Document No. : TE-2025-03

RED-WHITE TOYO Toyo Valve

Operation Manual

For

Aluminum Butterfly Valves

【Wafer Type】

We appreciate your purchasing our products.
Ensure to read all the contents of this manual before piping and using them.
Also keep this manual to the
place accessible to the operator.

KITZ CORPORATION

Document No. : TE-2025-03

This manual applies to the aluminum butterfly valves (Wafer Type).

SAFETY CAUTIONS

For the safe use of the product, read all of the safety precautions in this manual before handling the product.

The safety precautions in this manual are determined to ensure safe and proper use of the product and to prevent personal injury and property damage. This manual uses two terms, "Warning" and "Caution", according to the hazard level, to clearly indicate the extent and severity of the risk.

Both "Warning" and "Caution" indicate important safety instructions. Please be sure to follow them.

⚠ WARNING	Indicates an imminently hazardous situation that, if not avoided, may result in serious injury or death.
⚠ CAUTION	Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury and product damage.

Indicates a "prohibited" action that must not be carried out.

Indicates a "mandatory" action that must be carried out.

NOTES TO USERS

- This manual is designed to show an appropriate usage of the products for transportation, storage, installation, operation and maintenance. Be sure to read through this manual before handling the products.
- This manual does not cover the whole scope of conceivable usage of the products for transportation, storage, installation, operation and maintenance. If technical assistance beyond the scope of this manual is required, contact KITZ Corporation or its distributors.
- The specifications have been determined with safety consideration. Do not use products beyond the specifications.
- The illustrations given in this manual do not show all the details. If more detailed information is required, refer to our relevant valve assembly drawings.

*Any information provided in this operation manual is subject to change without prior notice.

RED-WHITE TOYO

Document No.: TE-2025-03

Contents

Ⅰ. Construction and Design Features ····· 1

Ⅱ. Valve Operating Device ····· 6

Ⅲ. Transportation and Storage ····· 9

Ⅳ. Valve Installation ····· 12

Ⅴ. Valve Operation ····· 16

Ⅵ. Periodic Inspection ····· 20

Ⅶ. Disassembly and Reassembly ····· 24

RED-WHITE
TOYO

I. Construction and Design Features

RED-WHITE TOYO

I. Construction and Design Features

1. Construction and Function

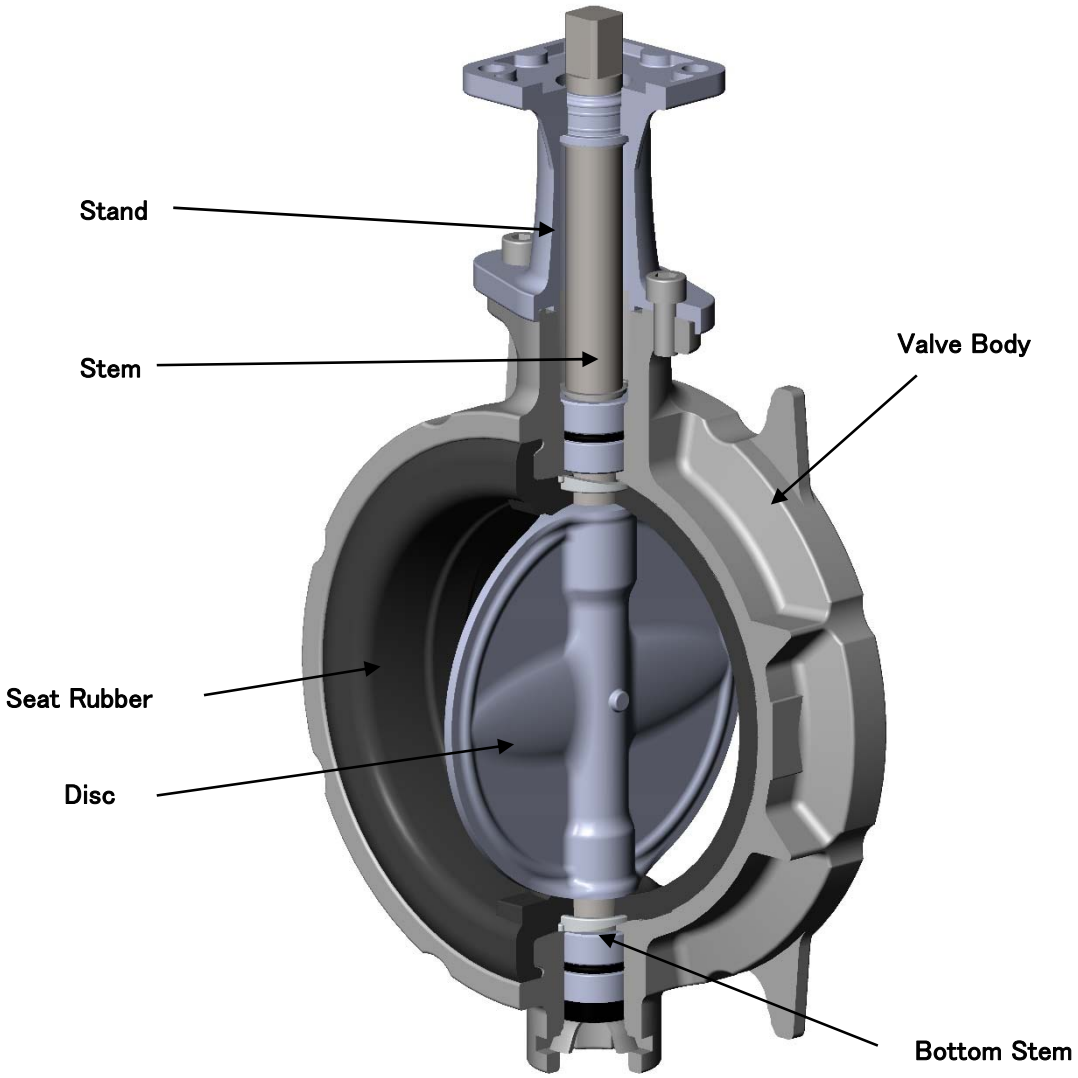
1.1 Construction and parts names are as indicated in the figure below.

1.2 Rotation of the stem by 90 degrees opens and closes the valve.

1.3 Designed for use in fully open, fully closed, or intermediate position for flow control.

1.4 A center drive mechanism is adopted.

1.5 Bi-directional flow is available.



2. General Features

2.1 Selectable neck design

Neck design can be selected from a long neck type or a short neck type.

2.2 Interchangeability with JIS products

Aluminum butterfly valves (wafer type) comply with JIS B 2032 and interchangeable with the existing JIS standard butterfly valves. And gear operator type valves (nominal size 50A to 300A) satisfy the public building construction standard specifications.

2.3 Improved operability

Alignment is easily achieved due to the light aluminum alloy die-casting body.

2.4 Applicable to various fluids

Stainless steel (SCS14A) disc and EPDM seat, which are applicable to various fluids, are used as standard items.(Except that EPDM seats cannot be used for oil.)

2.5 Stable operating torque

Use of bearings prevents stem galling and provides stable operating torque.

2.6 Condensation prevention

Condensation is less likely to occur even on the cold water pipe because a condensation preventive system is provided to the long neck type (Applicable to a gear operator type).

I. Construction and Design Features

3. Valve Specifications and Pressure-Temperature Rating

3.1 Valve specifications

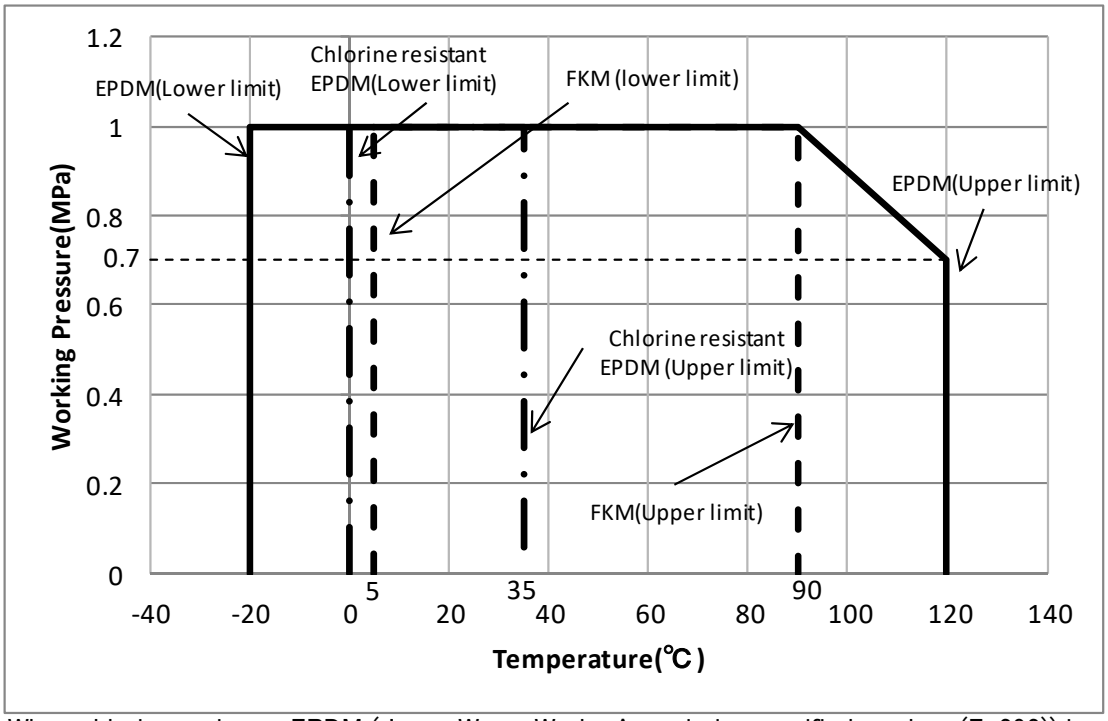
3.1.1 Maximum allowable pressure ..... 1.0 MPa

3.1.2 Service temperature range(Do not freeze the fluid) ..... EPDM : from −20°C to +120°C
FKM : +5～+90℃
Chlorine resistant EPDM : 0～+35℃
(See PT chart for more details)

3.1.3 Fluid temperature range for continuous operation (EPDM) ..... from −20°C to +100°C

3.1.4 Face to face dimension ..... JIS B 2002 (2032) (46 series)

3.2 Pressure-Temperature rating. (P-T Rating)



When chlorine resistant EPDM (Japan Water Works Association certified product (E-292)) is used, please apply it to water supply service.
Products certified by the Japan Water Works Association are provided as special order item.

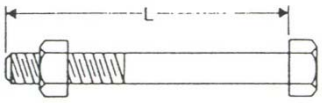
I. Construction and Design Features

4. Size and Number of Mounting Bolt and Nut

JIS 10K

Valve Size		Number of bolts	Nominal Size	Length (L) (mm)
DN	NPS			
40	11/2	4	M16	85
50	2	4	M16	95
65	21/2	4	M16	105
80	3	8	M16	105
100	4	8	M16	110
125	5	8	M20	120
150	6	8	M20	125
200	8	12	M20	130
250	10	16	M22	150
300	12	16	M22	160

Hexagon bolt and nut (L=mm)



5. Minimum Inside Diameter of Applicable Pipe

Never apply the pipes which have inside diameters smaller than those shown in the table below, otherwise it will cause unwanted contact with the valve disc and malfunctions.

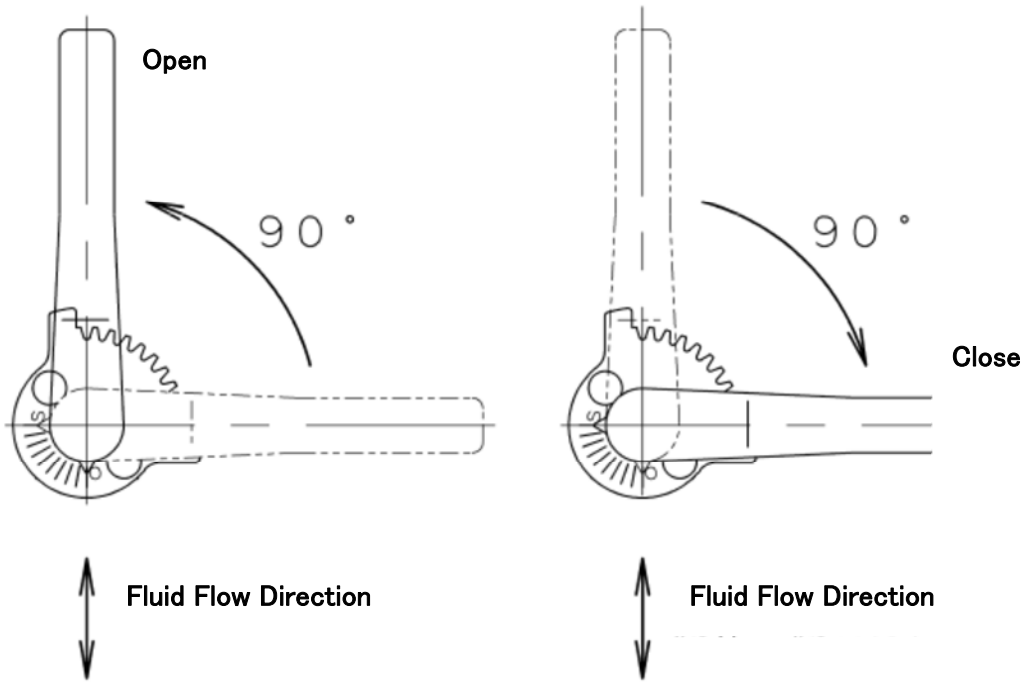
Valve Size		Pipe Inside Diameter (mm)
DN	NPS	
40	11/2	28
50	2	30
65	21/2	50
80	3	70
100	4	90
125	5	116
150	6	144
200	8	194
250	10	244
300	12	292

Ⅱ. Valve Operating Device

Lever Operator Type

1. A lever operator is directly mounted on the valve.

2. Turning the lever handle by 90 degrees clockwise will close the valve, and turning the lever handle by 90 degrees counterclockwise will open the valve.



Ⅱ. Valve Operating Device

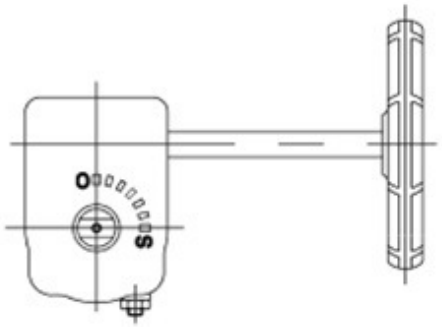
Gear Operator Type

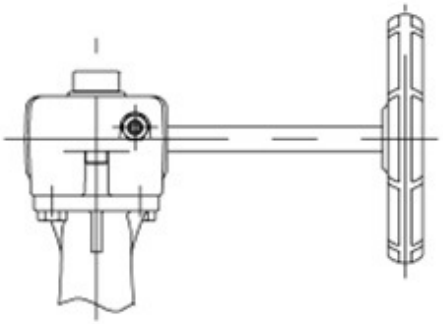
1. A gear operator is mounted on the valve.

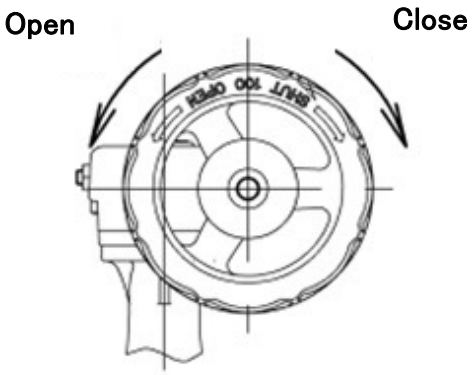
2. According to the letter or arrow on the hand wheel, turning the handwheel clockwise will close the valve, and turning the handwheel counterclockwise will open the valve.

3. Handwheel operating torque varies with the valve sizes and opening positions.

4. Gear operator is a device to transmit a large torque to the valve stem by converting the torque from the drive shaft by means of the reduction gears.







Ⅲ. Transportation and Storage

1. Transportation

1.1 Precautions

⚠ WARNING	
	● Keep off the valve lifting area to prevent personal injury caused by unsecured valves when transporting the valve by lifting.

⚠ CAUTION	
	● Take care not to damage painted valve surfaces during transportation. All damaged surfaces shall be properly repaired to prevent corrosion. ● Take care when handling and storing carton-packaged products. High humidity may damage the cartons and products. ● Be careful not to apply abnormal force to shaft of manual gear. Deformed shaft causes gear and/or valve failures.

1.2 Transportation

1.2.1 Keep valves in the original packages during transportation and until just before installation.

1.2.2 Never apply any excessive impact to valves by throwing, dropping, or dragging them.

2. Storage

2.1 Precautions

⚠ CAUTION	
	● DO NOT store valves in a corrosive environment. It may cause corrosion in the threaded portions of valves. ● DO NOT apply any heavy load to the valve. Overloading may damage the valve. ● DO NOT carelessly pile up valves for storage. Unstable piling may damage the valves or cause personal injury.

2.2 Storage

2.2.1 Store valves in a dust-free and well ventilated indoor area with low humidity, avoiding direct sunlight.

2.2.2 Place packaged valves on pallets or racks for storage. Storing valves directly on the ground or concrete floor shall be avoided.

2.2.3 Keep the valve open by approximately 10 degrees to prevent the seat rubber from deforming when the valve is stored for a long period.

Ⅳ. Valve Installation

Ⅳ. Valve Installation

1. Precautions for Installation

⚠ WARNING	
	● Check the valve specifications with the catalog and/or the attached name plate. The valve trim and seat materials determine the service pressure, service fluid and the range of temperature. Services beyond the valve specifications could cause leakage or malfunctions.

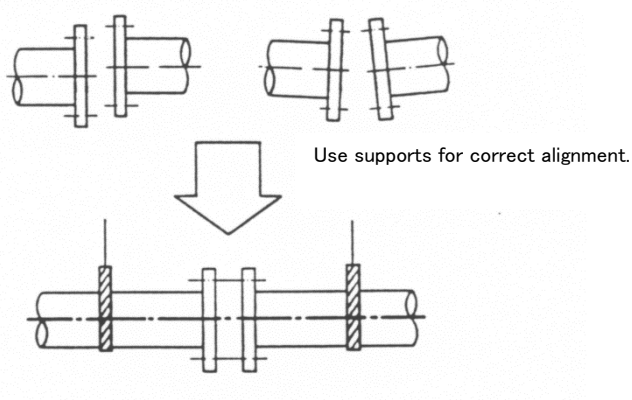
⚠ CAUTION	
	● DO NOT install the valve directly to a check valve or a pump. The valve disc may be damaged due to unwanted contact with other portions during operation.
	● Keep a secure footing for valve installation and operation. ● Provide adequate lighting for valve installation and operation. ● Provide appropriate pipe supports to avoid excessive load on the pipes.

1.1 Allow sufficient space for operation, installation, disassembly and subsequent maintenance of valves.

1.2 For smooth operation, inspection and maintenance, take appropriate measures for the valves installed in a small space.

1.3 Valves shall not be installed in a place where valve functions may be hampered by such outer forces as vibrations.

2. Precautions for Piping

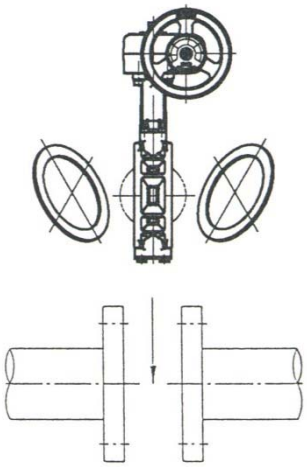
⚠ CAUTION	
⊘	● DO NOT use a flange gasket for piping. It may cause leakage. ● DO NOT forcibly install the valve when the distance between the flanges is not enough. It may cause leakage due to displacement or deformation of the seat rubber.
❗	● Install the valve after the flange and pipe weld connections have been completely cooled down. ● Edges of flange welded areas shall be thoroughly chamfered to protect valve seats. ● Clean the pipes and remove foreign objects such as dusts, weld spatters or rust from the flange surfaces before valve installation. ● Flange surfaces shall have no damage, deformation or irregularities. Remove foreign objects from the flange surfaces. (EPDM seat surfaces must be free from grease.) ● Align the upstream side pipe and the downstream side pipe accurately. Inaccurate alignment may cause leakage from flange connections.  Use supports for correct alignment. ● Install or dismount the valve with the valve open by approximately 10 degrees before the fully closed position. ● Be careful not to apply abnormal force to shaft of manual gear. Deformed shaft causes gear and/or valve failures.

Ⅳ. Valve Installation

3. Valve Mounting

3.1 Adjust the flange-to-flange distance for valve installation. Use jack bolts if required. Allow some space between the flanges, 6 mm to 10mm wider than the valve face-to-face dimension.

3.2 Set two bolts to the lower part of the valve. Then, place the valve between the flanges taking care not to damage the seat rubber. Set two bolts to the upper part of the valve. Never use a gasket for installation because the seat rubber also functions as a gasket.

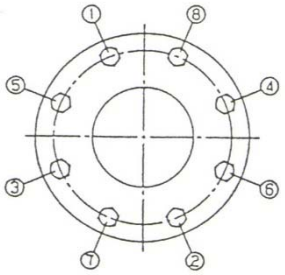


3.3 Temporarily tighten two sets of the upper bolts and nuts and the two sets of lower bolts and nuts. Then, adjust the valve in the correct position.

3.4 Before tightening the bolts, set the valve in the fully open position and make sure that the disc does not touch the flanges.

3.5 Attach all of the remaining bolts and nuts.

3.6 Tighten the bolts evenly and alternately to avoid uneven tightening.



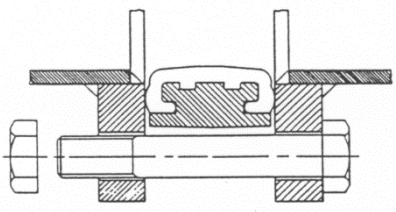
3.7 Securely tighten the bolts until the both flanges firmly contact with the valve body.

※Excessive tightening torque causes serious damages for the valve body.

※DO NOT use an impact wrench to tighten.

※Tightening torque is following table.

Valve size	Torque (N・m)	Bolt size
DN40 to 100	49	M16
DN125 to 200	88	M20
DN250 to 300	118	M22



Ⅴ. Valve Operation

Ⅴ. Valve Operation

1. Precautions

⚠ CAUTION	
	● DO NOT loosen the bolts on the piping section while the service fluid is under pressure. ● DO NOT remove the valve driving section while the service fluid is under pressure. The stem may blow off. ● DO NOT fully close the valve to use the closed valve as a substitute for a blank flange. When a pressure test (with pressure higher than the rated pressure) is performed on the pipeline, the valve shall be in the fully open position. ● DO NOT carelessly touch the stopper bolt on the gear unit. Displacement of the closed position may cause seat leakage. ● DO NOT apply any excessive operation force to the gear operator when it has reached the stopper for the fully open or closed position, otherwise the gear operator may be damaged.
	● Perform a pressure test (with pressure higher than the rated pressure) with the valve fully open. ● The lever handle or handwheel must be operated by hand. Use of tools such as a pipe or wrench shall be avoided. ● When the valve is used at the slightly open position by 30 degrees or below, contact KITZ for technical advice.

2. Open-Close Operation

2.1 Lever operator

Clockwise rotation of the lever handle by 90 degrees opens the valve and counterclockwise rotation closes the valve.

2.2 Gear operator

Clockwise rotation of the handwheel according the arrow opens the valve and counterclockwise rotation closes the valve.

3. Daily Inspection

Carry out daily maintenance and inspection on the valves in use.

Inspection items are as shown below.

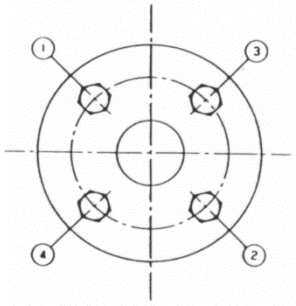
Inspection Items	Areas to be inspected	Inspection Methods	Remedies
External leakage	Pipe connection area	Visual check Soap water	Retighten the bolts and nuts.
	Valve surfaces	Visual check Soap water	Replace the valve.
Abnormal noise	Valve body	Auditory check	Consult a piping engineer.
	Bolted sections (looseness)	Auditory check	Retighten the bolts and nuts.
	Pipes (vibration)	Auditory check	Consult a piping engineer.
Loosening of bolts and nuts	Bolted area	Visual check Tactile check	Retighten the bolts and nuts.
Seat leakage	—	—	Remove foreign objects from the seat. Disassemble and inspect the valve. Replace the valve.
Operational failure	Valve open/closed position	Visual check	Make sure that the valve can be set in the predetermined operating position.
	Lever handle Handwheel	Tactile check Auditory check	Disassemble and inspect the valve.

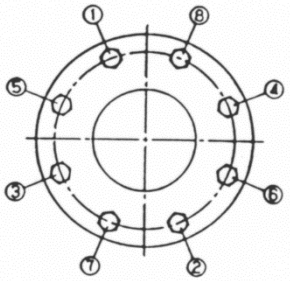
4. Remedial Measures

⚠ CAUTION	
	● Wear protective equipment such as goggles, gloves and safety footwear. ● Take adequate safety measures against toxic, inflammables or corrosive fluid. ● Reduce the line pressure to the atmospheric level before retightening the flange bolts and nuts.

4.1 Leakage from flange areas

Tighten the bolts evenly, gradually and alternately in a star pattern as shown below.





Ⅵ. Periodic Inspection

Ⅵ. Periodic Inspection

1. Periodic Inspection

1.1 Conduct valve inspections with the valve installed in the pipeline at least once a year.

1.2 Check that the valve operates smoothly and safely.

1.3 See “3. Daily Inspection” in Chapter Ⅴ for inspection items and methods.

1.4 Conduct periodic inspections on the valves that are not inspected daily or not operated on a daily basis. (Periodic inspections shall be carried out on all valves.)

1.5 Thorough checks are required for the valves which are used under the following services or conditions. Remove the valve from the pipes and overhaul as required.

(1) Operational failure of the valve could result in a major shutdown of the entire plant unit.

(2) Fluids are highly viscous and may get stuck and built up inside the valve.

(3) Corrosion and/or wear caused by fluid flow are likely to occur.

2. Maintenance Inspection

After maintenance work or inspection of the pipeline facilities is conducted, perform a valve seat leakage test and an operation test, as required. If any sign of seat or external leakage is found, overhaul and inspect the product and make sure that the product is satisfactory.

2.1 Precautions

⚠ WARNING	
	● Discharge the fluid from the pipe and reduce the line pressure to the atmospheric level before dismantling the valve. Trapped pressure or fluid may blow out and cause personal injury. ● Take safety measures for the valves which handle toxic, flammable, corrosive or explosive fluid. Special measures shall be taken for storage or discard of these valves. ● Keep off the valve lifting area to prevent personal injury caused by unsecured valves when transporting the valve by lifting.

⚠ CAUTION	
	● Wear protective equipment such as goggles, gloves and safety footwear. ● Keep a secure footing when removing or installing a valve. ● Use appropriate pipe supports to avoid displacement of the pipes when dismounting or mounting a valve. ● Put matchmarks on the pipe flanges and the valve before removing the valve from the pipe. The valve shall be reinstalled with the matchmarks aligned properly.

2.2 Disassembly and Reassembly

Disassemble and reassemble the valve according the instructions in “Ⅶ.Disassembly and Reassembly” of this manual.

2.3 Test and inspection

Check the following points.

2.3.1 Operation Test

(1) Operation of the lever or gear handle is smooth without galling or sticking in the moving parts.

(2) The stem is firmly connected to the disc without looseness.

(3) The disc is parallel with the flow passage when it is fully open.

2.3.2 Shell Test and Seat Leakage Test

(1) Precautions

⚠ CAUTION	
	● Wear protective equipment such as goggles, gloves and safety footwear. ● Take sufficient safety precautions before shell test and seat leakage test

(2) All of the reassembled valves are subject to hydrostatic or pneumatic shell test and seat leakage test at the specified test pressure. Refer to JIS B2003 or other specified standards for testing conditions.

VII. Disassembly and Reassembly

Ⅶ. Disassembly and Reassembly

1. Disassembly

1.1 Precautions

⚠ WARNING	
	● Take protective measures against fire hazard and the fluid left in the valve.

⚠ CAUTION	
	● Wear protective equipment such as goggles, gloves and safety footwear. ● Be careful not to catch your finger or hand in the valve during disassembly.

1.2 Notes for disassembly

1.2.1 Disassemble the valve in a clean area.

1.2.2 Take care not to damage the disc sealing sections such as seat rubber.

1.3 Precautions for parts replacement

Remove the valve from the pipe system before parts replacement.

⚠ WARNING	
	● DO NOT remove the neck (stand) while the valve is under pressure, otherwise the stem may blow out.

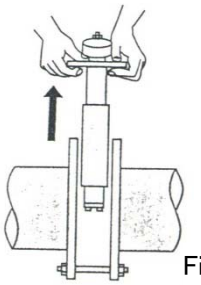


Figure 1

⚠ CAUTION	
	● When removing the valve from the pipe system, make sure the pressure in the pipe system is 0. Loosening the bolt under pressure is very dangerous. If fluid still remains in the pipe, drain it out and make sure there is no fluid left before removing the valve. ● Remove the valve from the pipe system with the valve in the fully closed position. Set the jack bolt and adjust the flange space not to damage the seat rubber while removing the valve. The face-to-face dimension at this point should be approximately 6 to 10 mm wider than the valve dimension. (Figure 1) ● Reassemble the valve at a dust-free place with a sufficient space. Take care not to damage the seat surface.

1.4 Disassembly (Removal of Operating Device)

1.4.1 Gear operator

(1) Fully close the valve.

(2) Put matchmarks on the gear unit (102), stand (61) and body (1) so that they can be installed in the correct position when reassembling them.

(3) Remove the bolt (99) and then remove the gear unit (102).

1.4.2 Lever operator

Removal is not applicable to the lever type operating device.

.

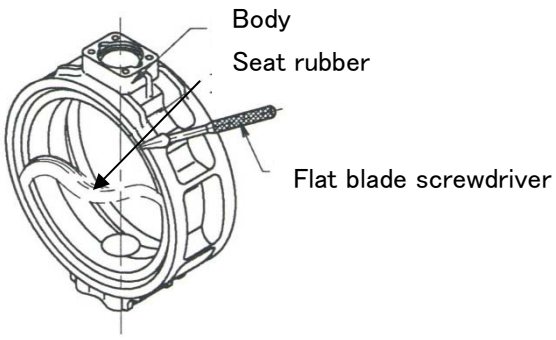
1.5 Disassembly （40A and 50A）

1.5.1 Remove the stand bolt (63) and stand (61).

1.5.2 Pull out the stem (3) from the body (1).

1.5.3 Remove the disc (4) from the body (1).

1.5.4 Remove the seat rubber (106) by inserting a flat blade screwdriver between the body (1) and the seat rubber to make a space. Put your hand into this space to remove the seat rubber (106).



1.5.5 Pull out the stem bearing (67).

1.6 Disassembly (from 65A to 200A)

Disassembly is not applicable to the valves in size 65A to 200A.

1.7 Prior Work (250A and 300A)

Follow the procedures below to discharge the internal pressure from the cavity in the disc before disassembly. Discharge the pressure completely to prevent a blowout of the stem during disassembly.

1.7.1 Prepare long bolts (Full thread bolt and nut).

Table 1

Fig	Screw Size	Length of full thread screw (mm)	Quantity
10ALM-N-GUCE 250	M6	110	2
10ALM-N-GUCE 300	M6	100	2

<Pressure Release Procedure>

(1) Replace the end plate bolts (35) with the full thread bolts and nuts specified in Table 1.

(2) Loosen the nuts evenly to discharge the residual pressure completely from the bottom stem(103) of the body (1). (Note: Evenly loosen the nuts until the sound of the releasing air can be heard.)

<Confirmation of No Residual Pressure>

(1) Check that there is no air releasing sound heard.

(2) The end plate (147) does not come even after loosening the nuts.
(The bottom stem (103) shall not come off.)

1.8 Disassembly (250A and 300A)

1.8.1 Remove the stand bolts (63) and the stand (61).

(This is not required for a short neck type because the stand is not provided with a short neck type.)

1.8.2 Remove the gland plate bolts (36) and then remove the gland plate (144).

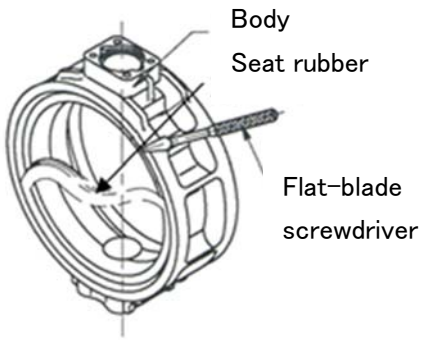
1.8.3 Pull out the stem (3) from the body (1).

1.8.4 Remove the end plate bolts (35) and then remove the spring washers (145A) and the end plate (147).

1.8.5 Insert the end plate bolts (35) into the tapped holes on the bottom stem (103) and pull out the bottom stem (103) from the body (1) by using the end plate bolts. At this point, the bottom stem (103) and O ring (45B) come off together.

1.8.6 Remove the disc (4) from the body (1).

1.8.7 Remove the seat rubber (106) by inserting a flat blade screwdriver between the body (1) and the seat rubber to make a space. Put the hand into this space and take out the seat rubber (106).



1.8.8 Pull out the stem bearing (67A) from the stem (3).

1.8.9 Pull out the stem bearings (67B) from the bottom stem (103).

1.8.10 Pull out the stem bearing (67C) from the stem (3).
(In case of a short neck type, it unnecessary to remove the stem bearing..)

2. Reassembly

2.1 Precautions

⚠ CAUTION	
	● Wear protective equipment such as goggles, gloves and safety footwear. ● Take care not to catch fire during work. ● Be careful not to catch your finger or hand in the valve during reassembly. ● Replace O rings with new ones. Reuse of O rings may cause leakage.

2.2 Notes for reassembly

2.2.1 Check the valve and the parts before reassembly. Replace the valve with a new one if the valve is dissatisfactory.

2.2.2 Clean the parts, if they are for reuse, and remove oil, dust or any other foreign objects.

2.2.3 Assemble the valve in a clean area.

2.2.4 Take care not to damage the sealing sections, seat rubber, etc.

2.2.5 Bolts and nuts shall be securely tightened.

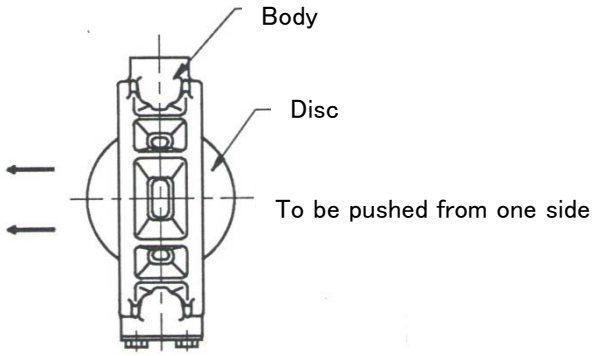
2.3 Reassembly (40A and 50A)

2.3.1 Insert the O ring (45C) in the stem bearing (67) and apply liquid packing (Three Bond 1215) around the bearing periphery. Install the bearing into the body (1).

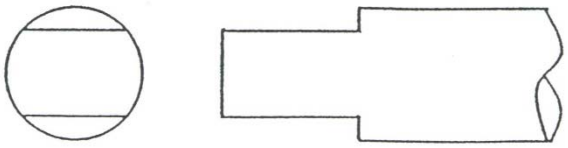
2.3.2 Place the body (1) securely with the upper side up. By aligning the projected portion on the seat rubber periphery with the notch on the body end, install the seat rubber to the body from the upper side to the lower side along the curving line of the body. .Apply silicon grease (*1) to the axis hole of the seat rubber.

2.3.3 After installing the seat rubber (106), make sure that the hole on the seat rubber is aligned accurately with the stem hole on the body.

2.3.4 Apply silicon grease (*1) to the spherical sealing section of the disc and the disc sealing section of the seat rubber. Align the stem inserting positions of the body and the disc and install the disc to the body with the disc in the fully open position. Align the holes on the disc and the body by looking from the upper part of the body.



2.3.5 Apply a small amount of grease (*2) to the stem. Install the O ring (45B) and the snap ring (48) to the stem (3). After aligning the end shape of the stem with the square hole of the disc, insert the stem into the disc using a tool such as a wooden hammer..



2.3.6 Install the thrust bearing (74) and the stand (61) and fix them with the stand bolts (63).
Tightening torque: 12 – 15Nm

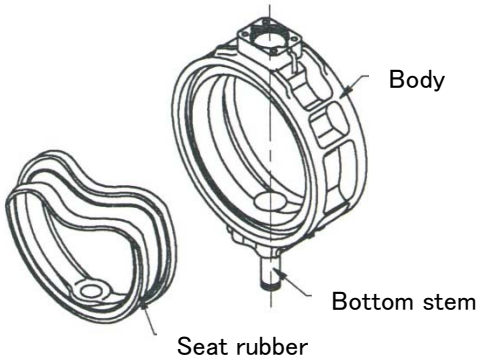
⚠ CAUTION	
	● Tighten the stand bolts evenly and securely.

*1: KF96-100000cSt (or better grade) manufactured by SHIN-ETSU SILICONES is recommended.

*2: GLEITMO746 (CHEMPLEX 746) manufactured by FUCHS is recommended.

2.4 Reassembly (65A through 200A)
Reassembly is not applicable to the valves in sizes from 65A to 200A.

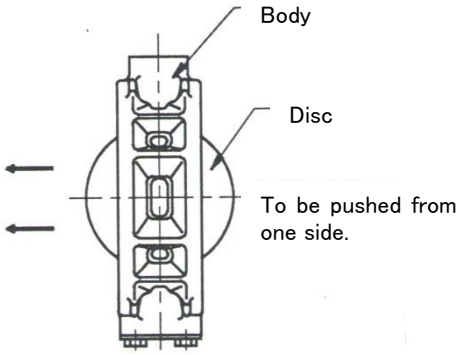
Ⅶ. Disassembly and Reassembly



2.5 Reassembly (250A and 300A)

2.5.1 Insert the bottom stem (103) into the body (1) beforehand. Use this assembly as a guide when installing the seat rubber (106) into the body (1).

2.5.2 Put the hole located at the bottom of the seat rubber (106) into the bottom stem (103). Then install the seat rubber into the body (1). After the seat rubber is installed into the body completely, pull out the bottom stem.

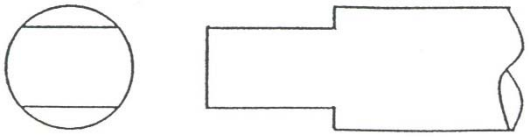


2.5.3 Apply silicon grease (*1) to the spherical sealing section of the disc and the disc sealing section of the seat rubber. Setting the stem hole side of the disc which has width across flats in the upper side, insert the disc (4) in the body with the disc in the fully open position.

2.5.4 Make sure that the stem hole is in the correct position by looking from the upper hole and the bottom hole on the body (1).

2.5.5 Install the O ring (45A) and the stem bearings (67A and 67C) to the stem (3).

2.5.6 Apply a small amount of grease (*2) to the stem. . After aligning the end shape of the stem with the square hole of the disc, insert the stem into the disc hammer.



2.5.7 Install the O ring washer (7) to the stem and then fix the gland plate (144) to the body (1) with gland plate bolts (36).

2.5.8 Install the stand (61) to the body and fix the stand with the stand bolts (63).
(Stand bolt tightening torque; 12-15 Nm)
(Installation of the stand is not required for short neck type.)

⚠ CAUTION	
	● Tighten the stand bolts evenly and securely.

2.5.9 Install the O ring (45B) and the stem bearing (67B) to the bottom stem (103).

2.5.10 Insert the bottom stem (103) in the disc and fix the end plate (147) and the spring washers (145A) to the bottom stem with the end plate bolts (35).

*1: KF96-100000cSt (or better grade) manufactured by SHIN-ETSU SILICONES is recommended.

*2: GLEITMO746 (CHEMPLEX 746) manufactured by FUCHS is recommended.

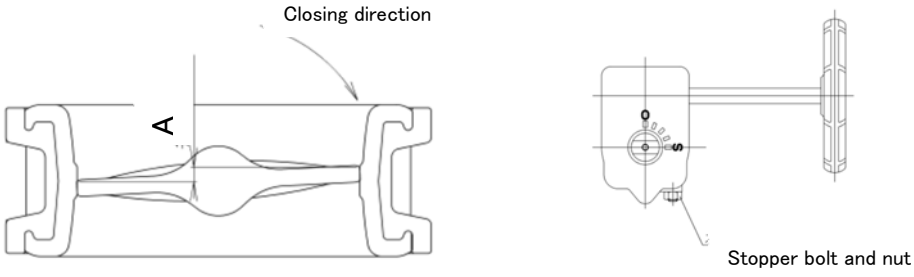
2.6 Installation of operating device

2.6.1 Gear operator

(1) Align the open-close position of the disc (4) with that of the gear unit (102). Fix the gear unit to the body with the set bolts (99) by aligning the matchmarks.

(2) By adjusting the stopper Bolton the gear operator, the disc positions shall be adjusted in accordance with the table below. (When the valve is closed, the disc is positioned slightly before the horizontal position due to the function of the stop bolt.)

Nominal Size	A (mm)	Nominal Size	A (mm)	Nominal Size	A (mm)
40	2-3	80	3-4	150	5-6
50	2-3	100	4-5	200	5-7
65	2-3	125	4-5	250	8-10
				300	10-12

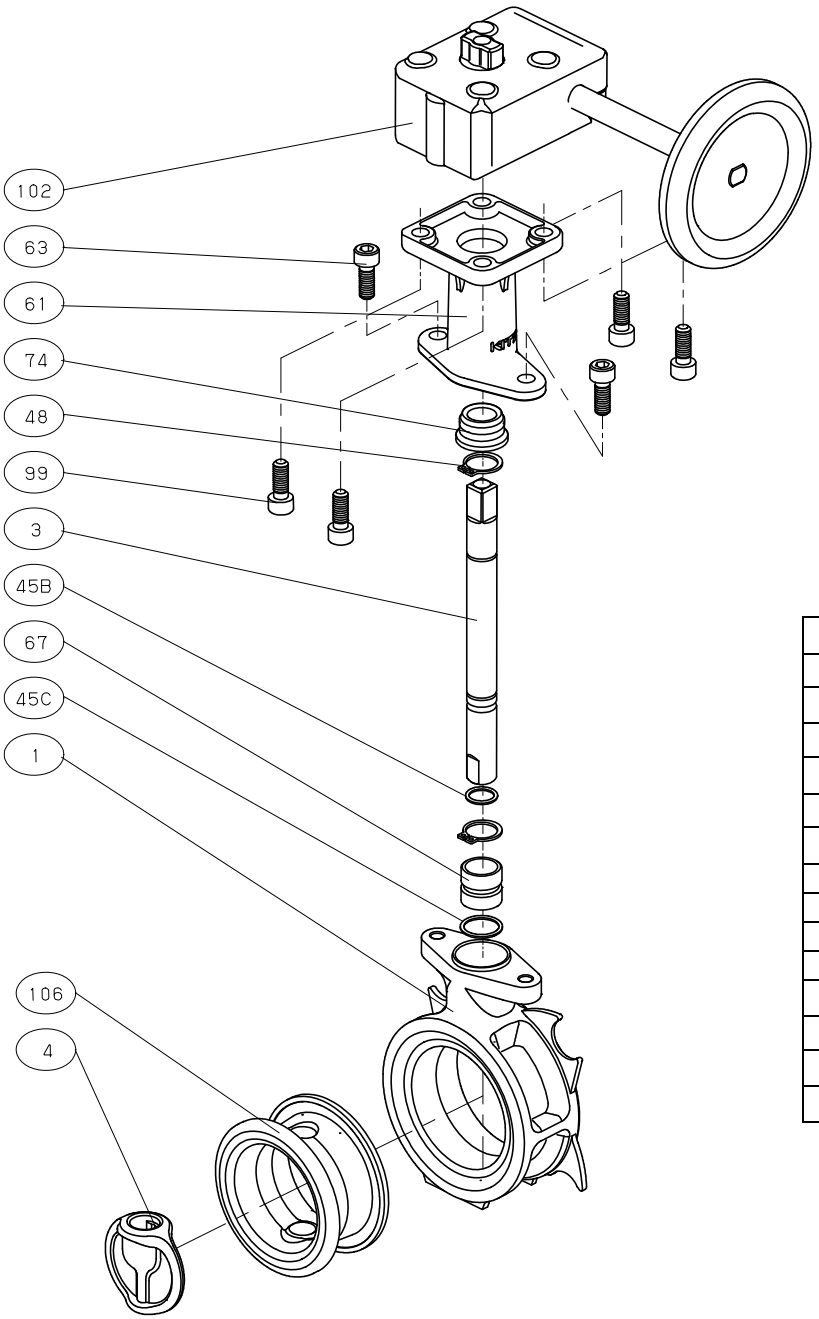


2.6.2 Lever operator

Installation of a lever operator is not applicable.

3. Structure Drawing

3.1 Gear Operator Type, 40A and 50A

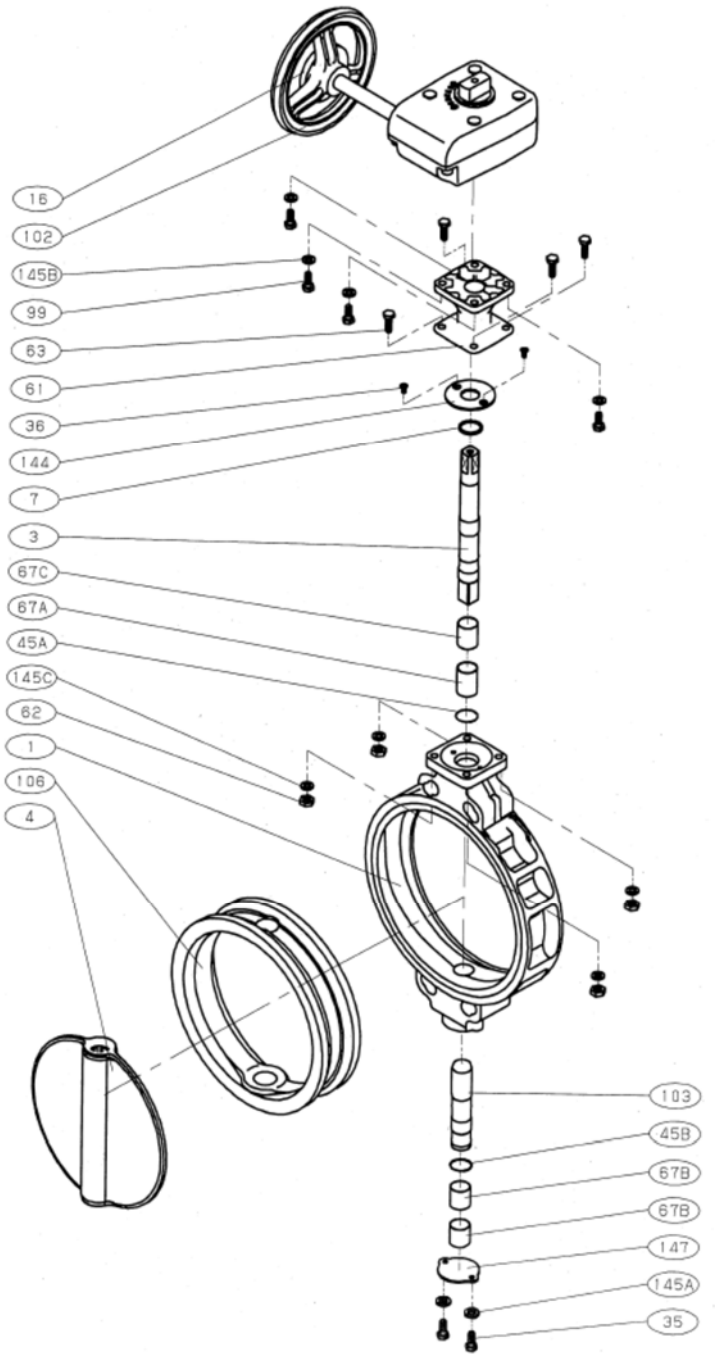


No.	PARTS
1	BODY
3	STEM
4	DISC
16	NAME PLATE
45B	O RING
45C	O RING
48	SNAP RING
61	STAND
63	STAND BOLT
67	STEM BEARING
74	THRUST BEARING
99	SET BOLT
102	GEAR UNIT
106	SEAT RUBBER

This illustration shows a typical construction.

Refer to the approved drawing for disassembly and reassembly.

3.2 Gear Operator Type, 250A and 300A, Long Neck

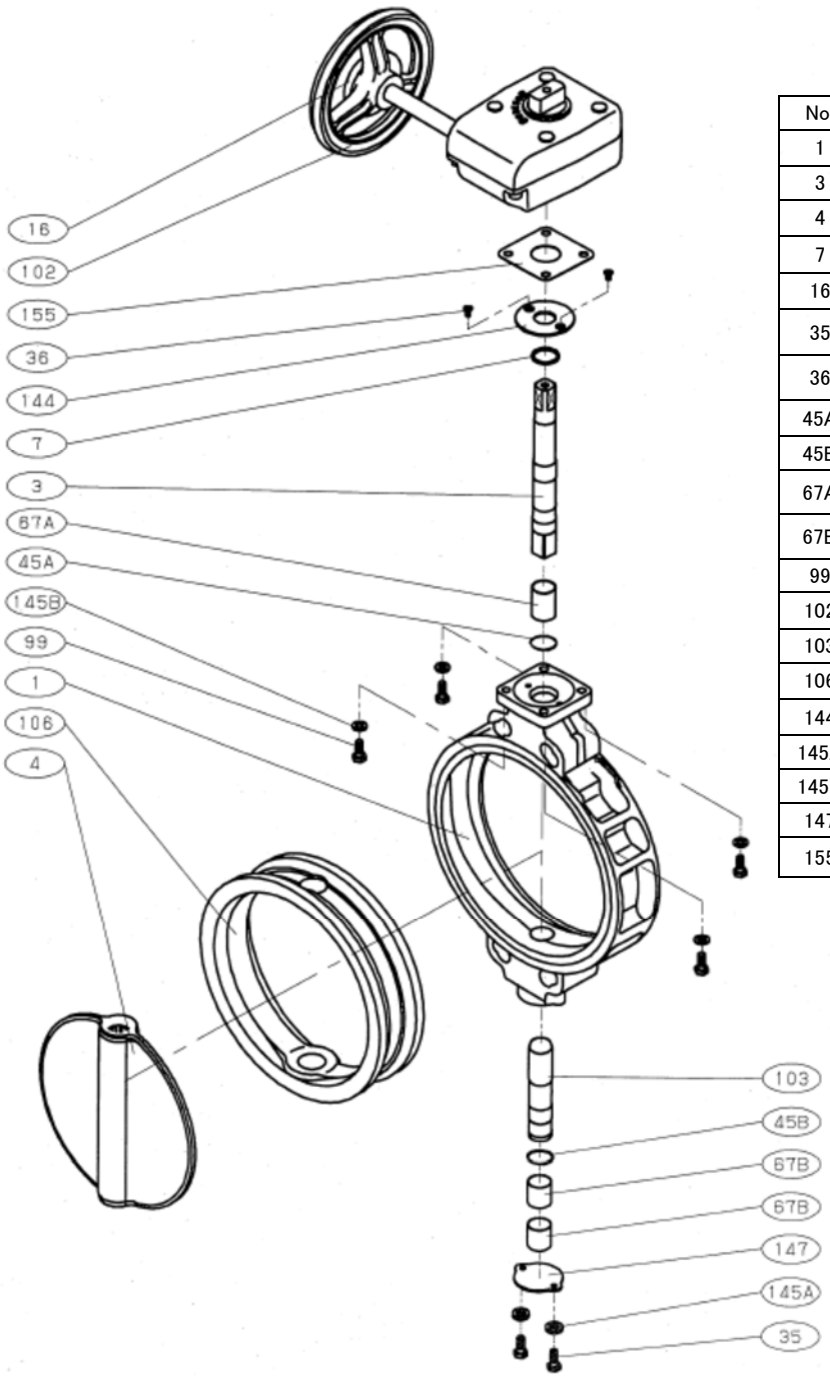


No.	PARTS
1	BODY
3	STEM
4	DISC
7	O RING WASHER
16	NAME PLATE
35	END PLATE BOLT
36	GLAND PLATE BOLT
45A	O RING
45B	O RING
61	STAND
62	NUT
63	STAND BOLT
67A	STEM BEARING
67B	STEM BEARING
67C	STEM BEARING
99	SET BOLT
102	GEAR UNIT
103	BOTTOM STEM
106	SEAT RUBBER
144	GLAND PLATE
145A	SPRING WASHER
145B	SPRING WASHER
145C	SPRING WASHER
147	END PLATE

This illustration shows a typical construction.

Refer to the approved drawing for disassembly and reassembly.

3.3 Gear Operator Type, 250A and 300A, Short Neck



No.	PARTS
1	BODY
3	STEM
4	DISC
7	O RING WASHER
16	NAME PLATE
35	END PLATE BOLT
36	GLAND PLATE BOLT
45A	O RING
45B	O RING
67A	STEM BEARING
67B	STEM BEARING
99	SET BOLT
102	GEAR UNIT
103	BOTTOM STEM
106	SEAT RUBBER
144	GLAND PLATE
145A	SPRING WASHER
145B	SPRING WASHER
147	END PLATE
155	ACTUATOR FLANGE PLATE

This illustration shows a typical construction.

Refer to the approved drawing for disassembly and reassembly.