



A CIRCOR CRYOGENICS COMPANY

Rockwood Swendeman

PRODUCT GUIDE





CRYOGENIC VALVES AND EQUIPMENT
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SAFETY RELIEF VALVE SUB-ASSEMBLY

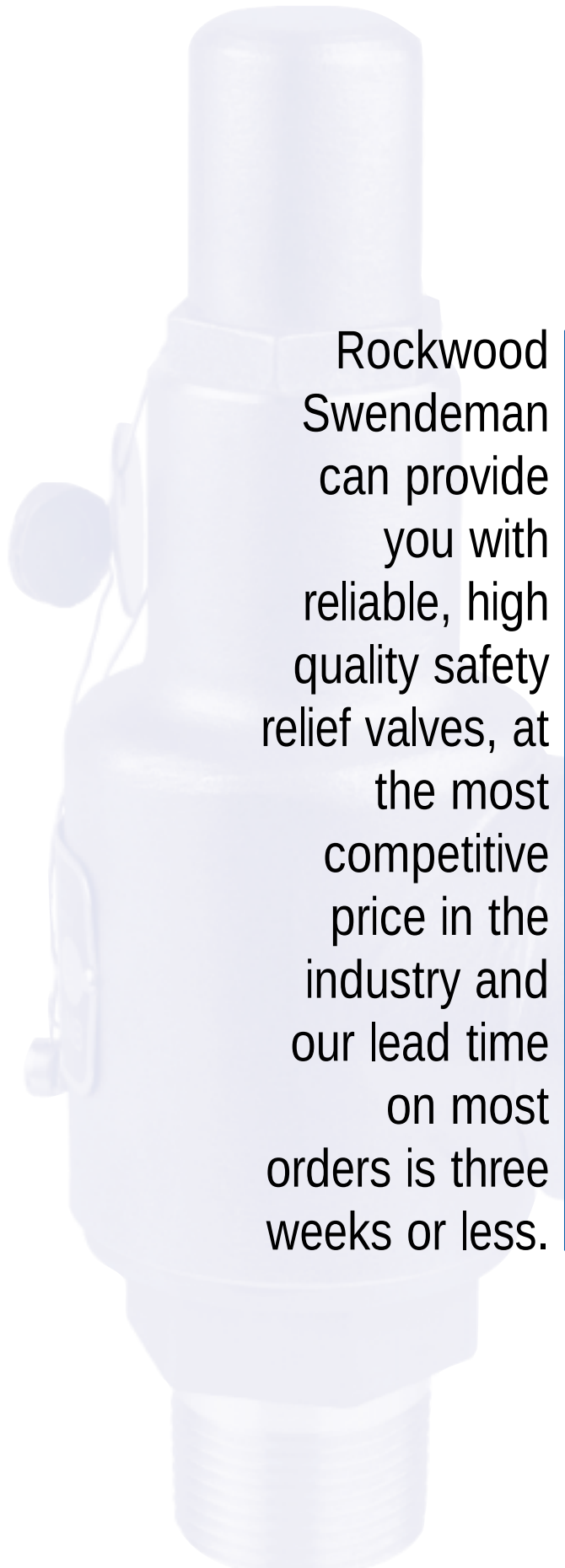
Cryotree™12

HOW TO ORDER

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ROCKWOOD SWENDEMAN has a policy of continuous product research and improvement and reserves the right to change design and specifications without notice.
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Rockwood Swendeman can provide you with reliable, high quality safety relief valves, at the most competitive price in the industry and our lead time on most orders is three weeks or less.

QUALITY
PRICE
LEAD TIME



Air Liquide America, Houston, Texas, has standardized the Rockwood Swendeman CryoTree™ assembly as part of their ongoing cost reduction programs to serve customers more effectively. Air Liquide has stated that although the total cost of the Rockwood Swendeman CryoTree™ parallels their internal fabricated design used in the past, their fabrication time can now be spent in other areas. Originally five to six separate purchase orders were issued for individual components. It now requires only one. This modular design provides only two part numbers for their complete tank inventory providing standardization on a global basis.

Rockwood Swendeman

A CIRCOR CRYOGENICS COMPANY

Designed and manufactured with a commitment to quality and service with over 50 years of experience in the cryogenic and gas industry.

Rockwood Swendeman valves are guaranteed against defects in material or workmanship for a period of one year. Any valve claimed to be defective may be returned to us, on receipt of our written consent, for examination. If in our opinion the valve is defective it will be repaired or replaced F.O.B. our plant. Under no circumstances does Rockwood Swendeman assume responsibility for consequential damages, labor, repair or other expenses.

Any adjustments or repairs should be done by Rockwood Swendeman at our facility. We have 50 plus years experience as a world leader in the manufacture and assembly of reliable safety relief valves for the industrial gas industry. Today many multi-national firms in the industry rely on quality Rockwood Swendeman valves. We manufacture bronze and stainless steel valves for air, gas and liquid service.

visit our website at: www.rockwoodswendeman.com





TYPE RXSO

0 - 400 psig

A CIRCOR CRYOGENICS COMPANY
**Rockwood
Swendeman**

BRONZE SAFETY RELIEF VALVES

Technical Data

Operating Ranges

Temperature-423°F to +400°F

Set Pressuresto 400 psig

Materials of Construction

ShellCast Bronze,
A.S.M.E SB-62

BaseForged Brass,
Alloy C37700

TrimCopper Alloy

SpringStainless Steel
17-7 PH A.S.T.M.,
A-313, Type 631

Tests

Each valve is set, tested, retested and sealed at the factory to the customer's specifications.

Sizes

Inlet - 1/2 inch to 2 inch

Outlet - 3/4 inch to 2-1/2 inch

Applicable Codes

Designed and manufactured to meet:

- CGA S-1.2 and S-1.3.
- V-4301 (Cryogenic Non-Oxygen)
- V-4401 (Oxygen)
- ASME sec.VIII
- API 527
- AD-Merkblatt A2
- CRN OG0591.9

Features

- Special Teflon® seat, making bubble-tight seals possible to over 90% of set pressures per spec API 527; not applicable to steam.
- Adjustable blowdown ring
- Meets AD-Merkblatt A2 certified by TÜV
- Cleaned and packaged for use in O₂ service in compliance with the CGA specification G-4.1

Additional cleaning specifications:

- 4WPI-SW70003
- ES.660.503
- GS-38
- GS-40

Application

- Especially recommended where noxious or expensive liquids or gases place a premium on seal quality.
- Stationary Cryogenic storage tanks
- Dual Safety relief systems
- Overpressure relief of tanks, pipelines, vessels, pumps
- Air and gas compressors
- Corrosive industrial applications

Options

- Large and Extra Large Capacity
Consult factory for flow rates
- BSP threads are available on most sizes
- Lever operation

Dimensions & Characteristics

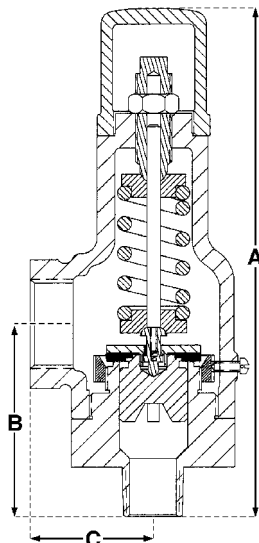
Type RXSO

AIR CAPACITY TABLE

Discharge capacities in cubic feet per minute of air at 10% or 3 PSI, whichever is greater, overpressure.

Inlet Sizes Inches	1/2	3/4	1	1-1/4	1-1/2
Outlet Sizes	3/4	1	1-1/4	1-1/2	2
Seat Diameter	A	B	C	D	E
Flow Area	0.118	0.204	0.326	0.424	0.628
Set Pressure					
10	36	63	100	130	193
15	43	74	118	154	227
20	48	85	136	177	262
25	55	96	154	200	297
30	62	108	172	224	332
35	70	120	192	250	370
40	77	133	212	276	408
45	84	145	232	301	446
50	91	157	252	327	485
55	98	170	271	353	523
60	105	182	291	379	561
65	113	195	311	405	599
70	120	207	331	430	638
75	127	220	351	456	676
80	134	232	371	482	714
85	141	244	391	508	752
90	149	257	410	534	791
95	156	269	430	560	829
100	163	282	450	585	867
105	170	294	470	611	905
110	177	307	490	637	944
115	184	319	510	663	982
120	192	331	530	689	1020
125	199	344	549	715	1058
130	206	356	569	740	1097
135	213	369	589	766	1135
140	220	381	609	792	1173
145	228	393	629	818	1211
150	235	406	649	844	1249
155	242	418	668	869	1288
160	249	431	688	895	1326
165	256	443	708	921	1364
170	264	456	728	947	1402
175	271	468	748	973	1441
180	278	480	768	999	1479
185	285	493	788	1024	1517
190	292	505	807	1050	1555
195	299	518	827	1076	1594
200	307	530	847	1102	1632
205	314	543	867	1128	1670

Inlet Sizes Inches	1/2	1/2	3/4	1	1-1/4
Outlet Sizes	3/4	1	1-1/4	1-1/2	2
Seat Diameter	A	B	C	D	E
Flow Area	0.118	0.204	0.326	0.424	0.628
Set Pressure					
210	321	555	887	1153	1708
215	328	567	907	1179	1747
220	335	580	927	1205	1785
225	343	592	946	1231	1823
230	350	605	966	1257	1861
235	357	617	986	1283	1900
240	364	629	1006	1308	1938
245	371	642	1026	1334	1976
250	378	654	1046	1360	2014
255	386	667	1066	1386	2053
260	393	679	1085	1412	2091
265	400	692	1105	1437	2129
270	407	704	1125	1463	2167
275	414	716	1145	1489	2206
280	422	729	1165	1515	2244
285	429	741	1185	1541	2282
290	436	754	1204	1567	2320
295	443	766	1224	1592	2359
300	450	779	1244	1618	2397
305	458	791	1264	1644	2435
310	465	803	1284	1670	2473
315	472	816	1304	1696	2511
320	479	828	1324	1721	2550
325	486	841	1343	1747	2588
330	493	853	1363	1773	2626
335	501	866	1383	1799	2664
340	508	878	1403	1825	2703
345	515	890	1423	1851	2741
350	522	903	1443	1876	2779
355	529	915	1463	1902	2817
360	537	928	1482	1928	2856
365	544	940	1502	1954	2894
370	551	952	1522	1980	2932
375	558	965	1542	2005	2970
380	565	977	1562	2031	3009
385	590	989	1582	2057	3047
390	580	1002	1602	2083	3085
395	587	1015	1621	2109	3123
400	594	1027	1641	2135	3162



DIMENSIONS & WEIGHTS

Inlet	Outlet	A	B	C	Weight	Max Psi
1/2	3/4	5 15/16	2 21/32	1 15/16	2 lbs.	max 400 psi
1/2	1	6 9/16	2 29/32	1 9/16	3 lbs.	max 400 psi
3/4	3/4	6 3/16	2 9/16	1 9/16	2 lbs.	max 150 psi
3/4	1	6 9/16	2 29/32	1 9/16	3 lbs.	max 400 psi
1	1	7 23/32	2 15/16	1 5/8	4 lbs.	max 150 psi
1	1 1/4	7 13/16	3 1/2	1 13/16	5 lbs.	max 400 psi
1 1/4	1 1/4	8 23/32	3 1/2	2 9/16	6 lbs.	max 150 psi
1 1/4	1 1/2	9 7/8	3 9/16	2 9/16	7 lbs.	max 400 psi
1 1/2	1 1/2	9 29/32	3 9/16	2 9/16	7 lbs.	max 150 psi
1 1/2	2	10 1/4	3 13/16	2 5/8	9 lbs.	max 400 psi
2	2	10 1/16	3 3/4	2 5/8	9 lbs.	max 150 psi
2	2 1/2	10 1/16	4 1/16	2 13/16	10 lbs.	max 400 psi

TO ORDER: See Page 14



TYPE RXSO-S

0 to 400 psig

A CIRCOR CRYOGENICS COMPANY
**Rockwood
Swendeman**

STAINLESS STEEL SAFETY RELIEF VALVE

Technical Data

Operating Ranges

Temperature-423°F to +400°F

Set Pressuresto 400 psig

Materials of Construction

ShellInvestment Cast 316SS,
A.S.M.E SA-351

BaseInvestment Cast 316SS,
A.S.M.E SA-351

Trim316SS, A.S.M.E. SA-479

SpringStainless Steel
17-7 PH A.S.T.M.,
A-313, Type 631

Tests

Each valve is set, tested, retested and sealed at the factory to the customer's specifications.

Sizes

Inlet - 1/2 inch to 1 inch

Outlet - 3/4 inch to 1-1/4 inch

Applicable Codes

Designed and manufactured to meet:

- CGA S-1.2 and S-1.3.
- V-4301 (Cryogenic Non-Oxygen)
- V-4401 (Oxygen)
- ASME sec.VIII
- API 527
- AD-Merkblatt A2
- CRN OG0591.9

Features

- Special Teflon® seat, making bubble-tight seals possible to over 90% of set pressures per spec API 527; not applicable to steam.
- Adjustable blowdown ring
- Cleaned and packaged for use in O₂ service in compliance with the CGA specification G-4.1
Additional cleaning specifications:
 - 4WPI-SW70003 • ES.660.503
 - GS-38 • GS-40
- Electropolishing of base and proper assembly for high purity and electronic applications

Application

- Especially recommended where corrosive or expensive gases benefit from stainless steel construction.
- Stationary Cryogenic storage tanks
- Dual Safety relief systems
- Overpressure relief of tanks, pipelines, vessels, pumps
- Air and gas compressors

Options

- Large and Extra Large Capacity
Consult factory for flow rates
- BSP threads are available on most sizes.
- Lever operation

Type RXSO-S

Dimensions & Characteristics

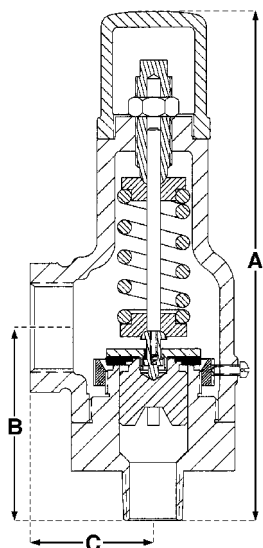
AIR CAPACITY TABLE

Discharge capacities in cubic feet per minute of air at 10% or 3 PSI, whichever is greater, overpressure.

Inlet Sizes Inches	1/2 3/4 1	1/2 3/4 1
Outlet Sizes Inches	3/4 1 1-1/4	3/4 1 1-1/4
Seat Diameter Inches	A 0.750 1.000	B 0.750 1.000
Flow Area	0.118	0.204
Set Pressure		
10	36	63
15	43	74
20	48	85
25	55	96
30	62	108
35	70	120
40	77	133
45	84	145
50	91	157
55	98	170
60	105	182
65	113	195
70	120	207
75	127	220
80	134	232
85	141	244
90	149	257
95	156	269
100	163	282
105	170	294
110	177	307
115	184	319
120	192	331
125	199	344
130	206	356
135	213	369

Inlet Sizes Inches	1/2 3/4 1	1/2 3/4 1
Outlet Sizes Inches	3/4 1 1-1/4	3/4 1 1-1/4
Seat Diameter Inches	A 0.750 1.000	B 0.750 1.000
Flow Area	0.118	0.204
Set Pressure		
140	220	381
145	228	393
150	235	406
155	242	418
160	249	431
165	256	443
170	264	456
175	271	468
180	278	480
185	285	493
190	292	505
195	299	518
200	307	530
205	314	543
210	321	555
215	328	567
220	335	580
225	343	592
230	350	605
235	357	617
240	364	629
245	371	642
250	378	654
255	386	667
260	393	679
265	400	692

Inlet Sizes Inches	1/2 3/4 1	1/2 3/4 1
Outlet Sizes Inches	3/4 1 1-1/4	3/4 1 1-1/4
Seat Diameter Inches	A 0.750 1.000	B 0.750 1.000
Flow Area	0.118	0.204
Set Pressure		
270	407	704
275	414	716
280	422	729
285	429	741
290	436	754
295	443	766
300	450	779
305	458	791
310	465	803
315	472	816
320	479	828
325	486	841
330	493	853
335	501	866
340	508	878
345	515	890
350	522	903
355	529	915
360	537	928
365	544	940
370	551	952
375	558	965
380	565	977
385	590	989
390	580	1002
395	587	1015
400	594	1027



DIMENSIONS & WEIGHTS

Inlet	Outlet	A	B	C	Weight	Max Psi
1/2	3/4	5 15/16	2 21/32	1 1/16	2 lbs.	max 400psi
1/2	1	6 9/16	2 29/32	1 1/16	3 lbs.	max 400 psi
3/4	3/4	6 3/16	2 9/16	1 1/16	2 lbs.	max 150 psi
3/4	1	6 9/16	2 29/32	1 1/16	3 lbs.	max 400 psi
1	1 1/4	7 13/16	3 1/32	1 13/16	5 lbs.	max 400 psi

TO ORDER: See Page 14



TYPE RSL

0 - 300 psig

A CIRCOR CRYOGENICS COMPANY
**Rockwood
 Swendeman**

BRONZE & STAINLESS STEEL SAFETY RELIEF VALVES

Technical Data

Operating Ranges

Temperature 0 to +300°F

Set Pressures to 300 psig

For use with back pressure services, please consult factory.

Materials of Construction

BRONZE

Shell Cast Bronze, A.S.M.E. SB-62

Base Forged Brass, Alloy C37700

Trim Copper Alloy

Spring Stainless Steel

17-7 PH A.S.T.M., A-313, Type 631

STAINLESS STEEL

Shell Investment Cast 316SS, A.S.M.E SA-351

Base Investment Cast 316SS, A.S.M.E SA-351

Trim 316SS, A.S.M.E. SA-479

Spring Stainless Steel

17-7 PH, A.S.T.M., A-313, Type 631

Tests

Each valve is set, tested and retested at the factory to the customer's specifications.

Sizes

Bronze Inlet - 1/2 inch to 2 inches

Outlet - 3/4 inch to 2-1/2 inch

Stainless Steel Inlet - 1/2 inch to 1 inch

Outlet - 3/4 inch to 1-1/4 inch

Features

- Teflon® seat for improved seat tightness
- Cleaned and packaged for use in O₂ service in compliance with the CGA specification G-4.1

Additional cleaning specifications:

- 4WPI-SW 7003
- GS-38

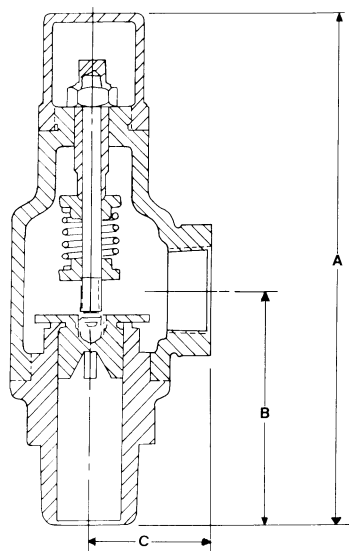
Applications

- Tanks, pumps, pipe lines and other vessels containing non-corrosive liquid, and where large relieving capacities are not required.

Options

- BSP threads available on most sizes
- Lever operation

Dimensions & Characteristics



DIMENSIONS & WEIGHTS

Inlet	Outlet	A	B	C	Weight	Max Psi
1/2	3/4	5 15/16	2 21/32	1 5/16	2 lbs.	max 300 psi
1/2	1	6 1/16	2 29/32	1 1/16	3 lbs.	max 300 psi
3/4	3/4	6 3/16	2 1/16	1 1/16	2 lbs.	max 300 psi
3/4	1	6 7/16	2 29/32	1 1/16	3 lbs.	max 300 psi
1	1	7 23/32	2 15/16	1 1/8	4 lbs.	max 300 psi
1	1 1/4	7 13/16	3 1/32	1 13/16	5 lbs.	max 300 psi
1 1/4	1 1/4	8 23/32	3 1/2	2 1/16	6 lbs.	max 300 psi
1 1/4	1 1/2	9 1/8	3 3/16	2 1/16	7 lbs.	max 300 psi
1 1/2	1 1/2	9 29/32	3 3/16	2 1/16	7 lbs.	max 300 psi
1 1/2	2	10 1/4	3 13/16	2 5/8	9 lbs.	max 300 psi
2	2	10 1/16	3 3/4	2 5/8	9 lbs.	max 300 psi
2	2 1/2	10 1/16	4 1/16	2 13/16	10 lbs.	max 300 psi

Type RSL

WATER CAPACITY TABLE

Rate of discharge in gallons of water per minute at set pressure plus 25% accumulation or overpressure.

Inlet Sizes Inches	1/2	3/4	1	1-1/4	1-1/2
Outlet Sizes	3/4	1	1-1/4	1-1/2	2
Seat Diameter Inches	A	B	C	D	E
Flow Area	.118	0.204	0.326	0.424	0.628
Set Pressure					
5	10.5	17.6	28.1	36.5	54.1
10	12.0	20.0	32.0	41.6	61.6
15	13.3	22.2	35.5	46.1	68.3
20	14.5	24.2	38.6	50.3	74.4
25	15.6	26.0	41.6	54.1	80.1
30	16.6	27.7	44.3	57.6	85.3
35	17.6	29.3	46.9	61.0	90.3
40	18.5	30.9	49.3	64.1	95.0
45	19.4	32.3	51.6	67.2	99.5
50	20.2	33.7	53.9	70.1	103.8
55	21.0	35.1	56.0	72.9	107.9
60	21.8	36.3	58.1	75.5	111.9
65	22.5	37.6	60.1	78.1	115.7
70	23.3	38.8	62.0	80.6	119.4
75	24.0	40.0	63.9	83.1	123.0
80	24.6	41.1	65.7	85.4	126.5
85	25.3	42.2	67.4	87.7	129.9
90	25.9	43.3	69.2	89.9	133.2
95	26.6	44.3	70.8	92.1	136.5
100	27.2	45.4	72.5	94.3	139.6
105	27.8	46.4	74.1	96.3	142.7
110	28.4	47.3	75.6	98.4	145.7
115	29.0	48.3	77.2	100.4	148.7
120	29.5	49.2	78.7	102.4	151.6
125	30.1	50.2	80.2	104.3	154.4
130	30.6	51.1	81.6	106.2	157.2
135	31.2	52.0	83.1	108.0	160.0
140	31.7	52.8	84.5	109.8	162.7
145	32.2	53.7	85.8	111.6	165.4
150	32.7	54.6	87.2	113.4	168.0
155	33.2	55.4	88.5	115.1	170.5
160	33.7	56.2	89.8	116.9	173.1
165	34.2	57.0	91.1	118.5	175.6
170	34.7	57.8	92.4	120.2	178.0
175	35.1	58.6	93.7	121.9	180.5
180	35.6	59.4	94.9	123.5	182.9
185	36.1	60.2	96.2	125.1	185.3
190	36.5	60.9	97.4	126.7	187.6
195	37.0	61.7	98.6	128.2	189.9
200	37.4	62.4	99.8	129.8	192.2
205	37.9	63.2	100.9	131.3	194.4
210	38.3	63.9	102.1	132.8	196.7
215	38.7	64.6	103.2	134.3	196.9
220	39.2	65.3	104.4	135.7	201.1
225	39.6	66.0	105.5	137.2	203.2
230	40.0	66.7	106.6	138.6	205.3
235	40.4	67.4	107.7	140.1	207.5
240	40.8	68.1	108.8	141.5	209.5
245	41.2	68.7	109.9	142.9	211.6
250	41.6	69.4	110.9	144.3	213.7
255	42.0	70.1	112.0	145.6	215.7
260	42.4	70.7	113.0	147.0	217.7
265	42.8	71.4	114.1	148.3	219.7
270	43.2	72.0	115.1	149.7	221.7
275	43.5	72.6	116.1	151.0	223.6
280	43.9	73.3	117.7	152.3	225.6
285	44.3	73.9	118.1	153.6	227.5
290	44.7	74.5	119.1	154.9	229.4
295	45.0	75.1	120.1	156.2	231.3
300	45.4	75.7	121.0	157.4	233.2

TO ORDER: See Page 14



DIVERTER VALVE

0 - 600 psig

A CIRCOR CRYOGENICS COMPANY
Rockwood Swendeman

FULL FLOW DIVERTER VALVE

Technical Data

Operating Ranges

Temperatures-423°F to 400°F

Set Pressuresto 600 psig

Materials of Construction

BodyBronze B61

End PlateBronze B61

BallBronze

Stem316SS

SeatsMTFE

Body SealsTFE

Stem SealsCTFE

Stem BearingTFE

Bellville Wsh17-7 SS

External Hdwe300 Series SS

Sizes

Available in 3/4 inch F to 1 inch F

Applicable Codes

Designed and manufactured to meet:

- ANSI B31.3, B16.34

Features

- Engineered for maximum safety and reliability
- Full flow manifold ends
- Medical level O₂ cleaning in conformance with CGA G-4.1
- 180 degree operation
- Handle indicates flow direction
- Low maintenance
- Blow out proof stem
- V-ring stem packing
- All stainless externals

Applications

- Dual safety relief systems
- Stationary cryogenic tanks
- Manifolding
- Distribution systems
- Process systems
- Liquid and Gaseous Cryogenic Applications

Dimensions & Characteristics

HIGH FLOW DIVERTER VALVE CV VALUES*

Sizes (inches)	Safety Relief Valve Outlet		Rupture Disc Outlet		Torque
	CV@ mid position (90°)	CV@ full open (180°)	CV@ mid position (90°)	CV@ full open (180°)	Max. Value
¾F	9.2	8.2	10.7	8.1	200 in. lbs.
1F	25.3	18.3	16.4	14.0	300 in. lbs.

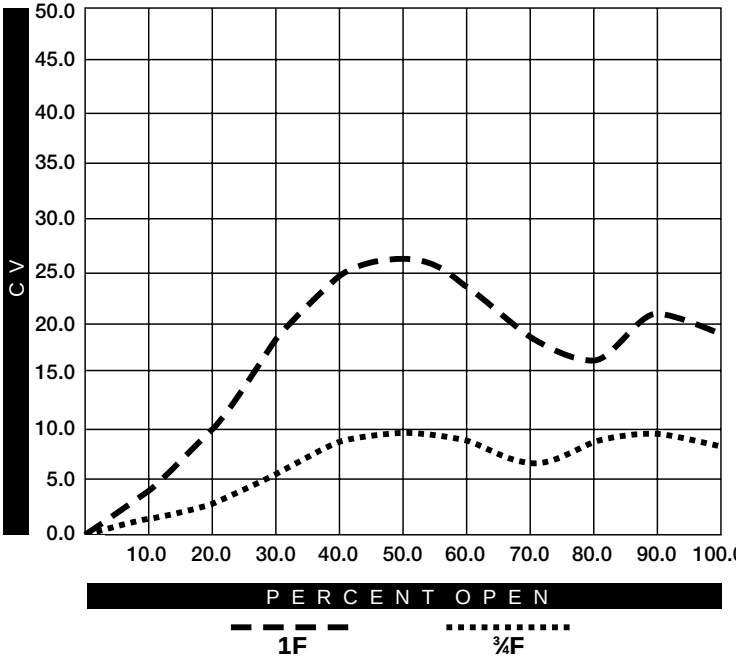
* Flows may vary slightly due to outlet connection sizes.

DIMENSIONS (inches)

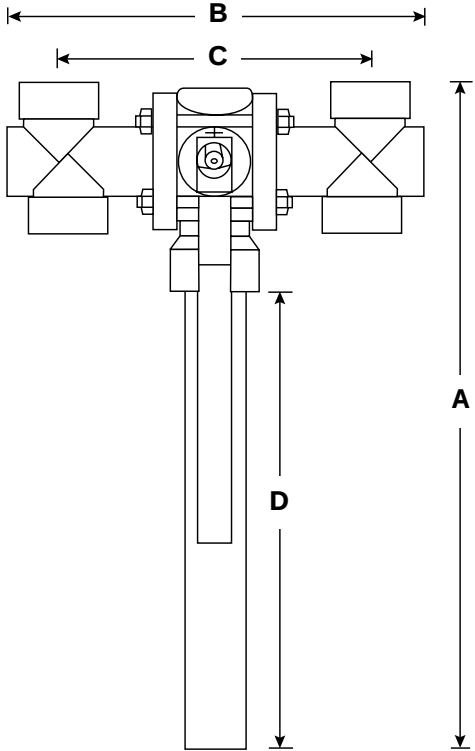
Size	A	B	C	D
¾F	13.00	9.38	7.25	7.75
1F	17.66	11.61	8.73	12.00

Dimensions for reference only

HIGH FLOW DIVERTER VALVE Cv GRAPH



DIVERTER VALVE





CRYOTREE™

0 - 400 psig

A CIRCOR CRYOGENICS COMPANY
Rockwood Swendeman
SAFETY RELIEF VALVE SUB-ASSEMBLY

Technical Data

Temperatures-423°F to 400°F

Set Pressuresto 400 psig

Materials

BodyBronze B61

End PlateBronze B61

BallBronze

Stem316SS

Tests

Hydrostatically tested as a complete unit to assure leak tightness

Sizes

Available in 3/4 inch F to 1 inch F

Features

- Dual safety relief systems engineered for maximum safety and reliability
- Easy system installation
- Includes high capacity safety relief valves, full flow diverting valve, rupture discs, bleed valves, and related piping assembled
- Standardized components
- Low maintenance
- Eliminates the need to shut down and evacuate the tank for service
- Minimizes pressure drop in system
- Medical level O₂ cleaning in conformance with CGA G-4.1
- Sealed in 6 mil poly bags to eliminate contamination prior to installation
- Handle indicates flow direction

Applications

- On stationary cryogenic storage tanks to isolate safety relief valves and rupture discs in the event they need to be serviced

Rockwood Swendeman's CryoTree™ assemblies are manufactured for use on stationary cryogenic storage tanks to isolate safety relief valves and rupture discs in the event they need to be serviced. Utilizing this system eliminates the need to shut down and evacuate the tank for service. This modular assembly provides for just a single connection to the internal tank piping.

Applicable Codes

Designed and manufactured to meet:

- CGA S-1.2 and S-1.3.
- ASME Sec.VIII
- API 527
- AD -Merkblatt A2
- ANSI B31.3, B16.34

HIGH FLOW DIVERTER VALVE CV VALUES*

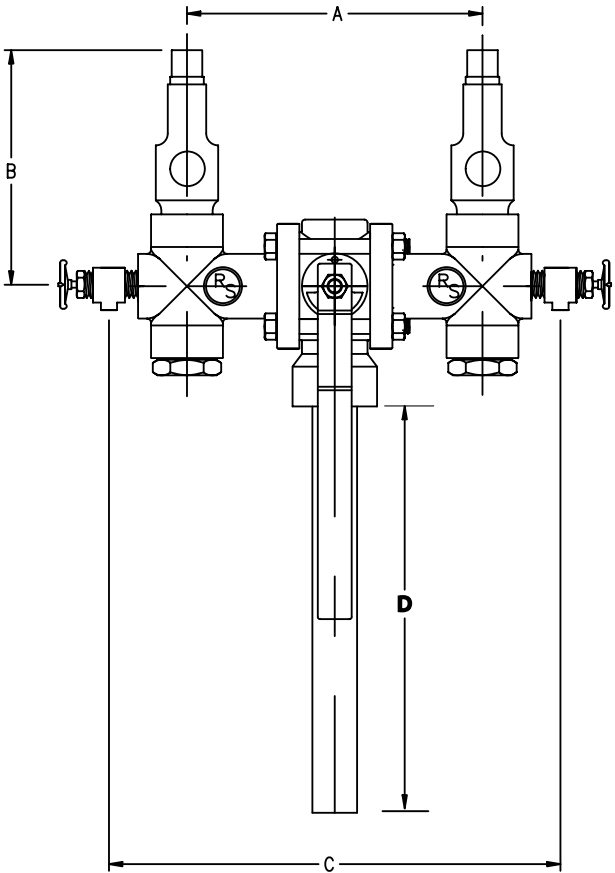
Size (inches)	Safety Relief Valve Outlet		Rupture Disc Outlet	
	CV@ mid position (90°)	CV@ full open (180°)	CV@ mid position (90°)	CV@ full open (180°)
¾F	9.2	8.2	10.7	8.1
1F	25.3	18.3	16.4	14.0

Flows may vary slightly due to outlet connection sizes.

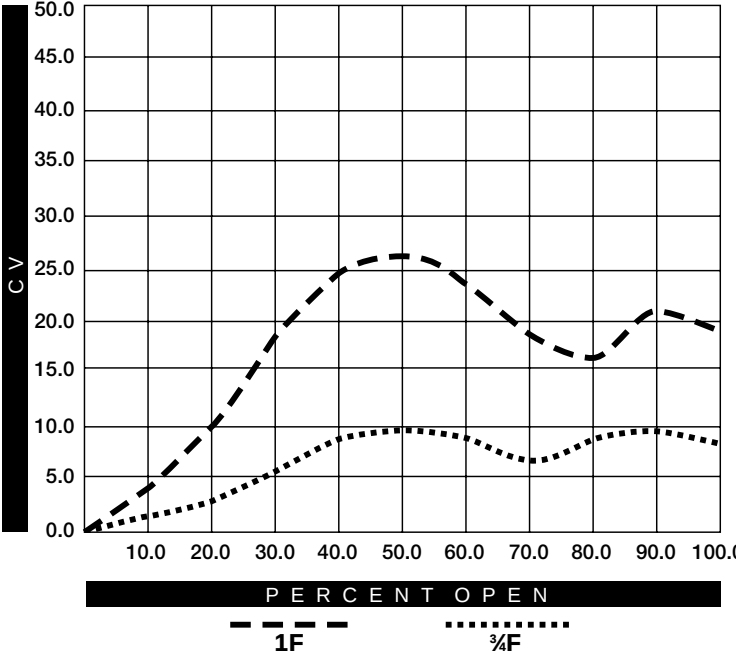
DIMENSIONS - INCHES

SIZE	A	B	C
¾F	5.9	22.5	14.8
1F	8.7	25.7	16.5

Dimensions for reference only.

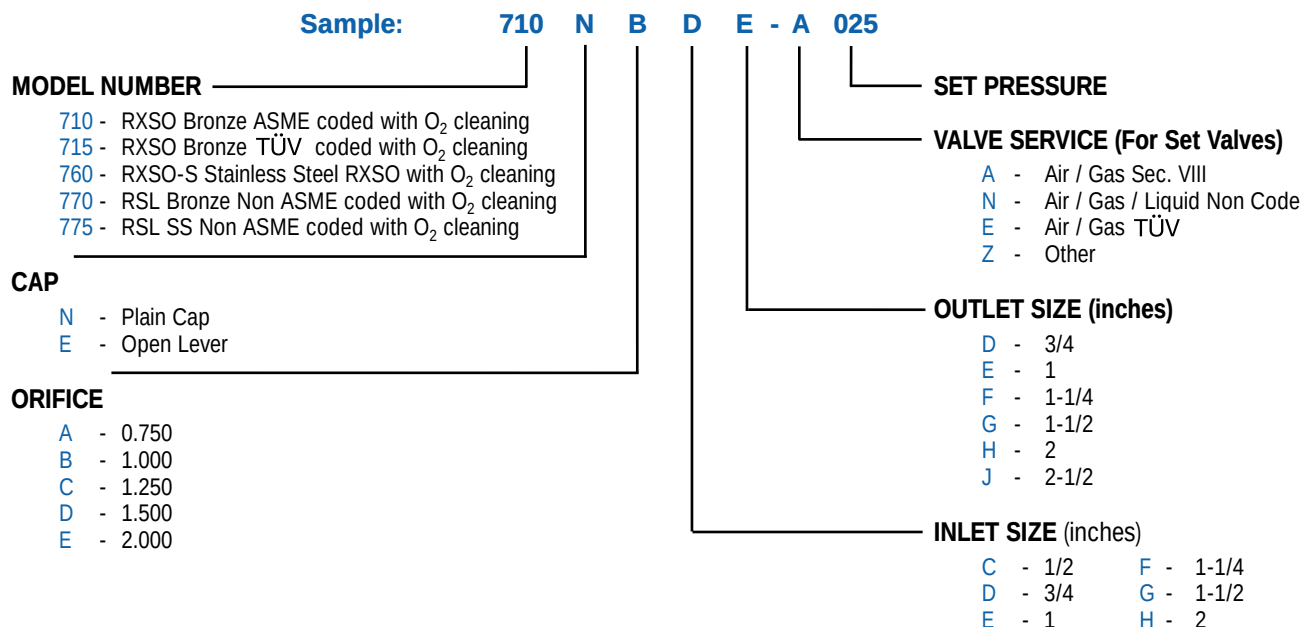


HIGH FLOW DIVERTER VALVE Cv GRAPH



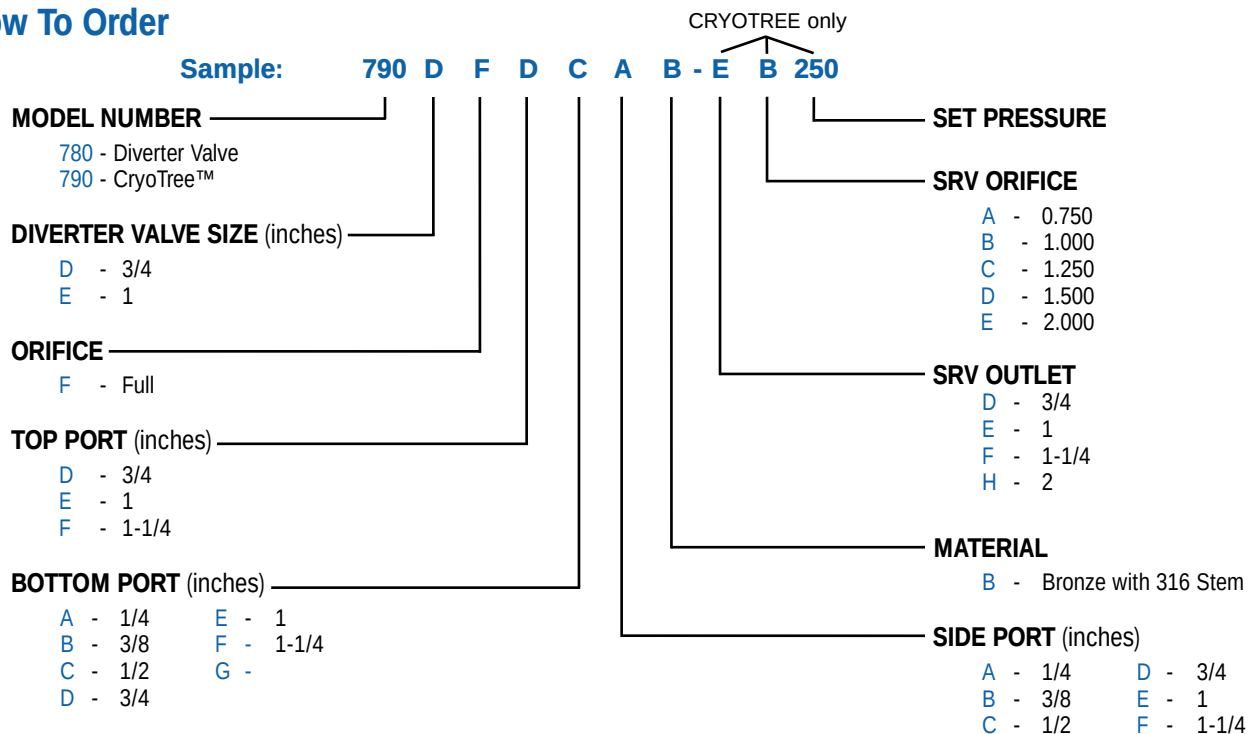
SAFETY RELIEF VALVES

How To Order



DIVERTER AND CRYOTREE™

How To Order





A CIRCOR CRYOGENICS COMPANY

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