

April 2011

Tartarini™ Trunnion Mounted Ball Valve

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Figure 1. Tartarini™ Trunnion Mounted Ball Valve



WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion, fire, and/or chemical contamination causing property damage and personal injury or death.

Tartarini™ ball valves must be installed, operated, and maintained in accordance with federal, state and local codes, rules and regulations, and Emerson Process Management Regulator Technologies, Inc. (Regulator Technologies) instructions.

If the ball valve vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Installation, operation, and maintenance procedures performed by unqualified personnel may result in improper adjustment and unsafe operation.

Either condition may result in equipment damage or personal injury. Use qualified personnel when installing, operating, and maintaining this ball valve.

Introduction

Scope of the Manual

This instruction manual provides ball valve installation, assembly, disassembly, maintenance instructions, troubleshooting guide, and parts ordering information for Tartarini™ Trunnion Mounted Ball Valve.

Description

The Tartarini Trunnion Mounted Ball Valve is a general-purpose block valve used for long-range natural gas, oil, petrochemical, and other chemical industry pipeline system. The ball valve is trunnion-mounted and is intended to function as a fully open or fully closed device.

Trunnion Mounted Ball Valve

Specifications

Body Sizes

DN 80, 100, 150, 200, 250, 300, 350, 400, 450, 500, and 600 / 3, 4, 6, 8, 10, 12, 14, 16, 18, 20, and 24-inches

End Connection Styles

CL150, CL300, and CL600

General Design Standard

Meets API 608 / API 6D standards

Pressure and Temperature Rating

Meet ASME B16.34 standards

Face-to-Face Dimensions

Meet ASME B16.10 standards

Flange Type and Dimensions

Meet ASME B16.25 standards

Inspection and Test

Meet API 598 / API 6D standards

Construction Materials

Refer to Tables 1 and 2

Approximate Weights

Refer to Table 8

C_v Flow Coefficients

Refer to Table 3

Working Temperature

-20° to 60°C / -4° to 140°F

Approximate Weights

See Table 8

Principle of Operation

The main function of the Tartarini Trunnion Mounted Ball Valve is to cut off or connect the flow of fluid in a pipeline system. Via the handwheel handle or other driving device, application of torque force allows the ball to rotate 90 degrees, enough to align the ball bore to the centerline passage of the ball valve body, thus allowing fluid to pass through it. Turning the driving device clockwise closes the valve while turning it counterclockwise opens the valve. The same principle applies to any driving device used. Refer to Figure 2.

Installation and Commissioning



WARNING

Personal injury or system damage may result if this ball valve is installed where service conditions could exceed the limits given in the Specifications section.

Additionally, physical damage to the ball valve may result in personal injury or property damage due to escaping of accumulated fluid. To avoid such injury and damage, install the ball valve in a safe location.

General Installation Instructions

Before installing the ball valve, thoroughly check the specifications stamped in the nameplate of the

ball valve body and other documents that come with it. Make sure that it matches the specifications being ordered and is consistent with the installation requirements of your company.

Inspect the ball valve chamber, its sealing surface, and other parts of the valve for any shipment damage. Make sure that it is free of any dirt or foreign materials that may have collected during shipment. Use clean, soft cloth to remove any the dirt before installation.

Note

Do not turn the driving device or switch the ball valve from open to closed position without making sure that the valve chamber is cleaned. Doing so may cause the valve and valve seat to be damaged by the dirt, rust, and other residual impurities.

Check if the operation of the valve's driving device moves freely from the fully open to fully closed position. Make sure that it is not jammed and its bolts and nuts are tight.

The ball valve is in the fully open position at the time of delivery. Before installing the ball valve in the pipeline, make sure it is in the fully open position.

When installing large-diameter ball valves, place the valve on a separate platform to function as its support in order to allow horizontal movement for the valve during installation. Do not let the pipeline bear the entire weight of the valve to avoid deformation of the pipeline system.

The ball valve may be installed either horizontally or vertically and in any location. However, make sure that

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Table 1. Construction Materials for Trunnion Mounted Ball Valve Cast Steel Body

PARTS	CAST STEEL SERIES	NACE SERIES	STAINLESS STEEL SERIES		LCC, LCB SERIES
	WCB	WCB	CF8, CF3	CF8M, CF3M	LCB, LCC
Body	A216-WCB	A216-WCB	A351-CF8 / CF3	A351-CF8M / CF3M	A352-LCB / LCC
Ball	A105+HCr	A105N+ENP	A182-F304 / F304L / +HCr (Nitriding)	A182-F316 / F316L / +HCr (Nitriding)	A182-F304 / CF8
	A216-WCB+HCr	A216-WCB+ENP	A351-CF8 / CF3 / +HCr (Nitriding)	A351-CF8M / CF3M / +HCr (Nitriding)	A352-LCB / LCC +HCr
Stem	F6A / F304	F304 / 316	A182-F304 / F304L	A182-F316 / F316L	A182-F304
Seat	RPTFE (<i>standard</i>) / NYLON (High-pressure) / PPL (High-temperature)				
Seat Retainer	A105+Zn	A105+ENP	A182-F304 / F304L	A182-F316 / F316L	A182-F304
Packing	PTFE / PPL				
Gasket	SS304+Graphite Spiral Wound Gasket				
Bearing	PTFE / 304				
Spring	17-7PH / Inconel X750				
Stud	A193-B7	A193-B7M	A193-B8	A193-B8 / B8M	A320-L7
Nut	A194-2H	A194-2HM	A194-8	A194-8 / 8M	A194-4

NOTES:
1. All materials conform to ASTM specifications.
2. Materials above are general valve design standards. Other materials not listed above may be provided. Please contact your local business partner for availability.

Table 2. Construction Materials for Trunnion Mounted Ball Valve Forged Steel Body

PARTS	CAST STEEL SERIES	NACE SERIES	STAINLESS STEEL SERIES		LF2 SERIES
	A105	A105N	A182-F304 / F304L	A182-F316 / F316L	A350LF2
Body	A105	A105N	A182-F304 / F304L	A182-F316 / F316L	A350LF2
Ball	A105+HCr	A105N+ENP	A182-F304 / F304L / +HCr (Nitriding)	A182-F316 / F316L / +HCr (Nitriding)	A350LF2+HCr
Stem	F6A / F304	F304 / 316	A182-F304 / F304L	A182-F316 / F316L	A182-F304
Seat	PTFE (<i>standard</i>) / NYLON (High-pressure) / PPL (High-temperature)				
Seat Retainer	A105+Zn	A105N+ENP	A182-F304 / F304L	A182-F316 / F316L	A182-F304
Packing	Flexible Graphite				
Gasket	SS304+Graphite Spiral Wound Gasket				
Bearing	PTFE / 304				
Spring	17-7PH / Inconel X750				
Stud	A193-B7	A193-B7M	A193-B8	A193-B8 / B8M	A320-L7
Nut	A194-2H	A194-2HM	A194-8	A194-8 / 8M	A194-4

NOTES:
1. All materials conform to ASTM specifications.
2. Materials above are general valve design standards. Other materials not listed above may be provided. Please contact your local business partner for availability.

the valve can be accessed easily during maintenance, repair, and operation.

The ball valve can be flanged or welded to the pipeline. The customer can choose whether to connect the ends with either bolt (flanged) or with weld.

For Welded Connections

Note

Do not install the ball valve while welding pipe fittings or connections, or immediately after any welding activity within the pipelines.

The valve's body is coated with anti-corrosion material. Remove this material before welding.

When welding the valve to the pipe, make sure that the temperature of the sealing member inside the valve will not exceed 140°C / 284°F. The safe distance between the weld and the valve seat sealing is shown in Table 6.

Do not allow any welding slag or foreign particles to enter the valve during the welding process. This might clog the seat and can cause damage to the valve seat during operation.

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Table 3. C_v Flow Coefficients

BODY SIZE		CL150	CL300	CL600
DN	Inch			
80	3	1300	1100	1000
100	4	2300	2200	1800
150	6	5400	5400	4500
200	8	10000	10000	8900
250	10	17800	17100	14500
300	12	26000	25000	22000
350	14	32000	31000	28000
400	16	44000	42000	39000
450	18	58000	56000	51000
500	20	75000	72000	66000
600	24	111200	102000	92000

NOTE: C_v indicates the gallons of water at 16°C / 60°F flowing through the valve bore in 0.0069 MPa / 1 psig differential pressure.

Table 4. Trunnion Mounted Ball Valve Torque

BODY SIZE		TORQUE (N•m)		
DN	Inch	CL150	CL300	CL600
80	3	120	210	360
100	4	180	330	600
150	6	400	680	1100
200	8	650	1100	2000
250	10	1100	1900	3600
300	12	1750	3000	5600
350	14	2500	4400	8000
400	16	3800	6200	11 000
450	18	5500	8000	18 000
500	20	7200	10 000	22 000
600	24	11 500	16 000	36 000

Table 5. Recommended Distance of the Weld Seam from the Valve Seal

VALVE SIZE		DISTANCE TO WELD SEAM	
DN	Inches	mm	Inches
80	3	50	1.97
100 - 200	4 - 8	70	2.76
250 - 400	10 - 16	90	3.54
>400	>16	150	5.91

Note: These data also apply to the preheating work before welding.

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WARNING

Personal injury, equipment damage, or leakage due to escaping fluid may result if valve bolts are not tightened to proper load.

For Flanged Connections

When installing the ball valve to the pipelines, tighten all the bolts evenly in a crisscross pattern.

Commissioning

The ball valve has been commissioned at the factory. Confirm with your engineering division if secondary commissioning of the valve is necessary.

Hydraulic Pressure Test



WARNING

The test pressure should not exceed 1.5 times of the rated or allowable operating pressure of the ball valve. However, do not exceed the maximum allowable pressure rating of the pipeline system or any equipment attached to it during Hydraulic Pressure Test.

Note

Use only clean water when performing hydraulic pressure test. Ensure that the pipeline system is free of foreign materials before the pressure test of the valve.

1. Ensure that the ball valve is in the fully open position and the pipeline system and ball valve are clean.
2. After filling the pipe with clean water, rotate the driving device clockwise to turn the ball valve to the closed position. Check for any leaks.
3. Slowly open the ball valve again to about 10 degrees by rotating the driving device counterclockwise. Through this, the pressure can evenly act on the valve seat. This will also protect the ball valve when test pressure exceeds the rated pressure of the valve.
4. After the hydraulic pressure test, turn the ball valve to the fully open position and empty out the water in the pipeline.

5. If the ball valve is equipped with test connection port, use this to drain the remaining water in the valve chamber. Open the test connection port then open the ball valve once or twice to ensure that all remaining water inside are drained. After draining, close the test connection port. If the ball valve is not equipped with test connection port, open the valve once or twice to ensure full drainage.

Startup



WARNING

To avoid possible personal injury, equipment damage, or leakage due to escaping fluid, make certain the ball valve is installed as instructed in the Installation section.



CAUTION

If the ball valve is equipped with test connection port, make sure that it is fully closed before pressurizing the valve.

Note

The valve is only intended to block or allow flow through the pipeline. The valve should only be used in either fully open or fully closed position. Do not use this valve to regulate flow by partially opening or partially closing the valve. The valve should not stay in a semi-open or semi-closed state for more than two minutes.

Do not use the ball valve in process conditions where the pressure, temperature, media and other technical conditions exceeds the limitations set by the valve's specification.

1. Check that proper installation is completed and any downstream equipment has been properly adjusted.
2. Ensure that the pipeline system is free of foreign material before the startup.
3. Make sure that the ball valve is fully turned to the open position before allowing fluid to pass through the valve.

Trunnion Mounted Ball Valve

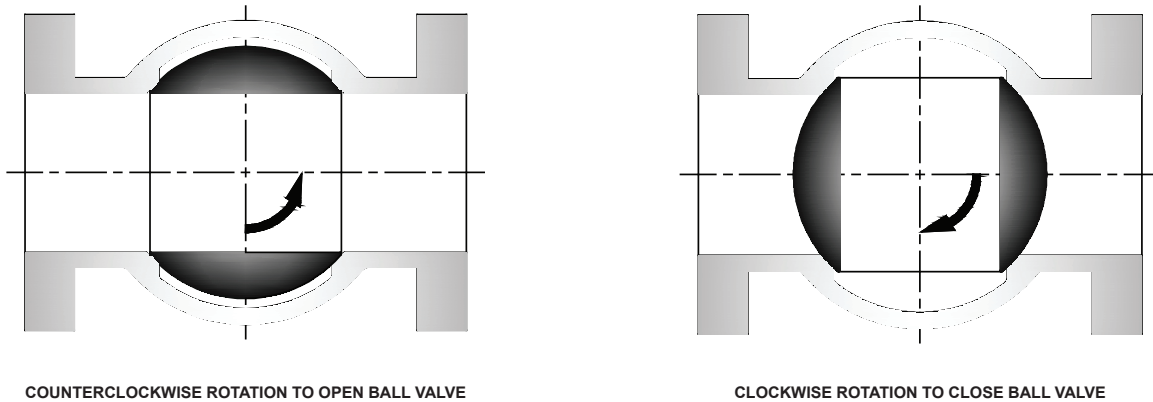


Figure 2. Ball Valve Opening and Closing Directions

Maintenance

WARNING

Personal injury, equipment damage, or leakage due to escaping fluid may result if seals are not properly lubricated or maintained. Due to normal part wear or damage that may occur from external sources, this ball valve should be inspected and maintained periodically. The frequency of inspection, maintenance, and replacement of parts depend upon the severity of service conditions or the requirements of local, state, and federal regulations.

Ball valves that have been disassembled for repair must be tested for proper operation before returning it to service. Only parts manufactured by Regulator Technologies should be used for repairing Tartarini™ ball valves.

Tartarini Trunnion Mounted Ball Valve does not need special care under normal condition. However, the following pointers help maximize the valve's life.

Note

In the repair/maintenance process, take appropriate protective measures, such as wearing protective clothing, oxygen masks, and gloves. Discharge

the residual materials inside the valve body before doing repair or maintenance procedure. For electric, hydraulic or pneumatic valves, ensure that these lines are shut off before performing maintenance.

- Switch the ball valve from fully open to fully closed or vice versa 2 to 3 times during longer operations and return it back to its original position. This should be done for at least once a year and/or during overhauling of the pipelines.

Note

The valves in the pipeline can only be fully opened or fully closed when running. Prohibit to take the valve for regulating or be in a semi-open or semi-closed state for more than 2 minutes.

When the ball valve has been opened and closed in place, do not continue to operate forcibly to avoid damage to the valve or drive.

- Regularly check if the ball valve is set at the desired position whether fully open or fully closed. If the ball valve cannot be switched to either fully open or fully closed position, valve service is required. If the ball valve's driving device needs replacement, simply remove the drive from the body. It is not necessary to disassemble the whole valve.

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- Do not use the valve stem or driving device to lift the ball valve. Do not use wrenches or any lever to operate the driving device of the valve.
- If the commodity conveyed in the pipeline contains residues and impurities, periodically discharge through the valve's drain. Water deposits for non-water service should also be drained out of the valve prior to winter season to avoid freezing.
- In order to avoid the dirt and residual substances to be carried downstream, set up a blow-off line in the valve's middle chamber to discharge the dirt and residues. If no blow-off line is installed, open the valve into half for discharging. Make sure that pipeline is under maintenance and there is no pressure on it when opening the valve and discharging the dirt.
- Regularly inject sealing grease into the valve stem to avoid from being stacked.
- The valve stem and connected parts should be cleaned regularly to ensure normal working condition. Refer to assembly or disassembly section when servicing valve parts.
- When repairing or maintaining the valve, open the relief valve and the drain plug to release the pressure in the middle chamber.
- After every operation, make sure to check valve parts for signs of wearing and corrosion especially the sealing surfaces or O-rings, seat, packing, and the body. Replace parts if necessary.
- For water or oil service it is recommended that inspection should be done every three months while for highly corrosive service, monthly inspection should be done.
- Lubricate valve body and moving parts annually.
- If the valve is equipped with driving device, conduct maintenance work as per maintenance instructions for driving device.
- Do not use the valve as a ladder or pedestal when reaching equipment located above the valve. Do not hang additional weight to the stem, drive or other related accessory of the valve.

Disassembly

WARNING

To avoid personal injury resulting from sudden release of pressure, isolate the ball valve from all pressure and cautiously release trapped pressure inside the valve chamber before attempting disassembly.

Ensure that the middle chamber of the valve is fully depressurized before dismantling or maintaining the valve. Pressure inside the pipe may be released, but the middle chamber may still have residual pressure. Open and then close the valve several times to ensure that the pressure in the valve is completely released.

If the media conveyed by the valve is toxic, inflammable, or explosive, make sure that there are no residual media left in the valve especially in the middle chamber. Flush the valve with water or the appropriate cleaning solvent to ensure the complete removal of the residual media. Open and then close the valve several times while flushing the valve.

Observe proper protective measures when dismantling the valve. If the media conveyed by the valve is toxic, inflammable, or explosive, always wear personal protective equipment to avoid any injury or accident. Keep the working site away from fire, sparks, or ignition especially if the media is combustible.

To disassemble the valve, start disassembling with the last part as outlined in the assembly section.

Place the dismantled parts on a soft mat. Do not allow it to have direct contact with the ground.

Mark the dismantled parts correctly to avoid confusion during the assembly. Do not drop or apply excessive force to the valve and its related parts to avoid damage or deformation of the components.

Store the dismantled parts in a safe and dry area if it will not be used for a long time in order to protect it and prevent the formation of rust.

Assembly

WARNING

Failure to properly follow the Assembly Instructions could result in ball valve damage, personal injury, and property

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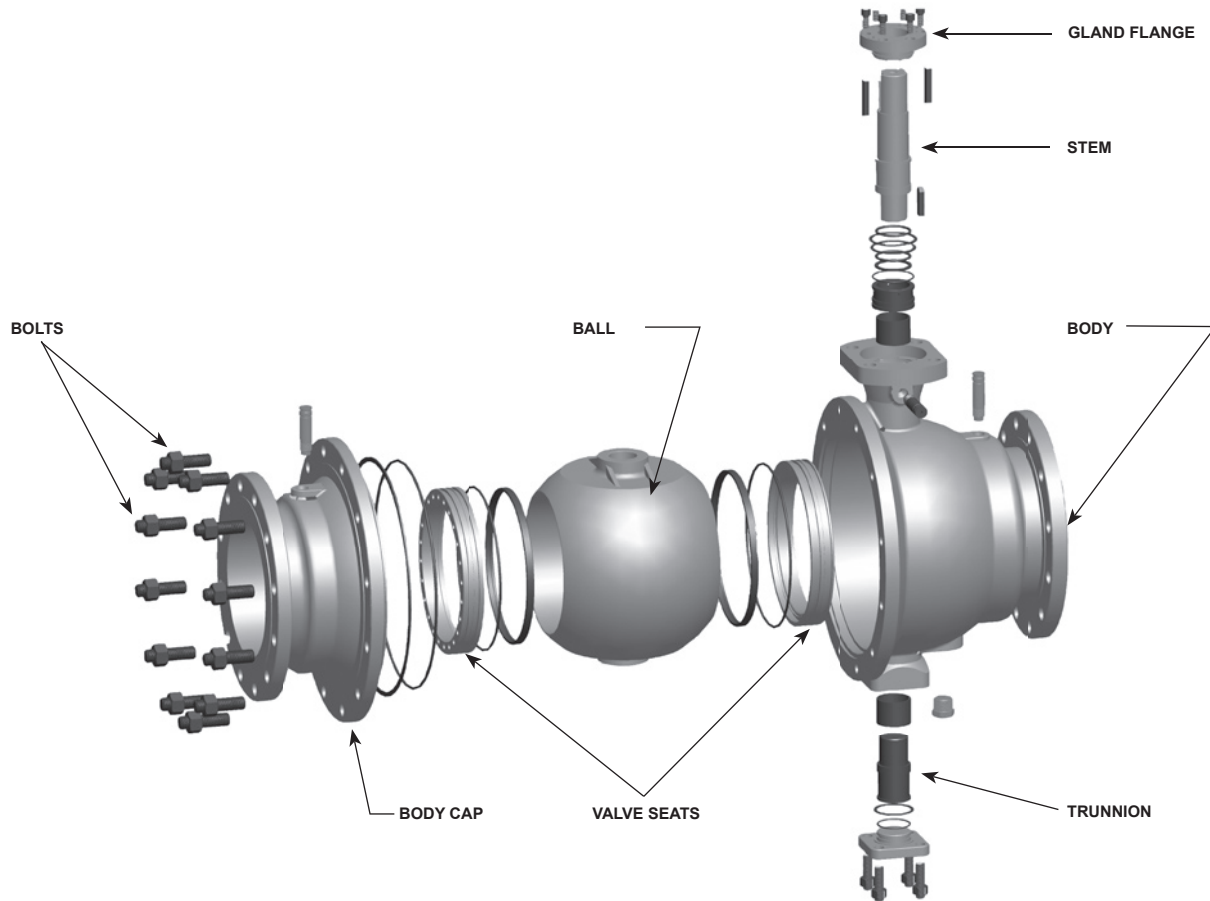


Figure 3. Exploded View of Tartarini™ Trunnion Mounted Ball Valve Assembly

damage due to escaping process fluid during testing, or after installing the ball valves in the pipe line.

Note

Before the performing the assembly work, clean all components of the ball valve and the working area. Ensure that there are no iron filings, rust, welding slag, and other debris inside the valve. Keep all valve parts and the working area clean all throughout the assembly process. The working area must be padded with any soft material or mat. Do not allow the valve body, its components, or any of its assembled parts to have direct contact with the ground.

Be careful with the lifting and moving of the ball valve's components. Excessive force applied to the assembly may

damage or deform the valve, its related parts, and its components which may cause the ball valve to malfunction.

1. Refer to the assembly drawing. Assemble the O-ring (key 8) and spring (key 9) into its corresponding location in the valve seat (key 6). Fit this assembly inside the valve body section (key 1). Also, assemble the other O-ring (key 8A) and spring (key 9A) into the other valve seat (key 6A) then fit this assembly into the body cap section (key 2). Place the remaining O-ring (key 10) and gasket (key 11) inside the cap section.
2. Place the ball (key 3) inside the valve body section (key 1). Connect the assembled body cap section (key 2) into the valve body section and secure it with stud (key 28) and nut (key 29). Tighten the bolts with a torque as specified in Table 6.
3. Place the antistatic components (keys 12 and 12A) in their position located at the lower stem trunnion (key 5) and fit them into the bottom part of the

Trunnion Mounted Ball Valve

Table 6. Recommended Torque Values for Tightening Flange Bolts

THREAD SIZE			TORQUE		THREAD SIZE			TORQUE	
MAJOR DIAMETER		THREADS PER INCH - COARSE (UNC)	ft•lbs	N•m	MAJOR DIAMETER		THREADS PER INCH (UN)	ft•lbs	N•m
Inch	mm				Inch	mm			
1/2	12.7	13	37-44	50-60	1-1/4	31.8	8	590-738	850-1000
9/16	14.3	12	52-59	70-80	1-3/8	34.9	8	811-959	1100-1300
5/8	15.9	11	74-96	100-130	1-1/2	38.1	8	1033-1328	1400-1800
3/4	19.1	10	118-155	160-210	1-5/8	41.3	8	1328-1623	1800-2200
7/8	22.2	9	207-243	280-330	1-3/4	44.4	8	1623-1918	2200-2600
1	25.4	8	310-369	420-500	1-7/8	47.6	8	2065-2434	2800-3300
1-1/8	28.6	8 UN	369-443	500-600	2	50.8	8	2581-3098	3500-4200

valve body (key 1). Make sure that head of the lower stem trunnion enters the hole underneath the ball (key 3) inside the valve body. Insert the stem bearing (key 13) into the lower stem trunnion and into the valve body.

- Place the gasket (key 16) and O-ring (key 15) into the lower cover (key 7) then fit the lower cover into the bottom of the valve body (key 1). Secure this into the valve body with screw bolt (key 30) and screw nut (key 31) and tighten it.
- Secure the key (key 26) into the keyway of the upper stem (key 4) and fit this into the top of the valve body (key 1). Make sure that its head is properly connected to the ball (key 3). Place the stem bearing (key 14) into the upper stem (key 4) and continuously into the valve body (key 1).
- Place the O-rings (keys 17 and 18) and backup ring (key 19) into the stem retainer (key 20). Fit the stem retainer into the head of the upper stem (key 4) and continuously into the top of the valve body (key 1).
- Place the cut ring (key 21) into the upper stem (key 4) and continuously into the top of the valve body (key 1).
- Insert the O-ring (key 18A), backup ring (key 19A), gasket (key 23), and packings (keys 22 and 22A) into the gland flange (key 24). Fit the gland flange into the head of the upper stem (key 4) and mount it on the top of the valve body (key 1). Secure it with stud bolts (key 32) and tighten.
- Insert the keys (keys 26, 26A, 27, and 27A) into the keyway of the upper stem (key 4). Place the driving device / operator (key 25) correctly into

the top of the valve stem which should come in contact with the top of the valve body (key 1).

- Use the bolt (key 33) and nut (key 34) to tighten the operator (key 25) and gland flange (key 24).
- Screw the sealant fittings (keys 35, 35A, and 35B) and the drain plug (key 36) into their corresponding location in the valve bodies (keys 1 and 2) and tighten it.
- Make the valve actuate once or twice by rotating the driving device to ensure the accuracy and reliability of the valve. Finally, rotate the valve at fully open position.

Parts Ordering

When corresponding with your local Sales Office about this ball valve, always reference the equipment serial number found on the nameplate.

When ordering replacement parts, reference the key number of each part as found in the following parts list.

Note

Use only genuine Tartarini™ replacement parts. Components that are not supplied by Regulator Technologies should not, under any circumstances, be used in any Tartarini ball valves, because they will void your warranty, might adversely affect the performance of the ball valve, and could give rise to personal injury and property damage.

Trunnion Mounted Ball Valve

Troubleshooting Guide

Table 7. Troubleshooting Guide

PROBLEM	POSSIBLE CAUSES	SOLUTION
The stem and driving device do not rotate.	Gear and bearing defect	Refer to disassembly section to access the bearing and check for any damage. Replace parts if necessary. Remove gear cover and check for damage.
	Low frequency of operation and/or lack of lubricating oil	Lubricate the valve seat. Use appropriate and recommended industrial lubricating grease for the gear.
	Frozen gear or valve	Heat or inject anti-freeze solution to the gear.
	Overtight packing	Loosen the stud that compresses the gland flange.
	Rough stem surface or dirt accumulation on the trim of the stem	Refer to disassembly section to access the stem. Clean stem and add lubricant.
	Bent or damaged stem	Repair or replace the valve stem.
Sealing surface is leaking.	Loose studs and nuts	Tighten nuts and studs. Torque, if necessary, according to recommended torque values.
	Damaged sealing surface	Replace the sealing materials (O-rings, gaskets, seats) of the leaking part.
	Clogged sealing surface with dirt	Refer to disassembly section to access the sealing surfaces and flush the dirt.
	Improper placing of the switch	Place the switch in the proper position.
Packing is leaking.	Uncompressed packing	Recompress the packing evenly.
	Some missing packing	Add more packing to suffice the required quantity.
	Damaged packing	Replace the packing.
	Deformed stem, uneven stem roundness, or presence of scratches, groove, galling, and other defects	Replace stem.
The middle flange is leaking.	Uneven bolt tightness	Retighten the bolts evenly. Torque, if necessary, according to recommended torque values.
	Damaged gasket	Replace the gasket.
	Rough and uneven flange sealing surface	Smoothen the flange sealing surface.
Valve is unable to close completely.	Improper installation of the limit switch of gear	Reinstall the limit switch.
	Inappropriate installation of the driving device	Reinstall the driving device in the proper position.
There is poor passage of the fluid to the valve body.	Improper alignment of the ball opening with the flow passage	Adjust the ball to its proper position. Make sure that the valve stem is properly connected to the slot of the ball.

Table 8. Approximate Weights, kg / lbs

BODY SIZE		CL150		CL300		CL600	
DN	Inch	Forged Steel	Cast Steel	Forged Steel	Cast Steel	Forged Steel	Cast Steel
80	3	25 / 55	22 / 49	33 / 73	30 / 66	65 / 143	55 / 121
100	4	38 / 84	35 / 77	59 / 130	55 / 121	110 / 243	102 / 225
150	6	78 / 172	74 / 163	125 / 276	118 / 260	245 / 540	232 / 511
200	8	210 / 463	205 / 452	270 / 595	255 / 562	430 / 948	390 / 860
250	10	340 / 750	322 / 710	390 / 860	370 / 816	760 / 1675	710 / 1565
300	12	480 / 1058	460 / 1014	560 / 1235	533 / 1175	1010 / 2227	960 / 2116
350	14	595 / 1312	576 / 1270	670 / 1477	640 / 1411	1850 / 4078	1700 / 3748
400	16	890 / 1962	864 / 1905	1080 / 2381	1030 / 2271	2100 / 4630	1970 / 4343
450	18	1350 / 2976	1280 / 2822	1610 / 3549	1542 / 3399	2980 / 6570	2150 / 4740
500	20	1680 / 3704	1600 / 3527	2210 / 4872	2100 / 4629	3360 / 7407	3250 / 7165
600	24	3650 / 8047	3540 / 7804	4435 / 9777	4200 / 9259	6000 / 13 228	5800 / 12 787

Trunnion Mounted Ball Valve

Parts List

Key	Description	Key	Description
1	Body	20	Stem Retainer
2	Body Cap	21	Cut Ring
3	Ball	22	Packing
4	Stem	22A	Packing
5	Trunnion	23	Gasket
6	Seat	24	Gland Flange
6A	Seat	25	Driving Device / Operator
7	Lower Cover	26	Key
8	O-Ring	26A	Key
8A	O-Ring	27	Key
9	Spring	27A	Key
9A	Spring	28	Bolt
10	O-Ring	29	Nut
11	Gasket	30	Bolt
12	Anti-static Device	31	Nut
12A	Anti-static Device	32	Stud
13	Stem Bearing	33	Bolt
14	Stem Bearing	34	Nut
15	O-Ring	35	Sealant Fitting
16	Gasket	35A	Sealant Fitting
17	O-Ring	35B	Sealant Fitting
18	O-Ring	36	Plug
18A	O-Ring		
19	Back-up Ring		
19A	Back-up Ring		

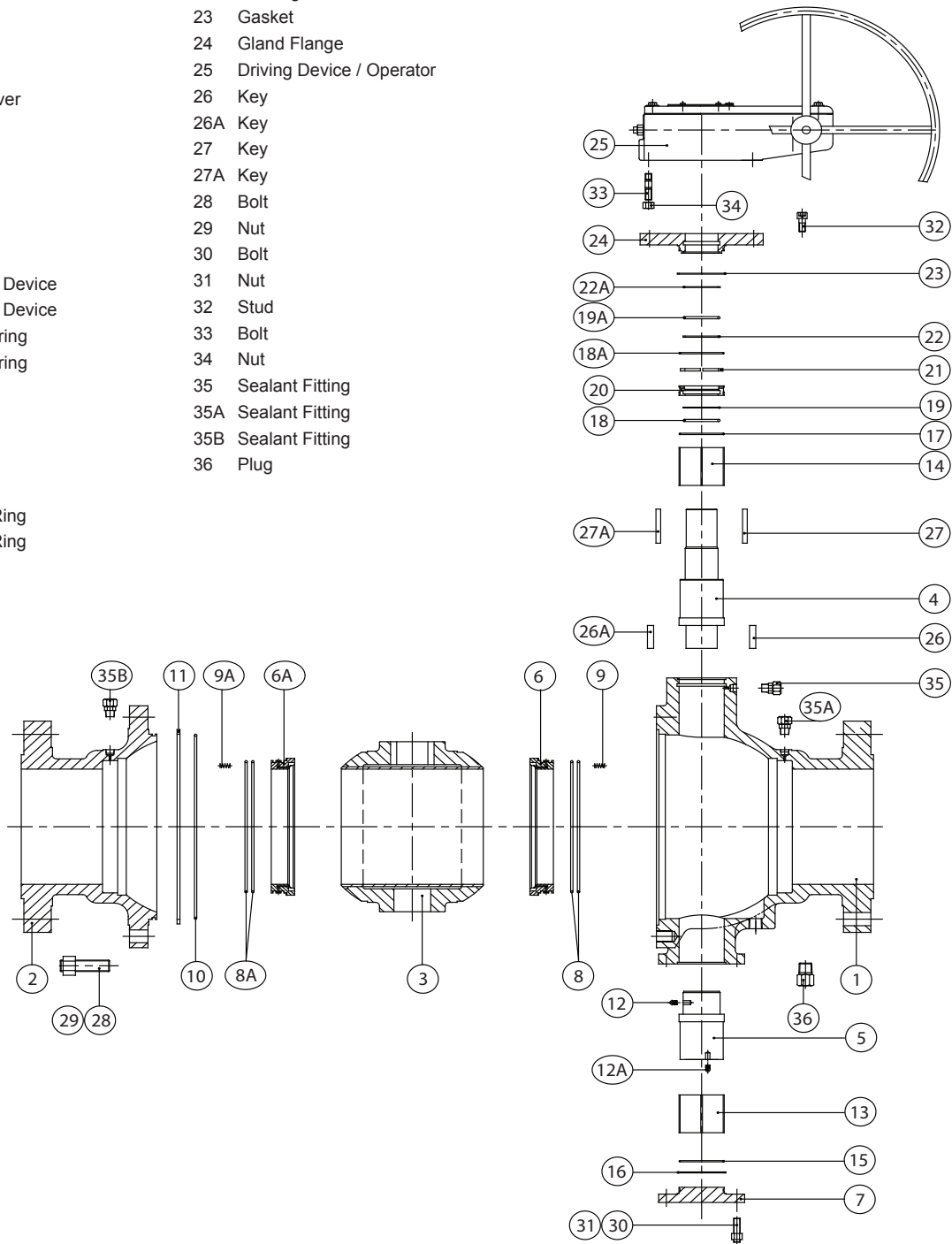


Figure 4. Tartarini™ Trunnion Mounted Ball Valve Assembly

Trunnion Mounted Ball Valve

Industrial Regulators

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