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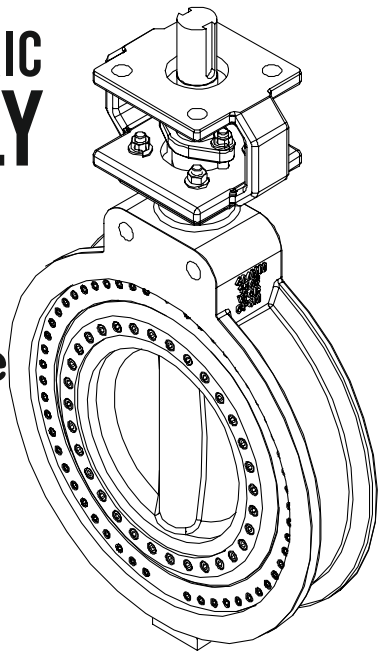
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INDIA

TRIPLE ECCENTRIC BUTTERFLY VALVE

Operation Maintenance Manual Guidelines



IOM No: AEA-IOM-TOBFV-0024-R0

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1. INTRODUCTION

The **"aira"** high-performance triple eccentric butterfly valves feature metal-to-metal seating, making them suitable for throttling and positive isolation in both bidirectional flow applications. They offer zero leakage, low fugitive emissions, and can handle steam (up to 550°C) and cryogenic conditions (down to -196°C). The triple eccentric design allows the disc to move friction-free along the specially designed body seat and seal, eliminating rubbing. When closed, the seal ring energizes the seat for a snug fit, using a laminar seal of graphoil layers between metal laminations. This resilient seal flexes with temperature changes, preventing jamming and ensuring zero leakage.

1.1 ABOUT TRIPLE ECCENTRIC BUTTERFLY VALVE TECHNOLOGY

The **"aira"** Triple Eccentric Butterfly Valve is engineered to meet API 609 and ASME B16.34 standards. Unlike Double Eccentric metal seated valves, which may not achieve bubble-tight shut-off, this valve introduces a special sealing mechanism that uses an inclined, conical disc in contact with a laminated seat. This design minimizes friction and abrasion, offering low torque, broad sealing, and effective tight shut-off.

2. VALVE HANDLING & STORAGE

HANDLING

- Properly support and secure the valve before moving to avoid damage or injury.
- Do not drag the valve on the ground; maintain a minimum height of one foot while transporting.
- Use lifting lugs, not the valve port, for transportation.
- Avoid slinging crane wires around the actuator/gear unit to prevent added load. Ensure no external load affects the actuator/gear unit during handling.
- Remove the hand wheel before handling and transporting the valve

STORAGE

- Storage valves should be stored in a covered, dust-free, low-humidity, and well Ventilated area. Ensure end protectors are in place to prevent contamination that could Damage seating surfaces.
- After any checks or tests, replace protectors and maintain storage conditions above the Dew point to avoid water accumulation.
- Valves should not be placed directly on the floor; use wooden pallets to elevate them at Least 6 inches.
- Care should be taken not to damage the adaptor or actuator during storage, and avoid Applying tar, grease, or other substances inside the valve, as they may impair performance.

IMPROPER STORAGE AND /OR HANDLING MAY CAUSE DISC/SEAL DAMAGE OR DEFORMATION OF SHAFT OR SEAT, WHICH WILL AFFECT SEALING AND OPERATIONALPERFORMANCE OF THE VALVE.

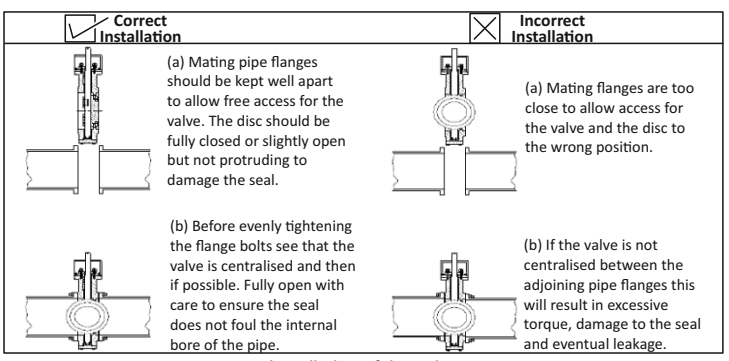
3. VALVE INSTALLATION

Carefully Unpack the valve and check for tags or identification plates, etc.

- If the identification plate / arrow plate / tag is lost or destroyed during the shipment or while in storage or if it is not legible, contact your distributor or **"aira"** Valves.
- The performance of the valve will be better if the flow is smooth. It is suggested to avoid installation of valves where turbulence is expected (Example: Immediate after elbows, bends, pumps etc.)
- Look for any special warning tags or plate attached to or accompanying the valve and if any, take appropriate action.
- It is recommended to remove all foreign particles from the pipe line by flushing it with a suitable fluid. Corrosion inhibitors shall be added to the flushing medium to prevent any corrosion due to trapped fluids.

- Remove the end protectors and protective sheath within the flow bore valve, wherever provided.
- Gasket contact faces of the valve and pipe flanges shall be inspected thoroughly for scratches / defects. Scratches, if any, shall be corrected by grinding the surfaces or by rubbing with emery sheet.
- After cleaning, operate the valve for at least two complete cycles before installation.
- Ensure pipes are properly aligned and minimize stresses from external loads and thermal expansion, following the pipe manufacturer's recommendations.
- For pipes with long overhangs, provide adequate support or jacks at the flange ends to prevent bending from the valve's weight.
- For optimal performance, install valves with the shaft horizontal and the hand wheel facing up; if not possible, install the shaft at an angle to prevent sediment buildup on the lower bearing area.
- The valve has bi-directional sealing capabilities and can be installed in either direction; however, install in the preferred flow direction indicated by the arrow mark on the valve.

THE IMPROPER ALIGNMENT OF THE PIPE AND THE VALVE DURING INSTALLATION CAN LEAD TO UNBALANCED TIGHTENING OF THE FLANGES WHICH MAY CAUSE EXCESSIVE STRESS ON THE BOLTS AND LEAD TO LEAKAGE



Installation of the valve

4. VALVE OPERATION

GENERAL

- Maximize the operational life of the valve by using it within the rated range and according to design parameters.
- Refer to the general assembly drawing of the valve for understanding its internal construction.

OPERATION MECHANISM

- The valve operates with a quarter turn motion using Gear units, Hydraulic, Pneumatic, or Electric Actuators.

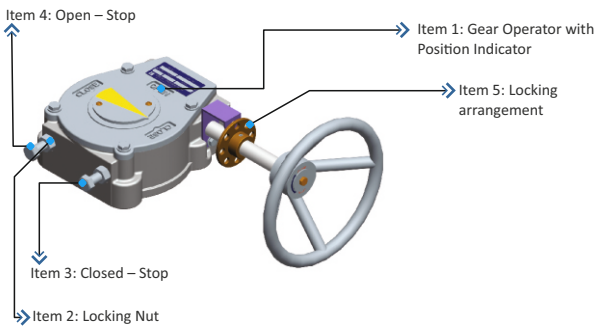
GEAR UNIT

- Gear units facilitate easier operation, with clockwise rotation for closing and anti clockwise for opening. The valve's position can be monitored via the position indicator on top of the gear unit. The number of turns required depends on the specific gear unit used, which is self-locking to prevent the disc from rotating due to line fluid pressure. Mechanical stopper screws are included for setting exact open and close positions and are factory set; refer to the troubleshooting section for adjustments if necessary.

FORCING THE HAND WHEEL, CHAIN WHEEL OR NUT AGAINST THE STOPS WILL NOT PROVIDE TIGHTER SHUTOFF OF THE VALVE AND MAY DAMAGE THE GEAR UNIT, ONLY GEAR UNIT STOPPER ADJUSTMENT WILL AFFECT THE VALVE SHUT OFF.

5. GEAR OPERATOR MOUNTING/SETTING (Refer image Figure-)

- Mount gear operator (Item 1) on top of butterfly valve with bolts and washers provided with each assembly.
- Loosen the stop screws and locking nuts (Item 2, 3 & 4) approximately three to four turns on both sides of the gear operator.
- Rotate hand wheel to the full open position and tighten the “open” stop screw (Item 4). Now tighten the locking nut (Item 2).
- Rotate hand wheel to the full closed position and tighten the “Closed” stop screw (Item 3). Now tighten the locking nut (Item 2).
- Open disc to 20% then back to closed position. Re-adjust stop screw and nut (Item 3) if necessary. You have now properly adjusted both the “Open” and “Closed” stop positions.



6. DO’S AND DON’TS

DO’S	DON'TS
Before installation, ensure the valve is thoroughly Cleaned inside and out, free of foreign particles or Metallic chips on the sealing element.	DO NOT install a valve in the pipe line without the operating mechanism.
While installing the operating mechanism make sure that the TOBV valves in fully closed position.	DO NOT force the actuator onto the valve shaft. If you encounter difficulties with aligning the keyways, consult the detailed instructional manual.
Make sure to remove the entire rust preventive on the machined surface in the flow area before a valve is put in the pipe line.	DO NOT hammer actuator surface to drive it in.
Carefully review the identification plate details and install the valve in the appropriate location for its designed duty conditions. The preferred sealing direction for butterfly valves is indicated by an arrow on the valve body beneath the identification plate.	DO NOT use adaptor, actuator body and gear box casting as lifting points.
Lined Pipes and Heavy walled pipes should have a minimum inside diameter well clear of Dimension "Zn" (Refer Figure) in Disc full open position.	These valves are not to be used for End of line service.

Make sure to supply rated voltage and frequency to the electrical actuator.	DO NOT operate electrically operated valves from fully open or fully closed position for initial starting.Make sure to bring them to mid-travel position by hand operation and check phase for reversal, if any, correct the phase reversal immediately. Note that none of the safety devices like limit switch, torque switch etc., will be effective in case of wrong phase connecting to the actuator.
Refer the general assembly drawing for recommended valve installation. Valves should be installed in the line after visually checking the condition of disc seal. In case there is any damage to the disc seal, the valve will not be leak tight, in such a case, replace the. seal, before installing the valve in the line.	DO NOT use force multiplying devices like levers or pulleys. In case a valve demands excessive operating torque, make sure there is no artificial obstruction in the pipe line or in the operating mechanism.
TOBV valve needs care and maintenance in its use. Always make routine checks once in three months for the working condition of operating mechanism.	DO NOT remove operating mechanism from the valve when the disc is partially open/Close.
Always use recommended spares as per our guidance.	DO NOT remove gland & gland packing while fluid pressure is in the line.

7. VALVE MAINTENANCE

7.1 INTRODUCTION

- For improved valve longevity and operability, periodic inspection and maintenance are recommended. The frequency of checks should be based on the application, with **“aira”** Valves suggesting inspections every 50 cycles or every three months, whichever comes first, to ensure smooth operation and leak-free performance. This applies even to stored valves. It is also advisable to keep a record of the valve's performance.

7.2 SAFETY PROCEDURE

- Always depressurize the pipeline before performing maintenance on the valve or actuator, and disconnect the electrical supply to the electrical actuator prior to any maintenance activities.

7.3 IN LINE MAINTENANCE

- These butterfly valves require only minimum in-line maintenance for satisfactory performance. Check Gland nuts for tightness at regular intervals. If loose, tighten them evenly. Check Gland nut tightening Torque.

7.4 ROUTING MAINTENANCE

GLAND LEAK

- Check the tightness of the gland nuts and tighten evenly if required. If the leak persists, the packing may be renewed.

PACKING REPLACEMENT

- Remove the gear unit/actuator and connecting keys, noting their positions. Detach the gland nut, gland flange, and gland. Clean the packing cavity and shaft after removing the packing. Insert new packing rings; use a 30° angle cut for solid molded packing and twist to install without breaking. Reassemble the gland, gland flange, and gland nut. Reattach the connecting keys and gear unit/actuator, then close the valve.

GEAR UNIT

- Gear-operated valves are equipped with enclosed, watertight worm gear units designed for years of maintenance-free operation. They are lubricated with heavy bearing grease during assembly and can be refilled as needed.

ACTUATOR

- For maintenance of electrical /pneumatic/hydraulic actuator refer the instruction manual of the electric actuator.

7.5 PERIODIC MAINTENANCE

DISMANTLING

- The pipeline shall be drained of the line fluid and the valve removed from the line before dismantling.
- Care should be taken during the removal of wafer and wafer lugged valves fitted with fail-open actuators. Such valves shall be closed using the manual over-ride gear unit before removing from the pipeline. If no manual over-ride is available, the fail open actuator shall be dismantled before the valve is removed from the pipe line. Subsequently, the valve shall be closed with a wrench and then removed.
- The Operator may be changed without removing the valve from the pipeline, however, the line pressure should be relieved.
- Maintenance of the operator shall be done as per manufacturer instruction.
- Operator shall be changed when the valve shall be in the fully closed condition.
- If the operator has a fail-safe position that cannot be overridden then unscrewing the bolting on the valve bracket should dismantle the actuator.

8. EXPLODED VIEW

Sr. No.	Description	Material
1	Body	WCB / CF8 / CF8M
2	Disc	WCB / CF8 / CF8M
3	Single Shaft	S.S. 304 / 316 / 410 / 17-4PH
4	Disc Pin + Nut Or Cotter Pin	S.S. 304 / 316
5	Bottom Bearing Bush	S.S. / NITRIDING
6	Stem Seal	GRAPHITE
7	Stem Square	S.S. 304 / 316 / 410 / M.S.
8	L.N Bolt For Stem Square	GR.B7
9	Top Bearing Bush	S.S. / NITRIDING
10	Guide Bush	S.S. / NITRIDING
11	Gland Seal	GRAPHITE
12	Flange Side Washer	S.S. 304 / 316
13	Gland Pata	WCB / CF8 / CF8M
14	Stud + Washer + Nut For Gland Pata	GR.B7
15	Bracket	WCB / CF8 / CF8M
16	Hx Bolt+Washer For Bracket	GR.B7
17	Disc Seal Ring Gasket	S.S. 304 / 316 INC.625 + GRAPHITE
18	Disc Seal Ring	S.S. 304A-276 / 316 + GRAPHOIL
19	Disc Seal Ring Refer. Pin	SOFT
20	Disc Retainer Gasket	S.S.304 / 316 INC.625 + GRAPHITE
21	Disc Retainer	S.S. 304 / 316
22	L.N. Bolt For Retainer	GR.B7
23	Body Seat Ring Gasket	S.S.304 / 316 INC.625 + GRAPHITE
24	Body Seat Ring	S.S. 304 / 316
25	Body Seat Ring Refer. Pin	SOFT
26	Body Clamping Ring Gasket	S.S.304 / 316 INC.625 + GRAPHITE
27	Body Clamping Ring	WCB / CF8 / CF8M
28	L.N.Bolt For Clamping Ring	GR.B7

