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I & M 3L/T-2100F Series

Installation & Maintenance Instructions for Marwin 3L/T-2100F Series Three Way Ball Valves

Warning: Marwin Valve ball valves must only be used, installed and repaired in accordance with these Installation & Maintenance Instructions. Observe all applicable public and company codes and regulations. In the event of leakage or other malfunction, call a qualified service person; continued operation may cause system failure or a general hazard.

Please read these instructions carefully!

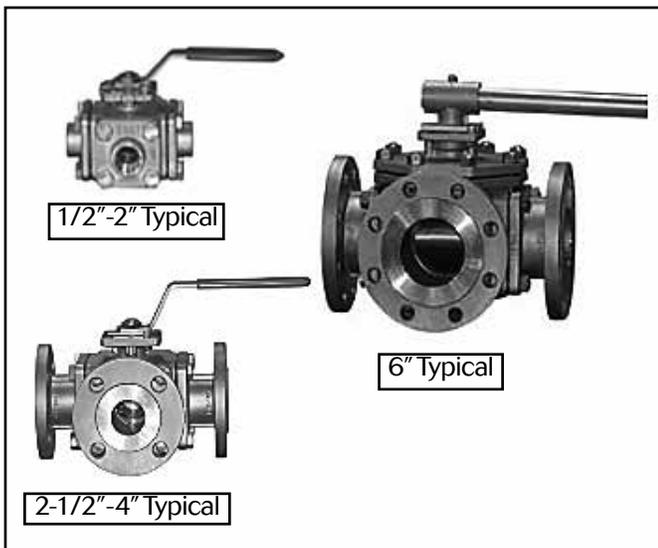
Your Marwin Valve product will provide you with long, trouble-free service if it is correctly installed and maintained. Spending a few minutes now reading these instructions can save hours of trouble and downtime later. When making repairs, use only genuine Marwin Valve parts, available for immediate shipment from the factory.

Scope

This manual is intended as a guide to assist customers in the storage, installation, and maintenance of Marwin 3L/T-2100F Series three way ball valves. Subsequent additions or special instructions will be provided for special ball valves, critical service or customer requirements.

Applicability

This manual is applicable to the 3L/T-2100F-A (threaded end) and 3L/T-2100F-F/G (flanged end) Series Marwin three way ball valves.



Caution

1. Valve pressure ratings are based on many variables, including valve series and size, as well as body, seat and bolt material. Verify that application does not exceed the pressure or temperature rating on the nameplate.
2. **Always** depressurize the line with the valve in the **OPEN** position before disassembly. Cycle valve in depressurized line before loosening bolts.
3. Wear protective equipment and take appropriate precautions to safeguard against injury caused by the discharge of trapped fluids.
4. Use only Marwin recommended spare parts for maintenance.
5. To ensure safety and maintain warranty, never modify valve in any way without prior approval from Marwin.

Storage

Lubricant is used on all internal surfaces. This may be removed with a solvent if found objectionable. All valves are adequately packed in a strong cardboard case in such a way as to avoid any possible damage during transport and storage.

If ball valves are not destined for immediate use, the following precautions should be taken:

1. If possible, leave the ball valves in their packing cases during the period of storage.
2. Ball valves must remain in open position during this time.
3. In order to prevent damage, protective plastic covers on valve ends should not be removed until immediately prior to installation.
4. It is advisable to store the valves in dry conditions. Ball valves should be protected to safeguard against humidity, moisture, dust, dirt sand, mud, salt spray and seawater.
5. Valves with actuators shall be stored in dry conditions.
6. Valves to be stored for a long period of time should be checked by the quality control personnel every six months; every three months when valves are automated.

Maintenance During Storage Period

- Internal surface should be inspected to check for dust or other foreign objects.
- Rust or dust must be removed by cleaning with proper solvent.
- After cleaning, ball valves must be lubricated with an adequate lubricant.
- Ball valves should be operated for at least two complete cycles before installing or returning to storage.

Installation

The ball valves may be installed in any position using standard pipe fitting practices. It is recommended that unions be installed before each end of threaded and welded multi-port valves for easy installation and removal.

Caution: Before installation of the valve:

1. Pipe must be free of tension both during and after installation.
2. Pipe must be flushed to clean dirt, welding residues, etc. which would damage ball or seats.
3. The valve should be kept in OPEN POSITION during installation and protective plastic covers should not be removed until the valve is installed.
4. Before shipment, the ball is lubricated with oil. This can be easily removed with an application compatible solvent if required.
5. If the valve was specified to be tested per ASME 16.34, there may be some trapped water between the ball and the body cavity. This can be removed by partially opening the valve, thereby exposing the cavity to the through port of the ball.
6. When installing automated ball valves, insure that the ball is in the proper position for the de-energized actuator.

Insure that the multi-port flow configuration is correct before installing valve. Refer to the Marwin product bulletin for available flow (port) configurations. Flow direction can be found on the top of the stem.

Multi-port ball valves are generally not recommended for throttling service because fluid now and the ball leading edge can damage the resilient seats.

Installation of Threaded End Ball Valves

1. Unless otherwise specified, pipe threads are American National Standard Taper Pipe Threads (NPT) per ANSI B1.20.1, and require that a pipe sealant be used.
2. Use an anti-seize thread sealant to seal and prevent galling
 - a. Marwin recommends PTFE-based liquid sealant or Grafoil tape as thread sealants.

- b. Use all pipe sealant products in accordance with the manufacturer's instructions and good piping practices.
 - c. Correct lubrication of stainless steel pipe threads is especially important to prevent galling.
3. To prevent distortion or damage to the valve, do not apply torque through the valve. when tightening valve, use wrench on the end nearest the pipe being tightened.
 4. Always leak test the system before using.

Installation of Flanged-End Ball Valves

1. Verify valve is in the full open position.
2. Use the appropriate size bolt and heavy hex nut.
3. Flange connection requires gasket (not included).
4. Follow gasket manufacturer's recommended practice for tightening flange bolts.

Installation of Weld-End Ball Valves

To avoid overheating and damaging the body seals and seats of weld end valves, the following procedure is recommended:

1. Tack weld the valve in line.
2. Loosen end cap fasteners, spread pipe, and drop the center section of the valve out of line.
3. Remove seats and seals from the end caps.
4. Weld end caps in line, using approved weld procedure for the material.
5. Reinstall center section.
6. Check valve for body joint leaks during system pressure test.

Note that this procedures require that the pipe can be spread, or that provisions have been made to weld the valve in a short section of removable pipe, and that a repair kit be available so that the end cap seals can be replaced if necessary.

Manual Operation

Reposition the valve by turning the handle one-quarter turn (90°). The top of the stem shows the open ports. Care must be taken to ensure valve open ports are oriented as needed. The handle stops can be oriented in 90° increments. A special stop plate is required for 180° rotation.

Automated Operation

A range of Marwin pneumatic and electric actuators are available. Refer to the Marwin product bulletin for operating torques for actuator sizing. When automated, no stop plate is fitted to the valve because the end stops are in the actuator. Depending on the port configuration, the pistons in spring return pneumatic actuators may need to be reversed for counter-clockwise spring rotation to insure the proper start/fail position.

When mounting an actuator in the field, it is good practice to manually operate the valve several times with a wrench to break the torque that may have built up during long term storage.

Maintenance

Before starting maintenance, please read the information contained in the Caution Section of this manual.

The maintenance frequency is determined based upon the application of the valve. User should consider the following factors when determining the maintenance time interval: fluid type, flow velocity, operation frequency, pressure and temperature.

1. Operate the ball valve at least once to completely release the pressure from valve body.
2. Ball valves, if correctly used, normally do not need any internal lubrication and maintenance. However, when necessary, ball or seats can be replaced by qualified personnel following the instructions of this manual.
3. Recommended spare parts are indicated in the parts table for Figures 1 and 2.

Valve Disassembly

Always depressurize the pipeline with the valve in the open position and cycle valve to remove media that might be trapped inside valve cavity before disassembling valve or removing it from pipeline.

To facilitate reassembly of the valve so that the operation is not changed, it is recommended that the orientation of the following be marked: stop plate (27, 28), stem (using port markings on top of stem as reference), and ball ports. In addition, each cap and cover should be match marked to the body so that everything is reassembled in the same location and orientation.

1/2" - 2" (Figure 1)

1. Remove handle nut (30), handle (29), saddle lock washer (24), stem nut (21), and Belleville washers (20).
2. Unbolt and remove three end caps (2) and one blank cap (3).
3. Lift ball (5) out of body (1), being careful not to damage ball.
4. Push stem (6) through body (1). Be careful to remove or secure anti-static ball and spring (7) so that they are not lost from stem.
5. Remove thrust washer (16) from stem shoulder or recess in body. Remove stem O-ring (17) from stem.
6. Remove packing gland (19), and packing (18), from packing chamber in body.

7. Remove body seals (10).
8. Remove seats (8) from caps (2) and (3).

2-1/2" - 6" (Figure 2)

1. Remove handle bolt (30), handle (29), handle adapter (28), stop pin nut (33), and stop pin (32).
2. (2-1/2" - 4") Remove threaded packing gland ring (22), using spanner wrench. Remove Belleville washers (20).
3. (6") Remove stop plate retainer ring (27a), and stop plate (27). Remove gland bolts (26), and gland (23).
4. Unbolt and remove three end caps (2), and one blank cap (3).
5. Lift bonnet (4) over stem (5) and out of body (1).
6. Lift ball-stem (5) out top of body (1), being careful not to damage ball.
7. Remove stem O-ring (17) from stem shoulder or recess inside bonnet.
8. Remove gland (19) and packing (18) from packing chamber in bonnet.
9. Remove four cap seals (10) and one bonnet seal (11) from body.
10. Remove seats (8) from caps (2) and (3).
11. Remove ball support (trunnion) bearing (9) from body (1).

Inspection and Replacement

Clean and inspect all components to be sure that they are free from foreign matter and pit marks, paying particular attention to the areas that must maintain a seal.

1. Ball: The surface of the ball should be free from any defect. If any are found, the ball should be replaced. Using a defective ball will be extremely detrimental to valve performance.
2. Seats: Replacement of seats is recommended.
3. Stem seals and body seals: stem and body seals should be discarded and replaced.
4. Remaining components of the valves: after cleaning, carefully examine for wear, corrosion, and mechanical damage. Pay particular attention to finished diameter on stem, stem seal areas on top cover, and gasket sealing surfaces on body, caps and cover. Replace all defective parts.

Valve Disassembly

Before reassembly, inspect the valve for any damage on body adaptor and all internals. Marwin recommends changing the seals and seats after disassembly.

Reassemble parts in original orientation.

Apply a suitable anti-seize coating to bolting to prevent galling.

1/2" - 2" (Figure 1)

1. Place new thrust washer (16), and stem O-ring (17), on stem (6), and insert through stem hole of body (1) from inside body. Install packing (18), packing gland (19), Belleville washers (20), and stem nut (21). Adjust stem nut so stem packing feels snug and firm.
2. Place ball (5) into body (1) cavity. Insure that ball ports are in proper orientation to body.
3. Insert seats (8) and seals (10) into caps (2) and (3).
4. Mount caps (2) and (3) on body (1) in proper orientation, and secure with bolts (12). Tighten fasteners in small increments in a diagonal pattern, and alternate between caps to compress seats evenly. Uneven force applied to the caps could cause seat compression to be too tight or too loose, affecting valve performance.
5. Install saddle lock washer (24), spacer ring (25), stop plate (27), handle (29) and handle nut (30).
6. Install stop bolt (32) and nut (33).

2-1/2" - 6" (Figure 2)

1. Replace ball support (trunnion) bearing (9) in body (1).
2. Place new stem O-ring (17) on stem (5), and place in body (1), engaging trunnion on bottom of ball in trunnion bearing (9). Insure that ball ports are in proper orientation to body.

3. Install bonnet seal (11) into groove on body (1). Install bonnet (4) over stem (5), and loosely secure with bolts (14) (2-1/2" - 4") or bolts and studs (6").
4. Install packing (18), packing gland (19), Belleville washers (20), and gland ring (22), using spanner wrench (2-1/2" - 4"); or gland flange and bolts (6"). Adjust stem packing to feel snug and firm.
5. Insert seats (8) and seals (10) into caps (2) and (3).
6. Mount caps (17) and (24) with seats and seals on body (20) in proper orientation, and secure with bolts (12) (2-1/2" - 4") or studs and nuts (6").
7. Tighten cap and bonnet fasteners in small increments in a diagonal pattern and alternate between covers to compress seats evenly. Uneven force applied to the caps could cause seat compression to be too tight or too loose, affecting valve performance.
8. Install stop plate (27) and stop plate retainer ring (6")(27a).
9. Install handle adapter (28), handle (29), and handle bolt (30).

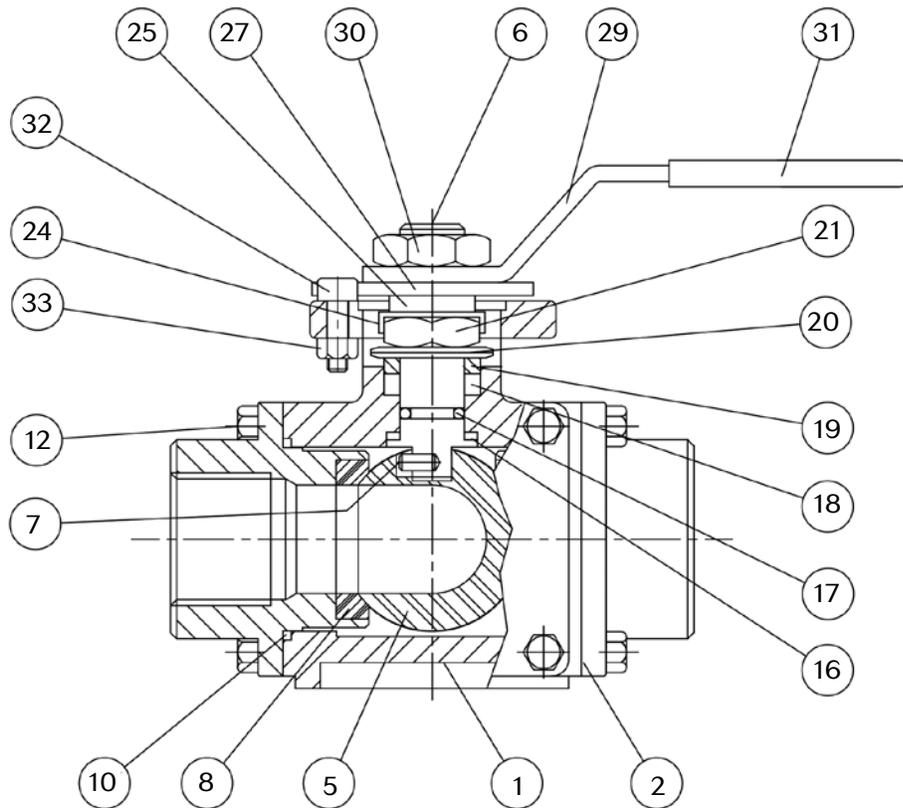
Testing

1. After completing the reassembly, check that the valve operates smoothly by opening and closing valve several times.
2. If entire valve was removed from line and if facilities are available, test the ball valve to appropriate specifications.

Troubleshooting

Symptom	Possible fault	Actions
Seat leakage through closed valve	Damage ball surface	Replace the ball
	Damaged seats	Replace seats
	Ball may not be closed fully	Check ball Open/Close setting
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 high velocity fluid flow	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
Leakage through body	Damaged O-ring or breakage of gasket	Replace O-ring / gasket
	Relaxation of studs due to gasket creep	Retighten the studs evenly in crisscross manner

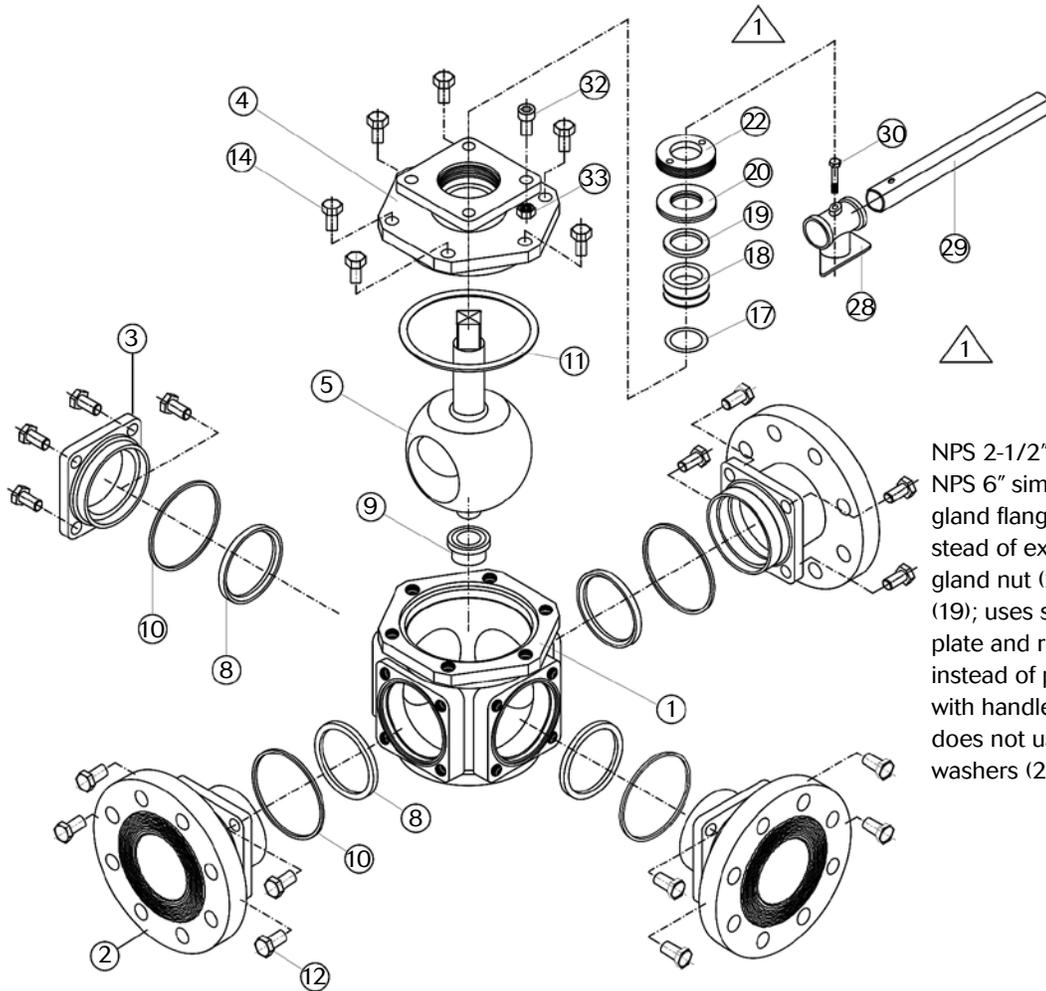
Figure 1. NPS 1/2" - 2" Typical Cross Section & Parts Callouts



ART1234

No.	Part Number	Material	No.	Part Number	Material
1	Body	CF8M / WCB	18	Packing*	PTFE
2	End Cap	CF8M / WCB	19	Gland Bushing	304SS
3	Blank Cap	CF8M / WCB	20	Belleville Washer	301 SS CSP
5	Ball	316 SS	21	Nut, Stem	304 SS
6	Stem	316 SS	24	Lockwasher, Stem Nut	304 SS
7	Pin, Locating	316 SS	25	Space Collar	304 SS
8	Seat*	PTFE	27	Stop Plate	304 SS
10	Seal, Cap*	PTFE	29	Handle	304 SS
11	Seal, Bonnet*	PTFE	30	Nut, Handle	304 SS
12	Bolt, Cap	Gr. B8 / Gr. B7	31	Cover, Handle	Vinyl
14	Bolt, Bonnet	Gr. B8 / Gr. B7	32	Stop Pin	304 SS
16	Thrust Washer*	PTFE	33	Nut, Stop Pin	304 SS
17	O-Ring, Stem*	Viton	* Recommended Spare Parts		

Figure 2. NPS 2-1/2" - 6" Typical Cross Section & Parts Callouts (2-1/2" - 4" shown)



NPS 2-1/2" - 4" shown. NPS 6" similar, but uses gland flange and bolts instead of external threaded gland nut (22) and bush (19); uses separate stop plate and retainer ring instead of plate integral with handle adapter (28); does not use Belleville washers (20)

ART1266

No.	Part Number	Material	No.	Part Number	Material
1	Body	CF8M / WCB	18	Packing, Stem*	PTFE
2	End Cap	CF8M / WCB	19	Gland Bush (2-1/2" - 4")	304 SS
3	Blank Cap	CF8M / WCB	20	Belleville Washer (2-1/2" - 4")	301 SS CSP
4	Bonnet	CF8M / WCB	22	OD Threaded Gland Nut (2-1/2" - 4")	304 SS
5	Ball / Stem	SS 316	23	Gland Flange / Gland (6")	CF8M / WCB
8	Seat*	PTFE	26	Bolt, Gland Flange (6")	304 SS
9	Bearing, Trunnion*	PTFE+SS	27	Stop Plate (6")	304 SS
10	Seal, Cap*	PTFE	27a	Retaining Ring, Stop Plate (6")	304 SS
11	Seal, Bonnet*	PTFE	28	Adapter, Handle	DI 65-45-12
12	Bolt (2-1/2" - 4") or Stud (6"), Cap	Gr. B8 / Gr. B7	29	Handle	Steel
13	Nut (6"), Cap	304SS / Steel	30	Bolt, Handle	304 SS
14	Bolt (2-1/2" - 4") or Stud (6"), Bonnet	Gr. B8 / Gr. B7	32	Pin, Stop (2-1/2" - 4")	304 SS
14a	Nut (6"), Bonnet	304SS / Steel	33	Nut, Stop Pin (2-1/2" - 4")	304 SS
17	O-Ring, Stem*	Viton	* Recommended Spare Parts		