

INSTALLATION OPERATION & MAINTENANCE MANUAL

TRUNNION-MOUNTED BALL VALVE

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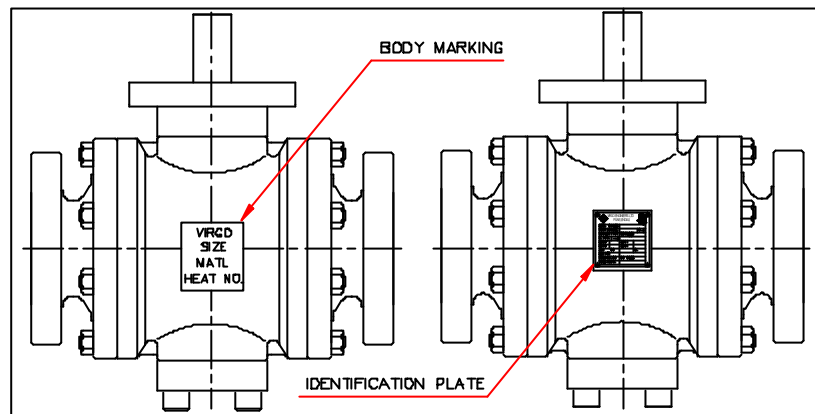
1. Introduction

Scope

The purpose of this manual is to ensure that the valves supplied are properly installed and maintained to give trouble free performance. For better understanding of product and the maintenance requirements, see enclosed exploded view of the valve, where different parts are identified.

Identification of Valve

Specifications of the valve are marked on the body or on an identification plate or both, prior to shipment.



1.1 Identification of Valve

2. Transportation, Reception and Storage

While unpacking the valves, check that the valves & any accessories have not been damaged during transportation.

Note: If the valve or any of its accessories is damaged or missing during transportation, inform the same to the Factory / Branch Office.

CAUTION!

Placing the valves directly on the ground or on a concrete floor should be avoided!

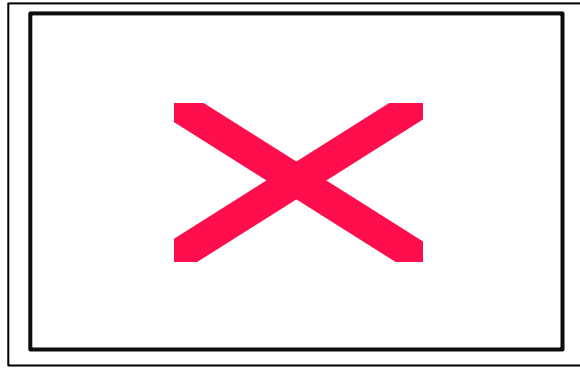
Valve open or close position is indicated on the handle sleeves for lever operated valves or on the top of the gearbox for gearbox operated valves.

All valves are delivered with the ball port in full open position and ends protected with protective end caps to avoid the entry of debris, other solid particles during transportation and damage to serrations.

Note: When the valve operation is by single acting pneumatic actuator, where spring closes the ball port and air supply open the ball port, the valves are supplied with ball port in closed position. Special care must be taken to avoid damage to the surface of the ball.

All wrapping and protection on the valves should not be removed until the valve is ready for installation. If protective end caps are removed for the examination of the valve internals, they should be refitted immediately.

We recommend storing the valves indoor, in a dry and dust free atmosphere. Avoid any accidental damage during storage.



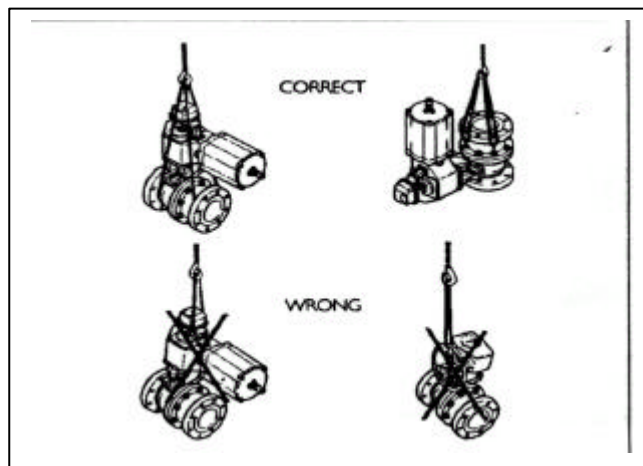
2.1 Storing the Valve

If the valves are stored for a longer time, then all the valves should be cleaned and hydrostatic/pneumatic shell/seat tested before installation in consultation with the Factory / Branch Office.

CAUTION!

When handling the valve or the valve package, bear in mind its weight.

Place the rope securely around the valve body or use lifting hooks (provided for valves greater than 250 kg.) while handling the valve. Special care should be taken not to damage the lever or gearbox or actuator.



2.2 Lifting of Valve

3. Do's and Don'ts

Note: User should ensure that he has read and understood the Do's and Don'ts before Installation, Operation and Maintenance of the valve is carried out. In case of any clarification contact the Factory /Branch Office.

Do's

- Use the valve for the specified application as agreed between the manufacturer & the purchaser.
- Read Installation, Operation and Maintenance manual before installing, operating or repairing any valve.
- The purchaser / end users should train their employee for the safe use of the valve.
- Ensure that nuts/bolts are tightened to specified torque value.
- Periodically ensure the electrical continuity of the valve.
- Open or close the valve slowly to avoid hammering effect on the valve and the pipeline.
- Always replace the damaged parts with genuine and recommended parts only.



- Be aware of the type of media & the environment (explosive, highly flammable, toxic, oxidising etc.) in which the valve is to be used. Protect the peoples & the environment from any harmful or poisonous substances.
- Carefully read the Cautions / Warning plates on the valve.
- Customer to take care of residual hazard (if applicable or as informed by the manufacturer) at his premises to avoid any major damage.
- The valve body may be very hot or very cold during use. Protect the people against burns or cold injuries.

Don'ts

- Specification of the valve is marked on the body or on the nameplate or both, prior to shipment. Users to ensure that the maximum operating conditions are not exceeded.
- Do not keep the valve open at any intermediate position.
- Do not try to rectify the valve leakage by reworking of seats. Leaking seats have to be replaced with the new Virgo genuine seats.
- The threaded connections of the valve body for the drain and the vent lines are sealed by threaded plugs. These plugs should not be removed as long as the valve is under pressure.
- Modification in the valve should not be carried out.

4. Installation

Before installing a new valve in the line, make sure that the valve should be checked for identification purpose and ensure that characteristics of the valve matches to those specified for piping specifications, for the line where that is to be mounted. Nameplate instructions and Tag plates will give the necessary information. If this information is missing, consult Factory/Branch office.

When taking out the valve from storage a careful check should be made to ensure that the valve is not being damaged during the storage period.

Before installation of the valves, remove the end protectors & check that serrations on flange face are not damaged and the valve bore is clean. Clean the valve, if necessary.

CAUTION!

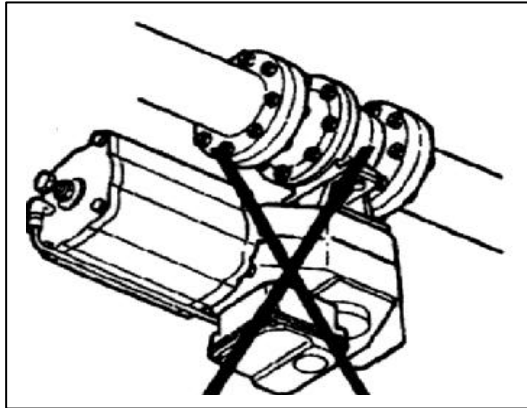
- **Ensure pipeline is fully cleaned before installation of the valve into the pipeline. pipeline debris, scaling, etc will damage the soft seat inserts of the valve and cause seat leakage during commissioning.**
- **During commissioning and pipeline flushing, valve should be kept fully open to prevent damage to the internal parts.**

***Note:** One way to prevent damage to the valve during flushing and testing of pipelines is to substitute them by spool pieces. If use of spool pieces is not possible, it is essential that the valve is kept in fully open condition and it is also advisable to install temporary strainers at critical places to protect soft Seats of the valves from solid particles.*

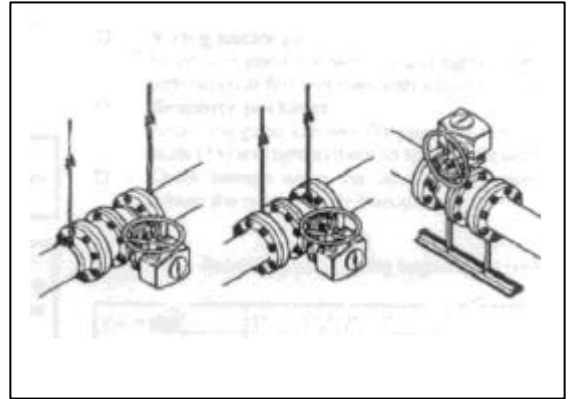
Ball valves are designed for bi-directional flow unless the ball is drilled for cavity relief. For the ball with cavity relief hole, ensure that the installation of the valve is correct with respect to flow direction arrow marked on valve.

Valves can be mounted in a horizontal (with stem upwards only) or vertical position depending on the pipeline routing. However we do not recommend installing the Valve with the Actuator on the underneath side because dirt in the pipeline may then enter the Body cavity and damage the gland packing.

It may be necessary to firmly support the pipeline in order to protect the valve from excess stress & to reduce the pipeline vibrations. To facilitate servicing, it is preferable that the valve should be supported by the body, using the pipe clamps and supports. Do not fasten supports to the flange bolting or to the actuator. Refer Figure No. 4.2.



4.1 Avoid this mounting position.



4.2 Supporting the valve

I. Flanged End Valves :

Don't attempt to correct the misalignment, by means of flange bolts.

During the tightening operation, ensure that piping stresses are not transferred to the valve.

Excessive over-tightening of flange studs can cause damage and/or leakage on the end flanges or body-to-body end joints.

II. Weld End Valves :

Note: A qualified Welder must do welding operation. The welding procedure should be according to ASME Boiler And Pressure Vessel Code Section IX.

CAUTION!

Don't allow temperature of the valve body seat area to exceed 200 °F (94°C) to prevent seat and seal damage during welding operation. It is recommended that thermal chucks are used to check the temperature.

Note : Any damage to the seats due to the temperature above 200°F (94°C) can cause the valve leakage. It is recommended that the customer keeps spares kit at his end.

CAUTION!

Ensure that weld spatter does not fall over ball & body seals. This may damage the sealing surfaces & seals.

After welding, flush the pipeline when the valve is in open condition to remove the weld spatter formed during welding and then operate the valve 3-4 times in order to ensure the proper operation of the valve.

Butt Weld End Valves :

Ensure a gap of 0.08" to 0.12" between the valve ends and pipeline as per ASME welding standard and tack weld the pipeline and the valve ends. After ensuring the proper alignment between the pipeline and the valve, weld the valve end.

5. Operation of the Valve :

For lever operated valves, the hand lever is either assembled with the valve or shipped loose depending upon the size of the valve / handlever.

For gear operated valves, **THE GEARBOX OPEN / CLOSE ADJUSTMENT HAS BEEN DONE PRIOR TO DESPATCH AND MUST NOT BE DISTURBED.** Rotation of handwheel in the clockwise direction closes the valve and counter clockwise rotation opens it (Looking from handwheel end). The details of gear box are shown in the Figure No. 5.1. The internal details/construction of gearbox may vary as per manufacturers standard.

CAUTION!

Ensure that the force applied on the handwheel of the gearbox or lever shall not exceed 360 N.

Note: Do not apply extra leverage (using pipe/bar), when the end stops of the gearbox are reached to its final setting position.

Virgo ball valve always closes in clockwise direction. The ball should always be rotated through 90 ° to the fully opened or fully closed position.

CAUTION!

Keeping the Valve at any intermediate position should specially be avoided, as high fluid velocity through the narrow opening will produce erosion of seats, ball & even the body.

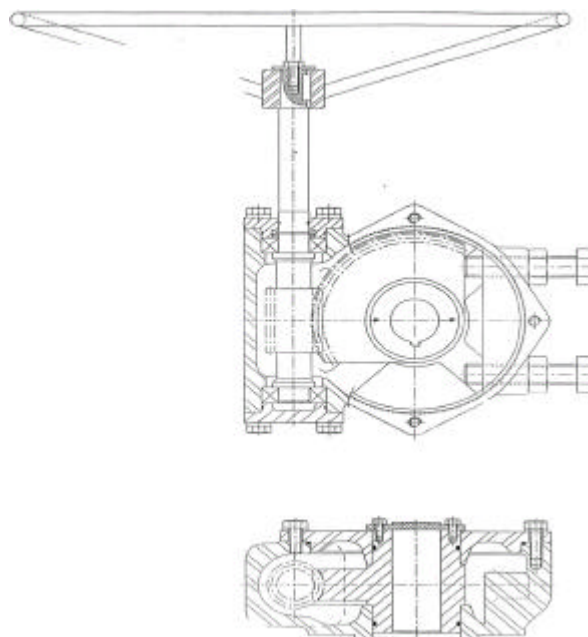


Fig No. 5.1 : Details of Gearbox.

6. Maintenance :

CAUTION!

Observe the Cautions/Safety precautions before carrying out the maintenance.

Routine checks by the user

- The following points will give guidelines for routine maintenance.
- Check the tightness of nuts/bolts between the body/body adapter, the bracket/stem housing, and the body/trunnion.
- Ensure that the performance of the valve is satisfactory.
- Ensure the electrical continuity of the valve.
- Ensure that no leakage is being observed from the valve.
- Frequent observation is recommended under extreme application / condition.
- Periodically flush the sealant ports with suitable valve cleaner to flush debris from the sealant system.
- Mounting studs/nuts of the worm gearbox may be checked for tightness and retightened if necessary.

Preventive Maintenance

In order to avoid valve failure during operation, all valves in a process plant should be periodically inspected thoroughly to detect the wear of ball, seats, seals and even the body. It is recommended that on such occasion's seats, gaskets, seals and packing should be replaced. Check the electrical continuity of the valve and the pipeline.

The type of process, fluids involved, working conditions and location of the valves in the process plants, will determine the frequency of this periodic inspection / maintenance which in fact will be made at the time of partial or total shutdown of the plant. Preventive maintenance is absolutely essential as the failure due to lack of the same may cause an emergency shut down of the plant.

The procedure for disassembly, repair and reassembly of the valve is given separately.

The procedure will be the same for a valve failing during operation due to lack of preventive maintenance, changes in process conditions or fluids, or by some other cause.

Before removing the valve from the pipe, it is important to mark the relative position of the valve flange with respect to pipeline flange and the flow of direction of the valve.

Once a the valve is repaired, it should undergo a complete set of tests to make sure that the valve is adequate for the original working conditions. Hydrostatic/pneumatic shell/seat tests should be carried out as per the specifications relevant to the valve (Refer general arrangement drawing).

Note:

If the customer wants to send the valve to the manufacturer for servicing, do not dismantle it. Instead, clean the valve carefully of all media and inform the manufacturer of any dangerous media involved

Sealant Injection feature in Trunnion Mounted Ball Valves :

Secondary sealant injection system is used only when damage has been caused to the seat rings or stem seals by the hard particles or dirt in the process media and a temporary tight shut off is required for maintenance or other purpose. Use standard grades of the valve sealants, which are suitable for the media in the valve. Sealant is to be pushed with a hand

pump on the seat surface through the sealant injection port provided on the valve body and stem housing. Prior to injecting sealant, flush the sealant port with suitable valve cleaner. This will purge old sealant and debris if any, from the valve seats.

Procedure for emergency sealant injection.

Note: Sealant injection is to be carried out only if the valve seats or stem packing are leaking.

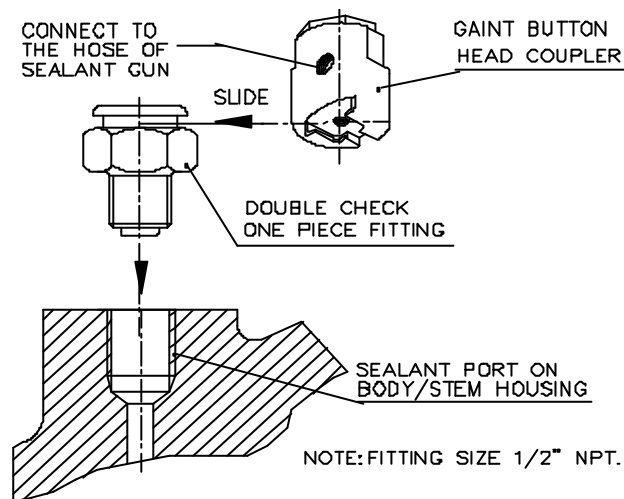
Trunnion mounted pipeline valves of sizes 6" NB and above are provided with two sealant injection ports on the body/body adapter for individual seats and one sealant injection port on the stem housing. Each port provided on the body provides sealant entry to the valve seats. The port provided on the stem housing provides sealant entry to the stem sealing area. The ports are fitted with double-check one piece fitting.

Injecting Handgun: Sealant is injected by connecting the outlet fitting of the handgun to the sealant injection port.

Sealant should be injected only when the valve is in closed position to ensure effective sealing of damaged seat.

Refer sealant injection fitting arrangement is shown in Figure No. 6.1. Slide the giant button head coupler which is integral with the hose of sealant injection gun, over a double - check one-piece fitting. Now the arrangement is ready for injection of the sealant.

After the completion of sealant Injection operation, slide away the giant button head coupler, which is integral with the hose of sealant Injection gun from the double-check one piece fitting.



Lubrication of Worm Gear Box

Worm gear boxes are supplied with grease filled. Normally the grease is suitable for -20°C (-4°F) to 80°C (176°F). For other applications, consult the Factory/Branch Office. Grease should be changed as under: If operated frequently, after approx. 3 years.

If operated rarely, after approx. 5 years.

The primary reducing spur gear unit attached to main worm gearbox should be re-greased at least annually.

CAUTION!

Disassembly of the gearbox should be done only by experienced / trained operators.

7. Trouble Shooting :

The following table lists the possible malfunctions that might occur after prolonged use.

Symptom	Possible fault	Actions
Leakage through a closed Valve	Damaged ball surface	Replace the ball.
	Damaged seats	Replace seats.
	Ball might not be closed fully	Check ball Open/Close settings.
Irregular ball movement	Impurities between the ball and seats or ball – body cavity and ball Seats.	Flush the ball from inside.
		Clean the sealing surfaces and seats.
Valve too hard to operate / valve torque too high	Damaged seats	Replace the seats.
	High application pressure / temperature	Confirm the application pressure /temperature rating.
	Foreign particles in Valve	Clean the internals.
Water hammer or noisy operation	Error in valve sizing or flow of fluid with high velocity.	Confirm valve sizing with respect to flow.
Leakage through stem	Gland nut loose	Tighten gland nut.
	Damaged stem, stem sealing surface	Replace the stem.
	Damaged stem seal	Replace the stem seal.

Ordering the spares

When ordering for spare parts, always convey the following information.

Size of the valve	}	Available on name plate or body of the valve
Valve rating		
Sr. No. / Batch No.	}	Available on general arrangement drawing
Mfg. Date		
Part No.	}	Available on general arrangement drawing
Name of the part		
Number of pieces required.		
P. O. Number		

Note: Selection and use of the valve for a specific application requires close consideration of detailed aspects. Due to the nature of the product, this manual cannot cover all the individual situations that may occur when installing, using or servicing the valve.

Disassembly

CAUTION!

Pipeline and valve must be depressurized by shutting off the valves & the bleed line, then cycling the valve once & leaving it half open to relieve the pressure from the body cavity.

Note: Recommended spare parts are listed on the exploded view. These parts should be stocked to minimise the down time.

Follow these steps to disassemble the valve:

1. Remove the valve from pipeline. Ensure that the valve should be in closed position for disassembling.
2. Keep the valve in a vertical position on plane & clean surface, taking care that end flange sealing surface should not be damaged.
3. For gear operated valves, remove the gear operator (35) by removing nuts (39). Then remove the studs (38). Also, remove the bracket (36) by removing the nuts (39) & the studs (38). Then, remove the coupling (37) & the keys (31) from the stem (04).
For lever operated valves, remove the handle coupler (42) with the lock & stop plate (40) by removing the hex bolt/grub screw (43) from stem (04).

Note: During this operation, care shall be taken not to damage the stem & key.

4. Remove the nuts (body) (19) in a crisscross pattern & lift the body adapter (02) along with the seat (05) taking care not to damage internals.
5. Remove the gland (21) by removing cap screws (22).
6. Remove the nuts (stem housing) (16) & studs (stem housing) (17).
7. Lift the stem (04) along with stem housing (09) from the body.
8. Remove the 'O'ring (stem housing)(14) & gasket (stem housing) (12).
9. Remove the stem from stem housing.
10. Remove 'O' ring (stem) (13) & thrust washer (stem) (20).
11. Remove the trunnion (23) by removing the cap screws (26).
12. Remove the antistatic spring (28), the thrust washer (trunnion) (27), the gasket (trunnion)(24) & the 'O'-ring (trunnion) (25).
13. Remove the ball (03) from the body.

Note: Be careful not to damage the ball & the body seat area, otherwise leakage could result, even when new seats are installed. Always place the ball on a soft liner on a table & prevent it from rolling.

14. Remove bush bearing (10) from bearing bore in ball on both stem & trunnion side.
15. Remove the 'O'-ring (body adapter) (07) & gaskets (body)(08) from the body adapter.
16. Remove the seat+insert (05) from the body & body adapter.
17. Remove the springs (29), seat 'O'-ring (06) from the seat..
18. Where applicable the sealant injection fittings [(stem) (30) & (seat) (32)] & drain/vent plugs (32) may be removed for cleaning.

Note: After the complete disassembly of the valve, all the components should be stored in a clean place to avoid damage.

Reassembly

1. Clean & inspect all the parts for damage & change any part if in doubt.

Note: If complete disassembling becomes necessary, replacement of all seats & seals is recommended.

2. Place the body on plane & clean wooden surface.
3. Coat body studs (12) with anti-corrosive paste.
4. Place the body adapter with end flange surface resting on clean wooden surface.
5. Place the springs in holes provided on body & body adapter or seats & fit 'O'-rings on the seats.

6. Fit the seat 'O'-rings on the seats. Lower the seats in the body & body adapter.
7. Fit the 'O'-ring (body adapter) & the gasket (body) (08) on the body adapter.
8. Fit the 'O' ring (stem) & thrust washer (stem) on stem.
9. Locate the stem in the stem housing.
10. Fit the 'O'ring (stem housing) & gasket (stem housing).
11. Fit the antistatic spring, the thrust washer (trunnion), the gasket (trunnion) & O'-ring (trunnion).
12. Fit the bush bearing (10) into the recess in ball on both stem & trunnion side.
13. Lift the ball & lower it into the body in the appropriate position.
14. Locate the trunnion in ball recess & tighten the cap screws.
15. Lift the valve & place it so that the direction of the flow axis is horizontal.
16. Locate the dowel pins & place the stem housing on the body, so that the stem housing fits into the bush bearing & stem flats locates in the ball slot.
17. Place & tighten the cap screws for stem housing.
18. Fit the body adapter with seat to the body & tighten the nuts.
19. Fit the gasket (stem) in the stem housing recess.
20. Place the gland on the stem housing & tighten the cap screws.
21. Fit the stem key in stem key way.
22. For lever operated valves, place the hand coupler with lock & stop plate on the stem & tighten the hex bolt/grub screw.
For gear operated valves, place the coupling on the stem, place the bracket on the stem housing, fit the studs & tighten the nuts. Place the gear operator on the coupling & the bracket, fit the studs & tighten the nuts.
23. Where applicable, fit sealant injection fittings [(stem) & (seat)] & the drain/vent plugs.
24. Rotate the ball slowly back & forth to a full quarter turn. This will allow the seat to assume its permanent position & shape against ball & body. A fast turning motion may damage the seat before it has a chance to form a proper seal.

Note: When the hand lever or the gear operator is re-assembled on the valve, it may be necessary to adjust the hand lever or gear operator travel stops to ensure proper setting of the ball in the open and closed position. Check proper assembly of the key in the key way.

CAUTION!

Follow safety rules & regulations to avoid personal injury or equipment damage.

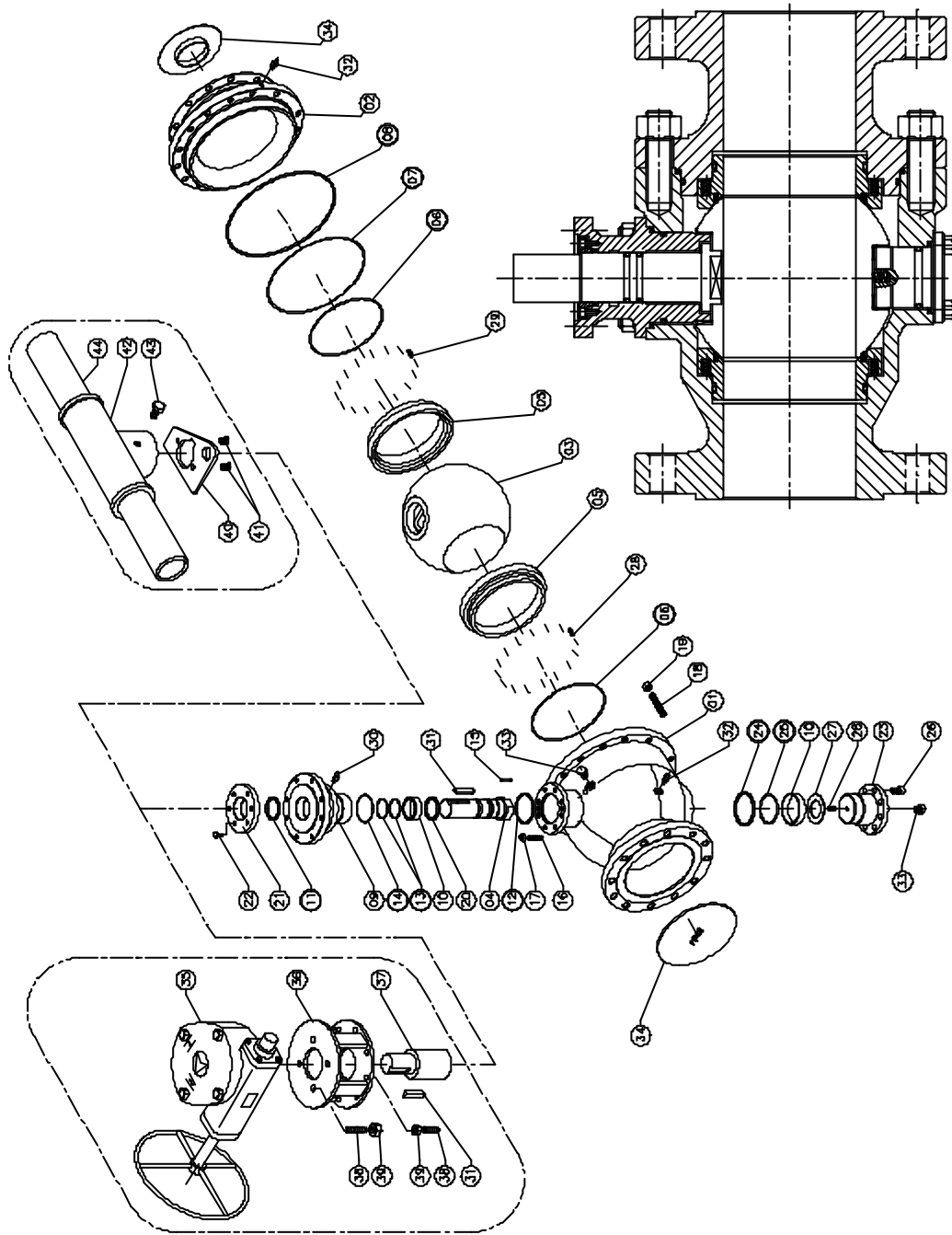
Fastener Torques

RECOMMENDED TIGHTENING TORQUES, Kg.m (N.m)

Thread Size	Property Class 8.8	Property Class 10.9	Property Class B7/B7M/B8/B8M
M8	2 (20)	2.9 (28)	0.6 (6)
M10	4 (40)	5.7 (56)	1.2 (12)
M12	7 (69)	10 (98)	2.2 (22)
M14	11.3 (111)	15.9 (156)	3.6 (35)
M16	17.2 (168)	24.2 (237)	5.4 (53)
M18	24.4 (239)	34.3 (336)	7.7 (76)
M20	33.5 (329)	47.2 (463)	10.7 (105)
M24	57.9 (568)	81.5 (799)	18.5 (181)
M27	87.5 (858)	123 (1207)	27.8 (273)
M30	115.9 (1137)	163 (1599)	36.9 (362)

Note: Ensure that all the nuts/bolts are tightened to the torque values as specified in this Table.

Exploded View



PART LIST	
01	BODY
02	BODY ADAPTER
03	BALL
04	STEM
05	SEAT-INBERT
06	O RING (SEAT)
07	O RING (B/A)
08	BODY GASKET
09	STEM HOUSING
10	BUSH BEARING
11	GASKET (STEM)
12	GASKET (STEM HOUSING)
13	O RING (STEM)
14	O RING (STEM HOUSING)
15	DOWELL PIN
16	STUDS (STEM HOUSING)
17	NUTS (STEM HOUSING)
18	STUDS (BODY)
19	NUTS (BODY)
20	THRUST WASHER (STEM)
21	GLAND
22	CAP SCREW
23	TRUNNION
24	GASKET (TRUNNION)
25	O RING (TRUNNION)
26	CAP SCREW
27	THRUST WASHER (TRUNNION)
28	ANTISTATIC SPRING
29	SPRINGS (SEAT)
30	INJECTION FITTING (STEM)
31	KEY
32	INJECTION FITTING (SEAT)
33	DRAIN/VENT PLUG
34	PROTECTIVE END CAP
FOR GEAR OPERATED	
35	GEAR OPERATOR
36	BRACKET
37	COUPLING
38	STUDS
39	NUTS
FOR HAND LEVER OPERATED	
40	LOCK & STOP PLATE
41	C/SUNK SCREW
42	HANDLE COUPLER
43	HEX BOLT / CRUB SCREW
44	PPE

NOTE :
ITEMS 35 & 36 ARE ELIMINATED IN CASE OF DIRECT MOUNTED GEAR BOX (34) ON VALVE STEM HOUSING (09)
● RECOMMENDED SPARE PARTS

Disassembly

CAUTION!

Pipeline and valve must be depressurized by shutting off the valves & the bleed line, then cycling the valve once & leaving it half open to relieve the pressure from the body cavity.

Note: Recommended spare parts are listed on the exploded view. These parts should be stocked to minimise the down time.

Follow these steps to disassemble the valve:

1. Remove the valve from pipeline. Ensure that the valve should be in closed position for disassembling.
2. Keep the valve in a vertical position on plane & clean surface, taking care that end flange sealing surface should not be damaged.
3. For gear operated valves, remove the gear operator (34) by removing nuts (38). Then remove the studs (37). Also, remove the bracket (35) by removing the nuts (38) & the studs (37). Then, remove the coupling (36) from the stem (04) & the keys (30).
For lever-operated valves, remove hand lever (40) by removing the cap screw (39).

Note: During this operation, care shall be taken not to damage the stem & key.

4. Remove the ISO mounting flange by removing cap screw (21) & dowel pin (15).
5. Remove the body nuts (18) in a crisscross pattern & lift the body adapter (02) along with the seat+insert (05) taking care not to damage internals.
6. Lift the valve, place it so that the end flange surface of second body adapter is facing upward & remove it as mentioned above.
7. Remove the stem housing cap screws (16) & dowel pin (15).
8. Lift the stem (04) along with stem housing (09) from the body.
9. Remove the 'O'ring (stem housing)(14) & gasket (stem housing) (12).
10. Remove the stem from stem housing.
11. Remove 'O' ring (stem) (13) & thrust washer (stem) (19).
12. Remove the trunnion (22) by removing the cap screws (25).
13. Remove the antistatic spring (27), the thrust washer (trunnion) (26), the gasket (trunnion)(23) & the 'O'-ring (trunnion) (24).
14. Remove the ball (03) from the body.

Note: Be careful not to damage the ball & the body seat area, otherwise leakage could result, even when new seats are installed. Always place the ball on a soft liner on a table & prevent it from rolling.

15. Remove bush bearing (10) from bearing bore in ball on both stem & trunnion side.
16. Remove the 'O'-ring (body) (07) & body gaskets (08) from both the body adapters.
17. Remove the seat+insert (05) from both the body adapters.
18. Remove the springs (28), the seat 'O'-ring (06) from the seat.
19. Where applicable the sealant injection fittings [(stem) (29) & (seat) (31)] & drain/vent plugs may be removed for cleaning.

Note: After the complete disassembly of the valve, all the components should be stored in a clean place to avoid damage.

Reassembly

1. Clean & inspect all the parts for damage & change any part if in doubt.

Note: If complete disassembling becomes necessary, replacement of all seats & seals is recommended.

2. Place the body on plane & clean wooden surface.
3. Coat body studs (12) with anti-corrosive paste.
4. Place both the body adapter with end flange surface resting on clean wooden surface.

5. Place the springs in holes provided on body adapter or seat & fit the 'O'-ring on seat.
6. Fit the seat 'O'-ring on the seats. Lower the seats in the body adapters.
7. Fit the 'O'-ring (body) & the body gaskets on both the body adapters.
8. Fit the 'O' ring (stem) & thrust washer (stem) on stem.
9. Locate the stem in the stem housing.
10. Fit the 'O'ring (stem housing) & gasket (stem housing).
11. Fit the antistatic spring, the thrust washer (trunnion), the gasket (trunnion) & 'O'-ring (trunnion).
12. Fit the bush bearing (10) into the bearing bore in ball on both stem & trunnion side.
13. Lift the ball & lower it into the body in the appropriate position.
14. Locate the trunnion in ball recess & tighten the cap screws.
15. Lift the valve & place it so that the direction of the flow axis is horizontal.
16. Locate the dowel pins & place the stem housing on the body so that the stem housing fits into the bush bearing & stem flats locates in the ball slot.
17. Place & tighten the cap screws for stem housing.
18. Fit both the body adapters with seat to the body & tighten the nuts.
19. Fit the gasket (stem) in the stem housing recess.
20. Locate the dowel pins, place the ISO mounting flange on the stem housing & tighten the cap screws.
21. Fit the stem key in stem key way.
22. For lever operated valves, place the hand lever on the stem & tighten the cap screw.
For gear operated valves, place the coupling on the stem, place the bracket to the ISO mounting flange, fit the studs & tighten the nuts. Place the gear operator on the coupling & the bracket, fit the studs & tighten the nuts.
23. Where applicable, fit the sealant injection fittings [(stem) & (seat)] & drain/vent plugs.
24. Rotate the ball slowly back & forth to a full quarter turn. This will allow the seat to assume its permanent position & shape against ball & body. A fast turning motion may damage the seat before it has a chance to form a proper seal.

Note: When the hand lever or the gear operator is re-assembled on the valve, it may be necessary to adjust the hand lever or gear operator travel stops to ensure proper setting of the ball in the open and closed position. Check proper assembly of the key in the key way.

CAUTION!

Follow safety rules & regulations to avoid personal injury or equipment damage.

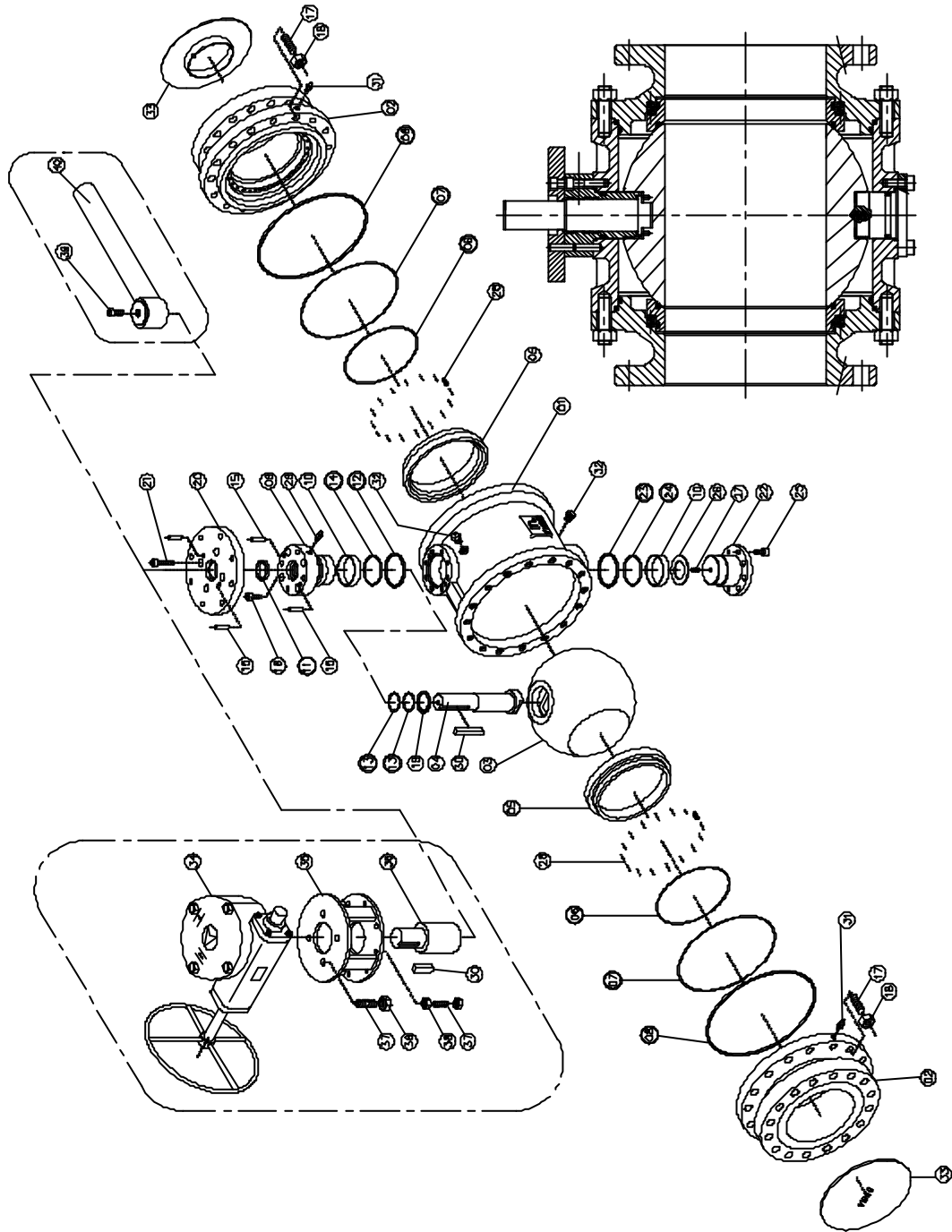
Fastener Torques

RECOMMENDED TIGHTENING TORQUES, Kg.m (N.m)

Thread Size	Property Class 8.8	Property Class 10.9	Property Class B7/B7M/B8/B8M
M8	2 (20)	2.9 (28)	0.6 (6)
M10	4 (40)	5.7 (56)	1.2 (12)
M12	7 (69)	10 (98)	2.2 (22)
M14	11.3 (111)	15.9 (156)	3.6 (35)
M16	17.2 (168)	24.2 (237)	5.4 (53)
M18	24.4 (239)	34.3 (336)	7.7 (76)
M20	33.5 (329)	47.2 (463)	10.7 (105)
M24	57.9 (568)	81.5 (799)	18.5 (181)
M27	87.5 (858)	123 (1207)	27.8 (273)
M30	115.9 (1137)	163 (1599)	36.9 (362)

Note: Ensure that all the nuts/bolts are tightened to the torque values as specified in this Table.

Exploded View



PART LIST	
01	BODY ADAPTER
02	BODY ADAPTER
03	BALL
04	STEM
05	SEAT-INSERT
06	O RING (SEAT)
07	O RING (B/A)
08	BODY GASKET
09	STEM HOUSING
10	BUSH BEARING
11	GASKET (STEM)
12	GASKET (STEM HOUSING)
13	O RING (STEM)
14	O RING (STEM HOUSING)
15	DOWEL PIN
16	CAP SCREW
17	STUDS
18	NUTS
19	THRUST WASHER (STEM)
20	ISO MOUNTING FLANGE
21	CAP SCREW
22	TRUNNION
23	GASKET (TRUNNION)
24	O RING (TRUNNION)
25	CAP SCREW
26	THRUST WASHER (TRUNNION)
27	ANTISTATIC SPRING
28	SPRINGS (SEAT)
29	INJECTION FITTING (STEM)
30	KEY
31	INJECTION FITTING (SEAT)
32	DRAIN/VENT PLUG
33	PROTECTIVE END CAP
FOR GEAR OPERATED	
34	GEAR OPERATOR
35	BRACKET
36	COUPLING
37	STUDS
38	NUTS
FOR HAND LEVER OPERATED	
39	CAP SCREW
40	HAND LEVER

NOTE :
ITEMS 35 & 36 ARE ELIMINATED IN CASE OF DIRECT MOUNTED GEAR BOX (34) ON VALVE ISO FLANGE (20)
RECOMMENDED SPARE PARTS

Customer	
Project	
Consultant	
P. O. No. and Date	
Work Order No.	
Date of Last Dispatch	
Date of Commissioning	

Guarantee :

“Our liability in respect of any defect in or failure of the goods supplied or for any loss, injury or damage attributable thereto is limited to making goods by replacement or repair defects which under proper use appear therein and arise solely from faulty materials and workmanship within a period of 18 calendar months after the original goods shall have been first despatched or 12 calendar months from the date of commissioning, whichever is earlier provided that such defective parts are returned free to our works for examination. The undertaking shall exclude any and every other obligation.”

In case of service / repair, please contact our nearest Branch Office / Factory.

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