KTM SERIES E01 TRUNNION MOUNTED BALL VALVE

INSTALLATION AND MAINTENANCE MANUAL

Before installation these instructions must be fully read and understood

1 INTRODUCTION

1.1 This product is suitable for gas and liquid media pipelines and regulating devices, with the advantages of small flow resistance, quick switch, flexible quick opening and closing, long life, being safe and reliable.
1.2 Range of application: oil, chemical, petroleum refining, natural gas, metallurgy, paper making, pharmaceutical, instrument and others.

2 RANGE OF APPLICATION

The manual applies to the high-pressure trunnion mounted ball valve listed in the table.

Model	Oracle model code	Pressure class	Size range (DN)
Full bore			
E0125	E01	ASME Class 150	50-200
E0126	E01	ASME Class 300	50-200
E0105	E01	ASME Class 150	250-600
E0106	E01	ASME Class 300	250-600
E0108	E01	ASME Class 600	50-500
E0109	E01	ASME Class 900	40-500
E0110	E01	ASME Class 1500	40-400
Reduced bore			
E0821	E01	ASME Class 150	80-250
E0822	E01	ASME Class 300	80-250
E0801	E01	ASME Class 150	300-650
E0802	E01	ASME Class 300	300-650
E0804	E01	ASME Class 600	80-600
E0807	E01	ASME Class 900	50-600

3 KEY PARAMETERS

3.1 Technical parameters

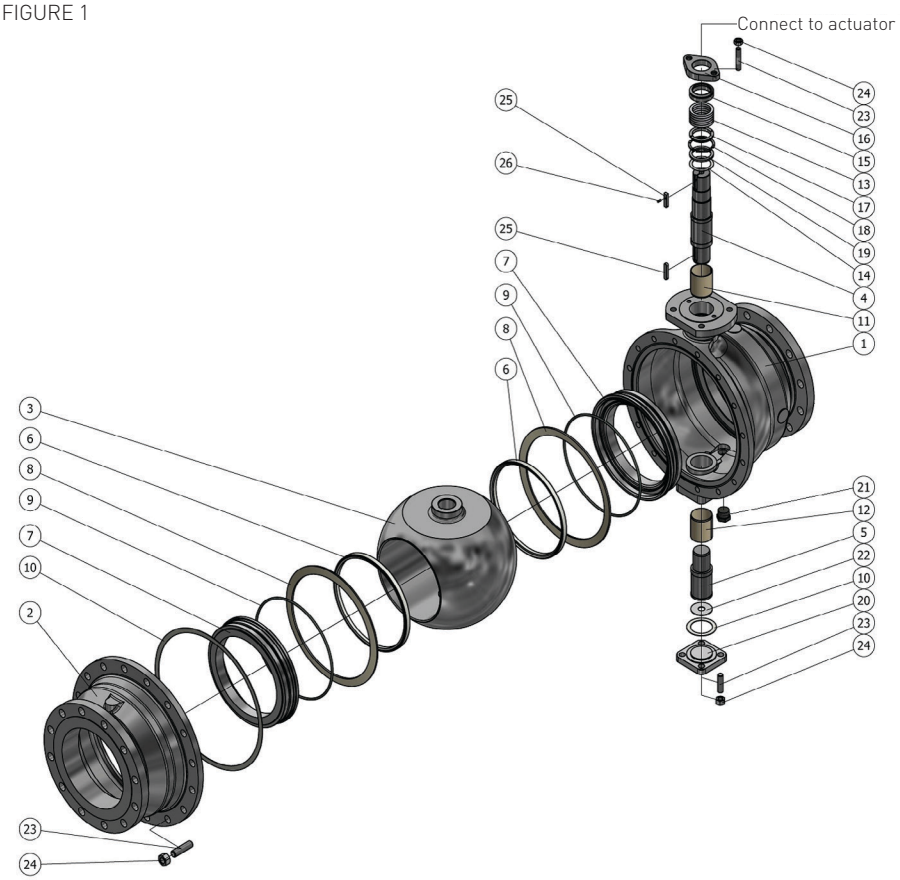
Model	Pressure class	Maximum operating pressure rating value psig (MPa)
Full bore		
E0125	ASME Class 150	275 (2)
E0126	ASME Class 300	720 (5)
E0105	ASME Class 150	275 (2)
E0106	ASME Class 300	720 (5)
E0108	ASME Class 600	1440 (10)
E0109	ASME Class 900	2160 (15)
E0110	ASME Class 1500	3600 (25)
Reduced bore		
E0821/E0801	ASME Class 150	275 (2)
E0822/E0802	ASME Class 300	720 (5)
E0804	ASME Class 600	1440 (10)
E0807	ASME Class 900	2160 (15)

- The rating value of the maximum operating pressure in the table below corresponds to the value at temperatures from -29°C to 38°C. Its unit is psig. The conversion between psig and MPa is: 1 psig - 0.006984757 MPa
- Other pressure classes shall be in accordance to the relevant standard

4 PRODUCT DISASSEMBLY, ASSEMBLY AND TEST METHOD

4.1 Valve exploded view (Varies among different models)

FIGURE 1



PARTS

No.	Name
1	Body
2	Cap
3	Ball
4	Upper stem
5	Lower stem
6*	Seat
7*	Seat retainer
8	Spring
9*	O-ring
10*	Gasket
11*	Upper stem bearing
12*	Lower stem bearing
13*	Gland packing
14*	Thrust bearing
15	Gland
16	Gland flange
17	Packing adaptor
18	Setting ring
19	Thrust washer
20	Lower cover
21	Drain plug
22*	Shim
23	Stud
24	Nut
25	Key
26	Pin

NOTE

* Standard repair kit inclusions

4.2 Disassembly

4.2.1

NOTES

Pay attention to the following points when disassembling the valve:

- Fully relieve the valve cavity. Even if the pressure of the piping has been discharged and there is still the possibility of residual pressure left in the valve. The valve must be opened and closed several times to fully release the pressure in the cavity. After making sure there is no residual pressure, the valve can be removed from the pipeline.
- If the media is harmful for humans, or is inflammable and explosive, make sure that no residual media is left inside of the valve (especially in the cavity). Then fully inject water inside to clean; after making sure there is no residual media, remove it from the pipeline; then fully open and close the valve several times.

4.2.2 Disassembly method

- Rotate the stem (4) clockwise, positioning the ball to the 'off' position.
- Remove the lever (or gearbox), remove the elastic ring and stopper.
- Loosen the gland bolt (23), remove the gland flange (16) and gland (15).
- Loosen the lower cover bolt (23), remove the lower cover (20), lower cover gasket (10), adjusting shim (22), thrust bearing (12), pull out the lower stem (5), remove the gasket (O-ring) and the lower stem bearing
- Loosen the flange coupling screw, remove the flange, flange gasket, adjusting shim, thrust bearing (11).
- Pull out upper stem (4), remove O-ring (9) or gland packing (13), upper stem bearing (11).
- Loosen the coupling screw, separate the body and cap, remove the ball (3), seat (6), seat retainer (7), seat spring (8), flat or spiral springs, junction gasket (10) (O-ring) from the body. Be careful not to collide nor drop the ball and seat, to avoid damaging the sealing surface.
- Remove the seat, seat holder, seat seal washer, flat or spiral springs.
- If the valve has a manual operator, then during the disassembling, the manual operator shall be removed first.

Once all the above is complete, the disassembly can be considered to be finished.

4.3 Assembly

After removing all parts from the valve, wipe the dust and clean it. After removing the dust and grime, ensure that there is no scratch on surface sealing of the ball and seat and stem assembly, replace any defective or obviously worn parts; no scratches should be on the junction and on the surface of the seats of the body and cap; Assemble in the following order:

- Put the spring, seat (seat holder, O-ring), ball, anti-static spring into the body, put gasket into the locating recess of the body.
- Put the ball into the body.
- Mount O-ring (if any) on the stem, then put stem bearing on the stem.
- Insert upper stem into the upper stem hole, the stem top is in 'off' position, then insert it into the ball.
- Put the spring, seat (seat holder, O-ring) into the left body, combine the surfaces between body and cap.
- Tighten the nuts uniformly and symmetrically.
- Mount the cap gasket (O-ring), mount lower stem bearing on lower stem, insert lower stem into lower stem hole.
- Assemble upper stem in place, then mount thrust bearing, gland packing or O-ring, gasket, flange, gland on stem, gland flange in order, screw in gland bolts and tighten. Screw the bolts by hand, then use the tool to tighten accordingly.

NOTE

When tightening the bolts, do not tightly tighten one by one, this will potentially misalign the gland flange and gland packing, and may cause leakage. The right way should be, slightly tighten one, then do another one, and so forth, until the gland flange and gland are compressed to ensure the uniform and aligned compression. Turn the stem to ensure a smooth rotation. Please refer to gland flange and center flange tightening torque matrix tables in Section 5.

- Mount the stopper, resilient retainer, lever; if the valve has manual operator, then mount it last. This completes the assembly process.

4.4 Test method: The test should be done according to the test pressure and holding time of the relevant standards. For the pressure test, we recommend the following methods:

- Shell test: close both ends of the valve, leaving it in the half open state, inject the media (liquid) with the required pressure, after holding for some time, check the junction, gland packing and shell for leakage.
- Liquid high-pressure closure test: close both ends of the valve, leaving it in the half open position, fill it with the media (liquid) with the required pressure from one end, close the valve, making the cavity be open to the atmosphere, check leak detection port for media leakage.
- Gas low-pressure closure test: close both ends of the valve, leaving it in the half open state, provide with the gas with required pressure from one end, close the valve, making the cavity be open to atmosphere, check leak detection port for gas within the stipulated time. Judging if valve qualified or not should be based on relevant standards.
- No visible leakage is allowed for strength test, low-pressure gas seal test and high-pressure seal test within stipulated time (standardized materials seat).
- Seal the valve with the sealing plate after pressure test; if it is a water pressure test, dry residual moisture content on the surface, regarding carbon steel valve, paint, anti-rust and oil then. Install sealing plate.

5 TIGHTENING TORQUE OF BOLTS / NUTS FOR KTM SERIES BALL VALVE

5.1 Requirements of tightening torque

The tightening torque of Class 150-300 packing gland bolts is shown in Table 5.1.1.

TABLE 5.1.1 CLASS 150-300 PACKING GLAND BOLTS TORQUE VALUES (N.m)

		Basic torque	
		Packing material	
		PTFE	Graphite
Valve size (DN)	Bolt size	ASME CL 150, 300	ASME CL 150, 300
15-20	M6	2	2.5
25	M8	3.5	4.5
32	M8	3.5	4.5
40-50	M10	7	9
65-80	M14	16	20
100	M14	19	23
125-150	M12	19	23
200-250	M14	32	40
300-350	M16	60	-
400-500	M20	110	-

The tightening torque of Class 600 packing gland bolts is shown in Table 5.1.2.

TABLE 5.1.2 CLASS 600 PACKING GLAND BOLTS TORQUE VALUES (N.m)

		Basic torque	
		Packing material	
Valve size (DN)	Bolt size	PTFE, H	Graphite
15, 20*	M8 (M10)	4 (5)	5 (6.25)
25, 40*	M10 (M12)	8 (9.6)	11(13.2)
50	M14	20	27
80	M14	23	31
100*	M12 (M14)	30 (35)	40 (47)
150	M16	50	65
200	M20	100	120
250	M22	150	200
300*	M16 (M20)	90 (112.5)	110 (137)
350	M20	115	135
400	M22	150	200
450	M20	90	110
500	M20	90	110

NOTE

* The basic torque data in brackets must be used if the valve uses the gland bolt size in brackets.

The tightening torque of Class 900 packing gland bolts is shown in Table 5.1.3.

TABLE 5.1.3 CLASS 900 PACKING GLAND BOLTS TORQUE VALUES (N.m)

		Basic torque	
		Packing material	
Valve size (DN)	Bolt size	H	Graphite
15	M10	12	15
20	M12	18	23
25	M12	18	23
40	M14	30	40
50	M14	36	48
80	M16	50	65
100	M16	60	75
150	M12	45	60
200	M14	72	90
250	M18	130	165
300	M18	130	165
350	M22	195	245
400	M22	205	255

The tightening torque of Class 1500 packing gland bolts is shown in Table 5.1.4.

TABLE 5.1.4 CLASS 1500 PACKING GLAND BOLTS TORQUE VALUES (N.m)

		Basic torque	
		Packing material	
Valve size (DN)	Bolt size	H	Graphite
15	M10	12	15
20	M12	18	23
25	M12	18	23
40	M14	30	40
50	M14	36	48
80	M16	56	73
100	M14	56	73
150	M20	132	173
200	M22	210	275

The tightening torque of Class 150-1500 ball valve joints, adapter plates and bottom cover bolts / nuts is shown in Table 5.1.5. The basic torque in the table is the theoretical value, while the actual torque is the torque range that must be reached when tightening

TABLE 5.1.5 CLASS 150-1500 BALL VALVE JOINTS, ADAPTER PLATES AND BOTTOM COVER BOLTS / NUTS TORQUE VALUES (N.m)

	Pressure rating			
	Class 150		Class 300-1000	
Valve size (DN)	Basic torque	Actual torque	Basic torque	Actual torque
M8	16	14-17	20	19-22
M10	32	29-33	40	38-45
M12	54	49-57	70	65-76
M14	85	76-89	110	100-120
M16	130	120-140	170	150-180
M18	170	160-190	230	210-250
M20	240	230-260	330	300-350
M22	330	300-350	440	400-470
M24	420	390-450	560	510-610
M27	610	570-660	820	750-890
M30	860	800-930	1150	1050-1240
M33	1160	1070-1250	1540	1410-1670
M36	1530	1410-1640	2030	1860-2200
M39	1970	1820-2130	2630	2410-2850
M42	2480	2290-2670	3310	3030-3580
M45	3080	2840-3310	4100	3760-4450
M48	3770	3480-4060	5020	4600-5440
M52	4810	4440-5180	6410	5880-6950
M56	6010	5550-6470	8010	7340-8680
M60	7420	6850-7990	9890	9060-10700
M64	9000	8310-9690	12000	11000-13000

6 APPLICATION METHOD

6.1 Operation

When operating the valve by the lever, handwheel (or manual operator), in principle, if rotating clockwise it is 'Open→Close', otherwise, 'Close→Open'.

6.2 Determination of open-close state and opening degree

Distinguish the on-off state of the valve based on the position of the lever and the direction of flat head or key block on stem top. When the lever is parallel to the pipeline, then the valve is in the 'Open' state, when it is in a right angle, then it is in the 'Close' state, arrow panel will indicate that if having manual operator.

7 REPAIR AND MAINTENANCE

The valve should be maintained regularly so that it functions properly. During repair and maintenance, the following points are essential:

7.1 Gland packing sealing

In case of slight leakage from the gland packing, under the condition of not affecting the torque, appropriately tighten the gland bolts. If there are still issues, disassemble the valve to check for any abnormalities. In case the gland packing is damaged, replace it with a new set. If stem seal is an O-ring, replace the O-ring. If the gland packing portion of a valve with manual operator needs to be checked and replaced, firstly remove the operator, then disassemble the valve. After parts replacement and assembly, check whether the valve is opened and closed in the right position. If the position is incorrect, then it needs to be adjusted.

7.2 Body sealing

The junction between the body and the cap uses the gasket and the O-ring. In case of leakage, tighten the junction nuts. If there are still problems, disassemble the junction to check the gasket or O-ring for any abnormalities: if any, replace them with new parts.

7.3 Seat sealing

In case of any leakages on the seat seal, disassemble the valve, check the ball, seat, O-ring (U-ring) for damages or deformation. If any, replace them with new parts.
When replacing the seat, O-ring or ball, no foreign matters should get into the body cavity.

7.4 Lower cover sealing

In case of any leaks on the lower cover, tighten the lower cover bolts. If it fails to prevent the leaks, you should loosen the bolts, remove the gasket or O-ring, check gasket or O-ring for damages. If any, replace them.

8 TRANSPORTATION, STORAGE AND INSTALLATION

8.1 Transportation

During transportation and removal of packing cases, try to avoid impact on the valves, so that their normal functions are not affected.

8.2 Storage

During storing the valves, the cap at the flow orifice of end flange must be well sealed, without being stacked. The valve should be in a full open position and be stored in a dry and ventilated room. It is recommended that the valve be operated every 6 months at a minimum.

8.3 Installation

8.3.1 Installation environment

This product can be used both indoor and outdoor. However, in case of corrosive media and since it can be easily rusted, make sure to choose the appropriate combination of materials: please refer to our sample for details. Please contact the factory when being used in special working conditions.

8.3.2 Install essentials

To ensure the valve is used correctly and can extend its service life, install it according to the following essential points:

- Prior to installation, check whether it meets operating requirements based on the casting mark and nameplate on the valve.
- Prior to installation, remove and clean all the defects and dirt caused during transportation.
- Prior to installation, check all fasteners of the valve; due to vibration during transportation, check whether there are any loose connecting bolts and nuts, tighten them in this case.
- Two flange surfaces are equipped with sealing covers/protectors, which should be removed during installation.
- Prior to installation, fully inject water into the piping, remove debris, any residual welding and cutting slags inside the valve or adjourning pipework that can damage the seat.
  Our company will not take any responsibilities for quality problems caused by inappropriate installation and commissioning.
- The valve can be installed in vertical and horizontal directions, while the maintenance and convenient operation for lever, as well as limit to the piping of automatic valve, shall be taken into consideration (please refer to the Installation and Maintenance Manual for Pneumatic Ball Valve for details).
- Tighten connecting flange bolts with proper strength, working the diagonally opposite nuts in sequence, be careful not to tighten unilaterally or do uneven one-sided tightening Potentially, the flange can be damaged due to the piping stress, which results in excessive operating torque.
- If purchasing acceptance test is necessary, it shall be carried out according to the relevant standards. Our company will not take any responsibilities for quality problems of the valve caused by inappropriate approach or human factors
- During the installing of the piping, hard objects (such as welding dregs, scrap iron and stone, etc.) should not get into the body, in order not to scratch the surface of the ball nor the seat, otherwise it can affect the sealing performance of the valve

Our company will not take any economic responsibilities for all the losses caused due to the above reasons.

9 ADJUSTMENT AFTER THE MAINTENANCE OF MANUAL BALL VALVE WITH MANUAL OPERATOR

This adjustment has an effect on the open-close state of the valve (may result in that the opening and closing of the valve is not in place). After the installation, check the opening-closing position of the valve. If improper, resolve according to the following methods:

9.1 Adjust the opening position, loosen the adjusting bolts, place the valve in the fully open position, then tighten the adjusting bolts.

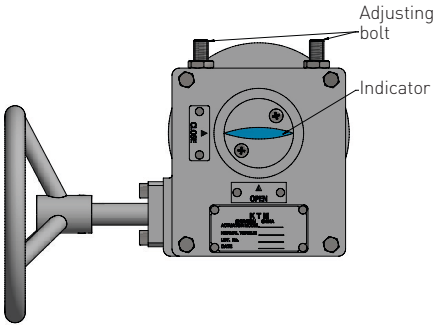
9.2 Adjust the closing position, loosen the adjusting bolts, place the valve in the fully closed position, then tighten the adjusting bolts.

10 NOTES

1. Don't place the valve in half-open state for a long time (t≤120min). Open and close the valve properly to avoid affecting the seat sealing performance.
2. When the valve is under the dangerous working conditions, then the locked mode is recommended. In order to avoid accidents caused by misoperation.
3. During pressure test, be sure to lay the valve flat so as not to make the valve lean, otherwise the future performance of the valve could be affected.
4. Pressure test shall be done through appropriate approach based on the relevant standard.
5. The role of the resilient retainer on the stem is to fix the stopper.
6. In case of special requirements on lubrication, please specify them while placing your order.
7. In order to prevent accidents, it is very important that oil and water is not used to clean and operate the valve whose fluid media is oxygen, oxozone and hydrogen.
   Conventional products can't be used (if used in oxygen, hydrogen peroxide and hydrogen media, please specify while placing your order).
8. During installing piping, hard objects (such as welding dregs, scrap iron and stone, etc.) should not get into the body cavity, so that they do not scratch the surfaces of the ball nor the seat, otherwise the sealing performance of the valve will be affected.
9. During maintenance, all fastenings must be tightened uniformly and symmetrically, to prevent additional stress.
10. During the overhaul, do not make mistakes with the setting direction of the gland packing, to avoid leakages of the gland packing portion.

FIGURE 2

WORM GEAR / WORM OPERATOR



11. Be careful not to scratch the sealing surfaces of the seat, ball and stem during maintenance.

Our company will not take any responsibilities for all losses caused by the above reasons.

11 FAULTS AND TROUBLESHOOTING

VALVE PORTION FAULTS

Faults	Reasons	Troubleshooting
Stem rotation doesn't work	1. Pressed gland packing too tight	1. Loosen the bolts and readjust
	2. There is damage or accumulated dirt on the junction between the stem and its connected parts	2. Disassemble to fix and remove the dirt
	3. Open and close repeatedly	3. Disassemble to clean and remove the dirt
If a leakage between the ball and sealing surface of the seat, or seat and body occurs	1. Insufficient preload	1. Increase preload
	2. There is damage or dirt on sealing surface	2. Trim or grind the sealing surface and remove dirt
	3. Deformation or failure on sealing elements	3 Replace the sealing elements
	4. O-ring is damaged	4. Replace O-ring
Leakage on stem gland packing	1. Insufficient gland packing force	1. Tighten the gland bolts
	2. Damaged or invalid gland packing	2. Replace gland packing
Leakage on junction	1. Loose flange bolts at junction	1. Tighten the flange nuts
	2. Damaged or invalid gasket or O-ring at junction	2. Replace gasket or O-ring
Leakage on cap	1. Loose cap bolts	1. Tighten the bolts
	2. Damaged gasket or O-ring	2. Replace gasket or O-ring

Manual, pneumatic, electric and other operating modes can be realized for high-pressure large-diameter trunnion mounted ball valve, actuator can be replaced very easily (please refer to the product manuals for the usage and replacement method of the actuator).

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