Technical Bulletin B-100 Features

Feature

Series 10
High Performance
Butterfly valves
For Rating JIS 20K

General :

The series 10 butterfly valves has been developed for a large number of applications throughout process industries. The series 10 high performance butterfly valves are mainly used for the control of fluids flowing in large valve at low differential pressure. It offers added advantages such as simple structure and low cost.

Performance :

- High Cv to valve weight ratio compared to conventional control valves.
- Throttling controls 60° rotation, on-off controls 90° rotation.
- Excellent control range ability.

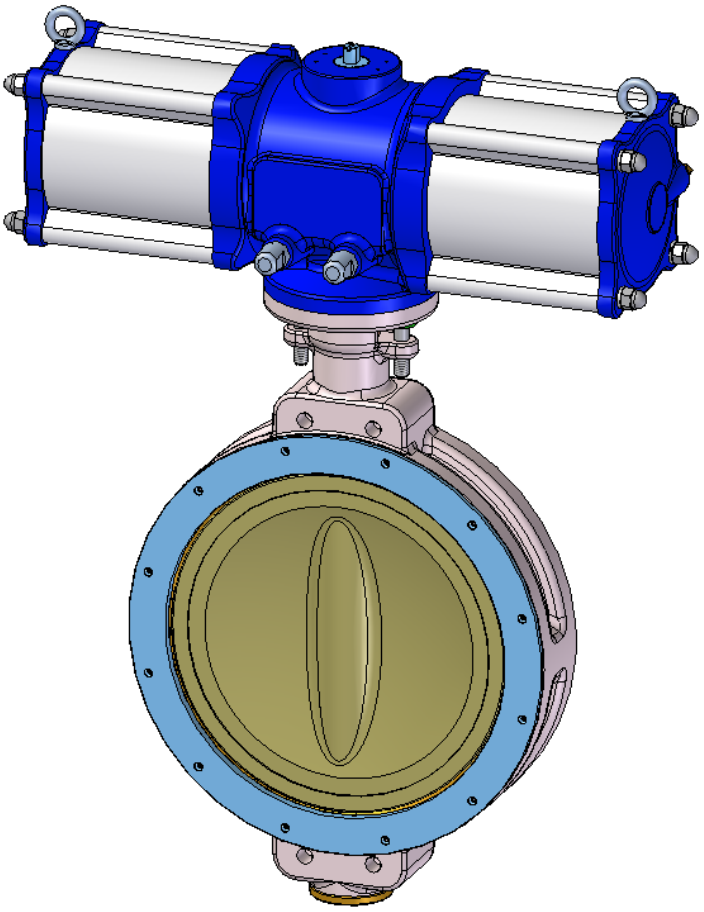


Figure 1. Series 10 Butterfly Valve

Design Flexibility :

- Swing through and tight shut-off seated trim design.
- Flange connection versions available.
- Full range of bonnet and packing design to suit Various temperatures and fluids.
- Provides fire safe sealing, which combines a soft seal ring and metal seal ring.
- Full range of body and vane material options, With availability of hard facings.

Design Integrity :

- Wafer type as standard.
- Triple eccentric mechanism.
- Actuator mounting flange dimensions in accordance with ISO 5211/1-1977

Quality Manufacturing :

- Rigorously tested to ensure specified performance on site.
- Quality assurance systems in accordance with ISO 9001.

Scope of Design

End Connection Size :

3” to 24” (80mm to 600mm)nominal size.

End connection styles :

ANSI, DIN and JIS wafer are standard, only other requirements available on request.

Valve Body Ratings :

JIS 10K, 20K, ANSI 150

BS 9504, PN6 ~ PN40.

Working Pressure :

In accordance with ASME / ANSI B16. 34

Working Temperature :

Up to 450°C.

For cryogenic range. (-196℃), please contact a sales office.

Face to Face Dimensions :

in accordance with ISO 5752-1982

Trim Design Options :

The vane with swing through or

fire safe seating

Inherent Characteristics :

Modified equal percentage

Standard Material Combinations :

These are shown in table 1.

Special Applications :

For arduous service other material combinations, hard facings on valve bore and vane are available.

Actuation :

Various type of actuation are available including 5500 series spring opposed pneumatic diaphragm.

3800 Series double acting, or spring opposed pneumatic cylinder.

In addition electric, electro-hydraulic, hydraulic and manually operated versions are available.

Sizing/noise Predication :

The procedures for performing valve sizing, velocity and sound pressure level calculations are detailed in the technical selection manual.

Design

Seat Designs :

Triple offset-zero leakage

Double offset-zero leakage

Concentric-rubber seated designs

Trip Designs :

Triple offset

Double offset

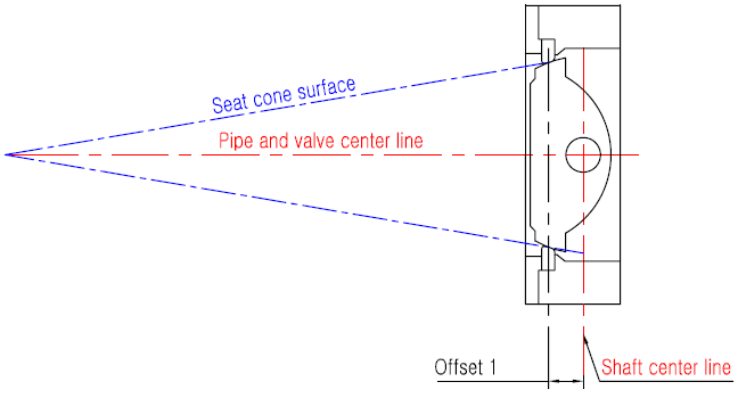
Concentric design

Anti - cavitations / low noise designs

The Evolution of Triple Offset Design

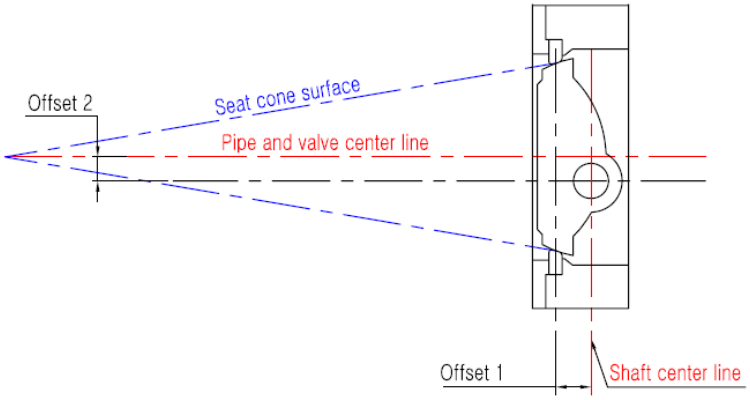
1. Single Offset

The center of rotation is moved back from the centerline of the valve disc. The seat and Seal are designed conically and on center, this design relies on a frictional, interference seal and so it is applicable only to soft-seated valves.



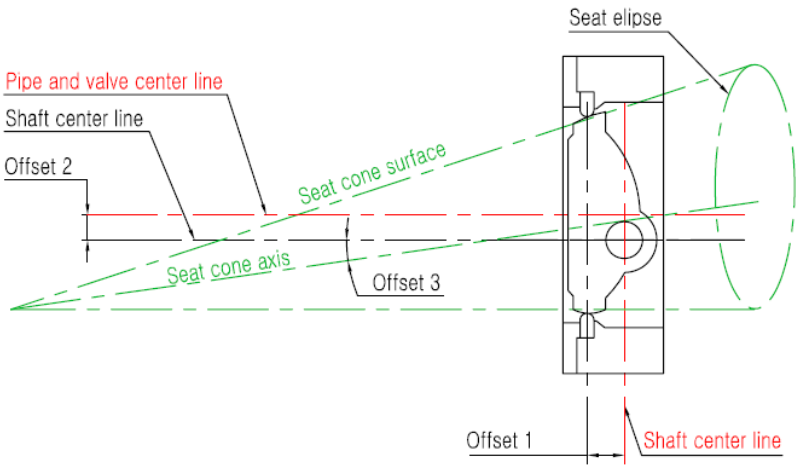
2. Double Offset

The center of rotation is moved from the Centerline of the valve body. The seat and seal Design remains frictional, interference seal, but The length of rotation over which this friction occurs Is reduced, allowing a larger range of process resistant Seat materials to be used. However these materials Must be relatively soft or highly elastic to prevent "jamming"



3. Triple Offset

The centerline of the cone is rotated away from The valve centerline resulting in an ellipsoidal profile And providing the third offset. With this geometry, Seat seal interference is completely eliminated Ensuring long sealing life. The result is a torque Seated, process pressure aided **FRICTIONLESS Seal**. The geometry allows the body seat to be Used as the closed limit stop, aiding operator Adjustment. The Tripe Offset design is ideally Suited to metal seated valves providing bubble-tight Performance on high temperature, high pressure And fire-safe applications.



THE TRIPLE OFFSET GEOMETRY

OFFSET 1 The shaft is offset behind the seat axis to allow complete sealing to contact around the entire seat.

OFFSET 2 The shaft centerline is offset from the pipe and valve which provides interference free opening and Closing of the valves.

OFFSET 3 The seat cone axis offset from the shaft centerline to eliminate friction during closing and opening And to achieve uniform compressive sealing around the entire seat.

- Triple offset and ellipsoidal sealing geometry
- Bi-directional bubble tight shut-off.
- Inherently Fire-safe by design.
- Developed geometry results in zero seat/seal friction

  Low torques

  Extended service life

  Continued seal through thermal cycling torque seating
- Excellent flow and throttling characteristics covering services from Cryogenic to high temperature
- Excellent control of fugitive emission by virtue of rotary stem movement and advanced packing Materials

PRESSURE / TEMPERATURE RATINGS

Temp °C	10K			20K		
	Carbon steel	Type 304	Type 316	Carbon steel	Type 304	Type 316
	Mpa	Mpa	Mpa	Mpa	Mpa	Mpa
-20~38	1.96	1.90	1.90	5.10	4.96	4.96
93	1.79	1.62	1.65	4.65	4.14	4.27
149	1.59	1.41	1.48	4.52	3.65	3.86
204	1.38	1.24	1.34	4.38	3.24	3.55
260	1.17	1.17	1.17	4.14	3.00	3.31
316	0.965	0.965	0.965	3.79	2.86	3.10
343	0.862	0.862	0.862	3.69	2.83	3.07
371	0.758	0.758	0.758	3.69	2.79	2.96
399	0.655	0.655	0.655	3.48	2.76	2.93
427	0.552	0.552	0.552	2.83	2.72	2.85

Table 1. Standard Material Construction.

Valve Body	Carbon steel SCPH2	Stainless steel SCS13	Stainless steel SCS14
Vane	Carbon steel SCS13	Stainless steel SCS14	Stainless steel SCS14
Shaft	Stainless steel 17-4PH	Stainless steel 17-4PH	Stainless steel SUS316
Inboard Bearing	Oiless bearing	Oiless bearing	Oiless bearing
Packing	Teflon fiber / Graphite	Teflon fiber / Graphite	Teflon fiber / Graphite
Packing Follower and Steel	Stainless steel	Stainless steel	Stainless steel
Seat Ring	Stainless steel SUS316	Stainless steel SUS316	Stainless steel SUS316
Soft Seat Ring	Reinforced teflon	Reinforced teflon	Reinforced teflon

Figure 2. Sealing Design.

(1) TRIPLE OFFSET

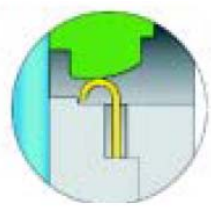


Fig.1 triple offset metal seal

Fig.2 Triple offset laminated seal

Fig.3 triple offset laminated seal

Fig.4 triple offset metal seal

(2) DOUBLE OFFSET

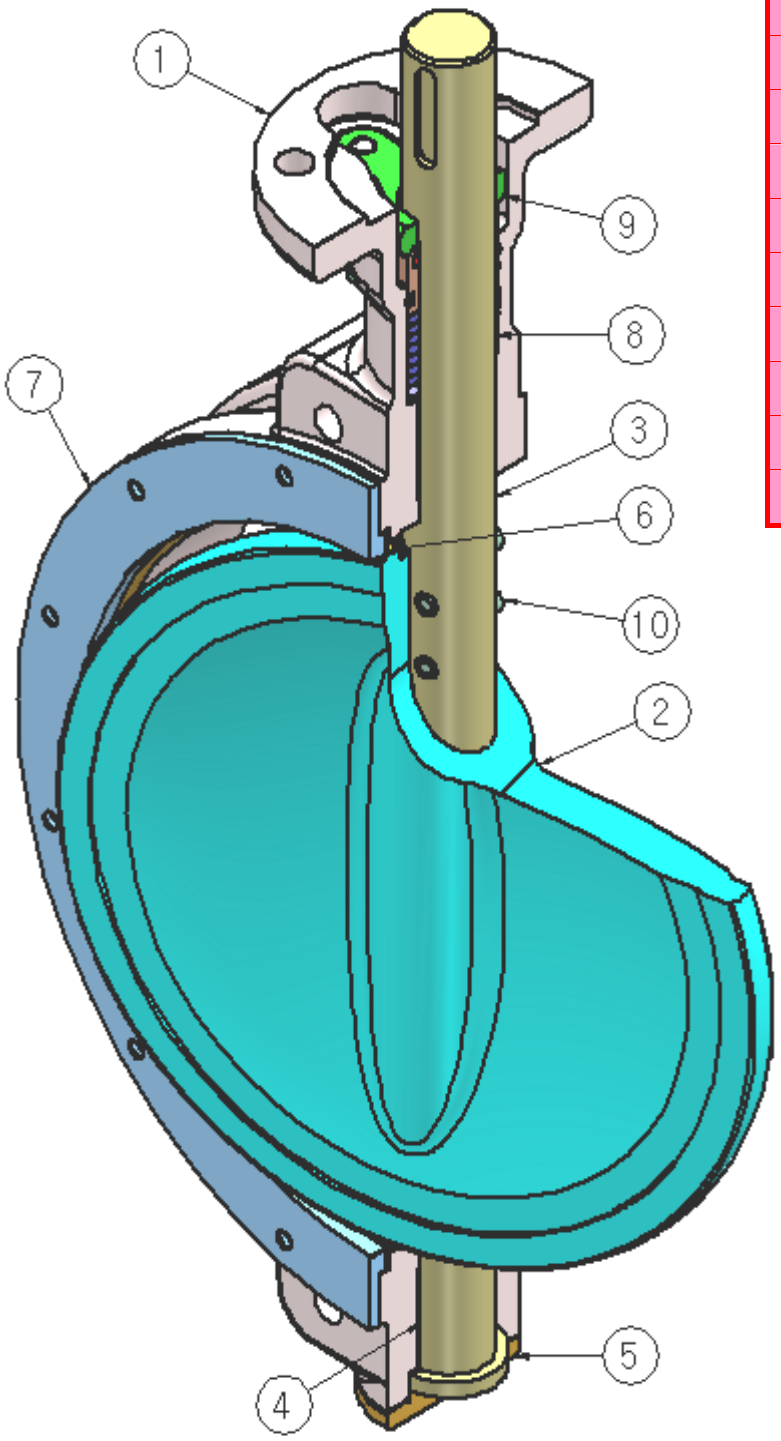
Fig.5 Rubber seal(integral body seat)

Fig.6 Rubber seal(Replacement seat)

Fig.7 Rubber seal

Fig.8 PTFE seal

*** Butterfly Valve Part List.**



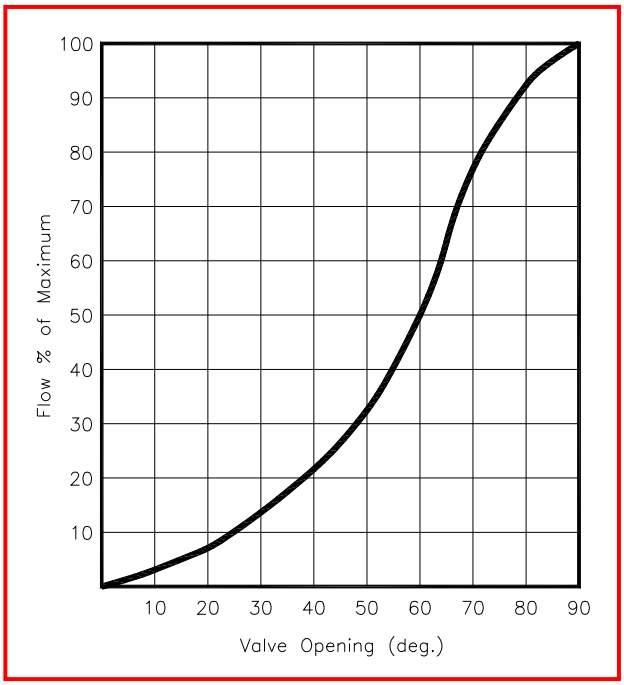
No.	Part Name	Material
1	BODY	SCPH2
2	VANE [DISC]	SCS14
3	SHAFT	SUS304
4	DU BUSH	BC6
5	BOTTEM COVER	S25C
6	SEAT RING	SUS316
7	RETAINER	SUS304
8	PACKING	GRAPHITE
9	GLAND FLANGE	SCPH2
10	PIN	S45C

* Cv Values

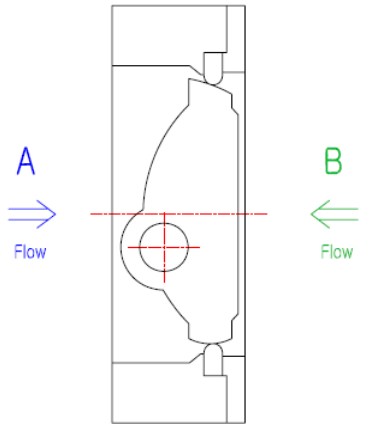
Table 2. Cv Values.

Valve size		Throttling 60	On-off 90
Inch	mm		
3”	80A	160	320
4”	100A	280	560
5”	125A	450	900
6”	150A	640	1280
8”	200A	1150	2300
10”	250A	1780	3560
12”	300A	2600	5200
14”	350A	3400	6800
16”	400A	4500	9000
18”	450A	5600	11200
20”	500A	7000	14000
24”	600A	12000	24000

Figure 3. Characteristic Curves.

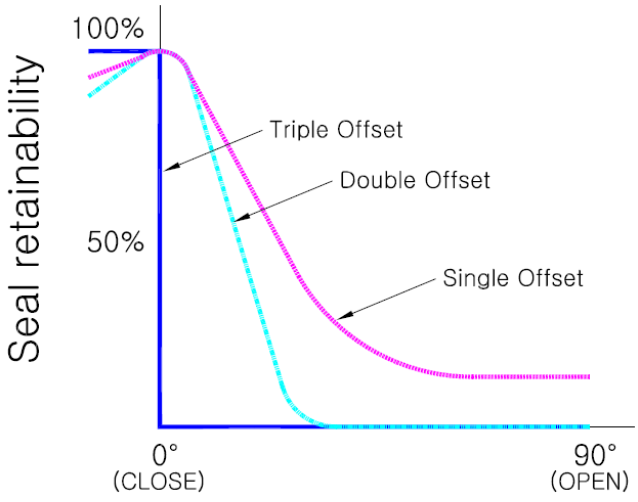


* Leakage Rates :



	A	B
Metal Seat	Class VI	Class V
Soft Seat	Class VI	Class VI

* Disc Friction :



ΔP Limitation for Butterfly Valve

A0-3800 Double Acting Cylinder Actuator

Supply Air : 5.0 kgf/cm2G.

ACTUATOR SIZE	8D	10D	12D	14D	16D	17D	20D	25D	30D	35D	40D
TORQUE	13.5	21.1	48.9	70.4	140.8	274.2	428.6	740.8	1543.7	2101.2	4036.5
3"	20										
4"	20										
5"	15.7	20									
6"		20									
8"		10	20								
10"			15.2	20							
12"				12.9	20						
14"					20						
16"					16.9	20					
18"						20					
20"						20					
24"						8.1	14.4	20			

ΔP Limitation for Butterfly Valve

A0-3800 Spring Return Cylinder Actuator

Air to Open

Supply Air : 5.0 kgf/cm2G.

Spring Range : 2~3 kgf/cm2G.

ACTUATOR SIZE	8S	10S	12S	14S	16S	17S	20S	25S	30S
TORQUE	5.4	8.6	19.6	28.4	42.5	54.8	128.8	222.2	463.1
3"	15.4	20							
4"		17.6	20						
5"			20						
6"			18.3	20					
8"				15.6	20	20			
10"					12.6	17.5			
12"							20		
14"							20		
16"							11.5	20	
18"								16.4	20
20"									17.1
24"									14.2

ΔP Limitation for Butterfly Valve

A0-5500 Rotary Diaphragm Actuator

Supply Air : 4.0 kgf/cm2G.

Spring Range : 1~3 kgf/cm2G.

ACTUATOR SIZE	T-2	T-3	T-4	T-5
TORQUE	12	23	64	108
3"	20			
4"	20			
5"	12.8	20		
6"	7.8	20		
8"		11.5	20	
10"		5	20	
12"			14.4	20
14"			8.9	12.6
16"			4.8	9.4
18"			3.6	6
20"				5.1
24"				2.7

* DIMENSION

Figure 4. Series 10 High Performance Butterfly Valve

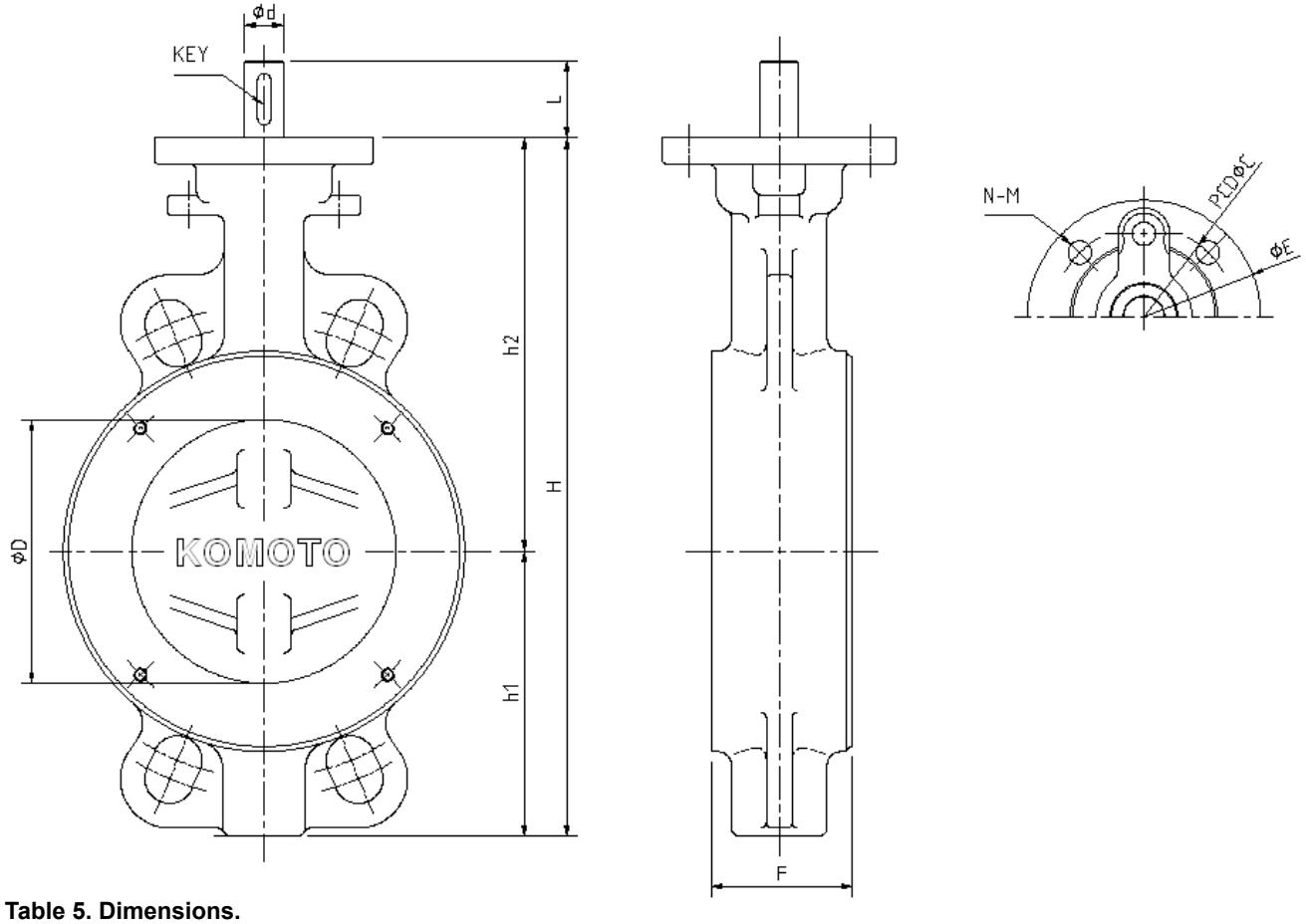


Table 5. Dimensions.

SIZE		F	h1	h2	H	ØD	Ød	L	PCD ØC	E	N-M	KEY
3"	80A	46	134	138	272	80	15	70	70	90	4-M8	5 x 5
4"	100A	52	139	150	289	102	15	70	70	90	4-M8	5 x 5
5"	125A	56	161	175	336	127	20	85	102	125	4-M10	6 x 6
6"	150A	57	189	203	392	150	25	85	102	125	4-M10	8 x 7
8"	200A	64	219	233	452	200	25	85	125	150	4-M10	8 x 7
10"	250A	71	254	266	520	250	30	110	102	125	4-M10	10 x 8
12"	300A	81	289	313	602	298	35	110	140	175	4-M16	10 x 8
14"	350A	92	331	364	695	350	35	110	140	175	4-M16	10 x 8
16"	400A	102	363	394	757	400	45	130	165	210	4-M16	14 x 9
18"	450A	114	393	424	817	450	45	130	165	210	4-M16	14 x 9
20"	500A	127	400	435	835	500	45	130	254	300	8-M16	16 x 10
24"	600A	154	460	495	955	598	55	130	254	300	8-M16	20 x 12
28”	700A	165	550.5	585.5	1136	670	65	130	254	300	8-M16	20 x 12
32”	800A	190	600	640	1240	760	80	130	254	300	8-M16	20 x 12