

## KTM



Please read through this manual completely before operating the valves.

KTM Jacketed Ball Valves are suitable for applications to fluids requiring hot insulation or cold insulation.

Please use the valves according to warnings and cautions described in this document. Failure to do so could result in accidents due to wrong storage, installation, operation, maintenance and disassembling and/or serious damage.

Please keep this manual in a handy place for immediate reference; be sure to provide it to purchaser, contractor, piping designer, user, operator or maintenance technician.

### Section 1 - Safety precautions

Precautions for using KTM valves safely are highlighted with the following two warning signs to indicate the level of danger posed. Please read the postscript carefully to ensure safety and prevent any damage before starting to use the product.

#### **WARNING**

A potentially hazardous situation which, if not avoided, could result in death or serious injury.

#### **CAUTION**

A potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

### Section 2 - Specification

The safety of the valves and conformity with your equipment should be checked by the design engineer or those who determine the specification based on the catalog or data.

Upon arrival, the applicable conditions (temperature, pressure, fluid-characteristics, environmental conditions, mounting gauge, etc.) should be first checked to make sure they are correct.

#### **WARNING**

Do not use valves beyond specifications or limits indicated in the technical data sheet.

#### **CAUTION**

1. These models may be used indoors or outdoors. If however used in an environment exposed to gas, an appropriate type and material should be used to prevent corrosion or rusting. (Details on the component materials are provided in the catalogs.)
2. To prevent accidents, custom-made valves for special treatment and operation should be ordered for specific applications using oxygen and hydrogen peroxide.

### Section 3 - Storage and preservation before installation

The storage of the valves should be in accordance with the following criteria:

1. Storage warehouse should be clean and dry.
2. The ball must be in open position and the end flanges must be protected with appropriate seal discs.
3. Do not remove the bore protection cover until installation to avoid rust and contamination with foreign substances.
4. Periodical checks have to be carried out in the storage area to verify that the above mentioned conditions are maintained.



### CAUTION

1. The ball valves are delivered with the ball in full-open position and should be stored as they are. Keeping the ball in other positions, incl. half-open position, for an extended period of time could cause seat leakage.
2. Do not place consignment package directly on the ground.
3. Do not expose consignment packages to the rain/wind or directly to the sun.
4. Storage in an open area for a limited period can be considered only if the valves have appropriate packing (packed in cases covered with vinyl sheets protecting from rain, wind, dust etc).
5. Store in a dry and well ventilated condition.
6. If storage is anticipated for an extended period, the desiccant bags (if supplied) should be changed every six months.

## Section 4 - Transportation



### WARNING

1. When handling valves, the correct equipment and accessories (slings, fasteners, hooks etc.) must be sized and selected, taking into consideration the individual and/or overall valves weight indicated in the packing list and/or delivery note.
2. Lifting and handling must be done only by qualified personnel. Improper hoisting can cause valve deformation or damage from dropping the valve.
3. Do not lift the valves by using lifting points or lugs on the actuator, as these lifting points/ lugs are for the actuator only.
4. Do not lift the valve by its hand-lever as these levers are not designed to take the load of the whole valve. Doing so may cause the lever to brake off or be disconnected from the valve, resulting in possible valve damage or a person's injury.
5. Avoid lifting over people's heads, equipment or anything else that can possibly be damaged or caused injury in the event that the lifted load falls off the handling equipment.
6. All local safety regulations must be observed and complied with at all times.

## Section 5 - Installation

The following instructions will make for a satisfactory and long life of the valve.

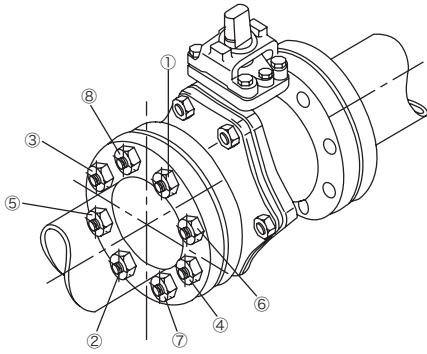
1. Remove the valve from the shipping package (box or pallet) carefully to avoid any damage to the valve and actuator (plus accessories where applicable).
2. Confirm that the materials of construction listed on the valve nameplates are appropriate for the intended service for and according to specification. When in doubt, contact KTM or your local Pentair facility.
3. Define the preferred mounting orientation with respect to the system pressure. Where applicable, the arrow on the body helps to identify the upstream side (high pressure) and downstream side (low pressure).
4. Fasteners like bolts and nuts at each connecting portion on the valve should be checked and retightened in case they were loosened due to shock during transportation. When tightening nuts, use a closed wrench for safety.
5. Before installation, the protection cover on the bore must be removed.
6. Manually operated valves, may be installed on pipes at any angle, horizontally, vertically or any other direction. It is however recommended they are installed to facilitate maintenance, handling, and nozzle, drain position.
7. Maintenance space must be provided.
8. The flange size of both side of the valve is different from the nominal size of the valve as shown right. Ensure correct fitting of the flange size before installation.

### Flange size (Metric)

Valve size (DN)	Flange size (mm)	
	Full bore	Reduced bore
15	40	-
20	40	-
25	50	-
40	65	-
50	80	-
65	100	-
80	150	100
100	200	150
125	200	-
150	250	200
200	350	250
250	-	350

### Flange size (Imperial)

Valve size (NPS)	Flange size (inch)	
	Full bore	Reduced bore
1/2	1 1/2	-
3/4	1 1/2	-
1	2	-
1 1/2	2 1/2	-
2	3	-
2 1/2	4	-
3	6	4
4	8	6
5	8	-
6	10	8
8	14	10
10	-	14



**Fig. 1** - Tightening of bolt

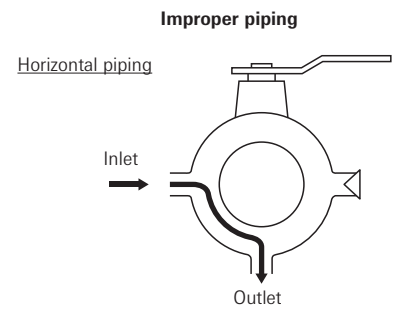
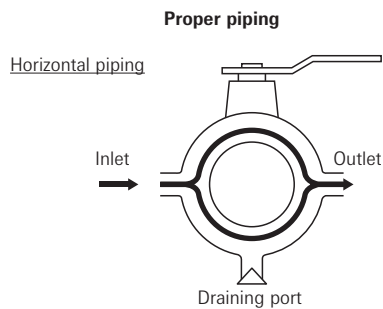


**CAUTION**

1. Ensure that there are no solid objects such as pieces of wood, plastic or packing materials within the valve or on the valve seat. It is recommended to flush pipes before installing the valve. If this is not possible, the installed valve must be in its open position before flushing takes place.
2. Unless otherwise recommended by KTM, the valves should be installed with the ball in open position to ensure that the seat rings are not damaged during installation.
3. Use appropriate gaskets which comply with standards or specifications.
4. Tighten the flange bolts with a closed wrench; using a 'crisscross' pattern that alternately tightens the bolts located 180 degrees apart. (see Fig. 1) Unequal partial tightening places stress on lined pipes which may damage the flange or produce excessive operation torque.
5. Failure to fabricate pipes without excessive stress will result in leakage, poor operation or failure of the valves.
6. When conducting a pressure test of the pipe system, the valves should be in a partially open or fully open position. Testing at closed position will impose too much load and will cause leakage from seats. Check for any leakage from the joint flange and gland portion during the pressure test. After conducting the pressure test, return to full open/close position at once.
7. If the piping system is pressurized with water for testing, and if the piping system has been shut down for a long time after testing, the following measures should be taken:
  - Use corrosion inhibitor with water to pressurize the piping system.
  - After testing, the piping system should be depressurized and the test water completely drained.
  - Ensure that the corrosion inhibitor does not leave a residue within the system as the particulates may damage the valve sealing surfaces.

**Section 6 - Piping**

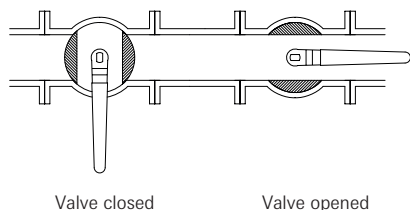
When piping the Jacketed ball valves, check that no foreign objects will block the inlet, outlet or draining port. Proper piping enables the steam to flow effectively to warm the jacketed part.



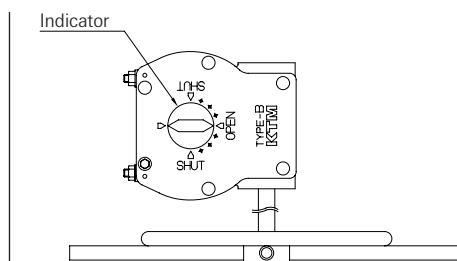
### Section 7 - Operation

#### 1. Operation instruction

Valve adjustment is performed through lever handle/gear operation. Turning the shaft clockwise shuts the valve. Check the operation of the valve by stroking it to 'fully open' and 'fully close'. Either the hand lever or the direction of the parallel flats on the top of the shaft indicate the open or closed position of the KTM ball valves. (see Fig.4) For gear operated valves, the position is indicated by the arrow-indicator (see Fig 5).



**Fig. 4 -** Lever operated valve



**Fig. 5 -** Gear operational valve

#### 2. Gear operated valve adjustment

If the gear-operating mechanism indicator does not correctly indicate the valve is completely open or shut, adjust the opening with the adjustment screw. For details, refer to Pentair Valves & Controls Sales /Service office

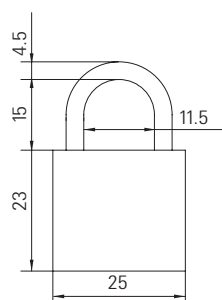
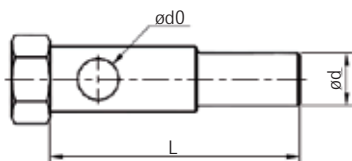
#### 3. Key-lock (option)

A locking device at the open and shut positions can be provided to prevent unauthorized or incorrect operation. Unlock and detach the padlock otherwise locking pins and stopper might break.

To lock the jacketed ball valves, use locks of the sizes indicated in the table below.

#### Lock pin and pad lock dimensions (mm)

Valve nominal diameter (mm) (Full bore)	Pin dimensions			Pad lock type
	d0	d	L	Alpha no.
15 - 25	5.5	4.9	25	1000 - 25 m/m
40 - 50	5.5	6.5	31	1000 - 25 m/m
65 - 100	6.5	8.3	39	1000 - 25 m/m
125 - 200	-	-	-	1000 - 25 m/m



**Fig. 6.1 -** Lock pin and pad lock (mm)



#### WARNING

1. Avoid using the valves in half opened position. Since it may result in seat deformation or leakage.
2. Operate the valves taking up a stable posture from a set direction, after checking that the specified handle is fastened by bolts/nuts. Also, when operating the valve with spare handle, please make sure that the handle is reliably inserted into the shaft's end. Insufficient insertion and forced operation of the handle may result in damage or injury if the handle slips out.
3. Excessive handle operation may break the lever, injure the operator, and/or deform the stopper or the shaft, which may also result in seat leakage.
4. Be careful in handling the valve where high temperature fluid flows in the pipeline. The heated valve may cause burn injury of bare hands.

Lock pin and pad lock dimensions (inch)

Valve nominal diameter (inch) (Full bore)	Pin dimensions			Pad lock type Alpha no.
	d0	d	L	
¾ - 1	0.217	0.193	0.984	1000 - 25 m/m
1½ - 2	0.217	0.256	1.220	1000 - 25 m/m
2½ - 4	0.256	0.327	1.535	1000 - 25 m/m
5 - 8	-	-	-	1000 - 25 m/m

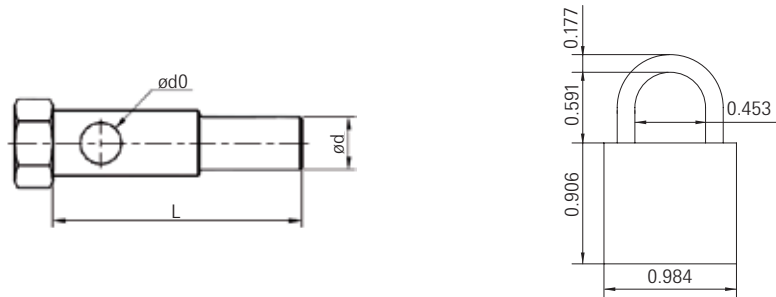


Fig. 6.2 - Lock pin and pad lock (inch)



**CAUTION**

Thermal insulation

In a condition where fluid in valve solidifies due to low temperature in jacket, shaft will twist during traveling of the valve. If solidification is expected, operate the valve after liquefying the fluid by introducing hot media into the jacket.

Section 8 - Abnormal pressure rising



**CAUTION**

Malfunction or damage of sealing material of the ball valves may occur due to abnormal pressure rise caused by fluid trapped in the cavity (see Fig. 7) between the body, ball and seat.

Abnormal pressure rise can be caused by

1. Rapid heating of valve exterior
2. Exposure to high temperature fluid after the valve is closed
3. Location near heat source

Please contact us concerning countermeasures for these problems, e.g. providing a pressure-relieving hole on the surface of a ball used for high pressure applications.

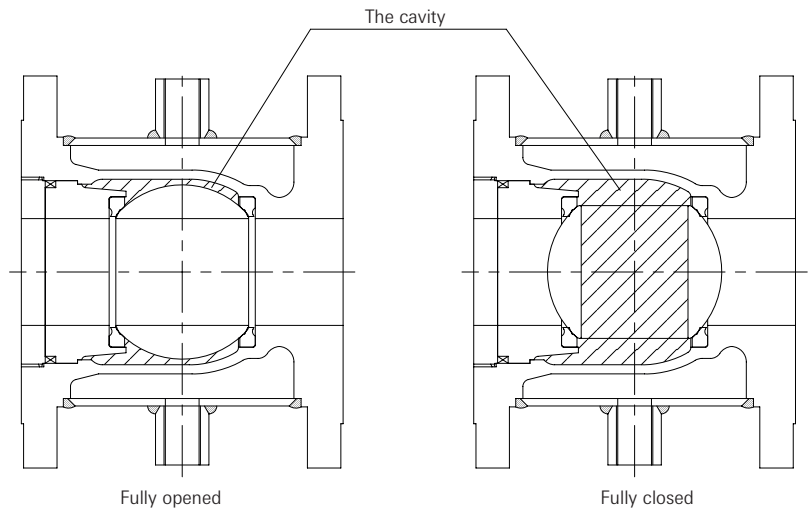


Fig. 7

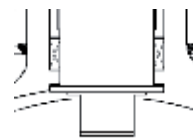
### Section 9 - Maintenance

The following instructions will contribute to long life service of the valve. Periodical checks and maintenance are required to keep valves in good working condition. Parts to be periodically checked and maintenance items are shown in below Figures 8 to 9.

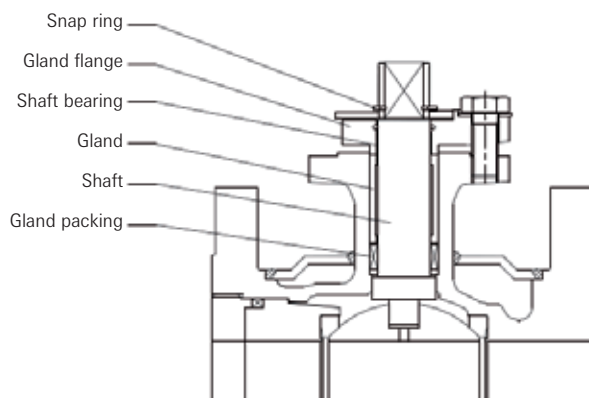
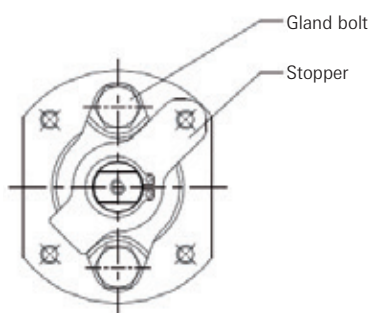
#### CAUTION

If leakage is observed through the gland packing, tighten the gland bolts slowly and evenly until the leakage stops. This must be accomplished without affecting the torque. Do not over-tighten the packing gland bolts, since this will increase the torque required to operate the valve.

This procedure should be performed every 3,000 operation cycles or every six months of service. When gland packing is expected to be loosened due to the heat cycle, retighten the screws every two months of service or every 1,000 operational cycles.

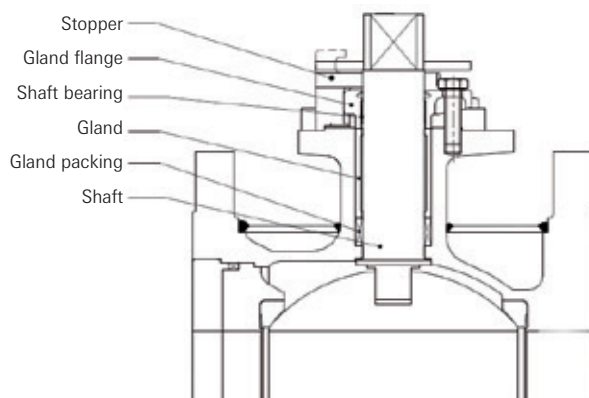
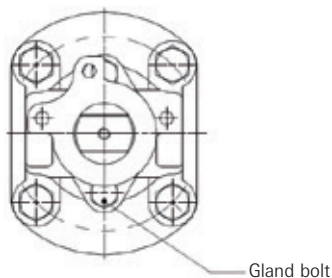


Full bore



**Fig. 8**

JB11 DN 15 - DN 80  
 JB12 DN 15 - DN 80  
 JB21 DN 80 - DN 100  
 JB22 DN 80 - DN 100



**Fig. 9**

JB11 DN 100 - DN 200  
 JB12 DN 100 - DN 200  
 JB21 DN 150 - DN 250  
 JB22 DN 150 - DN 250

Section 10 - Troubleshooting		
Trouble	Cause	Countermeasures
Does not operate smoothly	Solids exist in the fluid / caught slurry in.	Clean the inside of the valve. If necessary, replace parts (ball, seats, shaft bearing, thrust bearing)
	Ball is corroded by fluid.	Replace with ball made of corrosion resistant material
	Fluid adheres to ball and seats.	Clean the inside of the valve. If necessary, replace ball or seats, or replace with ball valve equipped with metallic seats.
	Seats are deformed by abnormal pressurization in the cavity.	Replace with ball with hole for releasing abnormal pressurization.
	Seats are deformed by high temperature fluid.	Replace with seats having good heat resistance, or replace the valve itself.
	Unusually high pressure exceeding its rating limit is applied by abnormal pressurization when shutting the valve.	Take measures to prevent pressure from rising and replace seats.
Outside leakage	Sealing performance of the gland packing decreases gradually when the operation frequency is high or the high temperature fluid flows.	The fastening nuts or bolts at gland packing are required to be lightly tightened, or gland packing replaced.
	Sealing performance of the gland packing decreases by abnormal pressurization in the cavity.	Replace with ball with hole for releasing abnormal pressurization.
	Sealing performance of the gland packing decreases by abnormal pressurization in the piping when shutting the valve.	Take measures to prevent pressure from rising and replace seats and gland packing.
	Ball and seats are damaged by solids and slurry in the fluid.	Clean the inside of the valve. If necessary, replace ball or seats, or replace with ball valve equipped with metallic seats.
	Fluid adheres to ball and seats.	
Seat leakage	Ball corrodes by the fluid.	Replace with ball that is made of corrosion resistant material.
	Seats are deformed by abnormal pressurization in the cavity.	Replace with ball with hole for releasing abnormal pressurization.
	Seats are deformed by high temperature fluid.	Replace with seats having good heat resistance, or replace the valve itself.
	Unusually high pressure exceeding its rating limit is applied by abnormal pressurization when shutting the valve.	Take measures to prevent pressure from rising and replace seats.

### Section 11 - Valve disassembly

Assemble/disassemble the valves in a clean, well-lit and well ventilated place.



#### WARNING

Before removing the valve from the piping, ensure that the system has been fully depressurized and any dangerous fluids have been drained off. Failure to do so may cause serious personal injury and/or damage to the valve.

Maintenance of the valves must be performed only by qualified personnel.

Never operate/disassemble the valves before checking for the safety. The valve is extremely heavy; ensure a stable position to prevent it from falling down when assembling/disassembling.

There is a cavity inside the ball valve when the ball is fully open or fully closed. For a safe disassembly, following instructions must be carried out.

1. Half open the valve when still installed in the piping, and make sure no pressure remains in the cavity. Failure to do so may result in injury, explosion or fire caused the remaining pressure.
2. Before disassembling the valve, make sure that it has been decontaminated of any harmful gasses or fluids, and disassembly is done at a well ventilated place and within a safe temperature range for maintenance.
3. Pressure of flammable gas and other dangerous fluids must be checked only at well ventilated places outdoors, far from any fire source.

Fig. 12.1 (Section 13) is a construction drawing of JB11 and JB12 'without' blow-out proof shaft construction. Fig. 12.2 is a drawing 'with' blow-out proof shaft construction. The number of parts is slightly different depending on the valve size, but the basic structures are identical within those two groups.

Refer to the drawing when disassembling. The numbers following the parts name in the following descriptions represent the parts number in the Fig. 12.1 or Fig. 12.2.

#### 11.1 Disassembly for valves 'without' blow-out proof shaft construction (Fig. 12.1)

- JB11 and JB12 with size up to DN 80 (NPS 3) and JB21 and JB22 with size up to DN 100 (NPS 4)

With ball in closed position, remove body cap (2) by inserting removing tool (Fig. 10) and turn counter clockwise. Remove body seal (7). Attach eyebolts in unused tap holes on seat holder (6) and pull it out. The seat (5) attached to the seat holder can be removed easily. Then, remove ball (3) with care not to give any damage. Remove also seat set in body side.

Remove handle (22), then remove snap ring (21) by using snap ring pliers. Stopper (20) can be removed at the same time. Loosen gland bolts (15) and remove them, then gland flange (14) can be removed.

Pull out shaft (4) with gland (12), shaft bearing (13), thrust bearing (8), thrust washer (9)(11) and gland packing (10) altogether. The shaft is to be pulled out outer side of the valve.

#### 11.2 Disassembly for valves 'with' blow-out proof shaft construction (Fig. 12.2)

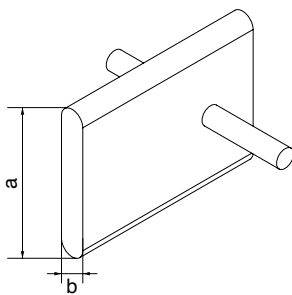
- JB11 and JB12 with size DN 100 (NPS 4) and larger and JB21 and JB22 with size DN 150 (NPS 6) and larger

With ball in closed position, remove body cap (2) by inserting removing tool (Fig. 10) and turn counter clockwise. Remove body seal (7). Attach eyebolts in unused tap holes on seat holder (6) and pull it out. The seat (5) attached to the seat holder can be removed easily. Then, remove ball (3) with care not to give any damage. Remove also seat set in body side.

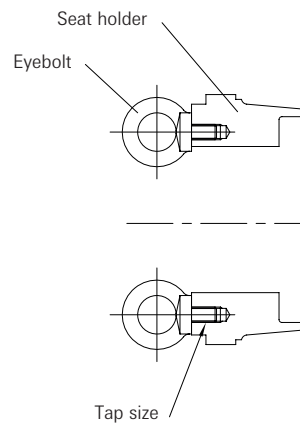
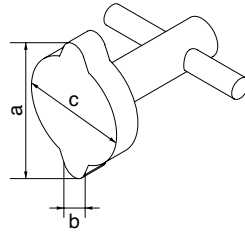
Remove handle (23), stopper (21), and gland cover (19). Loosen gland bolts (14) and remove them, then gland flange (13) can be removed.

Pull out shaft (4) and remove gland (11), shaft bearing (12), thrust bearing (8), thrust washer (10) and gland packing (9) altogether. The shaft is to be pulled towards inside of the valve.





**Fig. 10** - Cap remover



Body

**Fig. 11** - Details and dimensions for removing seat holder.

Unit: mm						
Valve nominal diameter (mm)		Dimensions in tools			Tap size for eyebolt on seat holder (size x pitch)	
JB11, JB12	JB21, JB22	a	b	c		
15	-	20	8	13	M4 x 0.7	
20	-	26	8	19	M4 x 0.7	
25	-	32	8	25	M5 x 0.8	
40	-	46	10	38	M6 x 1	
50	-	59	10	51	M8 x 1.25	
65	-	74	12	64	M6 x 1	
80	-	86	14	76	M8 x 1.25	
100	-	114	18	102	M8 x 1.25	
125	-	143	18	127	M10 x 1.5	
150	-	168	18	152	M10 x 1.5	
200	-	222	22	203	M12 x 1.75	
-	80	86	12	76	M6 x 1	
-	100	114	14	102	M6 x 1	
-	150	168	18	152	M10 x 1.5	
-	200	200	20	171	M10 x 1.5	
-	250 (JB21)	240	30	214	M12 x 1.75	
-	250 (JB22)	256	30	230	M12 x 1.75	

Unit: inch						
Valve nominal diameter (inch)		Dimensions in tools			Tap size for eyebolt on seat holder (size x pitch)	
JB11, JB12	JB21, JB22	a	b	c		
1/2	-	0.787	0.314	0.511	M4 x 0.028	
3/4	-	1.023	0.314	0.748	M4 x 0.028	
1	-	1.259	0.314	0.984	M5 x 0.032	
1 1/2	-	1.811	0.393	1.496	M6 x 0.039	
2	-	2.322	0.393	2.007	M8 x 0.049	
2 1/2	-	2.913	0.472	2.519	M6 x 0.039	
3	-	3.385	0.551	2.992	M8 x 0.049	
4	-	4.488	0.708	4.015	M8 x 0.049	
5	-	5.629	0.708	5.000	M10 x 0.059	
6	-	6.614	0.708	5.984	M10 x 0.059	
8	-	8.740	0.866	7.992	M12 x 0.069	
-	3	3.385	0.472	2.992	M6 x 0.039	
-	4	4.488	0.551	4.015	M6 x 0.039	
-	6	6.614	0.708	5.984	M10 x 0.059	
-	8	7.874	0.787	6.732	M10 x 0.059	
-	10 (JB21)	9.448	1.181	8.425	M12 x 0.069	
-	10 (JB22)	10.078	1.181	9.055	M12 x 0.069	

### Section 12 - Assembling

Parts should be cleaned before assembling. Especially, ball and fitting portion of seat, portion where body seal contacts, and place where gland packing inserted should be cleaned sufficiently. When the surface of the ball is damaged, please replace it.

#### 12.1 Standard valve, size up to DN 80 (Full bore) and up to DN 100 (Reduced bore) Fig. 12.1

The following parts are recommended to be replaced by new parts:

seat (5), gland packing (10), shaft bearing (13), thrust bearing (8), body seal (7)

1. Set seat (5) into body. Insert ball (3) with closed position. Insert shaft with proper alignment to ball slot, and fit shaft end flats to the slot of the ball.  
Set seat into seat holder (6) and insert the seat holder into body. Set body seal (7) into recess formed between body and seat holder. After applying grease containing molybdenum disulfide to thread of body cap (2) in thin layer to prevent sticking, screw the body cap into the body until the surfaces of the body cap and flange become same flat plane.
2. Insert thrust bearing (8), thrust washer (9), gland packing (10), thrust washer (11) and gland (12) with this order onto the shaft. Attach gland flange (14) with hand screwing gland bolts (15). Attach stopper (20) in the position where the hole matches with locking hole of gland flange, and fix it with snap ring (21) to prevent getting out.

#### 12.2 Standard valve, size up to DN 100 and larger (Full bore) and DN 150 and larger (Reduced bore) Fig. 12.2

The following parts are recommended to be replaced by new parts:

seat (5), gland packing (9), shaft bearing (12), thrust bearing (8), body seal (7)

1. Set seat (5) into body. Slip a thrust bearing (8) over the shaft, and insert it into gland (11) from the interior of the body. Hold the shaft in the closed position and insert ball (3) with closed position for proper alignment to ball slot, and fit shaft end flats to the slot of the ball.  
Set seat (5) into seat holder (6) and insert the seat holder into body. Set body seal (7) into recess formed between body and seat holder. After applying grease containing molybdenum disulfide to thread of body cap (2) in thin layer to prevent sticking, screw the body cap into the body until the surfaces of the body cap and flange become same flat plane.
2. Insert gland packing (9), thrust washer (10) and gland (11) with this order onto the shaft. Insert shaft bearing (12) on to the shaft on the top of gland and attach gland flange (13) with hand screwing gland bolts (14) putting live loading spring (15) in between. Put gland cover (19) and attach stopper (21) in the position where the hole matches with locking hole of gland cover.



#### CAUTION

1. There is a cavity inside the ball valve when the ball is fully open or fully closed. Since some pressure and fluid may remain inside the cavity, be sure to release pressure and purge fluids completely by keeping the valve half-open when removing the valve from the piping or sending them back to us.
2. Please return the valve without disassembling.

### Tightening torque for gland

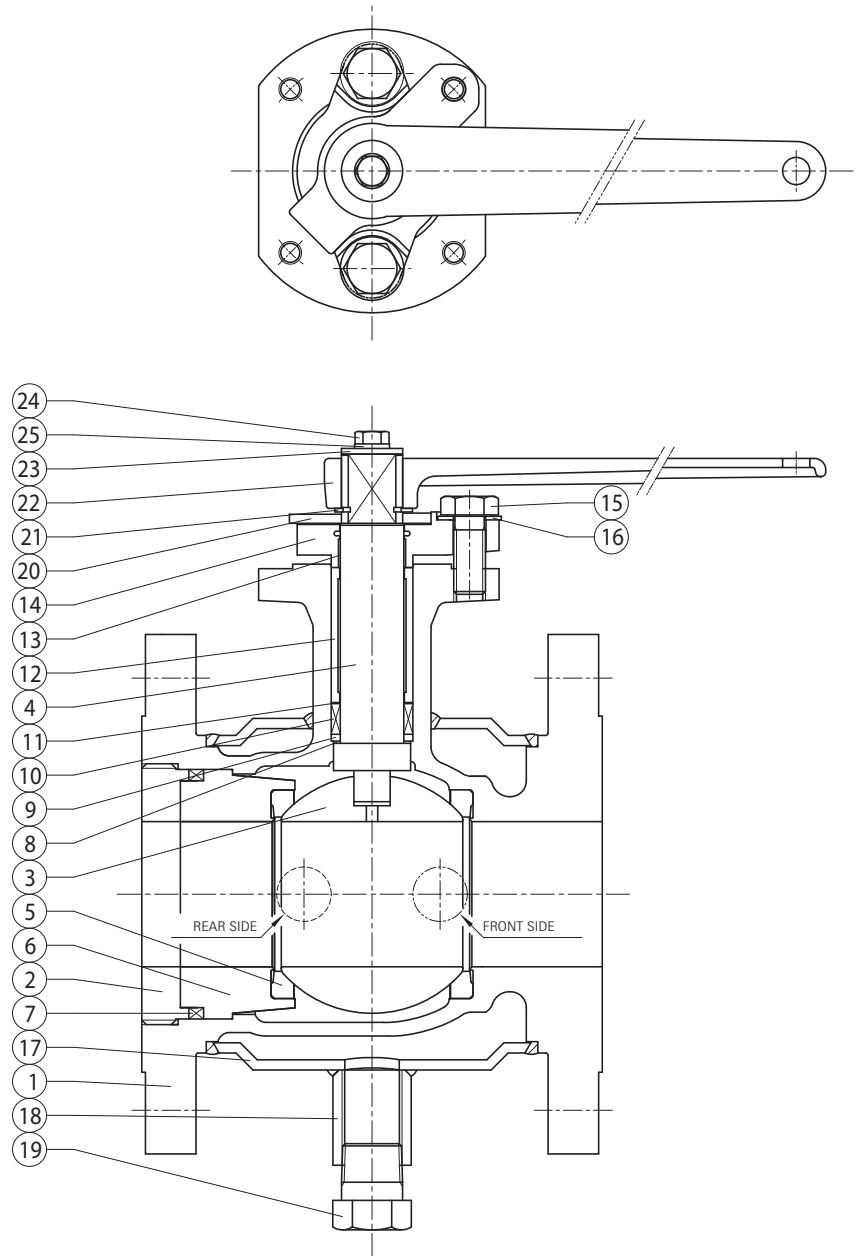
Valve size		PTFE packing			
Full bore		Reduced bore		Tightening torque	
DN	NPS	DN	NPS	Nm	in/lb
15	½			2	18
20	¾			2	18
25	1			3	27
40	1½			7	62
50	2			7	62
65	2½	80	3	16	142
80	3	100	4	16	142
100	4			19	168
125	5	150	6	19	168
150	6	200	8	19	168
200	8	250	10	32	283

**Section 13 - Warranty**

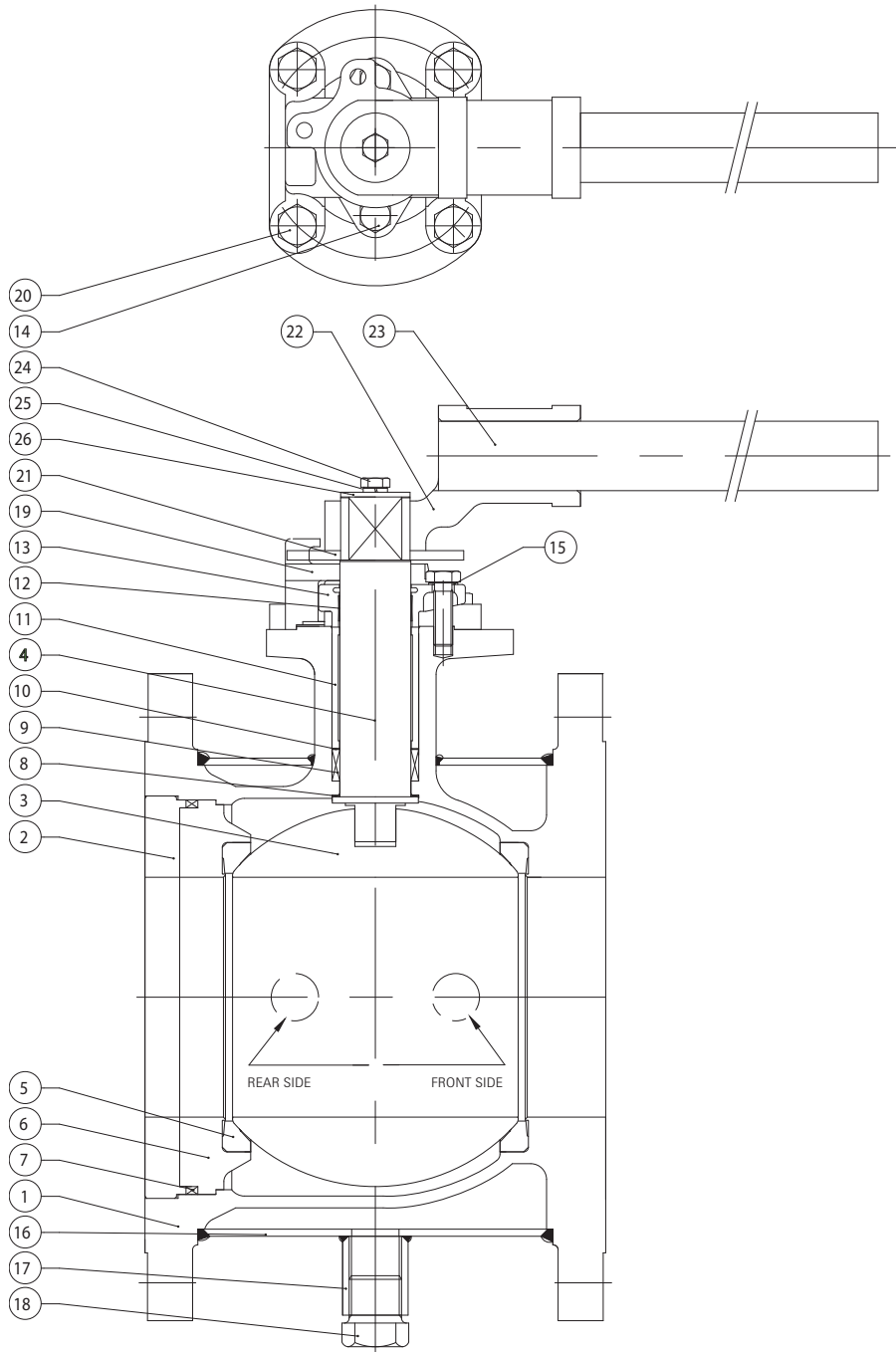
The warranty period is one year from the date of installation by the first use of the goods, or eighteen (18) months from the date of shipment to the first user, whichever occurs first.

**Parts list**

No.	Parts name
1	Body
2	Cap
3	Ball
4	Shaft
5	Seat
6	Seat holder
7	Body seal
8	Thrust bearing
9	Thrust washer
10	Gland packing
11	Thrust washer
12	Gland
13	Shaft bearing
14	Gland flange
15	Gland bolt
16	Live loading spring
17	Jacket
18	Socket
19	Plug
20	Stopper
21	Snap ring
22	Handle
23	Washer
24	Bolt
25	Spring washer



**Fig. 12.1** - Standard valve, Full bore DN 50 - DN 80



**Parts list**

No.	Parts name
1	Body
2	Cap
3	Ball
4	Shaft
5	Seat
6	Seat holder
7	Body seal
8	Thrust bearing
9	Gland packing
10	Thrust washer
11	Gland
12	Shaft bearing
13	Gland flange
14	Gland bolt
15	Live loading spring
16	Jacket
17	Socket
18	Plug
19	Gland cover
20	Bolt
21	Stopper
22	Handle head
23	Handle
24	Bolt
25	Spring washer
26	Washer

**Fig. 12.2** - Standard valve, Full bore DN 100 - DN 200