
KITZ

Operation Manual

For

Floating Type 3-Pieces Ball Valves

(Threaded/Socket-welding/Butt-welding)

Thank you for having chosen KITZ products.

For safe and trouble-free function and performance of the product, ensure to read and understand all items of this manual before valve mounting and operation.

Keep this manual in a convenient place for your valve operators' easy access.

This manual applies to the KITZ threaded or socket welding ends floating type 3-pieces ball valves.

This manual is prepared for manual valve operation.

For electric or pneumatic valve operation, refer to the operation manual prepared by the manufacturers of relevant valve actuators.

CAUTION AND WARNING

To ensure safe and trouble-free function and performance of the product, please read all items of this manual before handling, transportation, mounting and operation of valves. Keep this manual in a convenient place for your valve operations' easy access.

The signal words "WARNING" and "CAUTION" are defined as follows:



Indicating potentially hazardous conditions, which may result in death of personnel or serious injury to personnel, if such warnings shall be ignored.



Indicating potentially hazardous conditions, which may result in injury to personnel or only property damage, if such cautions shall be ignored.



Indicate prohibition of an action.



Indicate mandatory implementation of an action.

NOTES TO USERS

This manual covers the normal usage of the product. Technical data and instructions for operation, maintenance and inspection of the product are prepared in consideration of safety. However, they are good only to cover typical applications as a general guideline to users. If technical assistance beyond the scope of this manual is required, contact KITZ Corporation or its distributors.

The illustrations given in this manual do not introduce all details. If more detailed data are needed, refer to our relevant valve assembly drawings.

Any information provided in this operation manual is subject to revision at any time without notice. This edition cancels all previous issues.

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CHAPTER
Construction and Design Features

Construction and Design Features

1. Construction and Design Features

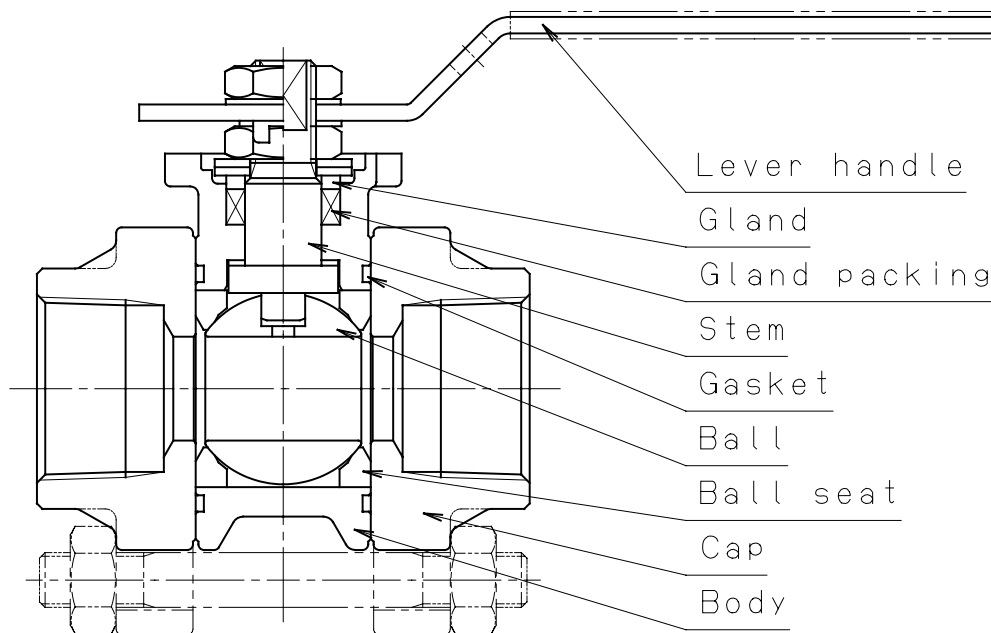
1.1 The typical valve design is as illustrated below.

1.2 Range of operation from full opening to full closing is 90 ° .

1.3 These ball valves are designed for use in the full open or full closed position only.

1.4 The ball is supported by both ball seats. When the valve is pressurized, the ball moves against the downstream seat to complete the seal, shutting off flow of the line fluid.

1.5 This ball valve design may be used on applications where a bi-directional flow is needed.



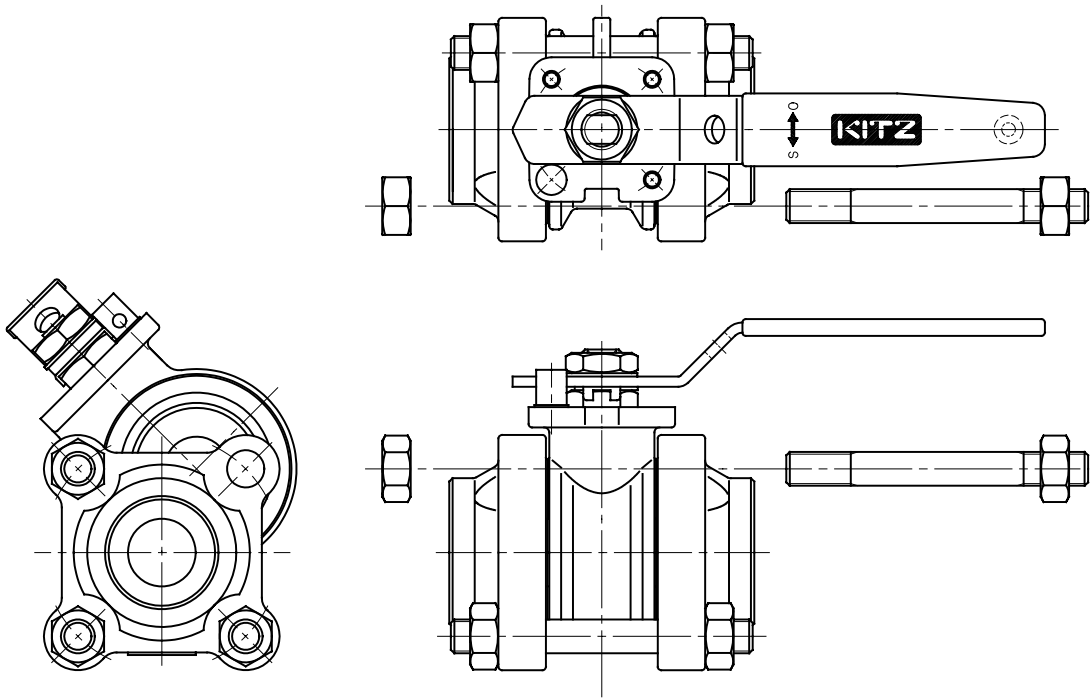
This illustration represents a typical construction.

Construction and Design Features

2. Design features

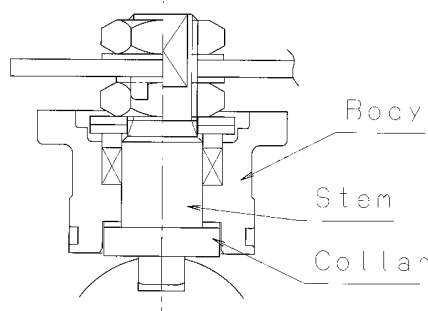
2.1 Body construction (Swing-away type)

Body is divided 3 parts and it can dismantle according losing 4 cap bolting and remove one bolt. Therefore It is easy to be clean, check and maintenance of valve internal.



2.2 Stem Blowout Proof

The lower end of the stem is designed with an integral collar to be stem blowout proof. It also functions as the backseat for assumed stem sealing.



CHAPTER
Valve Operating Device

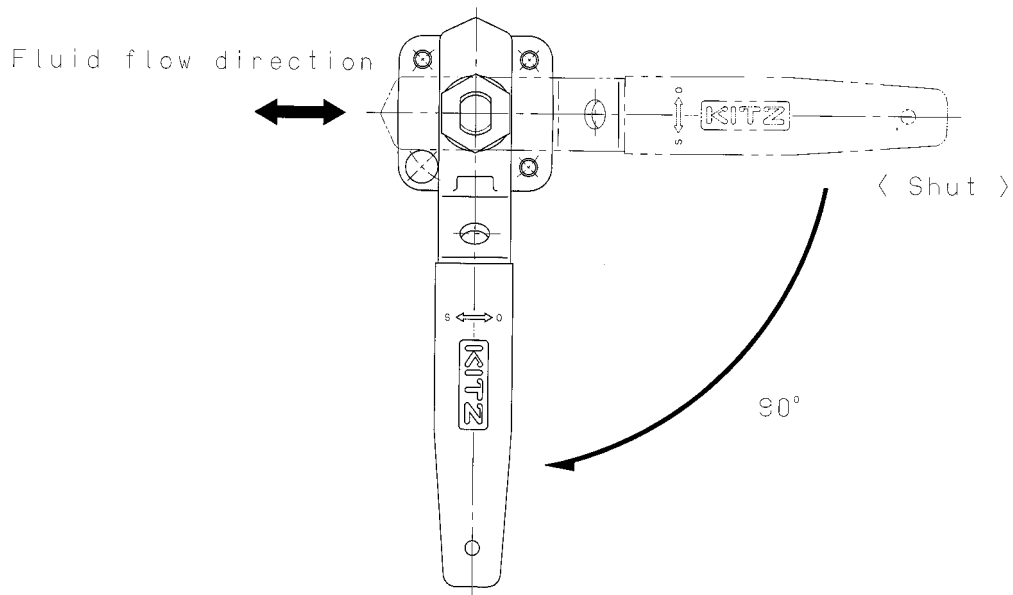
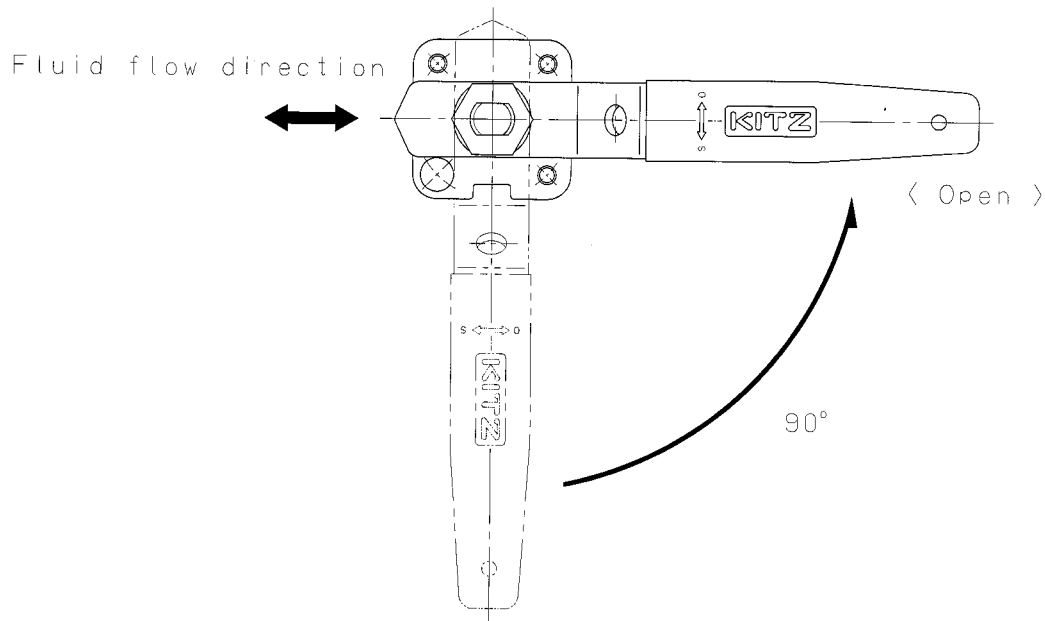
Valve Operating Device

1. Lever Handle

1.1 The lever handle is directly mounted on the valve stem.

1.2 Rotating the lever handle by 90 ° fully opens and fully closes the valve.

Turning the lever handle clockwise closes the valve, and counterclockwise opens it.





CHAPTER
Transportation and Storage

Transportation and Storage

1. Transportation

1.1 Caution for transportation

 CAUTION	
	(1) Take care the handling and storage of carton packed. The high humidity may damage the cartons, which may lead to damaging valves.

1.2 Transportation




1.2.1 Keep packages as they are delivered just before installation.

If the protective covers are found missing during transportation, provide appropriate type of protective covers.

1.2.2 Handle valves carefully so that they may not fall or drop on the ground. Any extraordinary mechanical impact should be avoided.

2. Storage

2.1 Caution for storage

 CAUTION	
	(1) DO NOT storage valves in the corrosive environment, which may cause corrosion on threaded portions of valves. (2) DO NOT place any other objects on valves, and DO NOT step on them. Over loading may damage valves. (3) DO NOT carelessly pile up products to avoid risk of product damage and personal injury caused by unstable pilling.
	(4) Keep the valves in the open position during storage. Storing the valves in halfway position may deform the ball seats, leading to the internal leakage.

2.2 Storage

2.2.1 Storage valves at a dust free, least humid and well ventilated places.

Indoor storage is recommended.

2.2.2 Storage of valves directly on the ground or concrete floor is not recommended.




2.2.3 Take appropriate measures to prevent valves from direct exposure to dust, rain and sunlight, if valves should be stored outdoors.



CHAPTER
Valve Installation

Valve Installation (Threaded valves)

1. Threaded Type

1.1 Cautions for Valve installation

 WARNING	
	<p>(1) The sealing materials determines the characteristic of service fluid and service range of pressure and temperature.</p> <p>Check the valve specifications with the catalogs and/or marking on the valve. Service beyond the valve specifications may cause fluid leakage and valve malfunctions.</p>
	<p>(2) DO NOT install for pipe end service, which may cause the external leakage. In such a case, the valve end shall be tightly plugged to prevent the leakage.</p>

 CAUTION	
	<p>(1) Keep a secure footing for valve installation and operation.</p> <p>(2) Sufficient lighting should be prepared for valve operation.</p> <p>(3) Piping should be properly supported, if needed.</p>

1.2.2 Allow sufficient room for safe and easy operation, installation and subsequent maintenance of valves.



1.2.3 For smooth operation, inspection and maintenance of valves take appropriate measures for valves which are forced to be installed in small spaces.




1.2.4 Try not to install valves in the places where valve functions may be hampered by such outer forces as vibrations and others.

1.2.5 It is recommended to install valves on horizontal piping in a upright position.

Valve Installation (Threaded valves)

1.2 Caution for Installation

 WARNING	
	(1) Keep off the valve lifting area to prevent personal injury caused by unsecured valves.

 CAUTION	
	<p>(1) DO NOT disassemble valves during installation.</p> <p>(2) DO NOT use pipe wrenches on valves. Use spanner or other appropriate tools for valve installation.</p> <p>(3) DO NOT apply a spanner or other appropriate tool on the other body cap on the connecting pipe side. Apply it on the body cap on the connecting pipe side.</p> <p>(4) DO NOT overly thread pipes into the valves. Excessive insertion of pipes into the valves may damaging the valve seats.</p>
	<p>(5) Take care not to damage threaded areas and seat surfaces during installation.</p> <p>(6) Use appropriate sealing materials in threaded areas, considering temperature, types and other conditions of the media.</p> <p>(7) Keep valves fully open during valve installation in order to protect the ball surface.</p> <p>(8) Retighten the packing nut before operation. Packing tightening force may be lowered due to the stress relaxation which may take place during transportation and storage, leading to the occurrence of leakage through the gland area.</p>

Valve Installation (Threaded valves)

1.2.1 Check the following items before valve mounting :

- (1) Service conditions should be within the valve specifications.
- (2) Valve threads should correspond with pipe threads.
- (3) No damage should be found on valve and pipe threads.
- (4) Make sure pipe threads comply with the relevant standards by using thread gauges.

1.2.2 Before installation, the inside and threaded areas of the connecting pipes should be cleaned to remove any foreign object such as sand, dust or cutting oil.

1.2.3 Handle valves carefully so that they may not fall or drop on the ground. Any extraordinary mechanical impact should be avoided.

1.2.4 Remove the protection covers just before installation.

1.2.5 Check all threaded areas after installation and retighten them, if needed.

1.2.6 Flush piping after installation with all valves fully opened, to assure removal of any foreign object. DO NOT operate the valves during flushing.

Valve Installation (Threaded valves)

1.3 Valve installation procedure (Threaded ends)

- 1.3.1 Ensure the connecting areas of pipes to valves are threaded.
- 1.3.2 Remove all foreign objects such as cuttings and oil from pipes, inside pipes and threaded connections of valves by using detergents and waste cloth.
- 1.3.3 Apply sealing agents, including seal tapes, to the threads of pipes.
- 1.3.4 Use appropriate tools to thread pipes into the valves.
- 1.3.5 Do not apply an excessive torque, when threading pipes into the valves. Torque should not exceed the value shown below.

Nominal Size	1/4	3/8	1/2	3/4	1
Torque N-m	20 - 29	20 - 29	20 - 29	39 - 49	49 - 59
Torque lbf-in	177 - 256	177 - 256	177 - 256	345 - 433	433 - 522

Nominal Size	1-1/4	1-1/2	2
Torque N-m	59 - 69	69 - 78	78 - 88
Torque lbf-in	522 - 610	610 - 690	690 - 780

- 1.3.6 Check the cap bolting after installation and retighten them, if needed. Torque should not exceed the value shown below. This value apply to reassembly.

Tightening Torque

unit: N-m (lbf-in)



Figure No.	Nominal Size							
	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2
AKU3THZM AWU3THZM			10 - 13 (89 - 115)		21 - 25 (186 - 221)	35 - 43 (310 - 380)		56 - 69 (496 - 610)
AKU3TFZM AWU3TFZM	10 - 13 (89 - 115)		21 - 25 (186 - 221)		35 - 43 (310 - 380)		56 - 69 (496 - 610)	



- 1.3.7 Gradually increase the pressure and temperature of pipe lines, when conducting test run. Retighten all threaded areas of valves, if needed.

Valve Installation (welding valves)

2. Socket welding Type

2.1 Caution for Valve installation



 WARNING	
	<p>(1) The sealing materials determines the characteristic of service fluid and service range of pressure and temperature.</p> <p>Check the valve specifications with the catalogs and/or marking on the valve. Service beyond the valve specifications may cause fluid leakage and valve malfunctions.</p>



 CAUTION	
	<p>(1) Keep a secure footing for valve installation and operation.</p> <p>(2) Sufficient lighting should be prepared for valve operation.</p> <p>(3) Piping should be properly supported, if needed.</p>

- 2.1.1 Allow sufficient room for safe and easy operation, installation and subsequent maintenance of valves.
- 2.1.2 For smooth operation, inspection and maintenance of valves take appropriate measures for valves which are forced to be installed in small spaces.
- 2.1.3 Try not to install valves in the places where valve functions may be hampered by such outer forces as vibrations and others.
- 2.1.4 It is recommended to install valves on horizontal piping in a upright position.

Valve Installation (welding valves)

2.2 Caution for installation

 WARNING	
	(1) Keep off the valve lifting area to prevent personal injury caused by unsecured valves.

 CAUTION	
	<ul style="list-style-type: none"> (1) Keep a secure footing for valve installation and operation. (2) Take care not to damage the seat surfaces during installation. (3) Remove the body unit from pipe line before welding so that soft parts such as packing, gasket and/or ball seats may not be damaged by welding heat and caused leakage. (4) Keep valves fully open position during valve installation and remove in order to protect the ball surface. (5) Sufficient lighting should be prepared for valve operation. (6) Retighten the packing nut before operation. Packing tightening force may be lowered due to the stress relaxation which may take place during transportation and storage, leading to the occurrence of leakage through the gland area. (7) Piping should be properly supported, if needed.

2.2.1 Check the service conditions should be within the valve specification before valve mounting

2.2.2 Before installation, the inside of the connecting pipes should be cleaned to remove any foreign object such as sand, dust, spatter or cutting oil.

2.2.3 Handle valves carefully so that they may not fall or drop on the ground. Any extraordinary mechanical impact should be avoided.

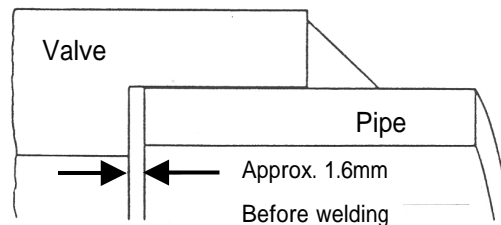
2.2.4 Remove the protection covers just before installation.

2.2.5 Flush piping after installation with all valves fully opened, to assure removal of any foreign object. DO NOT operate the valves during flushing.

Valve Installation (welding valves)

2.3 Valve installation procedure (socket welding)

- 2.3.1 All welding work for mounting valve on the pipeline should be made by qualified welders in accordance with the qualified welding procedures.
- 2.3.2 Select the appropriate welding rods for valves and piping material.
If covered welding rods are used, check that they are stored and dried appropriately.
- 2.3.3 For the socket-welding, it is recommended that the pipe should be withdrawn approximately 1.6 mm away from the contact with the bottom of socket, when the pipe is seated against the bottom of the socket as shown below.








- 2.3.4 Tack weld the pipe to the body to ensure that the installation position shall be correct.
- 2.3.5 Keep the valve open position, loosen the all cap bolting and remove upper side 2bolts, then remove the body unit.
- 2.3.6 Select the welding rod as thin as possible to prevent over heating of the cap. And electric current should be controlled as low as possible. Taking care to be straight piping and to prevent the welding stress, weld uniformly around piping.
- 2.3.7 Air cooling is recommended after welding.
- 2.3.8 Visual inspection or non destructive examinations are required to detect cracks, overlaps and undercut or other defects.
- 2.3.9 After cooled the welding parts, reassemble the body unit keeping open position, then tighten the cap bolts evenly, and gradually and alternately in a star pattern. Concerning tightening torque, refer to the table of Chapter section 1.3.6 of this manual.
- 2.3.10 Post weld heat treatment may be required depending on the pipe and valve material.
- 2.3.11 Gradually increase the pressure and temperature of pipe lines, when conducting test run. Retighten all threaded areas of valves, if needed

Valve Installation (welding valves)

3. Butt Welding Type

3.1 Cautions for safety

 WARNING	
	(1) Check the valve specifications with the catalogs and/or the attached nameplate. Services beyond the valve specifications may cause fluid leakage and valve malfunctions.
	(2) Do not install valves for pipe end service. It may cause external leakage.

 CAUTION	
	(1) Keep a secure footing for valve installation and operation. (2) Appropriate level of lighting should be provided to the valve mounting area. (3) Piping should be properly supported.

3.1.1 Allow sufficient room for operation, installation and subsequent maintenance of valves.

3.1.2 For smooth operation, inspection and maintenance, take appropriate actions for valves which are required to be installed in limited access locations.



3.1.3 Try not to install valves in locations where valve functionality may be hampered by external forces, such as vibration and other.



3.1.4 It is recommended to install valves on horizontal piping in an upright position.

3.1.5 Swing check valves can be used both on horizontal and vertical piping.
When installed on vertical piping, they can be used only with upward flow.

Valve Installation (welding valves)

3.2 Cautions for safety

 WARNING	
	(1) Keep off the valve lifting area to prevent personal injury caused by unsecured valves.

 CAUTION	
	<p>(1) Take care not to damage butt welding ends and seat surfaces.</p> <p>(2) Pipes should be properly supported, if needed.</p> <p>(3) Check valves are provided with stuffing inside for protection of the seat damage during transportation. Be sure to remove these stuffing completely before valve mounting.</p> <p>(4) In case of globe or check valves, the arrow on the valve body indicates the direction of fluid flow. Valves should be mounted according to this arrow. For gate valves with vent holes, vent holes should be positioned to the higher pressure side in fully closed position.</p> <p>(5) Retighten gland bolts before operation. Packing tightening stress may have been lowered due to the stress relaxation during transportation and storage, which may cause leakage from gland area.</p> <p>(6) Retighten bolts at working temperatures to restore surface stress at sealing areas for valves used at high temperatures (+ 200 and over).</p>

3.2.1 The service conditions should be within the range of the valve class and material specifications.

3.2.2 Before valve mounting, remove sand, dust and welding spatters from the connecting pipe interior.

3.2.3 Handle valves carefully so that they may not fall or drop on the ground. Any extraordinary mechanical impact should be avoided.

3.2.4 Remove protective covers just before valve mounting.




3.2.5 After valve mounting, all threaded portion should be checked. Retighten them, if needed.

3.2.6 The valve and pipe interior should be flushed to remove foreign objects. Do not operate the valve during flushing.

CHAPTER
Valve Operation

Valve Operation

1. Cautions for Safety

 CAUTION	
	<p>(1) DO NOT apply too excessive force to operate the valves by such methods as using a pipe or any other device.</p> <p>(2) Never loosen the gland nut and cap bolts of pressurized valves.</p> <p>(3) DO NOT use valves in an intermediate position. Such use may damage ball seats and cause internal through-bore leakage.</p>
	<p>(4) For valves with the gland packing design, retighten the gland nuts before operation of valves. Check a handle torque while retightening the nuts so that the operation won't become too difficult due to over-tightening..</p> <p>(5) Valve should be kept fully open during the line pressure test. Fully closing valves during the test may deform the ball seats, leading to the occurrence of internal through-bore leakage.</p> <p>(6) When service temperature fluctuates, retighten the gland nut after the temperature is stabilized in preparation for occurrence of stress relaxation of the gland packing.</p> <p>(7) Gradually open valves to prevent damage of pipes, when high temperature fluids such as steam are handled.</p> <p>(8) Take some appropriate measures to prevent freezing, as needed.</p>

2. Operation

2.1 Lever handle

Rotation of the valve stem by 90 ° fully opens or closes the valve. To close the valve, turn the operating handle clockwise according to the letters and the mark indicating the direction . Counterclockwise rotation will open the valve.

Valve Operation




3. Daily Inspection

In order to operate your valves safely and satisfactorily, the daily inspection is very important. Here are the inspection items.

Inspection items	Areas to be inspected	Inspection Method	Remedial Measure
External Leakage	Gland areas	Visual check with soap solution	Retighten gland nut. Replace the gland packing.
	Flange areas	Visual check with soap solution	Retighten cap bolts/nuts. Replace the gasket.
	Threaded areas	Visual check with soap solution	Retighten each threaded areas. Replace the parts as needed.
	Body surface	Visual check with soap solution	Replace the valve.
Abnormal Noises	Valve body	Auditory check	Consult a piping engineer.
	Loosened bolting	Auditory check	Retighten bolting.
	Pipe vibration	Auditory check	Consult a piping engineer
Loosened Bolting	Bolts and Nuts	Visual and Tactile check	Retighten bolts and nuts.
Internal thru-bore leakage			Remove foreign object. Disassemble and inspect the valve components. (Replace the ball seats) Replace the valve.
Valve operation	Valve operating position	Visual Check	Make sure that the valve is in predetermined position.
	Disturbed operation	Tactile check Auditory check	Disassemble and inspect the valve components.

Valve Operation

4. Trouble Shooting and Corrective Measures

 CAUTION	
	<p>(1) Wear the protective items such as goggles, gloves, working boots.</p> <p>(2) More stringent protective measures may be necessary when handling toxic, inflammable or corrosive media.</p> <p>(3) Ensure to reduce the line pressure to the atmospheric level, before retightening the packing nut or cap bolting, and loosening or replacing packing rings and gaskets.</p> <p>(4) When retightening the cap bolts, care should be taken for a possible gasket blowout. Operation should be carried out at the position where operators do not get a direct exposure of the media, even if such a blowout occurs.</p> <p>(5) Ensure to reduce the line pressure to the atmospheric level, before replacing packing rings and gaskets or loosening bolts and nuts. Operation should be carried out at the position where operators do not get a direct exposure of the media.</p>
	<p>(6) DO NOT apply the lubricant to the pipes and valves which handles oxygen.</p>

4.1 Leakage from the gland area

Retighten the gland nuts, if leakage from this area is detected. Adequate torque should be applied when retightening the gland nuts so that the valve operation won't become difficult. If it does not stop the leakage, the packing rings should be replaced.

4.2 Leakage from the flanged areas

Evenly retighten the bolting alternately and gradually in a star pattern.

Valve Operation

5. Trouble Shooting

Defect	Possible causes	Remedial measure
Disturbed valve operation	Foreign objects may have choked up the valve body cavity and stock around the ball seats.	Disassemble and inspect the valve components.
Excessive valve torque	Foreign objects may have stuck to the stem.	Remove the foreign objects and check the valve.
	Foreign objects may have choked up the valve body cavity and stock around the ball seats.	Flush the built-up objects by the media with the ball slightly open and disassemble and inspect the valve.
	The gland nuts may have been overly tightened.	Loosen the gland nuts once and adequately retighten them so that the leakage through the gland does not occur.
Leakage from The gland area	Loose gland nuts..	Retighten the gland nuts.
	Damage on the gland packing.	Replace the gland packing..
Internal through-bore leakage	Damage on the ball seats.	Disassemble and inspect the valve. Replace the ball seats.
Abnormal noise or vibration	Loose bolts and nuts.	Retighten the bolts and nuts.

CHAPTER

Periodic Inspection and Maintenance of Valves

Periodic Inspection and Maintenance of Valves

1. Periodic Inspection



- 1.1 A periodic inspection with valves mounted to pipelines is recommended at least once a year.
- 1.2 Ensure the smooth operation and safety of valves before inspection.
- 1.3 Inspection items and methods are same as daily inspection. See Chapter V for the items and methods suggested.
- 1.4 Where valves and adjoining piping are not daily inspected or not operated for a long period of time, a periodic inspection is also recommended. (A periodic inspection should be carried out on all valves.)
- 1.5 It is recommended to replace the gland packing and gaskets every time the periodic inspection is conducted.



Periodic Inspection and Maintenance of Valves

2. Inspection and maintenance

In case pipelines or facilities where valves are installed are shut down for the pipeline inspection, remove the valves from the pipelines and perform the body and seat pressure tests as well as operation tests, if needed. If any defect is found, disassemble the valves for further inspection. The valves must pass required inspections before being sent back to the pipelines or facilities for reinstallation.

2.1 Cautions for removal of the valves from pipelines or installation of the valves on pipelines.

 WARNING	
	<p>(1) Discharge the fluid from the pipes and reduce the line pressure to the atmospheric level when disassembling valves. Trapped pressure or fluid is very dangerous and cause accidents resulting in personal injury. In case of installation of pipe end service, the fluid might enclose between the valve and the blank plugged end. Open the valve and discharge the fluid from the pipe before the blank plugged end removal.</p> <p>(2) Discharge the fluid and pressure trapped within the valve body with the valve intermediate position before disassembling..</p> <p>(3) In case fluid is toxic, inflammable or corrosive, remove the fluid completely from pipes and internal valves.</p> <p>(4) Take protective measures to prevent direct exposure to the fluid and catching fire.</p> <p>(5) Keep off the working area to prevent personal injury if valves are installed at higher places.</p>

 CAUTION	
	<p>(1) Wear the protective items such as goggle, gloves and working boots.</p> <p>(2) Keep a secure footing for valve dismantle and installation.</p>

Periodic Inspection and Maintenance of Valves

2.2 Assembly and disassembly

Refer to Chapter VII for disassembly and reassembly.

2.3 Test and Inspection



Refer to the following procedure for test and inspection.

2.3.1 Operation Test

- (1) Check smooth operation of valves without galling or sticking of internal valve components.
- (2) Check that the stem is firmly assembled with the ball.
- (3) Ensure that there should be no offset of the ball port and ball seats in the fully open position. The ball should not be protruded into the valve port other than the rounded surface of the ball port edges.

2.3.2 Shell Test and Seat Leakage Test

- (1) Care for shell test and seat leakage test

 CAUTION	
	<ol style="list-style-type: none">(1) Wear the protective items such as goggles, gloves and working boots.(2) Before shell test and seat leakage test begin, take some precautions for operators safety.

- (2) Shell Test and Seat Leakage Test

All valves should be subjected to a hydrostatic or pneumatic shell test and seat leakage test at the required test pressures after reassembly.

Refer to JIS B 2003, JPI-7S-39 or API 598 for test methods and procedures.



CHAPTER



Disassembly and Reassembly of Valves

Disassembly and Reassembly of Valves

1. Disassembly procedure

1.1 Care for disassembly

 WARNING	
	(1) Operator should take an appropriate caution for not being exposed to the fluid or catching fire.

 CAUTION	
	(1) Keep valves fully open position during valve remove in order to protect the ball surface. (2) Wear the protective items such as goggle, gloves and working boots. (3) Pay attention not to catch fingers during disassembly.

1.2 Before Disassembly

1.2.1 Place the valve in a dust-free place.

1.2.2 Take care not to damage the flange surface, ball, stem and other parts.

Disassembly and Reassembly of Valves

1.3 Disassembly procedure

1.3.1 Full open the valve.

1.3.2 Remove the cap bolts (35), then disassemble the body (1) and body cap (2).

It is available to swing away the body from the body cap loosening 4 bolts and remove one bolt.

1.3.3 Remove the gasket (19) and ball seats (30) from the body (1).

1.3.4 Remove the ball (4) from the body (1) keeping valves open position.

1.3.5 Remove the handle nut (10), spring washer (16A), lever (9), lock plate (40), gland nut (34), coned disc spring (43) and gland (7) from the stem (3).

1.3.6 Push the stem (3) down into the body cavity to remove it from inside the body (1).




1.3.7 Remove the packing (8) from the body (1).

1.3.8 Remove the thrust washer (47) from the stem (3) or the body (1).

Disassembly and Reassembly of Valves

2. Reassembly procedure

2.1 Care for reassembly

 CAUTION	
	(1) DO NOT apply the lubricant to the pipes and any parts of contact with fluid which handles oxygen.
	(2) Wear the protective items such as goggle, gloves and working boots. (3) No open flame or smoking should be allowed in the working area. (4) Take care not to catch fingers in flanges during assembly. (5) Soft parts such as packing, gasket, ball seat and thrust washer shall be replaced to the new one. It may cause the leakage when they are reused.

2.2 Before Assembly

- 2.2.1 Check all parts before assembly. If any problem is detected, replace the valve.
- 2.2.2 Prepare new soft parts (ball seat, packing, gasket and thrust washer) before assembly.
- 2.2.3 Clean all parts for reuse to thoroughly remove dust and other foreign objects.
- 2.2.4 Assemble the valve in a dust-free area.
- 2.2.5 Take care not to damage all parts especially the ball, ball seats and stem.
- 2.2.6 Keep in mind that all threads should be securely tightened.

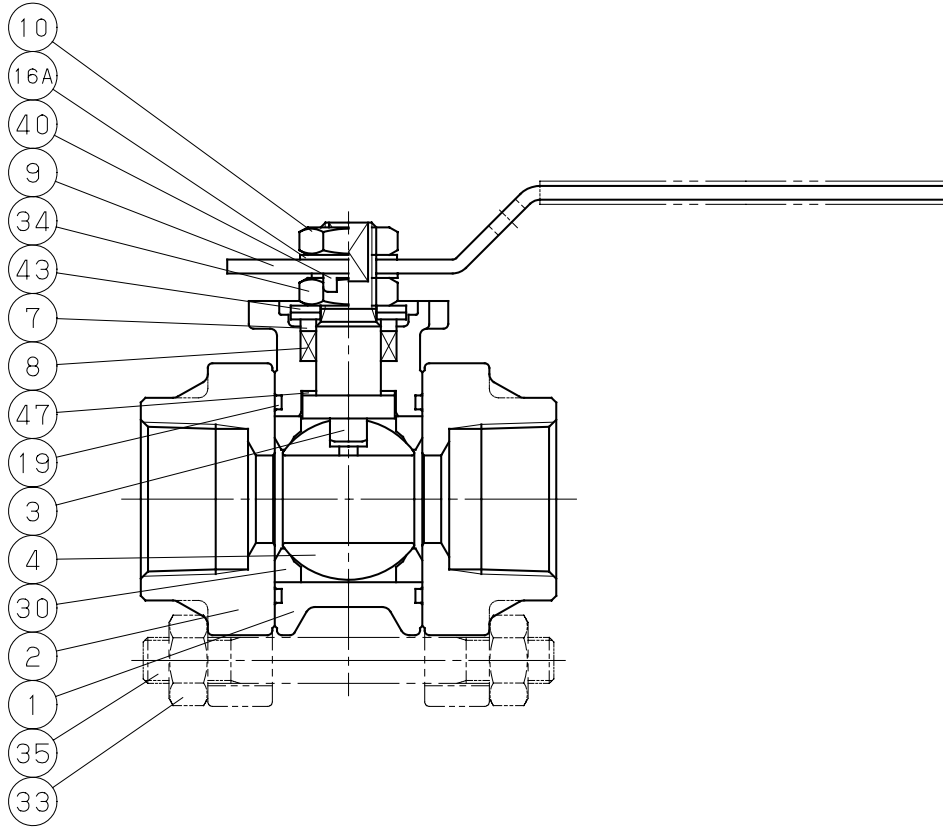
Disassembly and Reassembly of Valves

2.3 Reassembly procedure

- 2.3.1 Mount the thrust washer (47) on the stem (3).
- 2.3.2 Assemble the stem (3) into the body (1) from the body interior. Ensure that the stem collar securely contacts the body.
- 2.3.3 Assemble the packing (8), gland (7), and coned disc spring (43) to the body then tighten the packing nut (34).
- 2.3.4 Assemble the lock plate (40), lever (9) and spring washer (16A) to the stem (3), then tighten the handle nut (10) and that the valve position is fully closed.
- 2.3.5 Place the ball (4) into the body (1).
- 2.3.6 Open the valve then assemble the ball seats (30) and gaskets (19) on the body (1).
- 2.3.7 Securely screw the 4 cap bolts (35) after body (1) install between the two body caps. Bolts/nuts should be tightened evenly, and gradually and alternately in a star pattern. Concerning tightening torque, refer to the table of Chapter section 1.3.6 of this manual.
- 2.3.8 Tighten the packing nut (34). Check a handle torque while tightening the nuts so that the operation won't become too difficult due to over-tightening..
- 2.3.9 Tighten the handle nut (10).

Disassembly and Reassembly of Valves

3. Cross-sectional assembly drawing.



No.	Parts Name
1	Body
2	Body Cap
3	Stem
4	Ball
7	Gland
8	Packing
9	Lever Handle
10	Handle nut
16A	Spring Washer
19	Gasket
30	Ball Seat
33	Cap Bolt Nut
34	Packing Nut
35	Cap Bolt
40	Lock Plate
43	Coned disc spring
47	Thrust Washer

This drawing introduces a typical construction of the valve.
Refer to the approval drawing before disassembly and assembly.