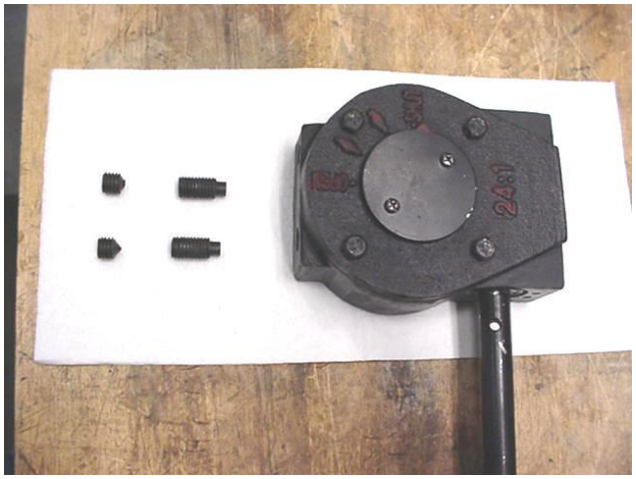

FIGURE 5

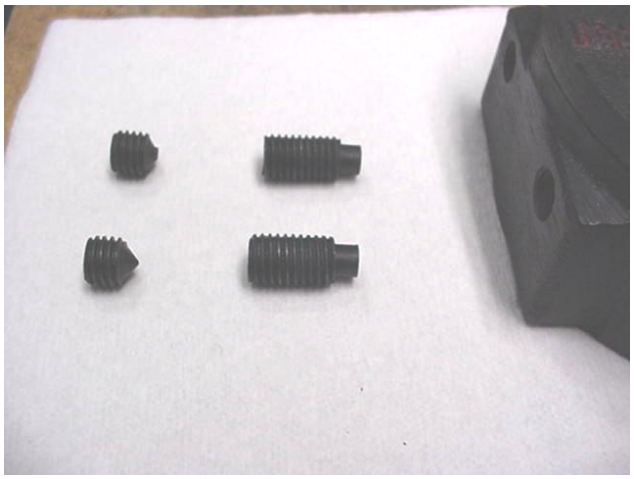

FIGURE 6

Gear operators have two sets of screws - Shown in relative position. (Shorter ones are ***lock screws***. Longer ones are ***travel adjustment or stop screws***). <u>You must remove the lock screws to adjust the disc's travel or to adjust stop screws.</u>


FIGURE 7

View of travel/adjustment stop screws (after removal of lock stop screws).

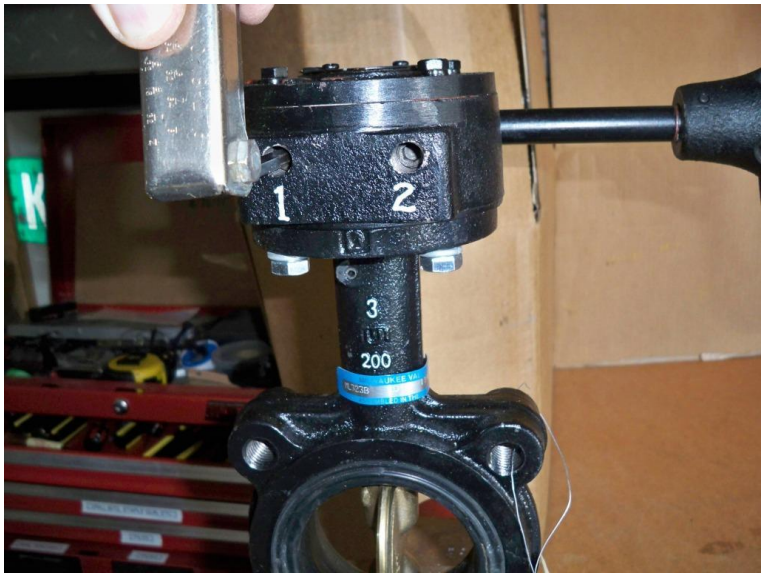


FIGURE 8

**To adjust OPEN POSITION**:

With valve & gear in proper orientation (see above) screw #1 (LEFT) is for adjusting the OPEN position. Turning stop screw CCW will lengthen the disc's travel (to open more). Turning CW will shorten the disc's travel (to open less).


FIGURE 9

**To adjust CLOSED POSITION:**

With valve & gear in proper orientation (see above) – screw #2 (RIGHT) is for adjusting the CLOSED position. Turning stop screw CCW will lengthen the disc's travel (to close more). Turning CW will shorten the disc's travel (to close less).

If valve is installed in line – removal of the gear operator's position indicator plate will allow visual access to the BFV's stem position.

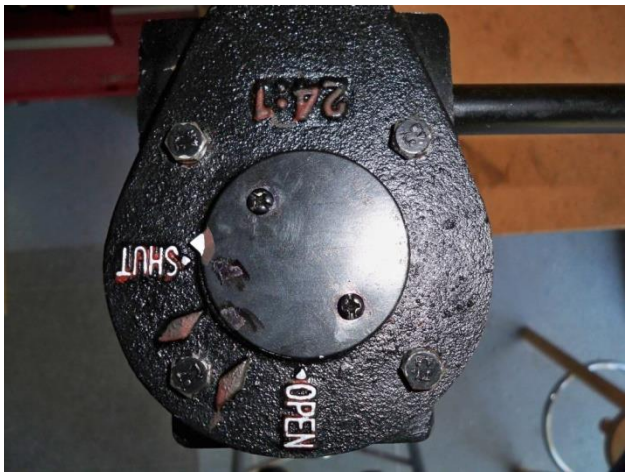


FIGURE 10 (Position indicator cover on)


FIGURE 11 (Position indicator cover removed showing valve in OPEN position)


FIGURE 12 (Position indicator cover removed showing valve in CLOSED position)


FIGURE 13

FIGURE 14 (CLOSED)

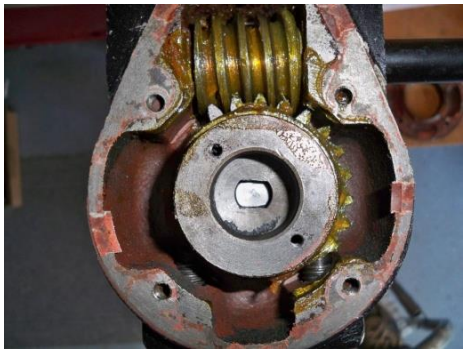

FIGURE 15 (OPEN)

If required, the gear operator's cover can be removed by first removing the indicator plate & unscrewing the operator cover cap screws. Care must be used in prying off cover plate (FIGURE 13) to not damage the internal gear mechanisms (FIGURES 14 & 15).