# Installation, Operation & Maintenance Manual for Triple offset Butterfly Valve

## F3 series

**Contents**

**Introduction**

Dear user, thank you for choosing our triple–eccentric butterfly valve, which was researched & developed, produced by us independently, we've applied for many patents. This manual covers description of products, notices, nameplate info, main components, storage & transportation, installation, operation & maintenance, breakdown analysis & removal, etc. Please read carefully and use our valves correctly. Please call or mail to us on any suggestion and proposal, we'll satisfy your requirements as much as possible.

**1 Description of products**

This valve has wide usage temperature range, reliable seal, can be widely used in oil & gas, chemical, etc. for cutting off or connecting pipeline.

We utilizes a triple offset structure in this valve, which has no friction,and can maintain low torque in low temperature. Bi-directional sealing come true by insetting metal ring in disc.

Low-leakage packing is adopted in stem sealing, which is fire-proof, anti blow-out and static.

We adopt QPQ treatment to increase the hardness, wear-resistance, and corrosion resistance of stem surface, which can make it easy to open and close.

We adopt paired material according to the corrosion and abrasion of different mediums, normally PTA STL, because of its good abrasion resistance.

We adopt 3D CAD/CAE/CAM and International standards ( ASME B16.34, API609,etc.) in design and production

We adopt subzero treatment repeatedly to improve the wear-resistance, size stability and extension strength of valves & components, to prolong their service life.

We have a complete range of specifications for this kind of valve, and adopt optimization design to reduce the flow resistance coefficient.

According to the requirements of customer, we offer various drive modes, hand wheel, gearbox, power-driven, etc.

**2 Notice**

Read carefully before installing or operating the valve

Please make sure the nature of low-temperature medium, i.e. flammable and combustible, poisonous, corrosive, and take proper precautions.

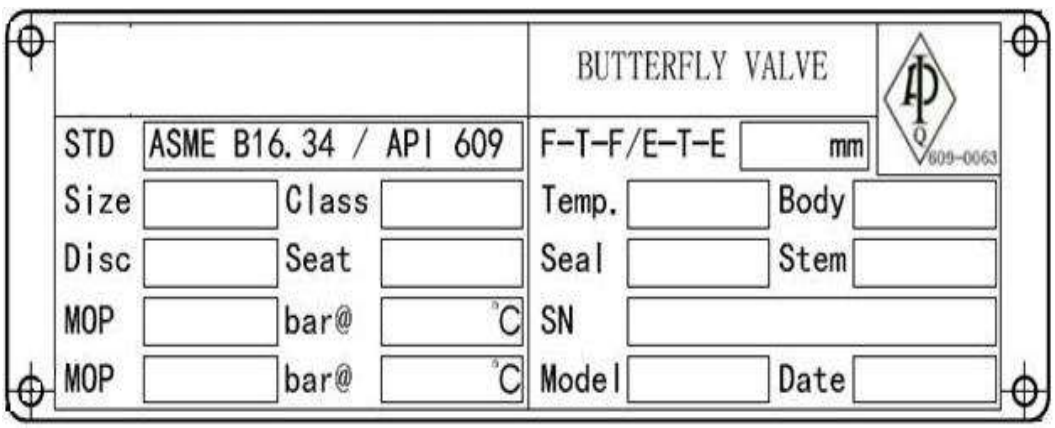
In case of the medium is ultralow temperature, please wear heat insulation gloves, protective clothing against heat while operation.

In case of the medium is flammable and combustible, please wear anti-static clothing, and non-explosion-proof wiring & flames are prohibited.

In case of the medium is poisonous, corrosive, please follow the rules and wear noddy suit, oxygen mask.

**3 Nameplate**

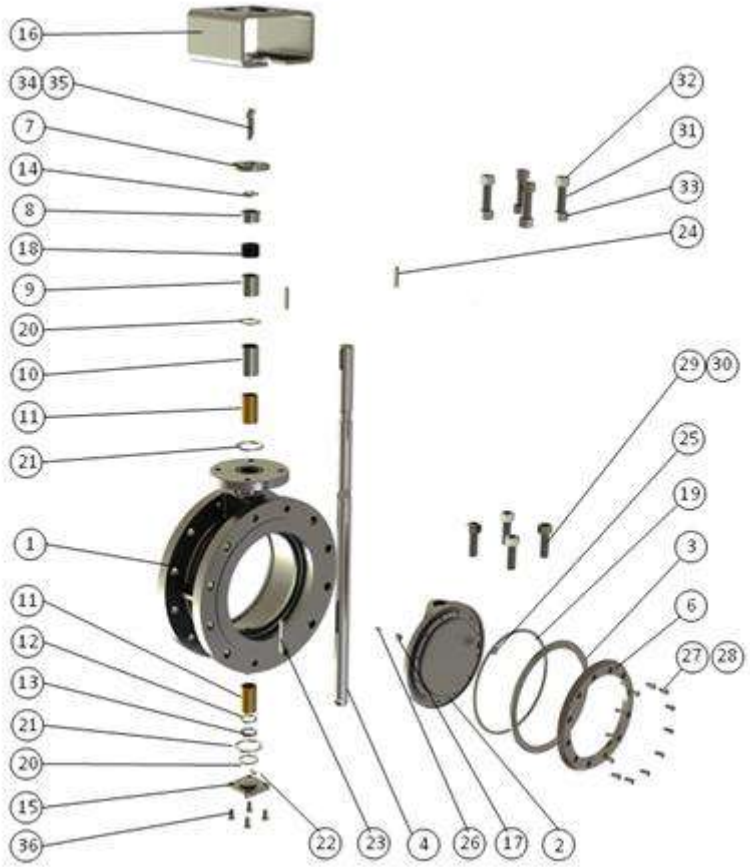
Size
Class
Temp
Body
Disc
Seat
Seal
Stem
Model
SN



Date
F-T-F/E-T-E
MOP□@Min Temp
MOP□@Max Temp

## 4 Main components list

**Triple offset bufferfly valve explosion view**




| Item | component | material | Item | Component | Material |
|---|---|---|---|---|---|
| 1 | Body | A216WCB+STL | 13 | Thrust Bearing | A276 316+QPQ |
| 2 | Disc | A216WCB | 14 | splint collar | A276 410 |
| 3 | Seal ring | A276 S31803 | 15 | Bottom Flange | A105N |
| 4 | Stem | A479 410 | 16 | Bracket | Q235A |
| | | | 17 | Nut | A276 304 |
| 6 | Retainer ring | A105N+ENP | 18 | Packing | Graphite |
| 7 | Pressing plate | A105N | 19 | Disc Spiral Wound Gasket | 316SS+ Graphite |
| 8 | Packing Bushing | A276 410 | 20 | Disc Spiral Wound Gasket | 316SS+ Graphite |
| 9 | Lantern Ring | A276 316+QPQ | 21 | Graphite ring | Graphite |
| 10 | Spacer | A276 410 | 22-24 | Key | 45 Steel |
| 11 | Bushing | A276 316+QPQ | 25 | Pin | A276 304 |

| | | | | | |
|---|---|---|---|---|---|
| 12 | Packing spacer | A276 316+QPQ | 26-36 | Stud nut | A193 B7/ A194 2H |

**5 Storage and Transporation**

**5.1 Storage**

In order to protect the product during storage, should be packed properly, we should take the following measures to protect:

(1) packing valve, butterfly valve disc should be slightly open 4degrees to 5 degrees.

(2) at both ends of the valve, plastic cover must be used.

(3) the way of packing must be in accordance with the customer order requirements, and ensure that valves can be shipped destination safely..

(4) the valve storage warehouse must be clean, dry and ventilated.

(5) the storage area should be checked regularly to ensure that it in accordance with the above requirements, the longest storage period for this products is six months.

(6) the valve should be installed packing, and packing bushing should be pressed, before storage.

**5.2Transportation**

(1) should be especially careful to transport packed valves, be attention to the lifting point of the cases and center of gravity.

(2) must protect all sealing surface for unpacked valves during the transportation, including sealing surface of flange, valve seat and stem.

(3) All packing valve while delivery must be carried out in accordance with local safety regulations, special attention should be paid to the valve weight for transport equipment limit.

(4) When shipping large diameter valves, the appropriate tools should be used (such as steel wire rope, hook, fastener) in order to reinforce fixed valve.

**6Installation**

**6.1 Preparation before installation**

Installation, operation , maintenance and repair for our products, must be carried out by specially trained and qualified personnel.

(1) prepare the necessary installation and disassembly tool, such as a torque wrench, copper hammer, claw hammer, harnesses, helmets, goggles and etc..

(2) When dismantle the valve package, valve and actuator shall not be caused any damage, especially to protect the sealing surface.

(3) After the demolition of the valve packing, the valve closure at both ends will be removed, with oilless and dry compressed air or nitrogen purge packing debris in the valve passage and the outer surface, especially on the connection flanges and butt welding ends. And remove defects may result in the transport process.

(4) Must check the nameplate marking carefully, in order to know if valves are suitable for the current application before installation.

**6.2 Install Actuators:**

Lever operated valves, please ignore this section. If the customer requires, we can install different actuators for customers in our plant, please ignore this section for this option too. If the customer requires installation actuators on site, please refer to the following steps:

(1) Confirmed the valve has been fully open or fully closed position for installation.

(2) There is a plurality of mounting direction for actuators, Pls select suitable amounting direction for personnel operation.

(3) When the actuator is installed in place, pls tighten flange bolts in accordance with appendix A and appendix B . If the bolt holes are not aligned, please slightly open or close the actuator until the bolt holes reach alignment.

(4) When the valve is in the closed position, adjust the open limit bolt on the actuator to lock. (Same for valve full open position )

(5) After the installation is completed, open & close the valve by full travel, and check the valve which stem should be flexible rotation, no jam phenomenon, the disc should be in place for open and close.

Note: the connection flange complies with the international standard ISO 5211; for the parameters of the actuator, please consult the actuator manufacturer, to ensure a proper installation.

### 6.3 Installation of valve

（1）Please hoist the valve in correct way, and make the body support to load. Or hoist the valve with lifting lug if there is.

（2）Don't hoist the valve with the lifting lug of actuators, since they're only for hoisting the actuator.

（3）Don't hoist the valve with valve handle or stem, since they are not designed for bearing the weight of whole valve.

（4）Don't hoist the valve above any staff or equipment, to avoid possible personal injury and equipment damage.

（5）Normally, the valve is installed in horizontal pipeline, and the stem points up, it can also incline appreciably for low-temperature liquid medium, while the included angel between stem and vertical direction should be less than 30 °.

（6）The valve should be fully closed while installation, to avoid scratch because the disc extrude the end face of valve.

（7）Please follow the rules of appendix A & B while installing flanges, bolts and gaskets.

Please note: the flow direction of cryogenic butterfly valve with manhole is unidirectional, the indication in valve body should be in accordance with the flow direction of medium. The flow direction of triple eccentric butterfly valve is bidirectional, while the same rule should be followed to ensure the best performance.

### 6.4Pressure test after installation

The procedure below should be followed while static pressure test after installation:

(1) Make sure all the bolts are screwed, all the relief holes are blocked off, and the packing is impacted.
(2) The valve should be fully open while injecting the test medium, which can wash the fragments and residues away from the passageway. The test medium should be assessed in advance and avoid to polluted the working medium.
(3) Fill the system with test medium after blowing, and then close the valve.
(4) Supercharge the system along the direction of arrow.
(5) Relieve the pressure and discharge test medium after static pressure test.

## 7 Operation and maintenance

### 7.1 Operate

Operate the level or hand wheel clockwise for close and anticlockwise for open. The operation force is less than 350N normally. Please follow the instructions to operate the actuator. Opening and closing the valve too fast may make the valve bearing more torsional load, while too slow may make the sealing face being scoured fast by the medium for a long time. So it's necessary to limit the open and close time of valve. Normally, we use the following formula to calculate open and close time, unless otherwise noted by the customer:

NPS/2＜T＜NPS×5

NPS: the nominal bore of valve ,inch； T:the open and close time, second。

Please note: This product is used for fully open or close only, not for adjustment, to avoid the speed up damage leading from scouring the sealing face.

**7.2Maintenance**

To achieve the best performance of valve after it come into service, please inspect once in every 3 months regularly. Before use again, the following occasions must be remove:

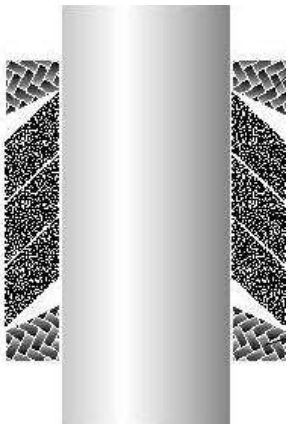
(1) Aging, failure, abrasion of packing
(2) The dust, greasy oil and remnant of medium in the rotary part of stem
(3) Loosen of bolts
(4) The reduction of wall thickness of valve body leading from corrosion

**7.3Repair**

Valve repair must be made by professional training of qualified and experienced staff, otherwise it may lead to valve scrap. For the valve minor leaks, which can refer to " Failure Analysis and Eliminate" in eighth chapters to solve the problem; the need for disassembly and maintenance of the valve, our company will send professional maintenance personnel to the scene maintenance or sent back repair. Our company promises that maintenance is completely free if quality problem happens in the warranty period.

The product warranty period is 12 months after the installation or 18 months after delivery, whichever first to quasi.

**8failure analysis and eliminate**



8.1 flange sealing leakage:

(1) the connecting bolts not tightened or elastic uneven, should be tightened uniformly order according to appendix B regulations, bolt tightening torque refer to appendix A recommendation.

(2) the sealing gasket failure, should remove and replace. The flange gasket between the valve and the pipeline can be replaced on site, the flange gasket between valve parts is needed to remove the whole valve, and need experienced operators local or sent back repair.

(3) there is dirt stuff between the flange sealing surface, should remove and clean. This problem may occur in the newly installed valve pressure test stage.

Note: after the first test at low temperature, all bolts should be tightened again.

8.2 packing leakage:

(1) packing too loose, should slow uniformly tighten the packing gland nut on and stop until the leakage.

(2) when the leak fastening can not stop further filler, probably because of the packing in packing box has been damaged . In this case, the packing should be replaced as soon as possible. When the need to replace the packing, please do the following steps:

(a) the demolition of actuator or handle;

(b) the demolition of the packing gland, bolts and nuts;

(c) to replace the packing, the stem or inner wall of packing box should avoid abrasions;

(d)while assembling, do it according to the reverse operation process.

Note: With manhole cryogenic butterfly valve adopt spring preload packing, which has been adjusted in place in factory.

Note: Because of the triple eccentric cryogenic butterfly valve with low leakage packing, the packing gland nuts are tightened appropriately to prevent stem leakage, while excessive tightening will reduce its life and increase torque. Tightening torque also should not exceed the recommended numerical appendix A. Should be cautious of the compression packing, as long as they can keep the effective seal, at the same time to keep the handle rotating flexible.

(3)If the packing gland pressure is deviation, the packing gland nuts should be loosen, then be uniform tightened appropriately.

Note:The packing gland of triple eccentric cryogenic butterfly valve is designed for self-aligning, so the structure can avoid packing bias due to improper tightening. However, in order to achieve the best results, please use the same force as much as possible to tighten nuts on the packing gland.

8.3 seat sealing surface leakage:

(1) the dirt existing between the sealing surface, should be removed and cleaned.

(2) the sealing surface wear, should be re grinded.

Warning: Do not open and inspect valve manhole, when the valve with pressure, otherwise it will hurt people!

8.4 stem torque too large:

(1) packing too tight, the nuts on the gland should be firstly loosen, then be uniform tightened appropriately.

(2) the packing gland pressed deviation, the nuts on the gland should be firstly loosen, then be uniform tightened appropriately.

(3) the stem transmission parts should be kept clean, regular inspection and clearance of obstructions will reduce operating torque of the valve.

Note: the valve in the working state is prohibited to paint on the stem, and remove any stains on the stem retention.

**Appendix A　Recommend screw tighten torque list**

| Screw Dn (mm) | Material A193 B7 | | Material A193 B8 | |
|---|---|---|---|---|
| | With lubricated（Nm） | Without Lubricated（Nm） | With lubricated（Nm） | Without Lubricated（Nm） |
| 8 | 10 | 17 | 5 | 8 |
| 10 | 18 | 30 | 9 | 15 |
| 12 | 31 | 51 | 15 | 26 |
| 16 | 73 | 123 | 36 | 62 |
| 20 | 140 | 238 | 70 | 119 |
| 24 | 240 | 407 | 120 | 204 |
| 27 | 345 | 589 | 173 | 296 |
| 30 | 468 | 798 | 235 | 400 |
| 33 | 628 | 1077 | 315 | 540 |
| 36 | 809 | 1382 | 406 | 694 |
| 39 | 1034 | 1777 | 519 | 892 |
| 42 | 1298 | 2241 | 651 | 1124 |
| 45 | 1602 | 2779 | 804 | 1394 |
| 48 | 1950 | 3396 | 979 | 1704 |
| 52 | 2488 | 4352 | 1249 | 2184 |

Note：Torque deviation±10%.

**Appendix B　instruction for　flange screw and gasket installation**

**Installation Tools:**

Cleaning and rotary screws needs a variety of specific tools, and abide by the safety operation and good safety equipment must also be used

Before installation,　be ready for the following equipment:

- torque wrench after checking, hydraulic wrench, or other tightening tool;
- Steel wire brush,  brass wire brush is the best ;
- helmet;
- safety goggles:
-Special lubricants;
-Other Special tools.

**the instruction includes following 5 points:**

1 cleaning and check

- Additional impurities and debris should be removed from the gasket seating surface, all kinds of fasteners (bolts, double end studs), nuts and washers.
- Check all fasteners (bolts, stud, nut and washer) burr, crack like defects.
- Check the flange surface with or without warping deformation, radial scratch, depth tool bruises traces, of other defects effects the gasket properly seated.
- if found defective element should be replaced; as for there are doubts about the replacement, should be timely consultation.

2 flange alignment

- without excessive force, so that the flange and bolt holes should be aligned

- for any can't achieve positive situation, should be timely report.

3. install gasket

－Make sure the size and material of gaskets conform to requirements.

－Make sure the gaskets are out of any defects.

－Insert the gasket between the two flanges carefully.

－Make sure the gasket is centric between the two flanges.

－Binder or anti-sticking agent are prohibited on the surface of gasket and sealing face of the flange, unless it’s required by the gasket manufacturer.

－Align the two flanges, to ensure the gasket out of scratch or stab.

4.Lubricate the stress surface

－Only specified or approved lubricant can be used, oil lubricant is prohibited.

－Add enough lubricant on the stress surface of all the bolts, nuts and gaskets.

－Ensure the surface of flanges and gaskets out of the pollution of lubricant

5. Installation and tighten the bolt

－The tool must be corrected torque wrench or other tools with tighten function.

－Tight the nuts according to torque value listed in appendix A.

－Tight the nuts in cross symmetrical order.(as the right), and following the next 5 steps:

1. Tight all the nuts with hands, or small wrench for larger nuts.
2. Reaching the 30% of torque required of each nut.
3. Reaching the 60% of the torque required of each nut.
4. Tight all the nuts in cross symmetrical order again, reaching 100% of torque required.(The same step may be redone for big size flange)
5. Tight all the nuts in cross symmetrical order once at least, reaching the torque required of each nut(the same

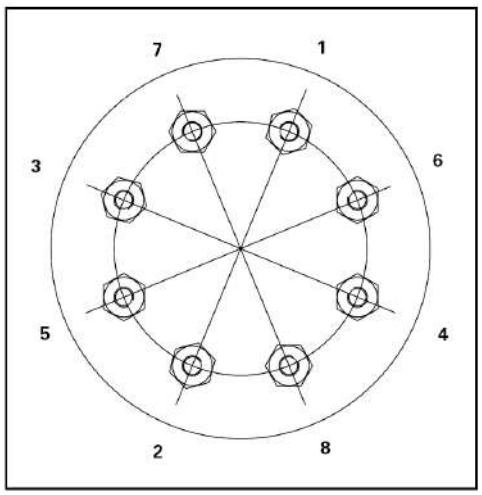
step may be redone for big size flange)

6. Tight the bolts again

   —Please note: consult the gasket manufacturer or engineering department about the instructions of tighten bolts.

   —Please tight the fasteners which suffered corrosive thermal cycling again.

   —All the above operations should be done under environmental temperature and barometric pressure



# Client focused

# Precision management