

# TOD

## Triple Offset Valve



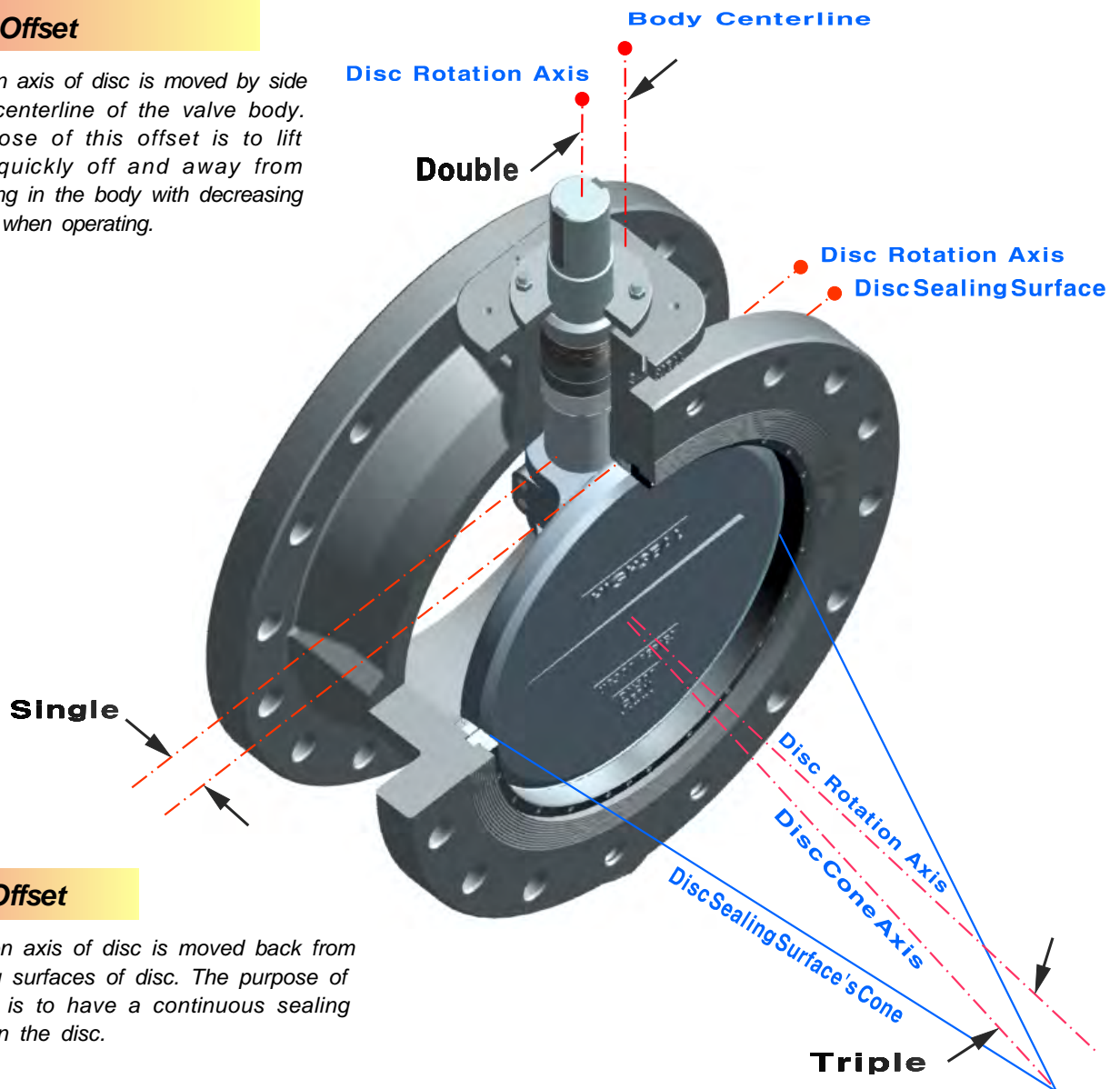
Perfect Harmony with Technology

### About Triple Offset Valve

In general, Many difficulties have been found for bubble tight shut-off with double offset metal seat design for long life service. To overcome this problem, the technology of triple offset sealing is introduced. It features special sealing mechanism that consists of contacts of a inclined and conical disc with a laminated seat, thereby minimizing the friction and abrasion between sealing elements(Disc and seat). Furthermore, the most unique aspect of the design is to provide low torque, broad sealing width and bi-directional tight shut-off.

#### Double Offset

The rotation axis of disc is moved by side from the centerline of the valve body. The purpose of this offset is to lift the disc quickly off and away from the seat ring in the body with decreasing the friction when operating.



#### Single Offset

The rotation axis of disc is moved back from the sealing surfaces of disc. The purpose of this offset is to have a continuous sealing surfaces on the disc.

#### Triple Offset

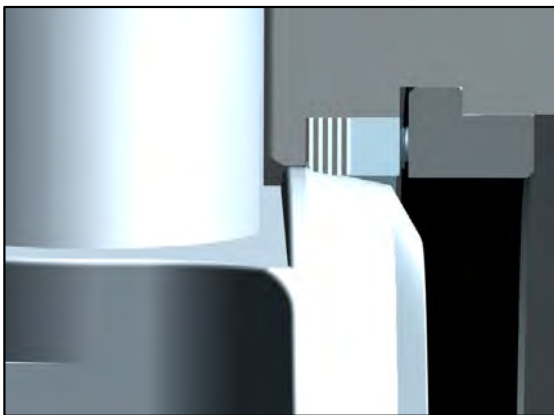
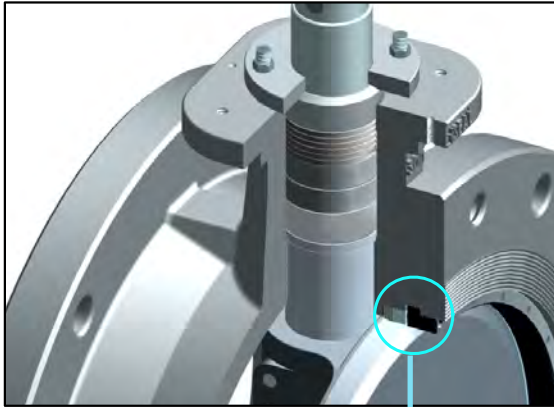
The virtual conic axis extended from the sealing surfaces of disc is inclined from the rotation axis of disc.

The purpose of this offset is to eliminate friction, galling and wear generated at the sealing surfaces during operation and provide bubble tight shut off on high pressure and temperature.

# SEALING SYSTEM

## PRINCIPLE OF SEALING SYSTEM

Most of metal seat in double offset design functions for sealing with mechanism of smooth side and its consequent depression between the sealing elements(disc and seat). The mechanism can cause galling or scratch on the sealing elements(disc and seat) by sudden torque. Sometimes, jamming between sealing elements occurs that get the valve troubled. On the other hand, triple offset valve have the advantage in this field.

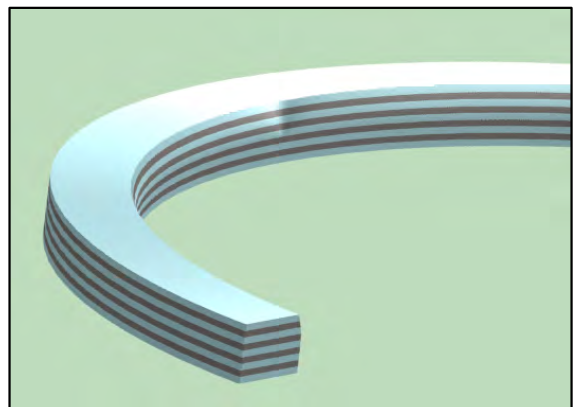


- ❑ The sealing surfaces of TOD valve disc are composed of different angles in all point, so TOD have a elliptical sealing system.
- ❑ The sealing surfaces of a elliptical sealing system are in entire contacts at all points only at the final position and upon opening, the contact points deviated from the seat ring at all points.
- ❑ This action completely solve the problems mentioned above and provides bubble tight shut-off.
- ❑ Contrary to the type, having the seat on the disc edge, the seat ring is fixed in body by the set screws along the retaining ring, mating with the thrust collar, so the seat ring is not directly influenced by the fluid when the valve is in open position.

## LAMINATED SEAT RING

The laminated seat ring is composed of alternating layers of metal and graphite.

- ❑ The layers of graphite compensate for the lack of smooth mating surfaces, so the laminated seat ring of TOD valve provides bubble tight shut off even in gas application.
- ❑ Each individual multilayer provides an independent sealing performance, unaffected by damage to the others.
- ❑ Laminated metal plate can be changeable to various materials including inconel, monel and hastelloy depending on the application.
- ❑ Additionally, For high temperature and more severe applications, the solid metal seat ring is available and for low temperature applications, the solid metal seat ring can be substituted by the PTFE / R.TFE seat ring.



# FEATURES

- ❑ Metal to metal sealing.
- ❑ Bi-directional tight shut-off.  
/ Achieved by introducing triple offset sealing technology.
- ❑ Triple offset design with inclined conical sealing system.  
/ Eliminates rubbing and jamming associated with sealing surface contact.
- ❑ Laminated metal or solid metal seat.
- ❑ No fasteners on disc, one piece structure.
- ❑ Provides the non-friction motion.
- ❑ Robust single-piece shaft.



- ❑ Efficient operation with worm gear, electric, pneumatic or hydraulic actuators.
- ❑ Inherently fire safety design.
- ❑ Prolongs the service life by the replaceable seat ring structure.  
/ Field repairable.
- ❑ Availability for various applications.  
/ Available in a wide range of materials including special alloys capable of resisting corrosion.
- ❑ Provides low operating torque.
- ❑ Provides durable, wide temperature range.

# APPLICATIONS IN MAJOR INDUSTRIES

- ❑ Petrochemical Plants
- ❑ Oil Production(On / Off shore Platforms)
- ❑ Power Plants(Hydroelectric / Nuclear)
- ❑ Oil Refinery
- ❑ Plant Engineering  
(LPG / LNG Storage and Transportation)
- ❑ Gas Industry
- ❑ Pulp Industry
- ❑ Steel Mills
- ❑ Paper Industry
- ❑ Ship Building
- ❑ District Heating(Transportation / Generating)
- ❑ General Industrial
- ❑ Water / Sewage
- ❑ Chemical Plants
- ❑ Hydrocarbon Storage and Transportation
- ❑ Sugar Industry

# GENERAL ORDERING INFORMATIONS

1	2	3	4	5	6	7	8	9		
03	A30	D	—	A	J	C	A	—	B	A
Valve Size	Pressure Rating	Type	Body	Disc	Seat	Shaft	Actuator	Disc Sealing Surface		

8in.	Class 300	Double Flange	—	WCB	CF8M	316 S.S. & Graphite	17-4PH	—	Worm Gear	ENP
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1	<b>VALVE SIZE</b>	
03	3in.(80mm) to 48in.(1200mm)	
2	<b>PRESSURE RATING</b>	
A15	ANSI CL.150	
A30	ANSI CL.300	
A60	ANSI CL.600	
A90	ANSI CL.900	
P10	PN10	
P16	PN16	
P20	PN20	
P40	PN40	
P64	PN64	
P100	PN100	
3	<b>VALVE TYPE</b>	
D	Double Flange	
B	Buttweld	

6	<b>SEAT RING</b>		
	<b>LAMINATED</b>		<b>SOLID</b>
A	304 S.S. & Graphite	L	304 S.S.
B	304L S.S. & Graphite	M	304L S.S.
C	316 S.S. & Graphite	N	316 S.S.
D	316L S.S. & Graphite	O	316L S.S.
E	317 S.S. & Graphite	P	317 S.S.
F	317L S.S. & Graphite	Q	317L S.S.
G	Inconel & Graphite	R	Inconel
H	Duplex & Graphite	S	Duplex
I	Monel & Graphite	T	Monel
J	Hastelloy & Graphite	U	Hastelloy
K	Alloy20 & Graphite	V	Alloy20
		W	PTFE
		X	R.TFE
7	<b>SHAFT</b>		
A	17-4PH	F	Hastelloy
B	Inconel	G	Alloy20
C	Duplex	H	Nitronic 50
D	Monel		
E	316 S.S.		

4 / 5	<b>BODY &amp; DISC</b>		
A	WCB	N	Inconel
B	WCC	O	Duplex
C	LCB	P	Monel
D	LCC	Q	Hastelloy
E	LC9	R	Alloy20
F	CA15		
G	WC6		
H	CF8		
I	CF3	9	<b>DISC SEALING SURFACE</b>
J	CF8M	A	ENP
K	CF3M	B	Stellite (H/F)
L	CG3M		
M	CG8M		

8	<b>ACTUATOR</b>		
A	Bare Shaft		
B	Manual Worm Gear		
C	Electric Motor		
D	Pneumatic Actuator		
E	Hydraulic Actuator		

For more information about TOD, please contact UNICOM.

EXCEPTIONAL DESIGN  
TOD  
Triple Offset Valve  
SUPERIOR QUALITY SYSTEM  
OPTIMUM PERFORMANCE



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