3-PC Ball Valve

2-Way

Instruction Manual

10202512-IM013

CONTENTS

1 General Description

This manual should be read carefully by all personnel involved in operation and maintenance.

Liability for any damages or issues resulting from non-compliance with these instructions will not be accepted.

It should also be noted that descriptions and specifications in this manual may be subject to technical changes.

1.1 Intended use

The ball valve is designed for the purposes outlined in Chapter 2.1. Any use beyond what is described in that chapter does not adhere to regulations, and MST (Minox) will not be held responsible for any resulting damages. The operator assumes full responsibility for risks.

Proper and safe operation of the ball valve requires appropriate transportation, storage, and professional assembly. Intended use also includes adherence to operating, service, and maintenance guidelines.

1.2 Storage

The ball valve should be stored in accordance with the following conditions:

- Storage area should be clean and dry at all times.
- Store the valve in a temperature-controlled area to protect gasket.
- Store the valve in a box and protect the inlet and outlet with end caps to prevent rust and contamination by foreign materials.
- Storage area should be checked periodically to ensure that these conditions are consistently maintained.

2 MINOX® 3-PC Ball Valve

2.1 Purpose of use

MINOX® 3-piece body sanitary ball valve is particularly used for applications involving high-viscosity fluids, high-pressure systems, and elevated temperatures. The 3-piece body design enables easy disassembly for cleaning and maintenance. The filled cavity seat design helps reduce areas where food particles, bacteria, or other contaminants could accumulate.

2.2 Features

The key features of MINOX® sanitary ball valve include:

- 3-piece body design enables easy maintenance and clean-on-place (COP) procedures without removing the entire valve from the pipeline.
- Fully encapsulated or cavity filled PTFE seat prevents product from entering behind the ball or seat, reducing the risk of cross contamination, build-up, or crystallisation on the sealing surface.
- Full-bore design provides an unobstructed flow path for maximum discharge efficiency, minimizing pressure drop and reducing the potential for blockages.
- ISO 5211 mounting pad allows seamless integration with actuators for easy and reliable automation.

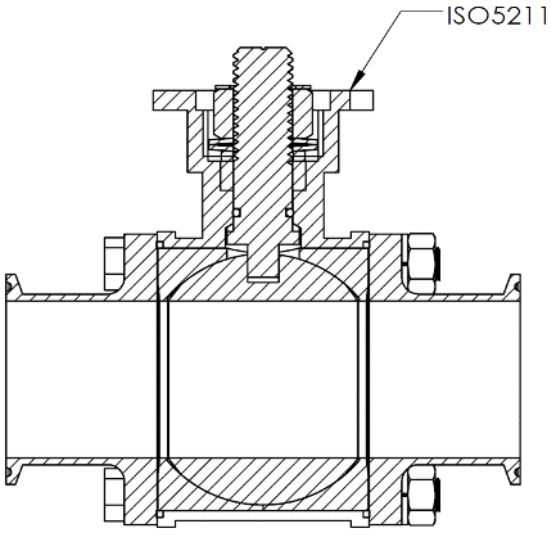
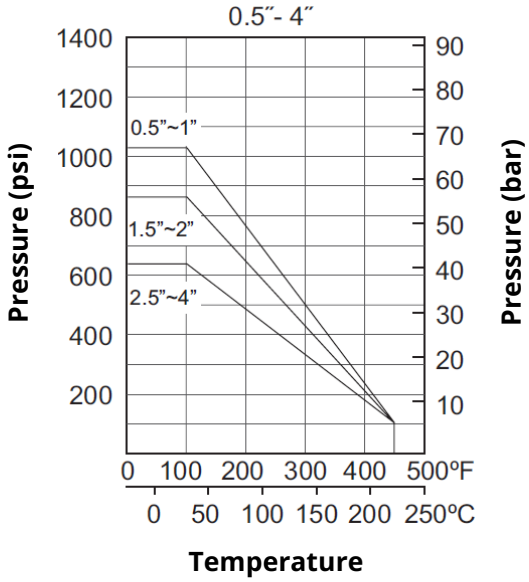


Figure 2.2.1: Features of MINOX® sanitary ball valve.

3 Technical Data

Material	
Body	ASTM A351 CF8M SS316
Seal	PTFE with cavity filled

Working Condition	
Pressure temperature rating	

Note:
100% air tested under water at 100 psi, for open and closed position.

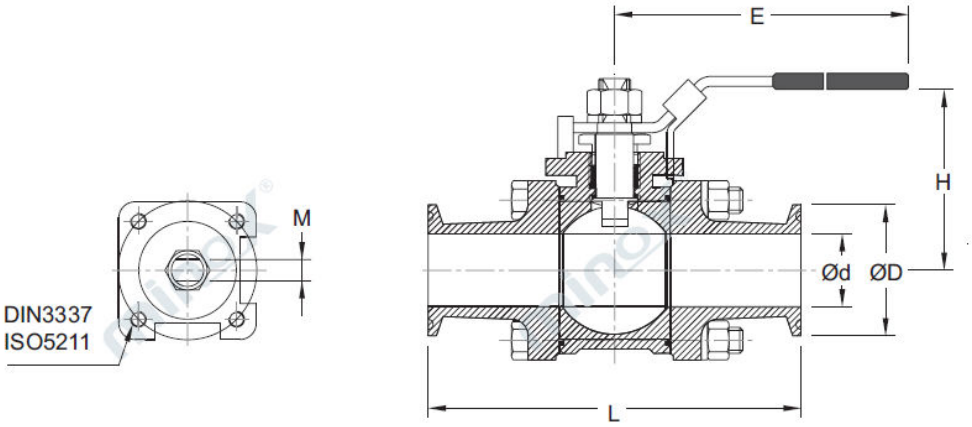
Physical Data	
Process connection	Clamp end (Weld end, SMS, DIN, RJT, IDF connections available on request)
Size	0.5" – 4" DN15 – DN100

Operation Type	
Manual	Manual with Handle
Auto	Pneumatic actuator
Control option	Solenoid valve, positioner, limit switch

Pneumatic Data	
Air quality	Class 3,3,3 acc. to DIN ISO 8573-1
Air pressure for actuator	5 – 7 bar

3 Technical Data

Dimension



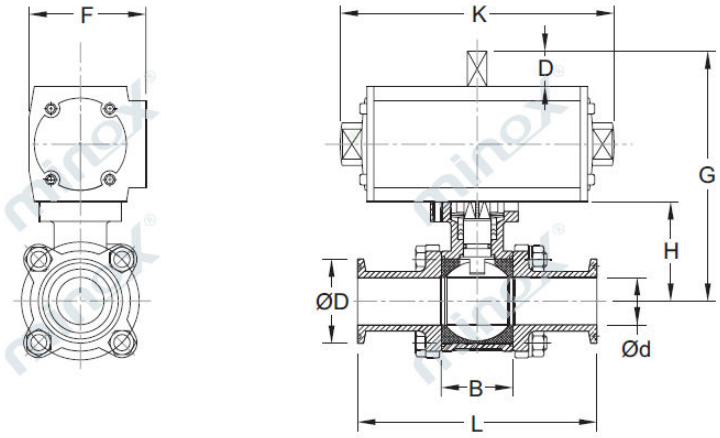
3-PC Manual Ball Valve

Size (Inch)	ISO-5211	H (mm)	L (mm)	E (mm)	Ød (mm)	ØD (mm)	M (mm)
0.5″	F03	65	89	140	9.5	25.5	5.0
0.75″	F03	68	101	140	15.8	25.5	5.0
1.0″	F04	71	114	140	22.2	50.4	6.5
1.5″	F05	86	140	195	35.0	50.4	8.5
2.0″	F05	93	156	195	47.6	63.6	8.5
2.5″	F07	140	197	262	60.3	77.5	12.0
3.0″	F07	155	229	262	73.0	90.8	12.0
4.0″	F10	180	241	290	97.4	118.5	16.0

Size (DIN)	ISO-5211	H (mm)	L (mm)	E (mm)	Ød (mm)	ØD (mm)	M (mm)
15	F03	65	89	140	16	34.0	5.0
20	F03	68	101	140	20	34.0	5.0
25	F04	71	114	140	26	50.5	6.5
40	F05	93	140	195	28	50.5	8.5
50	F05	100	156	195	50	63.6	8.5
65	F07	140	197	262	66	91.0	12.0
80	F07	155	229	262	81	106.0	12.0
100	F10	180	241	290	100	119.0	16.0

3 Technical Data

Dimension



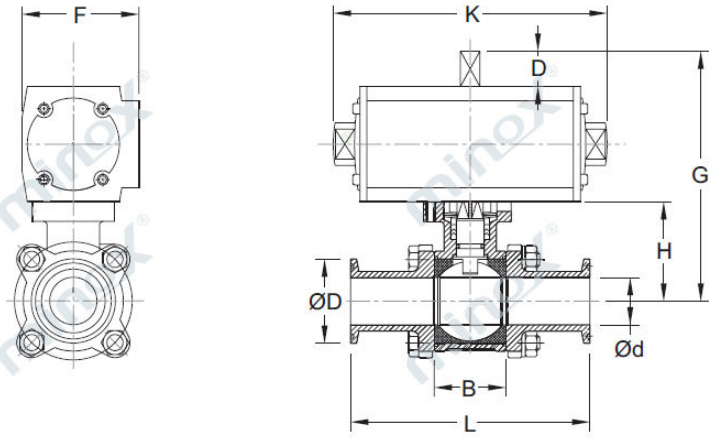
3-PC Pneumatic Ball Valve

Size (Inch)	ISO-5211	H (mm)	L (mm)	B (mm)	Ød (mm)	ØD (mm)	Torque (inch/lbs)
0.5”	F03 / F04	37.0	89	26.6	9.5	25.5	50
0.75”	F03 / F04	47.0	101	33.0	15.8	25.5	75
1.0”	F04 / F05	57.2	114	38.2	22.2	50.4	100
1.5”	F05 / F07	78.2	140	54.2	35.0	50.4	190
2.0”	F05 / F07	86.2	156	68.5	47.6	63.6	240
2.5”	F07 / F10	109.2	197	85.0	60.3	77.5	420
3.0”	F07 / F10	117.7	229	100.0	73.0	90.8	480
4.0”	F10 / F12	141.2	241	121.8	97.4	118.9	1200

Size (DIN)	ISO-5211	H (mm)	L (mm)	B (mm)	Ød (mm)	ØD (mm)	Torque (inch/lbs)
15	F03 / F04	37.0	89	26.6	16	34.0	50
20	F03 / F04	47.0	101	33.0	20	34.0	75
25	F04 / F05	57.2	114	38.2	26	50.5	100
40	F05 / F07	78.2	140	54.2	28	50.5	190
50	F05 / F07	86.2	156	68.5	50	63.6	240
65	F07 / F10	109.2	197	85.0	66	91.0	420
80	F07 / F10	117.7	229	100.0	81	106.0	480
100	F10 / F12	141.2	241	121.8	100	119.0	1200

3 Technical Data

Dimension



3-PC Pneumatic Ball Valve (Double Acting Actuator)

Size (Inch / DIN)	Actuator Model	D (mm)	F (mm)	G (mm)	K (mm)
0.5" / 15	DR00015	20	59.0	126.0	140.5
0.75" / 20	DR00015	20	59.0	136.0	140.5
1.0" / 25	DR00030	20	72.0	162.2	158.5
1.5" / 40	DR00060	20	84.5	200.2	210.5
2.0" / 50	DR00060	20	84.5	208.2	210.5
2.5" / 65	DR00100	20	97.5	244.2	247.5
3.0" / 80	DR00150	20	111.0	364.7	268.5
4.0" / 100	DR00220	30	127.0	316.2	315.0

3-PC Pneumatic Ball Valve (Single Acting Actuator)

Size (Inch / DIN)	Actuator Model	D (mm)	F (mm)	G (mm)	K (mm)
0.5" / 15	SC00015	20	59.0	126.0	140.5
0.75" / 20	SC00015	20	59.0	136.0	140.5
1.0" / 25	SC00030	20	72.0	162.2	158.5
1.5" / 40	SC00100	20	97.5	213.2	247.5
2.0" / 50	SC00100	20	97.5	221.2	247.5
2.5" / 65	SC00150	20	111.0	256.2	268.5
3.0" / 80	SC00220	20	127.0	292.7	315.0
4.0" / 100	SC00300	30	136.0	328.2	315.0

4 Installation

1. Before valve installation, remove the two end caps. Clean and flush the valve thoroughly with the valve in the fully open position.

2. Before installing the valve into the pipeline, ensure that the pipeline is completely flushed and free of debris or impurities that could damage the ball or seat seals.

3. Avoid stressing the valve during installation. Attention should be given to the following:
   - Vibration on the pipeline.
   - Thermal expansion of the pipeline during circulation of hot liquids.
   - Excessive welding.
   - Overloading on the pipeline.

4. The ball valve may be installed in either a horizontal or vertical orientation.

5. The pipeline must be properly aligned and should not sag, bend, or be subjected to external forces. Use pipe hangers to support the pipeline and eliminate misalignment or deviation near the valve installation point.

6. Before connecting the valve to the pipeline, tighten the end caps, bolts and nuts evenly and to the specified torque values, as shown in Table 4.1.1.

Table 4.1.1: Body and bolts torque.

Size (Inch / DIN)	Torque (inch/lbs)
0.5” / 15	54 – 65
0.75” / 20	100 – 110
1.0” / 25	100 – 110
1.5” / 40	172 – 196
2.0” / 50	172 – 196
2.5” / 65	250 – 330
3.0” / 80	290 – 470
4.0” / 100	580 – 620

5 Operation

Before first start-up

1. Clean the piping system thoroughly to ensure that no foreign objects are trapped inside.
2. Inspect the system for possible leakages during commissioning. Replace any defective seals immediately.

5.1 Manual operation

Manual operation using the handle is shown in *Figure 5.1.1*. Rotate the handle by 90° to fully open or close the valve.

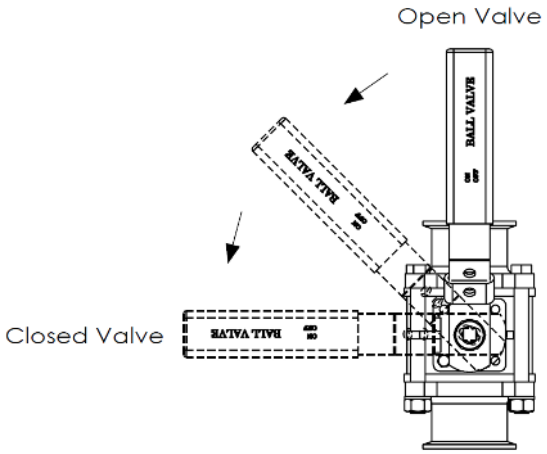


Figure 5.1.1: Manual operation of ball valve.

5 Operation

5.2 Pneumatic operation

Pneumatic operation using the actuator is shown in *Figure 5.1.2*. Apply compressed air to the pneumatic actuator to operate the valve. Valve position can be displayed if a limit switch box is installed.

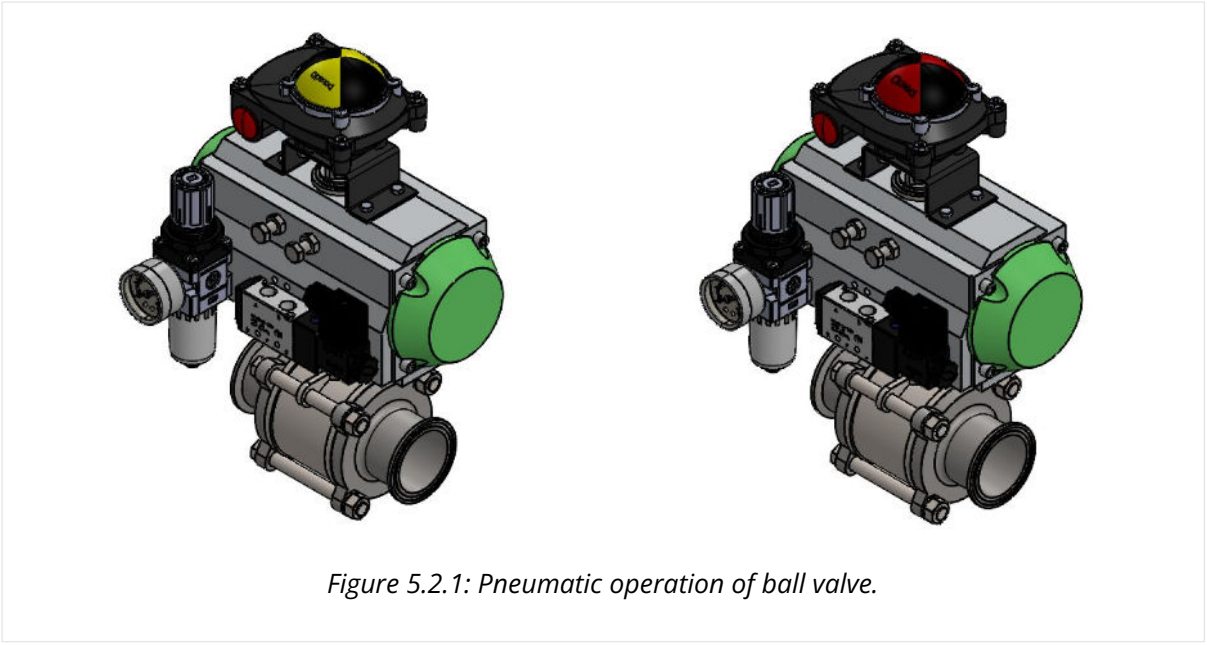
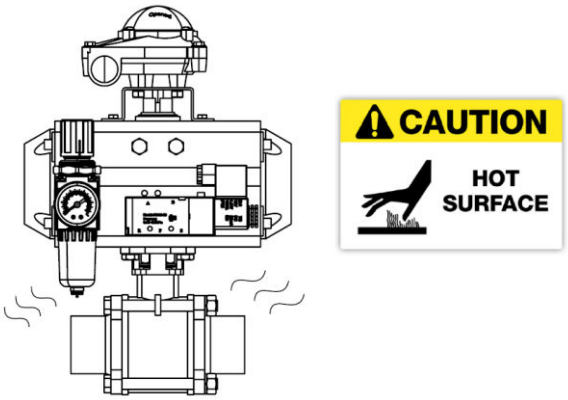


Figure 5.2.1: Pneumatic operation of ball valve.

Notes:

1. *Operate the valve by opening and closing it several times to ensure smooth and reliable movement between the ball and the seat.*
2. *Ensure smooth operation of the actuator.*



Caution!

- Do not touch the valve body and the actuator when it is in charged with compressed air.
- Do not touch the valve or piping when handling hot liquids or during sterilization.
- Release the compressed air after use.

6 Maintenance

6.1 General maintenance

Read the maintenance instruction carefully. Always keep the spare service kits in stock for any necessary replacement. Always use MINOX genuine spare parts. Table 6.1.1 shows the recommended action for maintenance.

Table 6.1.1: Maintenance guide for valve.

Recommended Action	Maintenance of Valve Gasket, O-Ring, Seat Seal, Thrust Washer & Stem Packing
Preventive maintenance	- Replace after 12 months.
Maintenance after leakage	- Replace immediately.
Planned maintenance	- Regular inspection for leakage and smooth operation. - Keep a track record of the valve operation. - Use statistic for inspection planning. - Replace after leakage.

Note:
Contact MINOX sales personnel to order spare service kits which can be found in the Chapter 9 Spare Part List.

Caution!
Before disassembling the valve's pipeline connections and clamps on the valve body, always take the following safety measures:

- Release the compressed air after use.
- Never service the valve when it is hot. Risk of burns!
- Never service the valve while the valve and pipeline are pressurized.
- Do not touch the valve body and the actuator when it is in charged with compressed air.
- Do not stick your fingers through the valve ports if the actuator is supplied with compressed air.
- Disconnect electric and pneumatic connections.
- Ensure that no process operations are running in the relavant area during maintenance and repair.
- All pipeline system components connected to the valve must be completely drained.

6 Maintenance

6.2 Recommended cleaning

Sanitary ball valves contain seat cavities and shadow areas that cannot be completely cleaned by CIP flow alone. Therefore, it is strongly recommended to perform COP (clean-out-of-place) before initiating the CIP (clean-in-place) process.

During COP, the valve shall be disassembled, and all product contact parts – including the ball, seats, and stem cavities shall be manually cleaned using approved cleaning agents. After thorough cleaning, rinsing, and inspection, the valve shall be properly reassembled and reinstalled into the pipeline.

Following COP, the CIP process shall be carried out to clean the connected pipeline system. During CIP, the valve passages are cleaned by circulating cleaning solution through the system. The choice of cleaning agents, exposure time, temperature, and procedures shall be determined based on the type and level of contamination. Ensure that the cleaning solution is chemically compatible with the sealing materials used.

1. Prepare 1% weight concentration of NaOH at 70℃.
   For example,
   NaOH (1kg) + water (100L) = alkaline cleaning agent

2. Prepare 0.5% weight concentration of HNO3 at 70℃.
   For example,
   53% HNO3 (0.7L) + water (100L) = acid cleaning agent

   Note:
   Use clean water free from chlorides.

3. The cleaning agent concentration should not be too high. Please add the cleaning agent gradually!

4. Adjust the cleaning agent flow rate according to the process. Increase the cleaning flow rate for milk/viscous liquid disinfection.

5. After cleaning, rinse with clean water.

Caution!
Always handle alkaline and acid with safety goggles and gloves.
Never touch the valve or pipeline when processing hot medium or sterilisation. Risk of burns!

Notes:
1. *Cleaning agents must be stored/handled in accordance with current regulations/standard.*
2. *Above are the details on common CIP chemicals and general guidelines for use. It is recommended you contact your CIP engineering partner to purchase chemicals that are right for your needs.*

7 Troubleshooting

Failures	Cause	Remedy
Internal leakage (normal wear)	- Worn valve seat - Worn gasket	- Replace the valve seat and the gasket
Internal leakage (early stage)	- Worn valve seat - Worn gasket - Many activations - High pressure and/or temperature - Aggressive media	- Replace the valve seat and gasket - Change operating conditions
External leakage (normal wear)	- Worn gasket - Worn stem packing	- Replace the gasket and stem packing
External leakage (early stage)	- Damaged or worn gasket - Damaged or worn stem packing - Many activations - High pressure and/or temperature - Aggressive media	- Replace the gasket and stem packing - Change operating conditions
Valve cannot be activated or is difficult to operate	- Too low air pressure	- Check the correct air pressure
Valve is NO (normally open), should be NC (normally closed)	- 90° displacement of the actuator	- Remove the actuator, turn valve into desired pressure-less position and remount actuator.

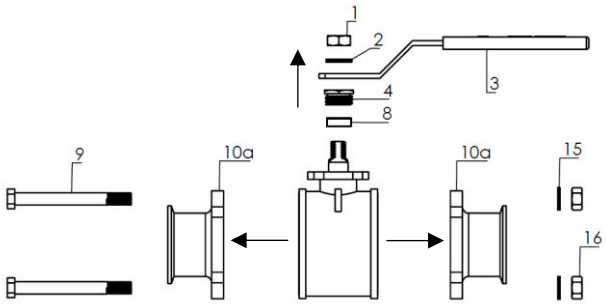
Note:
Contact MINOX sales personnel if technical assistance is required.

8 Valve Assembly & Disassembly

8.1 Valve disassembly

Step 1

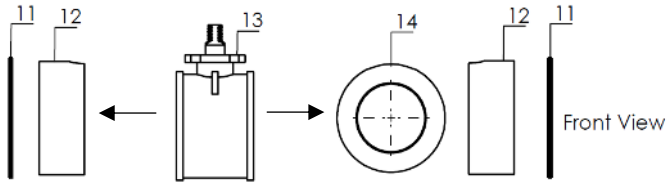
- Loosen and remove the hex nut (1), spring washer (2), handle (3), gland nut (4), and stem packing (8).
- Loosen and remove the hex bolts (9), spring washers (15) and hex nuts (16), then remove the end caps (10a) from both sides of the valve.



Step 2

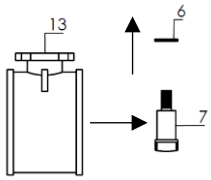
- Remove the gaskets (11) and seat seals (12) from both sides of the valve body (13).
- Remove the ball (14) from the valve body (13).

Note:
Ensure the ball (14) is in the closed position to facilitate easier removal from the valve body.



Step 3

- Gently push the stem (7) downward through the central bore of the valve body (13) until it is completely removed.
- Remove the thrust washer (6).

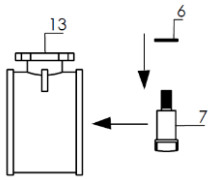


8 Valve Assembly & Disassembly

8.2 Valve assembly

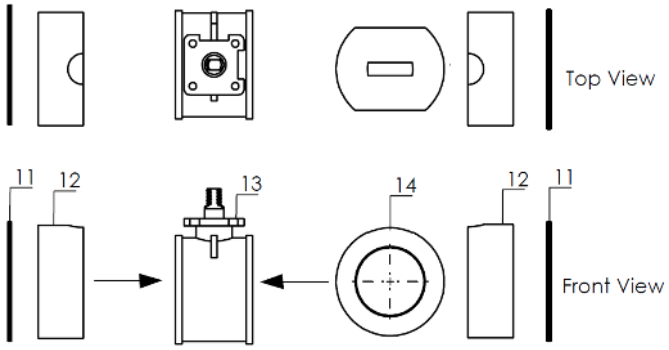
Step 1

- Fit the thrust washer (6) onto the stem (7).
- Insert the stem (7) into the valve body (13).



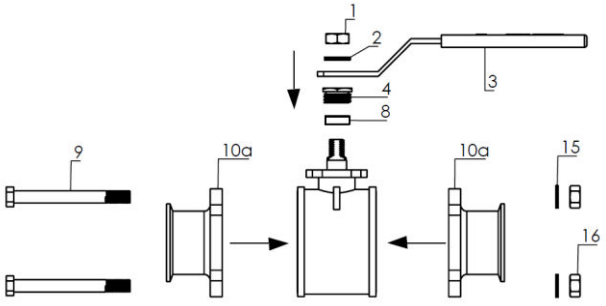
Step 2

- Align the seal, ball and valve body according to the top view orientation shown in the diagram.
- Insert the gasket (11) and seat seal (12) into the left side of the valve body (13).
- Install the ball (14) into the valve body (13).
- Insert the seat seal (12) and gasket (11) into the right side of the valve body (13).



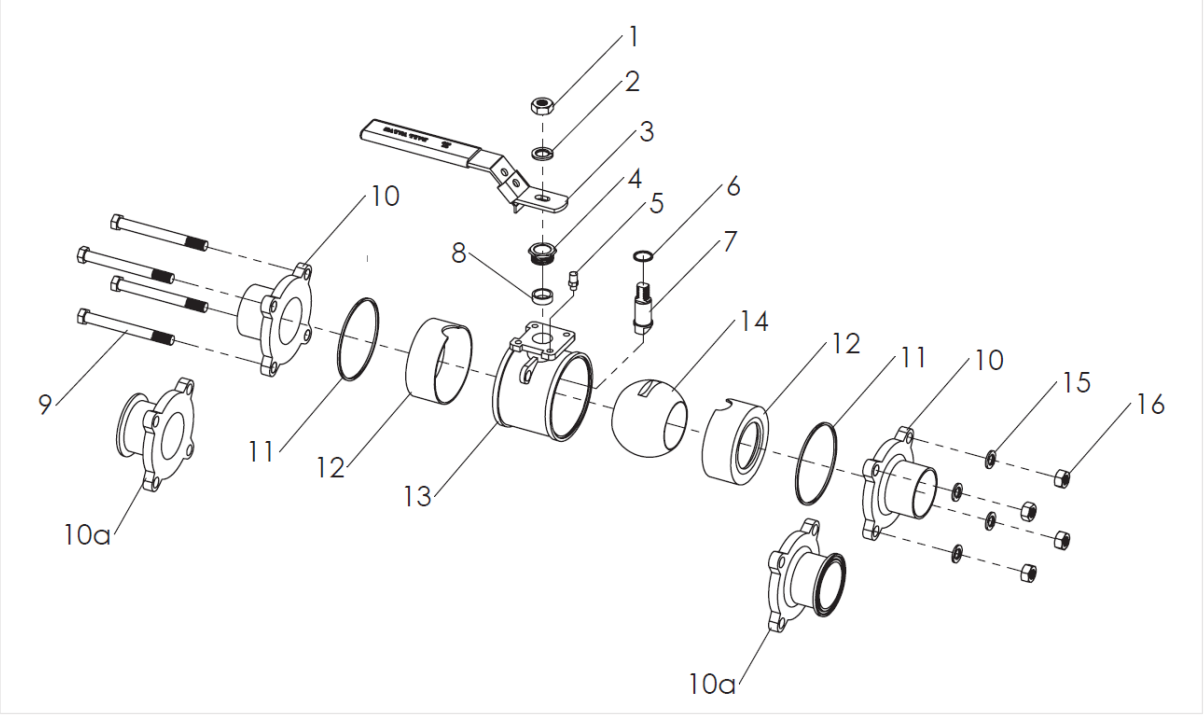
Step 3

- Insert the stem packing (8) and secure it by tightening the gland nut (4).
- Assemble the handle (3) onto the stem and secure it using the spring washer (2) and hex nut (1).
- Install the caps (10a) on both sides and secure them using hex bolts (9), spring washers (15) and hex nuts (16). The specified torque values can refer to Table 4.1.1.



9 Spare Part List

9.1 3-pc manual ball valve



9 Spare Part List

9.1 3-pc manual ball valve

No.	Part Name	Qty.	Material
1	Nut	1	
2	Spring washer	1	
3	Handle	1	304
4	Gland nut	1	304
5	Stopper	1	304
6*	Thrust washer	1	PTFE
7	Stem	1	316
8*	Stem packing	1	PTFE
9	Hex bolt Studs – double end	①	
10	Cap – weld end	2	316
10a	Cap – clamp end	2	316
11*	Gasket	2	PTFE
12*	Seat seal	2	PTFE
13	Body	1	316
14	Ball	1	316
15	Spring washer	①	
16	Nut	①	

SERVICE KIT
Parts marked with * are the service kit.

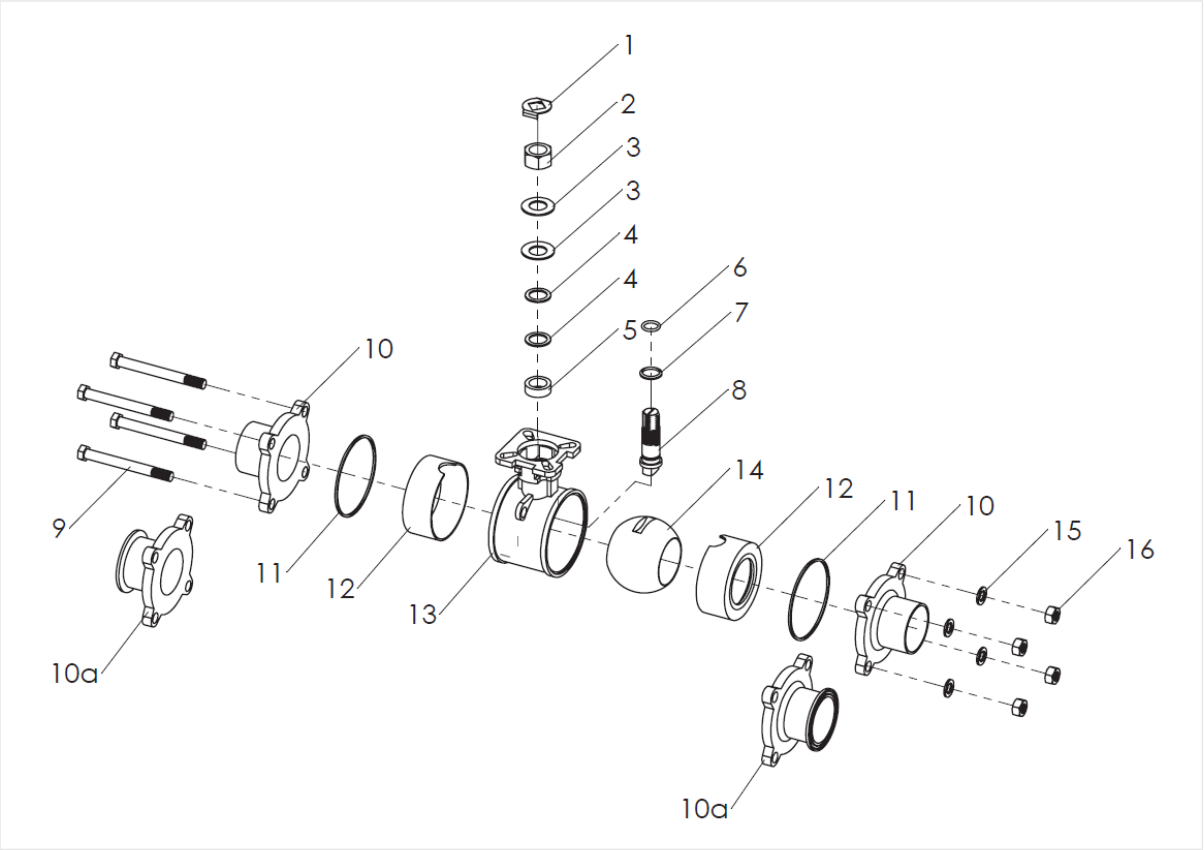
SERVICE KIT	0.5" (12.7mm)	0.75" (19.05mm)	1" (25.4mm)	1.5" (38.1mm)	2" (50.8mm)
PTFE	3B001-05504	3B001-05506	3B001-05508	3B001-05512	3B001-05516
SERVICE KIT	**2.5" (63.5mm)**	**3" (76.2mm)**	**4" (101.6mm)**		
PTFE	3B001-05520	3B001-05524	3B001-05532		

SERVICE KIT	DN15 (19mm)	DN20 (23mm)	DN25 (29mm)	DN40 (41mm)	DN50 (53mm)
PTFE	3B001-05019	3B001-05023	3B001-05029	3B001-05041	3B001-05053
SERVICE KIT	**DN65 (70mm)**	**DN80 (85mm)**	**DN100 (104mm)**		
PTFE	3B001-05070	3B001-05085	3B001-05104		

Note:
① *The required quantity depends on the valve size.*

9 Spare Part List

9.2 3-pc ball valve (ISO 5211)



9 Spare Part List

9.2 3-pc ball valve (ISO 5211)

No.	Part Name	Qty.	Material
1	Lock washer	1	304
2	Nut	1	
3	Belleville washer	2	
4	Sealing ring	2	
5*	Stem packing	1	PTFE
6*	O-ring	1	FKM
7*	Thrust washer	1	PTFE
8	Stem	1	316
9	Hex bolt Studs – double end	①	
10	Cap – weld end	2	316
10a	Cap – clamp end	2	316
11*	Gasket	2	PTFE
12*	Seat seal	2	PTFE
13	Body	1	316
14	Ball	1	316
15	Spring washer	①	
16	Nut	①	

SERVICE KIT
Parts marked with * are the service kit.

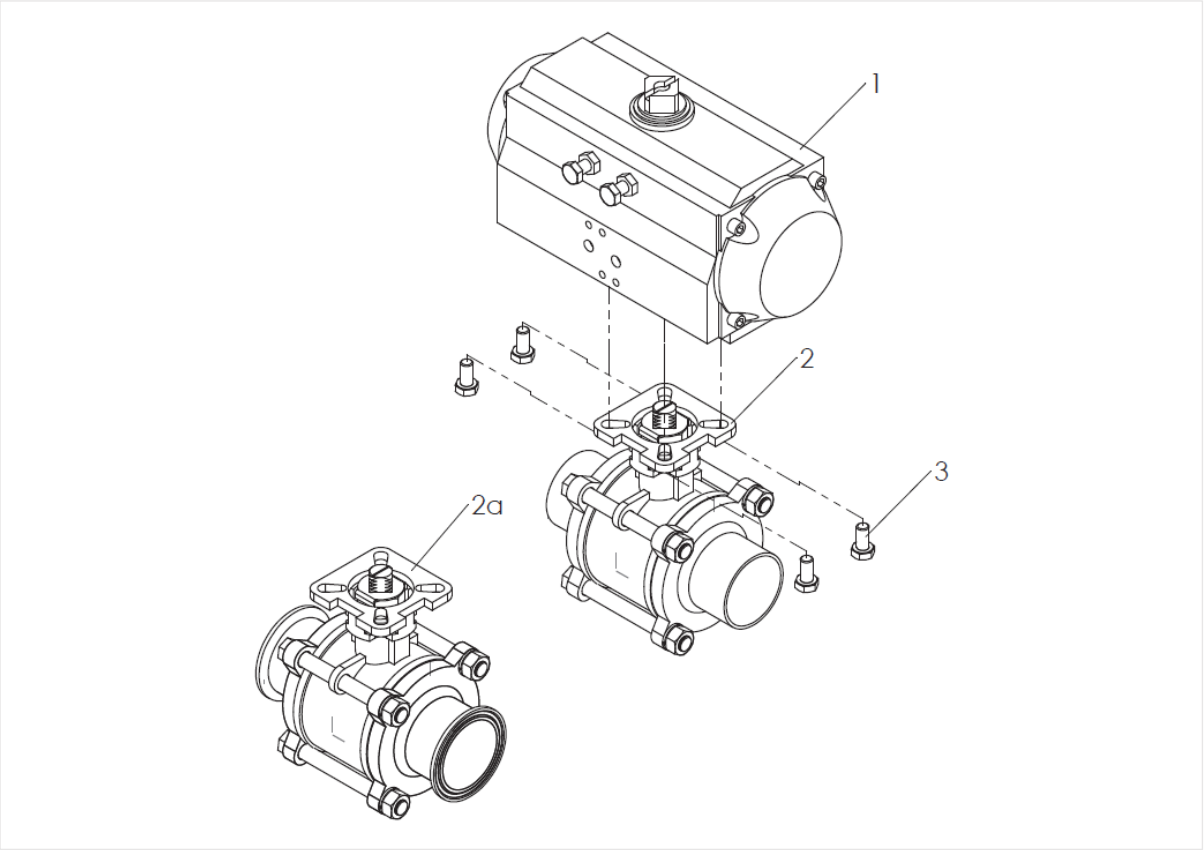
SERVICE KIT	0.5" (12.7mm)	0.75" (19.05mm)	1" (25.4mm)	1.5" (38.1mm)	2" (50.8mm)
PTFE	3B003-05504	3B003-05506	3B003-05508	3B003-05512	3B003-05516
SERVICE KIT	**2.5" (63.5mm)**	**3" (76.2mm)**	**4" (101.6mm)**		
PTFE	3B003-05520	3B003-05524	3B003-05532		

SERVICE KIT	DN15 (19mm)	DN20 (23mm)	DN25 (29mm)	DN40 (41mm)	DN50 (53mm)
PTFE	3B003-05019	3B003-05023	3B003-05029	3B003-05041	3B003-05053
SERVICE KIT	**DN65 (70mm)**	**DN80 (85mm)**	**DN100 (104mm)**		
PTFE	3B003-05070	3B003-05085	3B003-05104		

Note:
① *The required quantity depends on the valve size.*

9 Spare Part List

9.3 3-pc pneumatic ball valve



No.	Part Name	Qty.	Material
1	Actuator-1, complete (NO/NC) Actuator-2, complete (DA)	1	
2	3-pc ball valve (ISO 5211) – weld end	1	316
2a	3-pc ball valve (ISO 5211) – clamp end	1	316
3	Hex screw	4	

SERVICE KIT

Service kit for 3-pc ball valve (ISO 5211) refer to page 21.

The information provided in this manual is intended for general guidance and should be used in accordance with the instructions provided.

MST Stainless Steel Sdn Bhd (Minox) reserves the right to make changes to the design and materials of this product at any time without prior notification.

For customer support or additional information, please contact our sales representative in your region or visit our website at www.minox.biz.

MST Stainless Steel Sdn Bhd (Minox)
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