KTM MODEL NB/MB THREE-WAY BALL VALVES 2-SEATS (L-PORT) AND 4-SEATS (L+T-PORT)
INSTALLATION AND OPERATION MANUAL

Before installation these instructions must be fully read and understood

- 3-Way 2-Seats ball valves are usable for liquids, gases and powders and switching the flow.
- 3-Way 2-Seats gratite ball valves are usable for high temperature fluid.
- 3-Way 4-Seats ball valves are usable for switching, dividing or mixing fluids.

Please use the valves according to warnings and cautions described in this document. Failure to do so could result in an accident due to wrongstorage, 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 - SPECIFICATIONS

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 other technical 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.

For the standard specifications, refer to the catalog.

SECTION 3 - RANGE OF APPLICATION

Pressure/temperature rating
3-Way 2-Seats ball valves, 3-Way 4-Seats ball valves and 3-Way 2-Seats gratite ball valves have a range of application defined by temperature and pressure. Please operate the valve within each range shown below.
Operating the valve outside that range may result in failure of valve body or parts and leakage of the fluid.
(The pressure/temperature rating is defined by body and seat material.)

The contents of this manual is effective as of August 2007.
KTM reserves the right to discontinue the manufacture of, change or modify design and/or construction of any KTM product during the manufacturing procedure, without incurring any obligation to accept for credit, to replace or furnish or install such changes or modifications on products previously or subsequently sold.
This document is subject to changes without notice.

CAUTION

Applicable to 3-Way 4-Seats ball valves only

Due to the valve construction the seat sealing performance is limited to an operating temperature of 150°C (302°F) maximum.

Applicable to 3-Way 2-Seats gratite ball valves only

The maximum temperature for applications to oxidative fluids and in oxidative environment is 449°C (840°F).
The maximum temperature for models with nominal diameters NPS 6 (DN 150) and NPS 8 (DN 200) is normally 350°C (662°F).

WARNING

Do not use valves beyond specifications or limits indicated in the catalog.

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. *Valves for specific applications using oxygen and hydrogen peroxide require special washing and treatment to prevent accidents. Please indicate such applications since custom-made valves should be used.*

SECTION 4 - STORAGE AND PRESERVATION BEFORE INSTALLATION

The valves should be stored 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 3-Way ball valves are delivered with the ball in the left-hand rotated position and should be stored as they are.*
   Do not keep the ball in partially open position for an extended period of time, since this could cause seat leakage.
2. *Do not place consignment package directly on the ground.*
3. *Do not expose consignment packages to 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 5 -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 located 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 cause of 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 6 - INSTALLATION

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

1. Remove the valve from the shipping package (box or pallet) with care taken 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 and are according to specifications. When in doubt, contact KTM or your local Emerson 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 to consider facilitating maintenance and operation of the valve.
7. Maintenance space must be provided.

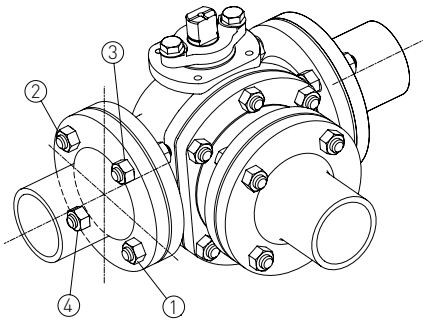


FIGURE 1 - TIGHTENING OF BOLTS

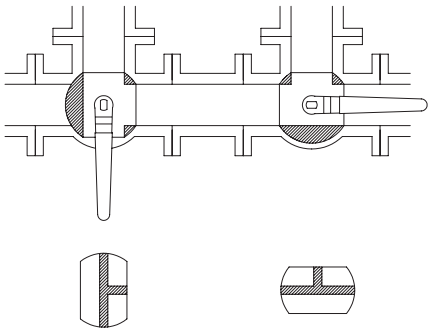


FIGURE 2 - LEVER HANDLING
3-Way T-port ball valves

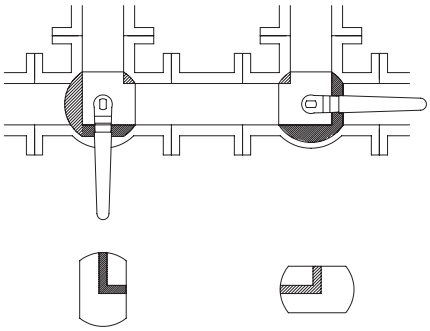


FIGURE 3 - LEVER HANDLING
3-Way L-port ball valves

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. *During installing the valves, ensure that the seat rings are not damaged. Unless otherwise recommended by KTM, the valves should be installed with the left or right-hand rotated 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 opened position. Testing at the left or right-hand rotated position will impose too much load and 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 the left or right-hand rotated 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 7 -OPERATION

7.1 Operation instruction

Valve adjustment is performed through lever handle/gear operation. The flow direction form can be identified by the stem top indication pattern (see Figure 2 and 3). For gear operated valves, the flow is indicated by the arrow-indicator (see Figure 4 and 5).

CAUTION

Avoid using the valves at partially open position. Using partially opened valves may lead to seat deformation and leakage.

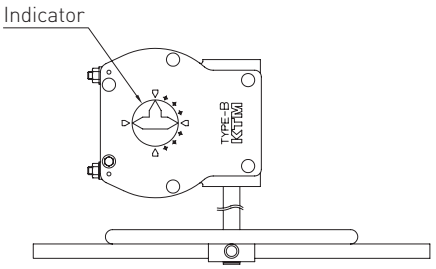


FIGURE 4 - GEAR OPERATIONAL
3-Way T-port ball valves

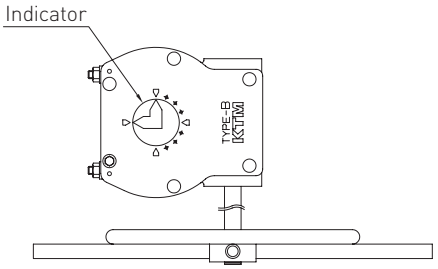


FIGURE 5 - GEAR OPERATIONAL
3-Way L-port ball valves

WARNING

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

7.2 Gear operated valve adjustment

If the gear-operated mechanism indicator does not correctly indicate the left or right-hand rotated position, adjust the opening with the adjustment screw. For details, refer to document
No. C325-330, "Instruction manual of A, B, C and D typed gear operational valves".

7.3 Key-lock (option)

A locking device at the left or right-hand rotated position of ball can be provided to prevent unauthorized or incorrect operation. Unlock and detach the padlock when you use the valves, otherwise padlock or stopper might break. (Refer figures 7 & 8 below)
To lock the valves, use locks of the sizes indicated in the tables below.

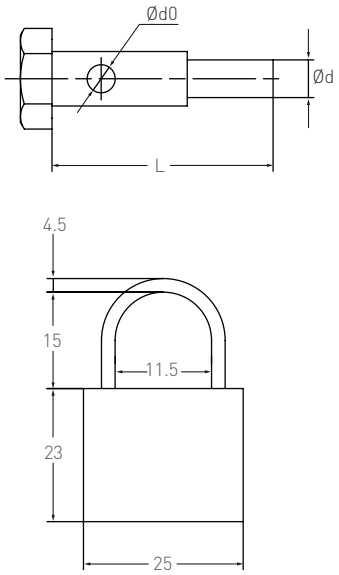


FIGURE 6 - LOCK PIN AND PAD LOCK (mm)

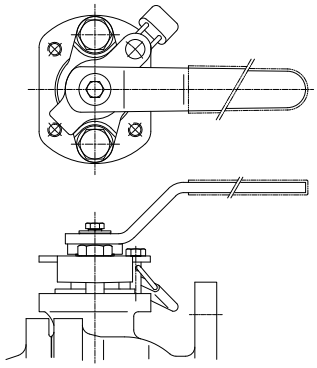


FIGURE 7 - LOCKING EXAMPLE

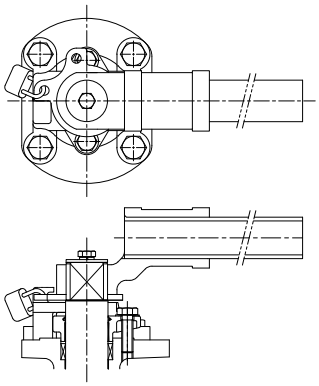


FIGURE 8 - LOCKING EXAMPLE

LOCK PIN AND PAD LOCK DIMENSIONS FOR 3-WAY 2-SEATS GRATITE BALL VALVES

Full bore		Reduced Bore		Pin dimensions			Pad lock type
DN	NPS	DN	NPS	do	d	L	Alpha no. (mm)
40 - 50	1½ - 2	-		5.5	6.5	31	1000 - 25
65 - 100	2½ - 4	125	5	6.5	8.3	39	1000 - 25
125 - 200	5 - 8	150 - 250	6 - 10	-	-		1000 - 25

LOCK PIN AND PAD LOCK DIMENSIONS FOR 3-WAY 4-SEATS BALL VALVES

Full bore		Reduced Bore		Pin dimensions			Pad lock type
DN	NPS	DN	NPS	do	d	L	Alpha no. (mm)
15	½	-	-	5.5	4.9	25	1000 - 25
20 - 25	¾ - 1	-	-	5.5	6.5	31	1000 - 25
40 - 80	5 - 8	-	-	6.5	8.3	39	1000 - 25
100 - 125	4 - 5	125 - 150	5 - 6	-	-	-	1000 - 25
150 - 200	6 - 8	200	8	-	-	-	-

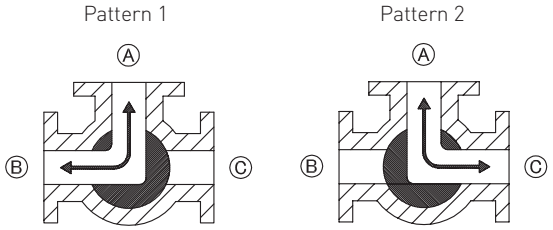


FIGURE 9

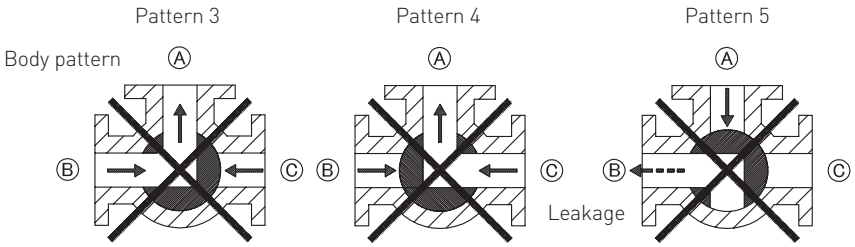


FIGURE 10

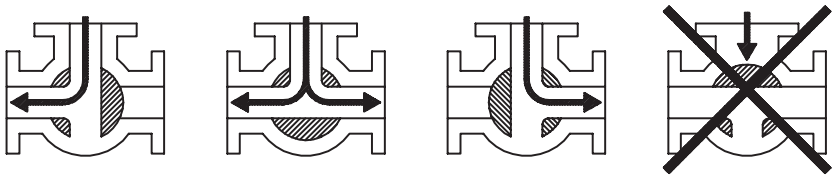


FIGURE 12 - SUPPLY DIRECTION IS A

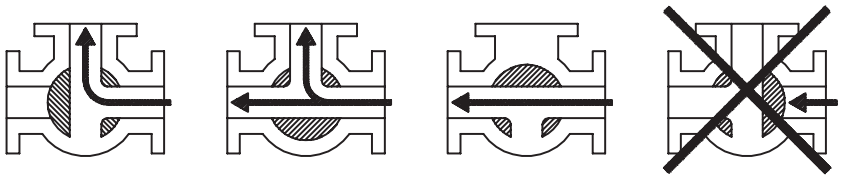


FIGURE 13 - SUPPLY DIRECTION IS B

7.4 Restriction of flow direction

A. The 3-Way 2-Seats and 3-Way 2-Seats gratite ball valves have two seats on two ports as shown in the figures below.

Type NB11/12 (3-way L-port Full Bore
Type NB 21/22 (3-way L-port Reduced Bore)

- Center Port (A) has no shutoff- function, since no seat is installed there.
- The L-Port valve can be used for the above patterns 1 or 2.
- Please note the switching direction of flow passage prior to use the valves.
- In Pattern 5, fluid passes both from A to B-Port and B to A-Port.
- In Pattern 3 and 4 fluid leaks to the flow channel side if pressure from C-Port or B-Port is higher than in the flow channel.
- Straight flow of B to C-Port and C to B-Port is not possible (valve operations rotates 90°).

B. Concerning flow direction control for 3-Way 4-Seats ball valves, refer to the following illustrations (Fig. 11 to Fig.15).

Type MB11/12 (3-way T-port Full Bore)
Type MB21/22 (3-way T-Port Reduced Bore)

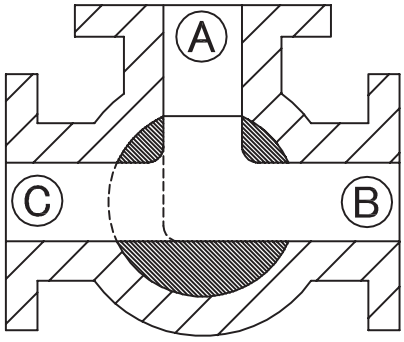
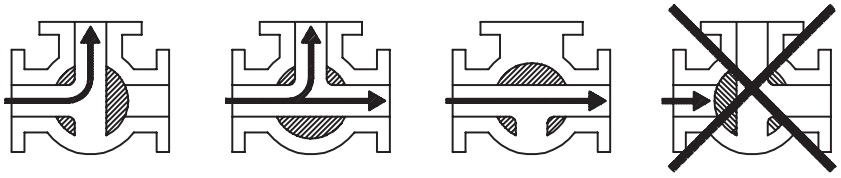


FIGURE 11
Solid line: 3-way T-port valve
Dashed line: 3-way L-port valve

NOTES

- The crossed out x patterns cannot be used.
- These illustrations refer to cases with pressure higher than 0 MPa.
- For vacuum use please inquire separately.



NOTES

- The crossed out x patterns cannot be used.
- These illustrations refer to cases with pressure higher than 0 MPa.
- For vacuum use please inquire separately.

FIGURE 14 - SUPPLY DIRECTION IS C

Type MB11/12 (3-way L-port Full Bore)
Type MB21/22 (3-way L-Port Reduced Bore)

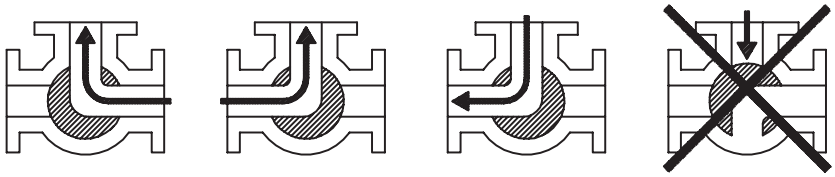


FIGURE 15

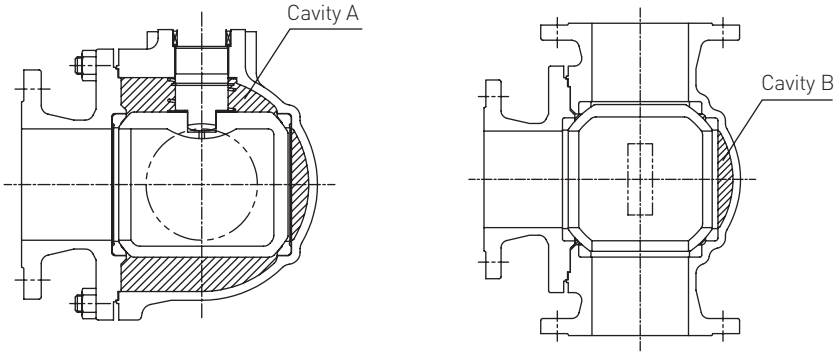


FIGURE 16

SECTION 8 - ABNORMAL PRESSURE RISE

(Applicable to 3-Way 4-Seats ball valves)

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. 16) between body, ball and seat.
Abnormal pressure rise can be caused by:

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

Please contact us about countermeasures for these problems, such as providing a pressure-relieving groove on the seat.
For cavity A, a measure to equalize pressure between the cavity and pipe is provided.

SECTION 9 - MAINTENANCE

The following instructions will contribute to a 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 17 to 21.

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.

The construction of gland seals on gear operated valves corresponds to the structure shown in Figures 18 and 20.
Stems have been designed as "anti-blow out" to improve safety during system operation. That means that the stem cannot be removed from the valve body through the top of the body, but from within the valve body.

CAUTION
The sealing portion between body and body cap is provided with the following gaskets as shown in Figure 21.
3-Way 4-Seats ball valves: reinforced PTFE gasket or O-ring
3-Way 2-Seats ball valves: reinforced PTFE or graphite gasket
3-Way 2-Seats gratite ball valves: graphite gasket
In case of slight leakage, fastening bolts should be moderately tightened (except for O-ring type).

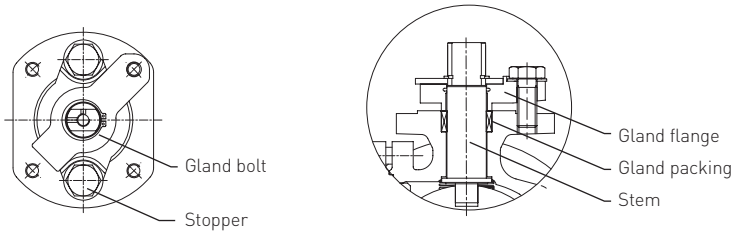


FIGURE 17
NB11(G), NB12(G) DN 40 - DN 100 (NPS 1½ - NPS 4)

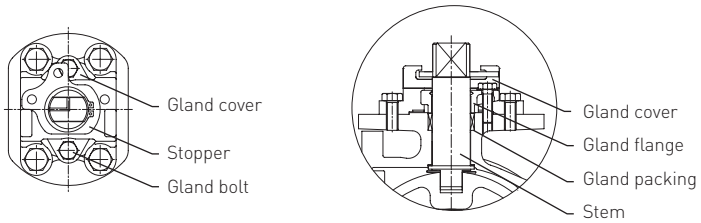


FIGURE 18
NB11(G), NB12(G) DN 125 - DN 200 (NPS 5 - NPS 8)

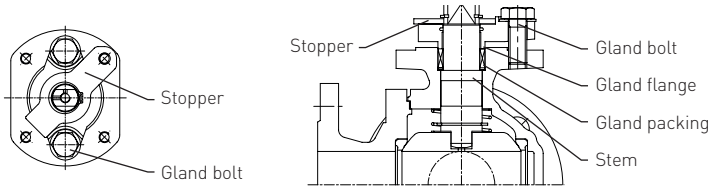


FIGURE 19
MB11 DN 40 - DN 80 (NPS 1½ - NPS 3)

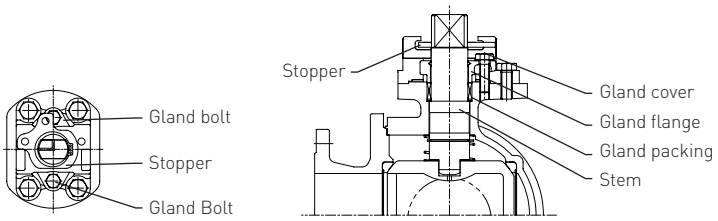


FIGURE 20
MB11 DN 100 - DN 200 (NPS 4 - NPS 8)

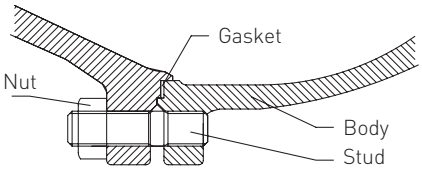


FIGURE 21
BODY SEALING STRUCTURES

SECTION 10 - TROUBLESHOOTING

Trouble example	Causes	Measures
Unsmooth operation	1. Jamming due to solids or slurry in the fluid.	1. Clean the inside of the valve. If necessary, replace parts (ball, seats, stem bearing, thrust bearing).
	2. Ball is corroded by fluid.	2. Replace with ball made of corrosion resistant material.
	3. Fluid sticks to ball and seats.	3. Clean the inside of the valve. If necessary, replace ball or seats, or replace with ball valve equipped with metal seats.
	4. Seats deformation due to high temperature fluid.	4. Replace with seats having good heat resistance, or replace the valve itself.
	5. Unusual pressure rise exceeding seat rating limit when shutting the valve.	5. Take measures to prevent abnormal pressure rise in pipe and replace seats.
Outside leakage	1. Sealing performance of gasket and gland packing decreases gradually when operation frequency is high or high temperature fluid flows.	1. The fastening nuts or bolts at gasket and gland packing are required to be slightly tightened, or gasket and gland packing replaced.
	2. Sealing performance of gasket and gland packing decreases by abnormal pressure rise in the piping when shutting the valve.	2. Take measures to prevent abnormal pressure rise and replace seats, gaskets and gland packing.
Seat leakage	1. Ball and seats are damaged by solids and slurry in the fluid.	1. Clean the inside of the valve. If necessary, replace ball or seats.
	2. Fluid stick to ball and seats.	2. Clean the inside of the valve. If necessary, replace ball or seats.
	3. Ball is corroded by fluid.	3. Replace with ball made of corrosion resistant material.
	4. Seat deformation due to high temperature fluid.	4. Replace with seats having good heat resistance, or replace the valve itself.
	5. Unusual pressure rise exceeding seat rating limit when shutting the valve leads to seat deformation.	5. Take measures to prevent abnormal pressure rise 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 the safety. The valve is extremely heavy; ensure a stable position to prevent it from falling down when assembling/disassembling.
The ball valve has a cavity in its interior.
For a safe disassembly, following instructions must be carried out.

1. *Open the valve partially when still installed in piping, and make sure no pressure remains in the cavity. Failure to do so may result in injury, explosion or fire caused by 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 checks for dangerous fluids such as inflammable gas should be done outdoors, far away from any fire source.*

Refer to below construction drawing(s) for disassembly. The numbers of parts varyslightly depending on the valve size, but the basic structures are identical.

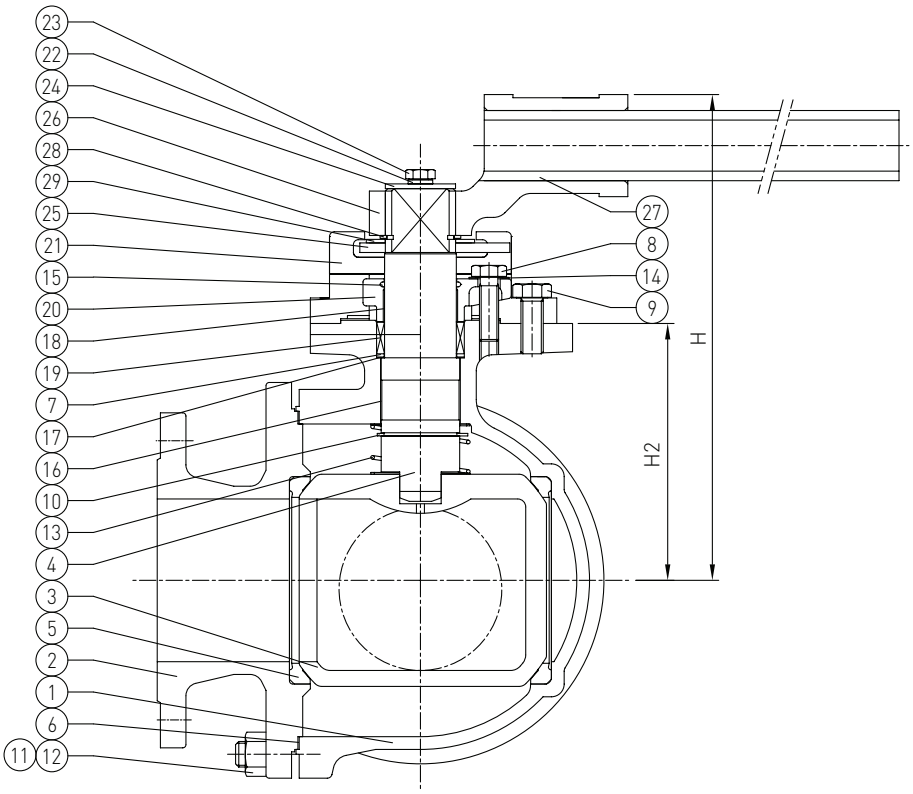
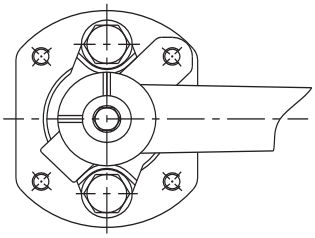
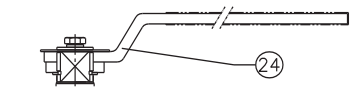


FIGURE 22
Parts construction of 3-Way 4-Seats ball valves (Nominal diameter: DN 100/NPS 4)

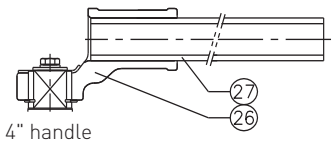
PARTSLIST

No.	Part name
1	Body
2	Cap
3	Ball
4	Stem
5	Seat
6	Gasket
7	Gland bolt
8	Washer
9	Gland flange
10	Gland packing
11	Stud
12	Nut
13	Live loading spring
14	Anti-static spring
15	Anti-static spring
16	Gland bearing
17	Thrust bearing
18	Stem bearing
19	Snap ring
20	Spring washer
21	Bolt
22	Washer
23	Stopper
24	Handle (for DN 40/NPS 1½, DN 50/NPS 2)
25	Handle (for DN 65/NPS 2½, DN 80/NPS 3)
26	Handle head (for DN 100/NPS 4)
27	Pipe (for DN 100/NPS 4)
28	Indicator


View 'A'



1½", 2" handle



4" handle

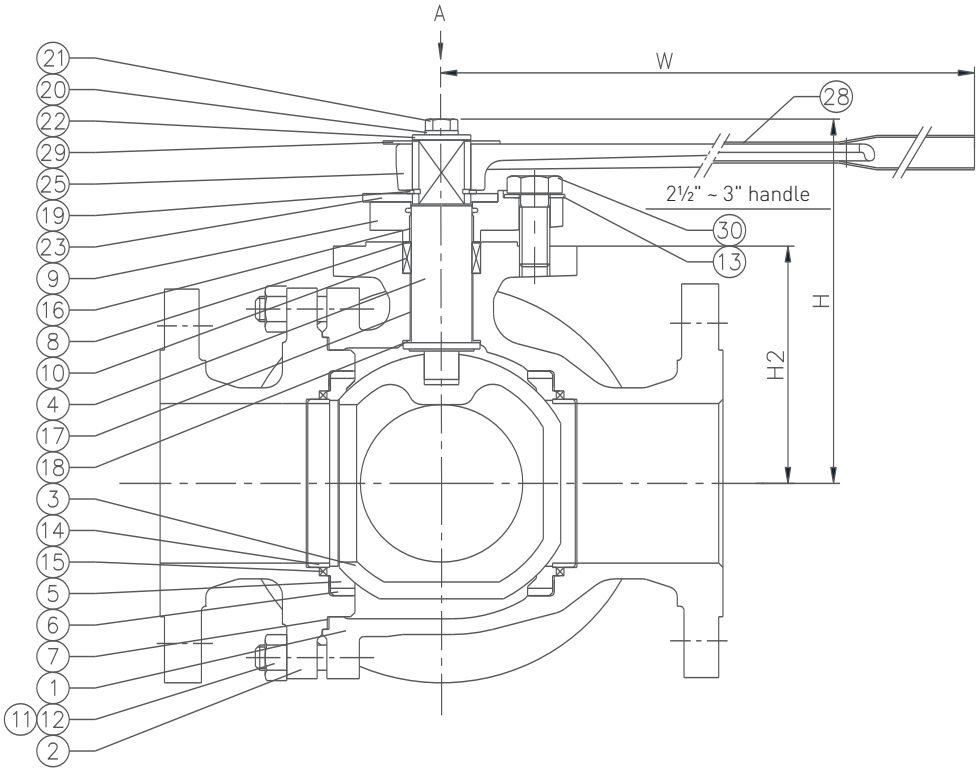
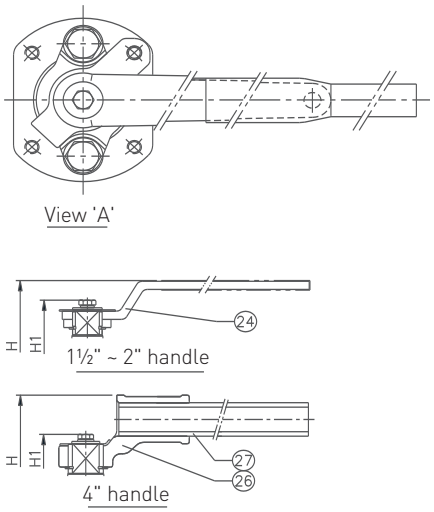


FIGURE 23
Parts construction of 3-Way 2-Seats ball valves (Nominal diameter: DN 50/NPS 2)

PARTSLIST

No.	Part name
1	Body
2	Cap
3	Ball
4	Stem
5	Seat
6	Seat retainer
7	Gasket
8	Packing washer
9	Gland flange
10	Gland packing
11	Stud
12	Nut
13	Live loading spring
14	Inner ring
15	Cushion
16	Gland bearing
17	Stem bearing
18	Thrust bearing
19	Snap ring
20	Spring washer
21	Hexagon bolt
22	Washer
23	Stopper
24	Handle (for DN 40/NPS 1½, DN 50/NPS 2)
25	Handle (for DN 65/NPS 2½, DN 80/NPS 3)
26	Handle head (for DN 100/NPS 4)
27	Pipe (for DN 100/NPS 4)
28	Pipe (for DN 65/NPS 2½, DN 80/NPS 3)
29	Indicator
30	Gland bolt



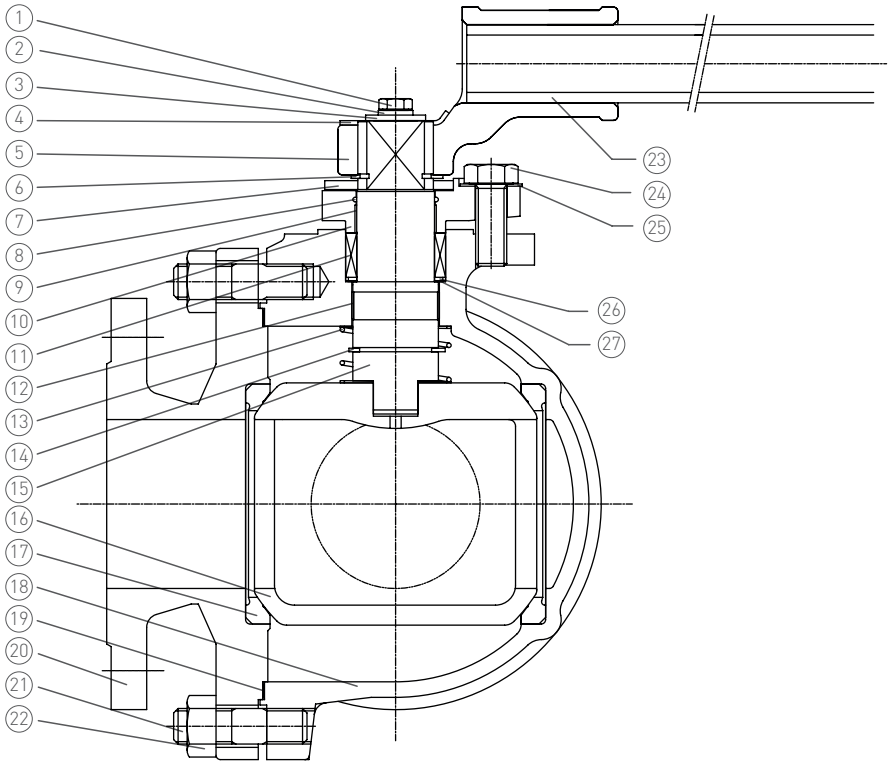


FIGURE 24
Parts construction of 3-Way 4-Seats ball valves - DN 80 (NPS 3)

PARTSLIST

No.	Part name
1.	Bolt
2.	Spring washer
3.	Washer
4.	Indicator
5.	Handle head
6.	Snap ring
7.	Stopper
8.	Anti-static spring
9.	Gland bearing
10.	Gland flange
11.	Gland packing
12.	Stem bearing
13.	Anti-static spring
14.	Snap ring
15.	Stem
16.	Ball
17.	Seat
18.	Body
19.	Gasket
20.	Cap
21.	Stud
22.	Nut
23.	Pipe
24.	Gland bolt
25.	Live loading spring
26.	Thrust washer
27.	Thrust bearing

TIGHTENING TORQUE- NB11/NB12

Full bore	Reduced bore	Gland bolt		Mating flange bolt			
DN (NPS)	DN (NPS)	N-m	lb·in	NB11 (N-m)	NB11 (lb·in)	NB12 (N-m)	NB12 (lb·in)
40 (1½)	50 (2)	7	62	29-33	257-292	65-76	575-673
50 (2)	65 (2½)	7	62	49-57	434-504	150-180	1328-1593
65 (2½)	80 (3)	16	142	49-57	434-504	100-120	885-1062
80 (3)	100 (4)	16	142	49-57	434-504	150-180	1328-1593
100 (4)	125 (5)	19	168	76-89	673-788	150-180	1328-1593
125 (5)	150 (6)	19	168	120-140	1062-1239	300-350	2655-3098
150 (6)	200 (8)	19	168	230-260	2036-2301	400-470	3540-4160
200 (8)	250 (10)	32	283	300-350	2655-3098	510-610	4514-5399

TABLE. TIGHTENING TORQUE - MB11/MB12

Full bore	Reduced bore	Gland bolt				Mating flange bolt			
DN (NPS)	DN (NPS)	MB11 (N-m)	MB11 (lb·in)	MB12 (N-m)	MB12 (lb·in)	MB11 (N-m)	MB11 (lb·in)	MB12 (N-m)	MB12 (lb·in)
15 (½)	-	3.5	31	7	62	-	-	65-76	575-673
20 (¾)	-	7	62	7	62	-	-	65-76	575-673
25 (1)	-	7	62	7	62	-	-	65-76	575-673
40 (1½)	50 (2)	16	142	16	142	100-120	885-1062	150-180	1328-1593
50 (2)	65 (2½)	19	168	19	168	100-120	885-1062	210-250	1859-2213
65 (2½)	80 (3)	19	168	19	168	100-120	885-1062	-	-
80 (3)	100 (4)	19	168	19	168	150-180	1328-1593	150-180	1328-1593
100 (4)	125 (5)	19	168	19	168	150-180	1328-1593	100-120	885-1062
125 (5)	150 (6)	19	168	19	168	300-350	2655-3098	-	-
150 (6)	200 (8)	32	283	32	283	300-350	2655-4160	150-180	1328-1593
200 (8)	250 (10)	60	531	60	531	510-610	4514-5399	300-350	2655-3098

TABLE. TIGHTENING TORQUE - MB11/MB12 (continued)

Full bore	Reduced bore	Lower cover bolt				Cover bolt	
DN (NPS)	DN (NPS)	MB11 (N-m)	MB11 (lb·in)	MB12 (N-m)	MB12 (lb·in)	MB12 (N-m)	MB12 (lb·in)
15 (½)	-	-	-	-	-	150-180	1328-1593
20 (¾)	-	-	-	-	-	150-180	1328-1593
25 (1)	-	-	-	-	-	150-180	1328-1593
40 (1½)	50 (2)	-	-	-	-	210-250	1859-2213
50 (2)	65 (2½)	-	-	-	-	400-470	3540-4160
65 (2½)	80 (3)	-	-	-	-	-	-
80 (3)	100 (4)	-	-	-	-	300-350	2655-3098
100 (4)	125 (5)	-	-	-	-	300-350	2655-3098
125 (5)	150 (6)	150-180	1328-1593	-	-	-	-
150 (6)	200 (8)	150-180	1328-1593	-	-	300-350	2655-3098
200 (8)	250 (10)	150-180	1328-1593	150-180	1328-1593	750-890	6638-7877

Sending the valves back to us and requesting repair.

CAUTION

3-Way 4-Seats ball valves have a cavity in its interior when the ball is at the left or right-hand rotated position. Since some pressure and fluid may remain inside the cavity, be sure to release pressure and purge fluids completely by keeping the valve as described below, when removing the valve from the piping or sending them back to us. 3-Way 4-Seats ball valves: open partially 3-Way 2-Seats and 3-Way 2-Seats gratite ball valves: half-left or right hand rotated position. Please return the valve without disassembling.

SECTION 12 -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.

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