

Solent & Pratt

Cryogenic TOSV™

Triple Offset Segment Valves



**CURTISS
WRIGHT**
Flow Control (UK) Ltd

For over 40 years Solent & Pratt has been at the forefront of the design, development and manufacture of high quality butterfly valves for engineering projects around the world. An absolute commitment to outstanding quality and reliability is the key of our success, particularly in environments such as the oil and gas, chemical, petro-chemical and power generation industries.



Top Entry Butt Weld End
Cryogenic TOSV



Double Flanged
Cryogenic TOSV



Lugged Body
Cryogenic TOSV

APPLICATIONS

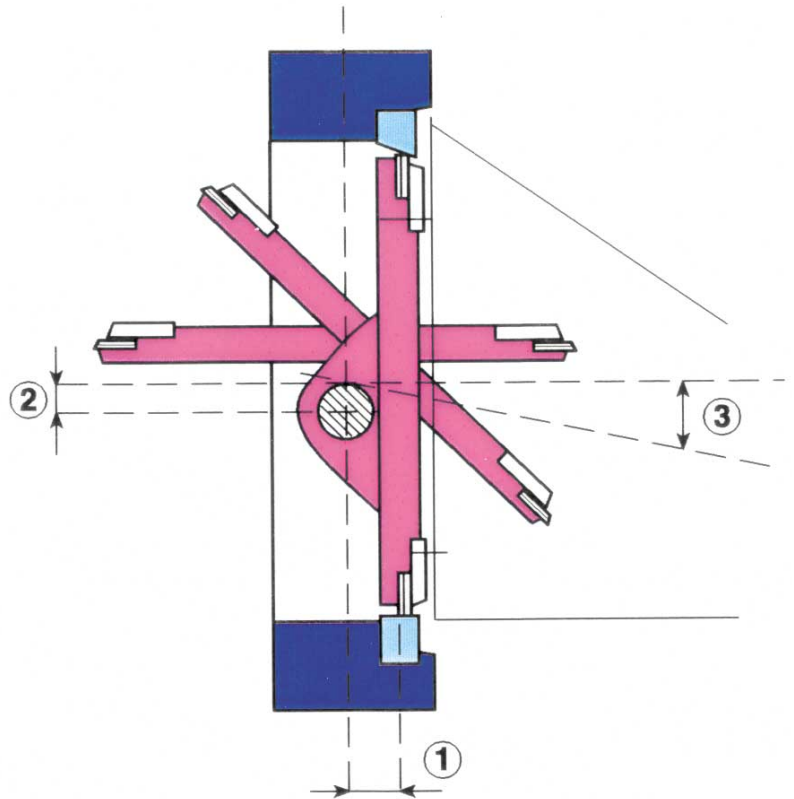
Cryogenics is the branch of physics dealing with processes and materials at very low temperatures normally below 150°F (-101°C). The need to handle low-temperature liquids and gases has become a commonplace requirement with fluids such as oxygen, liquid hydrogen and nitrogen. Valves that can provide tight shut off for isolation or modulation for control requirements at temperatures down to -320°F (-196°C) are now an essential part of today's process plant.

DESIGN

Valve designs of lightweight construction are advantageous for cryogenic use since the valve mass which must be cooled down from ambient to cryogenic temperatures on start up is much reduced. In addition the lower conductivity of lighter weight valves will assist in reducing heat influx which can occur in heavier design styles of valve.

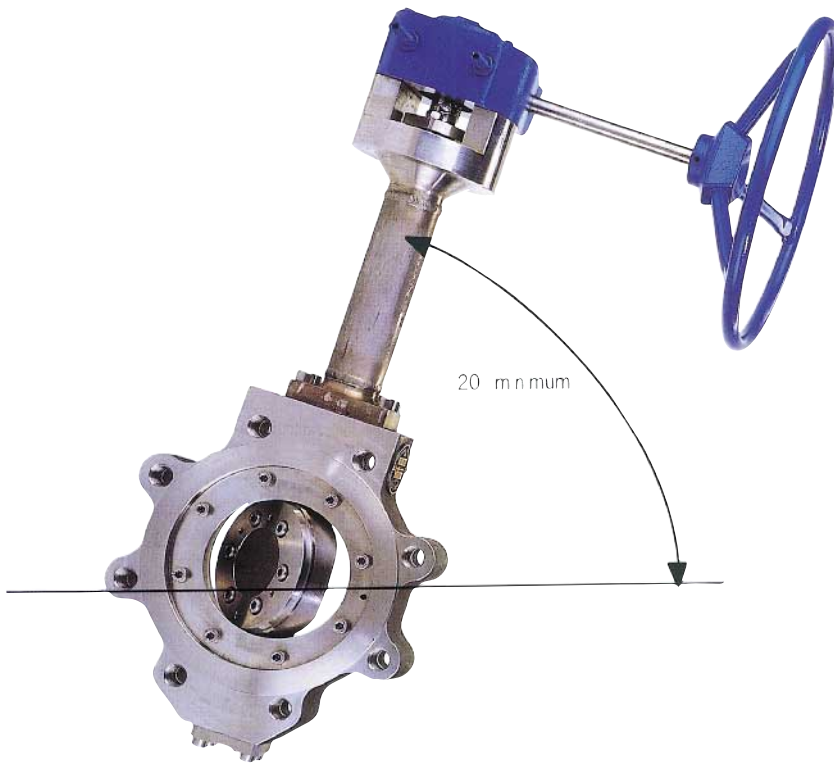
Solent & Pratt's design team have paid particular attention to these basic design principles in the product suitability of our cryogenic range of valves.

The Solent & Pratt TOSV, Triple Offset Segment Valve with its long life, high integrity on thermal cycling and low operating torques is an ideal valve for cryogenic applications.

**3" (80MM) NB TO 84" (2100MM) NB**

- Cryogenically tested to BS 6364 in both directions.
- Metal/metal sealing - inherently firesafe.
- Zero Leakage shut off available in both directions.
- Replaceable body seat and metal laminate disc seal.
- Triple offset design - non rubbing.
- Internal anti-blowout stem as standard, External to API 609 optional.
- Materials of construction available to NACE requirements
- Wafer lugged, double flanged, butt weld ends and top entry body designs available.
- 3" (80mm) to 84" (2100mm) in ANSI 150, 300 and 600lb with fully rated trims.
- 6" (200mm) to 36" (900mm) to ANSI 900 and 1500lbs designs with fully rated trims. Larger sizes available on request.
- Temperature range to -320°F (-196°C).
- UK and foreign patents issued.
- Quality assurance system approved to ISO 9001.

Cryogenic valves are easily recognisable by their long extension bonnets. The extension should protrude for at least 6" beyond any lagging on the pipework to assist a 'boil off' to occur within the bonnet extension. In order for this to occur the valve must always be installed with its extension at an angle not less than 20° from the horizontal. The vapour pocket which results from the 'boil off' within the extension will prevent the cold media from contacting and freezing the valve stem seals in the packing gland.



Materials

Materials of construction are an important issue for cryogenic valve applications. The Solent & Pratt valve is available in;

- ASTM A351 CF8M
- Duplex stainless steels
- 6 MO stainless steel
- Bronze
- Monel
- Incoloy
- Hastelloy B & C
- Zirconium
- Aluminium

Other materials available on request

Solent & Pratt valve undergoing cryogenic testing at Southampton University.



Certification

Cryogenic Testing Results (preferred direction)

Tested to BS 6364 Appendix A at Institute of Cryogenics, University of Southampton

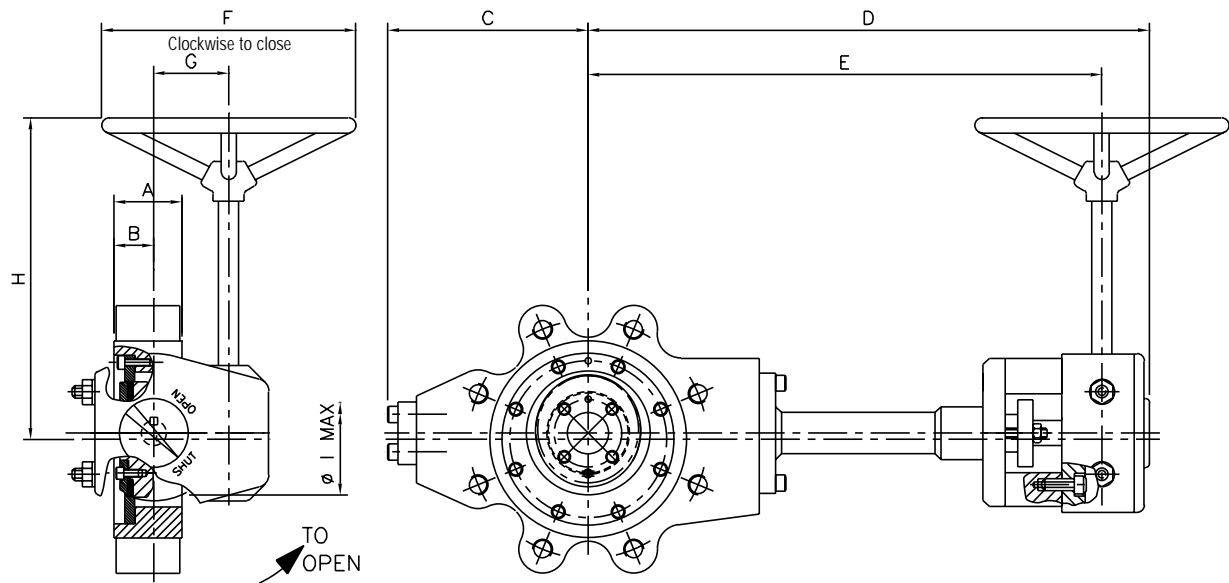
Summary from Test Report No. CAU.127

Leak Rate ml/min	Through Leak Rate at 20 Bar	Maximum Allowed	External Leak Rate at 20 Bar	Maximum Allowed
Pre-Cool down (ambient)	zero	2.7		
At 320°F (-196°C) (after 20 operations)	12	900	zero	zero
Returned to ambient	zero	2.7		

Notes

1. Valve tested was 6" (150mm) 150lb.
2. Tests conducted using Helium gas.
3. Test satisfactorily conducted in both directions.

Lugged Body Cryogenic TOSV envelope dimensions



Class 150# range (dimensions in mm)

Valve size Inches	mm	Gearbox size	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G	Dim. H	Dim. I	Wt. Kg.
3	80	M10/R8	48	29	125	527	495	200	52	169	66	24
4	100	M10/R8	54	31.5	135	569	537	200	52	169	88	32
6	150	M10/R8	57	36.5	170	589	557	200	52	175.5	124	37
8	200	M12/R12	64	41.5	200	636	597	305	67	293	175	55
10	250	MM12/18	71	47.5	240	685	646	457	67	262	230	88
12	350	M14/18	81	50	285	742	698	457	89.5	329	279	121
14	350	M14/R24	92	58.5	315	785	741	610	89.5	389	312	162
16	400	M15/R30	102	62.5	340	823	767	762	123	492	355	215
18	450	M16/R30	114	71.5	370	883	806	762	154	427	405	287
20	500	MFF57/S3/R24	127	72	415	904	842	762	60	532	450	360
24	600	MJF50/S5/R24	154	82	470	1043	930	610	97	526	540	520

28" (700mm) through 84" (2100mm) refer to factory

Class 300# range (dimensions in mm)

Valve size Inches	mm	Gearbox size	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G	Dim. H	Dim. I	Wt. Kg.
3	80	M10/R8	48	29	135	527	495	200	52	169	66	27
4	100	M10/R8	54	31.5	147	569	532	200	52	169	88	38
6	150	M12/R12	59	36.5	190	603	564	305	67	229.5	122	59
8	200	M14/R18	73	41.5	220	674	630	457	89.5	349	171	92
10	250	M15/R24	83	47.5	260	738	682	610	123	366	224	152
12	350	M15/R30	92	50	305	799	743	762	123	402	273	186
14	350	M16/R36	117	58.5	335	883	806	914	154	467	295	320
16	400	MFF36/S5/R24	133	66.5	365	896	834	610	52	494	335	415
18	450	MJF50/S5/R24	149	74.5	408	1000	905	610	97	525	380	585
20	500	MLF60/D12/R18	159	79.5	453	1039	946	457	237	581	420	627
24	600	MLF60/D12/R30	181	90.5	520	1192	1099	762	237	651	525	855

28" (700mm) through 84" (2100mm) refer to factory

Notes

1 Dimension I represents the maximum swing thro of the blade into the pipework.

2. 150lb & 300lb detailed. For 600, 900 & 1500lb refer to Solent & Pratt for details.

Body styles

Wafer flangeless, lugged (through drilled and tapped), double flanged and top entry butt weld ended body style are available.

Flange standards

All flange standards can be accommodated including ANSI, API, MSS, BS, PN and ISO.

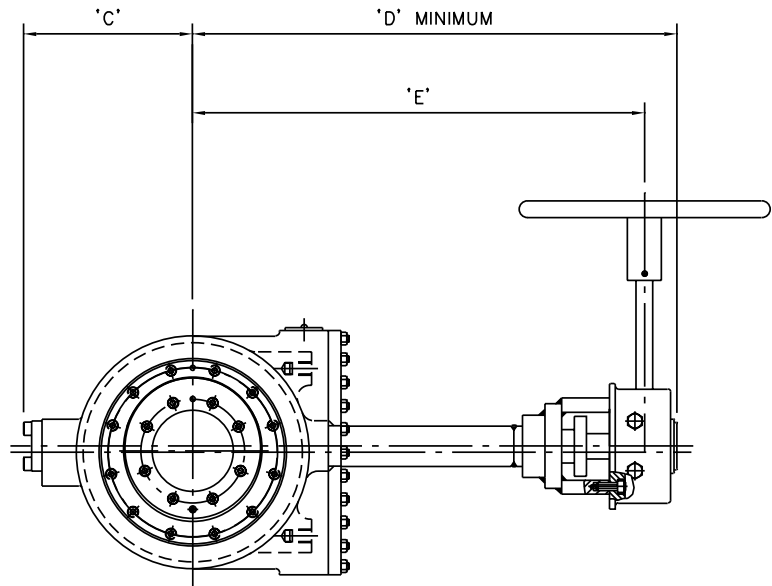
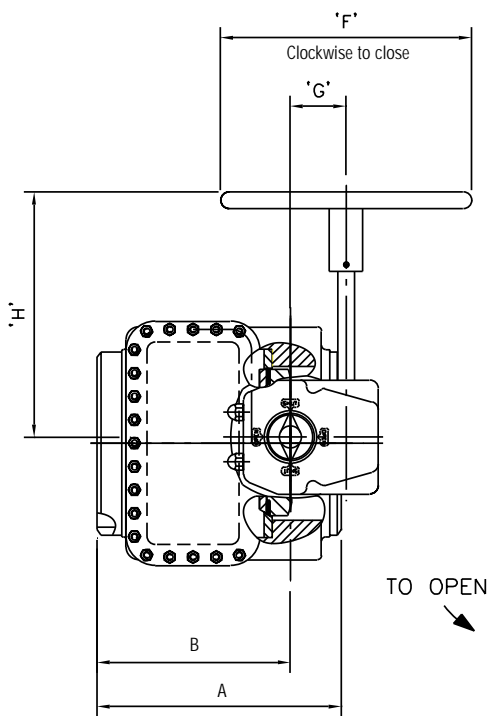
Face to face dimensions

Standard face to face dimension (wafer pattern) are to API 609 Table 2. Other face to face dimensions can be supplied including BS5155, MSS SP67 and special non-standard dimensions.

Operators

Valves can be supplied with manual, electric, pneumatic or hydraulic operators. Fail-safe systems for emergency operation are also available.

Top entry butt weld Cryogenic TOSV envelope dimensions



Class 150# range (dimensions in mm)

Valve size Inches mm	Gearbox size	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G	Dim. H	Wt. Kg.
6 100	M10/R8	287	226.5	170	589	557	200	52	175.5	57
8 200	M12/R12	292	231.5	200	636	597	305	67	293	85
10 250	MM12/18	301	237.5	240	685	646	457	67	262	136
12 350	M14/18	311	240	285	742	698	457	89.5	329	188
14 350	M14/R24	322	248.5	315	785	741	610	89.5	389	251
16 400	M15/R30	332	252.5	340	823	767	762	123	492	333
18 450	M16/R30	344	261.5	370	883	806	762	154	427	445
20 500	MFF57/S3/R24	357	262	415	904	842	762	60	532	558
24 600	MJF50/S5/R24	384	272	470	1043	930	610	97	526	806

28" (700mm) through 84" (2100mm) refer to factory

Class 300# range (dimensions in mm)

Valve size Inches mm	Gearbox size	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G	Dim. H	Wt. Kg.
6 150	M12/R12	289	226.5	190	603	564	305	67	229.5	103
8 200	M14/R18	303	231.5	220	674	630	457	89.5	349	161
10 250	M15/R24	313	237.5	260	738	682	610	123	366	266
12 350	M15/R30	322	240	305	799	743	762	123	402	326
14 350	M16/R36	347	248.5	335	883	806	914	154	467	560
16 400	MFF36/S5/R24	363	256.5	365	896	834	610	52	494	726
18 450	MJF50/S5/R24	379	264.5	408	1000	905	610	97	525	1024
20 500	MLF60/D12/R18	389	269.5	453	1039	946	457	237	581	1098
24 600	MLF60/D12/R30	411	280.5	520	1192	1099	762	237	651	1496

28" (700mm) through 84" (2100mm) refer to factory

Body Style

Top entry butt weld ended body styles are available.

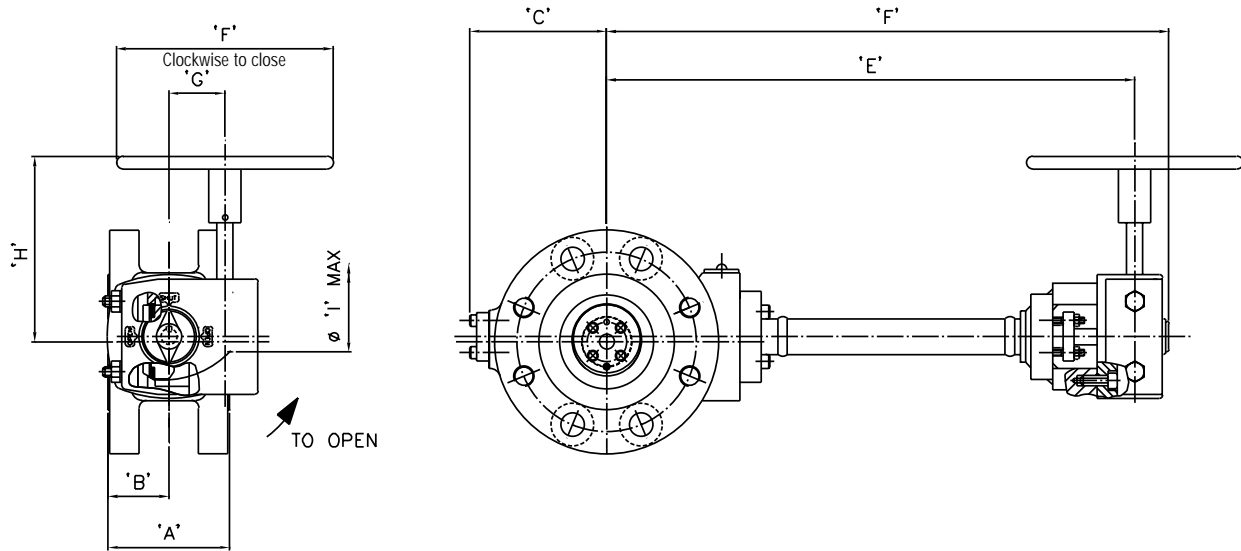
Face to face dimensions

Standard face to face dimensions are to ASME B16.10. Other face to face dimensions can be supplied including BS5155 and special non-standard dimensions.

Operators

Valves can be supplied with manual, electric, pneumatic or hydraulic operator. Fail-safe systems for emergency operation are also available.

Double flanged body Cryogenic TOSV envelope dimensions



Class 150# range (dimensions in mm)

Valve size Inches mm	Gearbox size	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G	Dim. H	Dim. I	Wt. Kg.
3 80	M10/R8	112	56	125	527	495	200	52	169	66	24
4 100	M10/R8	125	63	135	596	537	200	52	169	88	32
6 150	M10/R8	140	70	170	589	557	200	52	175.5	124	37
8 200	M12/R12	152	76	200	636	597	305	67	293	175	55
10 250	MM12/18	165	82.5	240	685	646	457	67	262	230	88
12 350	M14/18	178	89	285	742	698	457	89.5	329	279	121
14 350	M14/R24	190	95	315	785	741	610	89.5	389	312	162
16 400	M15/R30	216	108	340	823	767	762	123	492	355	215
18 450	M16/R30	222	111	370	883	806	762	154	427	405	287
20 500	MFF57/S3/R24	229	114.5	415	904	842	762	60	532	450	360
24 600	MJF50/S5/R24	267	113.5	470	1043	930	610	97	526	540	520

28" (700mm) through 84" (2100mm) refer to factory

Class 300# range (dimensions in mm)

Valve size Inches mm	Gearbox size	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G	Dim. H	Dim. I	Wt. Kg.
3 80	M10/R8	112	56	135	527	495	200	52	169	66	27
4 100	M10/R8	125	63	147	569	532	200	52	169	88	38
6 150	M12/R12	140	70	190	603	564	305	67	229.5	122	59
8 200	M14/R18	152	76	220	674	630	457	89.5	349	171	92
10 250	M15/R24	165	82.5	260	738	682	610	123	399	224	152
12 350	M15/R30	178	89	305	799	743	762	123	402	273	186
14 350	M16/R36	190	95	335	883	806	914	154	467	295	320
16 400	MFF36/S5/R24	216	108	365	896	834	610	52	494	335	415
18 450	MJF50/S5/R24	222	111	408	1000	905	610	97	525	380	585
20 500	MLF60/D12/R18	229	114.5	453	1039	946	457	237	581	420	627
24 600	MLF60/D12/R30	267	113.5	520	1192	1099	762	237	651	525	855

28" (700mm) through 84" (2100mm) refer to factory

Notes

1. Dimension I represents the maximum swing thro of the blade into the pipework,

2. 150lb & 300lb detailed.
For 600, 900 & 1500lb refer to Solent & Pratt for details.

Body styles

Wafer flangeless, lugged (through drilled and tapped), double flanged and top entry butt weld ended body styles are available.

Flange standards

All flange standards can be accommodated including ANSI, API, MSS, BS, PN and ISO.

Face to face dimensions

Standard face to face dimensions (wafer pattern) are to API 609 Table 2. Other face to face dimensions can be supplied including BS5155, MSS SP67 and special non-standard dimensions,

Operators

Valves can be supplied with manual, electric, pneumatic or hydraulic operator. Fail-safe systems for emergency operation are also available.

Other product ranges available from Solent & Pratt include:

- R-Series Resilient Seal Butterfly valves. Sizes: 2" (50mm) to 84" (2100mm)
- E-Series Ebonite Lined Butterfly valves. Sizes : 3" (80mm) to 84" (2100mm)
- T-Series High Performance Butterfly valves, Teflon - sealed firesafe. Sizes: 3" (80mm) to 48" (1200mm)
- TOSV Quarter Turn series. Sizes: 3" (80mm) to 84" (2100mm). Temperature range up to 1292°F (700°C)
- TOGV Gate Valve Series. Sizes: 3" (80mm) to 24" (600mm). Temperature range to up to 1292°F (700°C)
- TOSV Double Block and Bleed series. Sizes: 6" (150mm) to 84" (2100mm). Temperature range up to 932°F (500°C)
- TOSV Cryogenic series. Sizes: 3" (80mm) to 84" (2100mm). Temperature range down to -320°F (-196°C)
- Control Butterfly Valves. Actuated for both isolation and control duty.

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