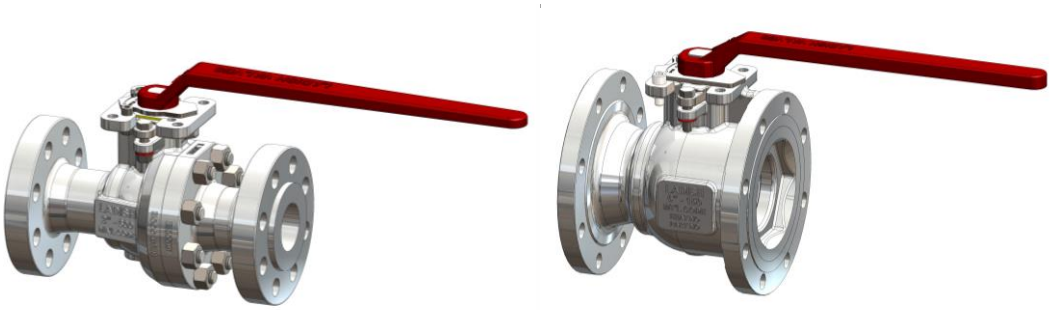
LADISH VALVES

INSTALLATION, OPERATION, MAINTENANCE MANUAL

MANUALLY OPERATED FLOATING BALL VALVES



Ladish Valves

7603 Bluff Point Drive Houston, TX 77086

Phone: 866.523.4740 281.880.8560 Fax: 281.880.8061

www.ladishvalves.com

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1.0 CONSTRUCTION & DESIGN FEATURES

The following instruction are critical for the maintenance, disassembling and assembling of Ladish Valves floating ball valve product line.

We recommend that this entire document be read prior to proceeding with any installation or repair.

The typical valve design is as illustrated below. The rotation of the stem by 90° fully opens or closes the valve. For the soft-seated valves the valves can only be operated in either fully "Open or Closed" position. The ball is held with the two ball seats placed in the valve body and body cap. The upstream pressure pushes the ball compressing the downstream side of the ball seat to completely shut off the fluid flow and vice versa. Fluid can flow through the valve port in both directions. Ladish Valves offers the following designs depicted in figures 1 and 2. Figures 3 & 4, extended handle, is an alternative for designs on figures 1 & 2.

FIGURE 1: PACKING DESIGN FLOATING BALL: P8/P7 SERIES.

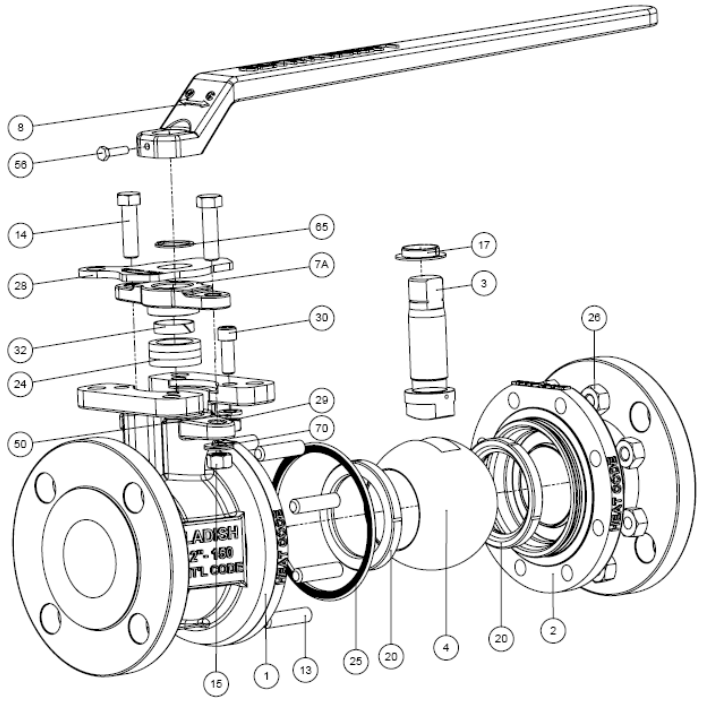


FIGURE 2: O-RING DESIGN FLOATING BALL: R8/R7 SERIES.

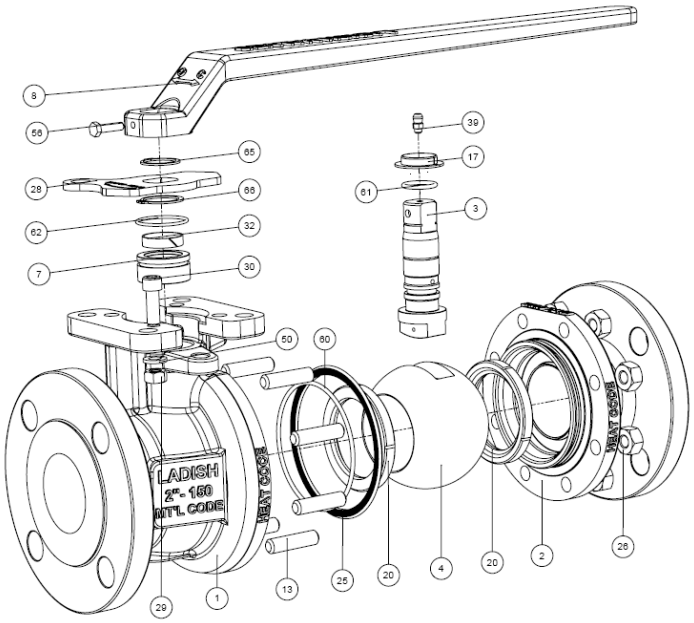


FIGURE 3: EXTENDED HANDLE DESIGN FLOATING BALL FOR 1.5" AND LARGER

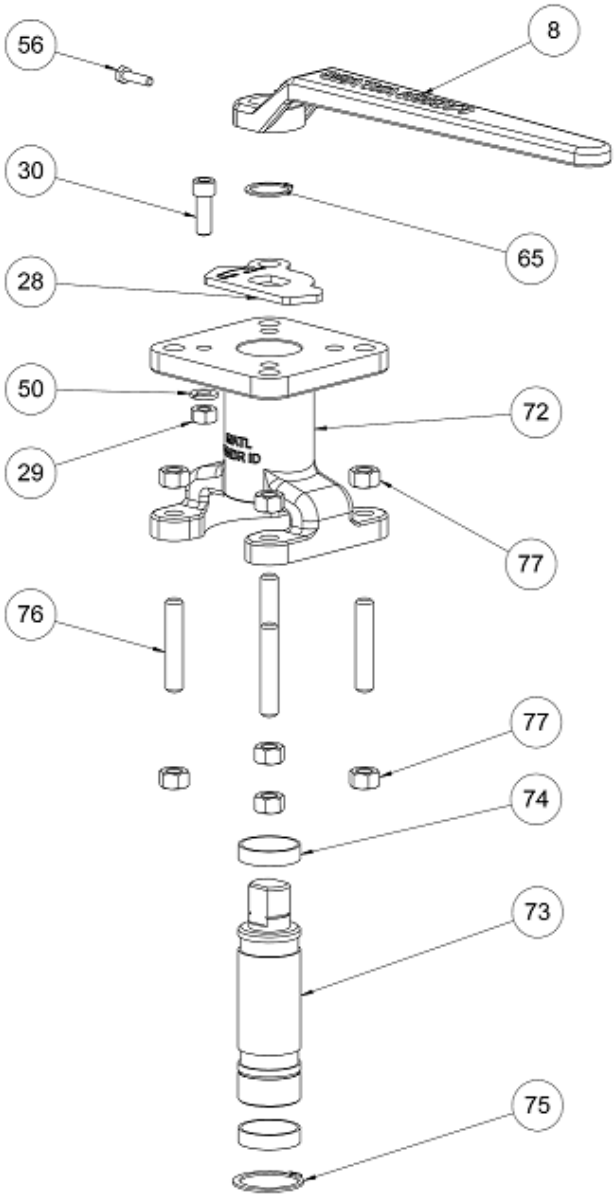
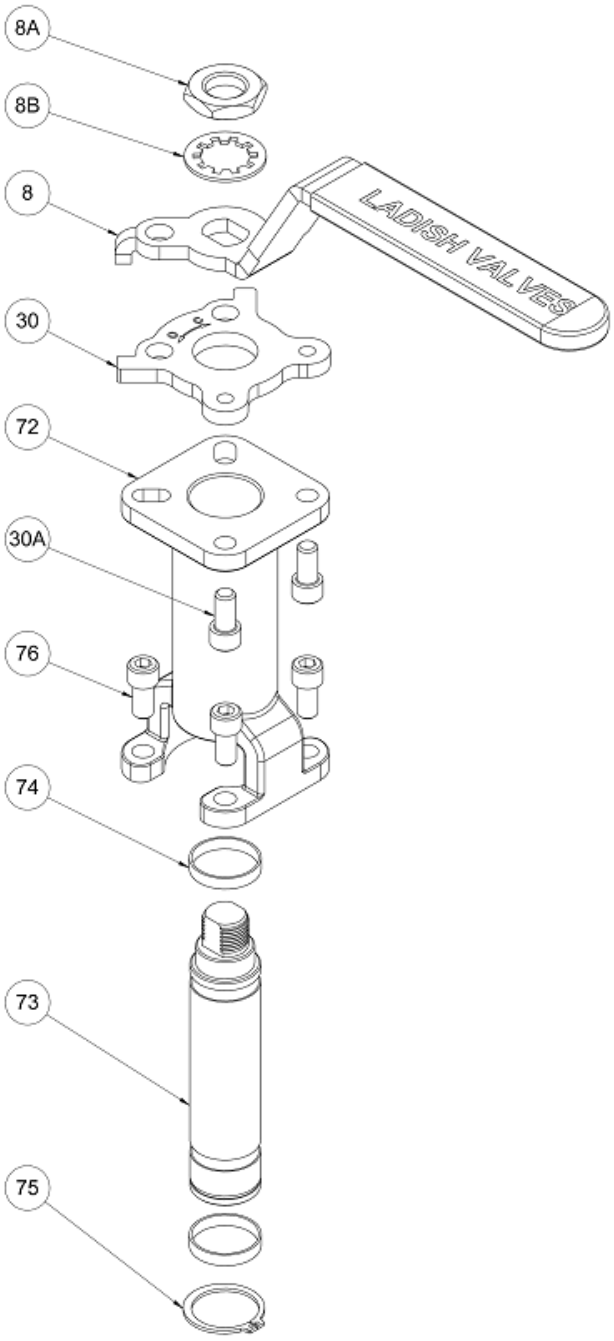


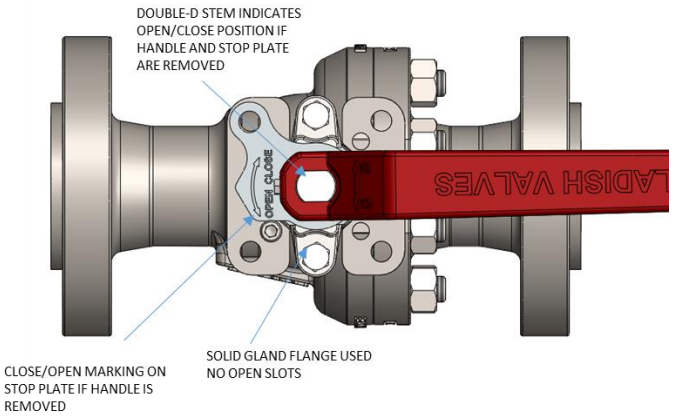
FIGURE 4: EXTENDED HANDLE DESIGN FLOATING BALL FOR 1" AND SMALLER



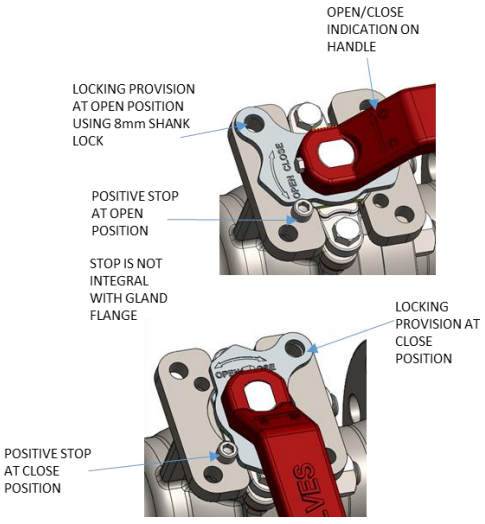
2.0 VALVE OPERATING DEVICE

Two different installations are addressed–the **lever operated** and the **gear operated** ball valve.

The lever handle is directly mounted on the stem. Rotation of the stem by 90° fully opens/Close the valve. The double-d stem design allows for visual confirmation of the valves position when the lever is not attached.

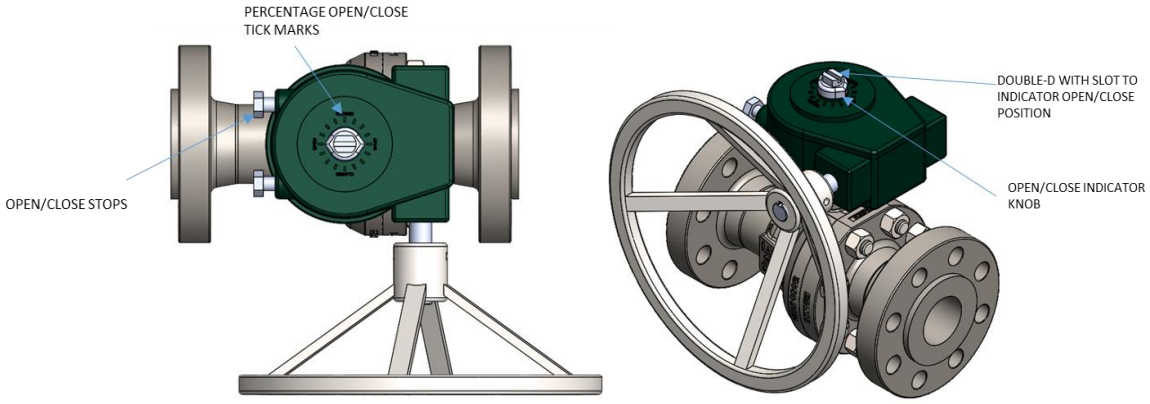


There are a number of features on the mounting pad to assist the operator in determining position. The "Open and Close" markings is marked on handle (8) and stop-plate (28). There are stops (30) to insure both the fully open and fully closed positions. Locking provisions are available to secure the valve in a desired position.



An integral ISO 5211 mounting pad is used for direct mount gear/actuator installation by simply removing the handle (8), snap-ring (65) and stop (30) before installing the actuator.

The Ladish Valves ball valve can be easily outfitted with a worm gear operator. The gear operator shares similar open/close marking features as the lever handled operator. The position of the valve is clearly indicated by the double d slot design on top of the gear. The addition of tick marks on the top of the gear allows the user to understand where the ball is in its travel. Open and close stops are also utilized to give the operator resistance once reaching the open or closed position.



3.0 STORAGE AND HANDLING

Ball valves should be stored in the full open position. End connection protectors should be tight to prevent ingress of moisture and debris. Valves should be left in original shipping container (If possible).

During delivery of the product, take care not to damage coated surfaces which may subsequently leave exposed areas vulnerable to corrosion. If the valve is damaged, touch up painting should be performed. Keep off the valve lifting area to prevent personal injury caused by unsecured valves.

When receiving valve packages, a thorough inspection should be performed to ensure product compliance. If the protective end flange covers are not present, provide appropriate covers. Take extreme care in handling the product to avoid damage and/or personal injury. If possible, keep product within the original shipping container. When storing, select a secure, dry, and low humidity environment that is ventilated and dust free. Storage of valves on the ground or concrete floor is not recommended.

1) DO NOT store valves in a corrosive environment.
2) DO NOT remove protective covers until installation.
3) DO NOT stack products to avoid product damage and risk of personal injury due to unstable piling.
4) Keep valves in open position while storing. Storing the valves partially open may deform the ball seats.

4.0 INSTALLATION

Ladish Valves recommends the following basic installation guidelines:

- Allow sufficient room for safe and easy operation, installation, and subsequent maintenance of valves.
- For smooth operation, inspection, and maintenance, take appropriate measures for valves which are forced to be installed in small places.
- Avoid installing the valves in locations where valve performance may be hampered. Examples include pipe stress or vibrations.
- Service conditions should be within the valve specification. Check nameplate.
- Valve flanges should correspond with piping flanges.
- Gasket contact surfaces of pipe and valve flanged must be thoroughly inspected to make sure no shipping damage or other indication is found.
- The valve and pipe center should be aligned accurately.
- Before installation, the connecting pipes should be cleaned to remove and debris such as sand, dust, and welding spatter from the pipe interior.
- Remove flange covers from valves just before installation and no sooner.
- Check all threaded areas after installation and retighten, as necessary.
- Piping should be flushed, with valves open, to assure debris removal. DO NOT operate valve during flushing.

1) The sealing materials determines the pressure and temperature rating of the valve. Check the valve specification with the nameplate. Operating outside of the prescribed range may cause leakage and severely effect valve performance.
2) DO NOT install for pipe end service without the use of a blind flange.
3) Sufficient lighting and secure footing shall be available for installation. Piping should be properly supported.

The following basic steps should be performed when installing your ball valve:

1. Ensure piping is aligned.
2. The length between the pipe flanges should correspond to the valve face-to-face dimensions.
3. Insert the valve between pipe flanges. Thread bolts through bottom holes and tighten bolts lightly.
4. Insert gaskets between valve and pipe flanges. It is recommended to apply the gasket paste to gasket faces.
5. Ensure the correct alignment of gaskets, which are held by bottom bolts between valve and pipe flanges.
6. Thread bolts through the remaining bolt holes and tighten them lightly.
7. Tighten bolts evenly and gradually in a basic star pattern. The ends of all tightened bolts should protrude equally beyond the nuts.
8. Raise the line temperature and pressure gradually and retighten bolts, if necessary.

As detailed in Section 2.0, Ladish Valves provides lever/gear/actuator operator. The valves with gear/actuator "Open/Close" position are set by manufacturer. If needed, when using a gear operator, the user must adjust the "OPEN" and "CLOSED" travel stops on the gear operator by observing the ball port and stem flats position. Complete assembly by installing covers. Failure to accurately set a maximum open and close position may result in premature seat failure.

5.0 OPERATION

The Ladish Valve, soft-seated ball valve is recommended for on-off service only. Rotation of the lever handle by 90° fully opens and fully closes the valve. When using a hand wheel operated worm gear operator, turning the handwheel clockwise closes the valve and turning the handwheel counterclockwise opens the valve.

1) DO NOT apply excessive torque by using a pipe or any other device to operate the valve.
2) DO NOT loosen bolts and nuts of gland and flange area of pressurized valves.
3) Avoid leaving the soft-seated valve in a partially open or closed position for long periods, which may cause damage to the seats.

Ladish Ball Valves are equipped with self-relieving seats. Ball valves have a body cavity where pressure can be trapped into a closed volume. Under this circumstance any increase of the contained fluid temperature or any degradation of the contained fluid can result in an uncontrolled pressure increase of the trapped fluid to figures that are above the design pressures of the pressure equipment.

To avoid the above scenario, all Ladish Ball Valves are provided with self-relieving seats. The design of a self-relieving seat is such that when the pressure in the body cavity exceeds the maximum cavity pressure, the excess pressure will be relieved through upstream seat maintaining pressure equalization between the body cavity and the pipeline.

In order to ensure valve operating performance, Ladish Valves recommend the following daily inspection items:

Inspection Item	Area	Method	Solution
External Leakage	Packing/Stem Seal	Visual check w/ soap solution	Retighten gland bolts. Replace gland packing
	ANSI Flange Joints		Retighten flange bolts. Replace gaskets.
	Threaded insert		Retighten each threaded area. Replace parts, as needed.
	Body/Cap joint		Retighten each threaded area. Replace parts, as needed.
Abnormal Noises	Valve body	Auditory check	Consult piping engineer.
	Loosened bolts		Retighten bolts.
	Pipe vibration		Consult piping engineer.
Loosened bolts and nuts	Bolts and nuts	Visual check Tactile check	Retighten bolts and nuts.
Internal thru-bore leakage	Damaged Seat	Visual Inspection	Remove the foreign object. Disassemble and inspect valve components. Replace seats or replace valve.
	Damaged Seat		Re-tighten the bolts and nuts.
Valve operation	Valve operating position	Visual check	Make sure valve is in correct position.
	Disturbed operation	Tactile check Auditory check	Disassemble and inspect components.

Trouble shooting options, including possible causes and remedial measures:

Problem	Potential Cause	Potential Solution
Disturbed valve operation	Object may have choked up the valve body and become lodged against seat.	Disassemble and inspect.
Excessive Valve Torque	Object or media stuck to stem.	Remove the object, inspect valve.
	Object may have choked up the valve body and become lodged against seat.	Flush valve bore with valve slightly open to remove build up or disassemble and inspect.
	Gland bolts overly tightened.	Loosen and retighten gland bolts to the extent leakage does not occur.
Leakage from gland area	Loose gland bolts.	Retighten gland bolts.
	Uneven tightening of gland bolts.	Loosen and retighten gland bolts.
	Damage to packing.	Replace packing.

6.0 DISASSEMBLY / REASSEMBLY

Prior to disassembling, technicians should be equipped with adequate personal protective equipment. Disassembly should occur in a relatively dust free environment. Mark the coupled flanges for easy coupling upon reassembly. Note refer to Figure 1 during the rest of this section. Contact your Ladish Valves technical support for help with a gear operated of actuated valve.

1) Technician must take protective measure to prevent direct exposure to process media.

2) Technician must wear appropriate PPE, such as gloves, boots, and safety glasses.

3) Take care not to catch fingers in flanges during disassembly.

Disassembly:

1. Fully close the valve. (For extended handle design skip steps 2, 3, & 4).
2. Remove the handle bolt (56) and handle (8) from the stem (3).
3. Remove the snap ring (65) from the stem (3).
4. Remove the stop plate bolt (30) and stop plate (28) from the body (1).
5. For extended handle on valves 1.5" and larger (see figure 3):

   5.1. Remove the handle bolt (56) and handle (8) from coupling (73).

   5.2. Remove snap ring (65), stop nut (29), stop washer (50), stop bolt (30) and lock plate (28).

   5.3. Remove bracket nuts (77), stud/bots (76), and extension bracket (72).

   5.4. Remove coupling (73) from stem (3).

   5.5. Remove snap ring (75) and coupling bearing (74) from coupling (73).
6. For extended handle on valves 1" and smaller (see figure 4):

   6.1. Remove handle lock nut (8A), handle washer (8B), and handle (8)

   6.2. Remove bracket bolt (30A) and stop bracket (30)

   6.3. Remove extension bracket stud/bots (76) and extension bracket (72)

   6.4. Remove coupling (73), from stem (3).

6.5. Remove snap ring (75) and coupling bearing (74) from coupling (73).

7. Remove the body nuts (26).
8. Disassemble the body (1) and cap (2).
9. Remove the gasket (25) from the body (1) or cap (2).
10. Remove the ball (4) from the body (1).
11. Remove the gland flange bolts (14) to disassemble the gland (7).
12. Remove the gland flange (7A) from the gland (7).
13. Remove the stem (3) from the body (1).
14. Remove the stem bearing (32) from the stem (3) or body (1).
15. Remove the ball seats (20) from the body (1) and cap (2).
16. Remove the gland packing (24).

Before reassembling the valve, check all parts and replace as necessary. Consumables such as ball seats, packing, gasket, o-rings, stem bearing should be prepared before reassembly. Clean all parts and thoroughly remove dust or loose material. Take care to assemble the valve in a dust-free place.

Reassembly:

1. Assemble the stem bearing (32) to the stem (3).
2. Insert the stem (3) from inside the body (1) making sure that the stem collar contacts the body and set the stem (3) in the fully closed position.
3. Assemble the gland flange bolts (14).
4. Assemble the gland flange (7A) to the gland (7). (Some designs only have one of these).
5. Mount the packing (24) and gland (7)/gland flange (7A,) in the body and temporarily tighten the gland flange bolts (14).
6. Mount the ball seats (20) in the body (1) and cap (2).
7. Mount the ball (4) in the body (1).
8. Mount the gasket (25) to the body (1) making sure the ball seat (20) is in the correct position without dropping them from the body (1).

9. Fasten the body (1) and cap (2) with the body studs (13). Evenly tighten gradually in a traditional star pattern. The body nuts (26) should evenly protrude beyond the nuts.
10. Tighten the gland flange bolts (14).
11. For extended handle only (1.5" and larger see Figure 3):
    11.1. Add coupling bearings (74) and snap ring (75) on coupling (73).
    11.2. Mount coupling (73) on stem (3).
    11.3. Mount bracket (72) on top of the valve.
    11.4. Fasten bracket (73) to the body (1) with bracket studs (76) & nuts (77).
    11.5. Add stop plate (28) on the stem (3) and secure with snap ring (65).
    11.6. Add stop bolt (30A),washer (50), and stop nut (29).
    11.7. Add the handle (8) and handle bolt (56) to the stem (3).
12. For extended handle only (1" and smaller see Figure 4):
    12.1. Add coupling bearings (74) and snap ring (75) on coupling (73).
    12.2. Mount coupling (73) on stem (3).
    12.3. Mount bracket (72) on top of the valve.
    12.4. Fasten bracket (73) to the body (1) with bracket studs/caps crews (76).
    12.5. Place stop bracket (30) on extended bracket (72) and secure with bracket bolts/cap screws (30A).
    12.6. Add washer (8B), handle (8) and handle lock nut(8A) to the stem (3).