

# Cryogenic and High Temperature Valve

## U.S. Type CBX (Includes RC260)

### DESCRIPTION

The U.S. Type CBX control valve is designed specifically for cryogenic cold box applications. The unique design allows ready access to the seat ring after the body has been sealed in the cold box. A special seat extraction tool simplifies trim changing operations. Although the standard body extension is 14 in. (355 mm), lengths up to 60 in. (1524 mm) are available on special order. The use of a standard threaded bonnet allows the user a choice of bonnet styles, from TFE chevron ring packing to bellows seals. An optional casing flange or weldable sleeve facilitates field mounting.

### APPLICATIONS

The valve is especially suited to modulating control of liquids and vapors in the cryogenic temperature range to  $-450^{\circ}\text{F}$  ( $-267^{\circ}\text{C}$ ). Although designed for cold service, the unit can also be used at elevated temperatures, such as sealed ovens.

### MATERIALS

<b>Body-Bonnet</b>	Body	CF3M (316L stainless steel)
	Body extension	316L stainless steel pipe and 316 stainless steel barstock
	Bonnet	316 stainless steel barstock
<b>Innervalue</b>	Standard	316 stainless steel
	Optional	Stellite, TFE or Kel-F soft seat
<b>Packing</b>	Standard	TFE chevron rings
	Optional	Graphite or bellows seal
<b>Actuator</b>	Standard	Aluminum (epoxy coated)
	Optional	316 stainless steel
	Hardware	300 series stainless steel
<b>Diaphragm</b>	Standard	Buna on Nylon
	Optional	Viton on Nomex
<b>Actuator Choices</b>	Standard	Air-to-open, Fail Close Air-to-close, Fail Open
	Signal Ranges	3...15#, 6...30#, (3...9# or 9...15# with positioner)
	Accessories	Top or side mounted positioner, gauges, regulator, solenoid, I/P converters, limit switches

**NOTE:** The EVA-1 electric actuator can also be used for low pressure applications if air is not available.



### STANDARD FEATURES

- Replaceable innervalue
- 316 stainless steel construction
- Wide range of innervalves and characteristics
- Guided innervalue
- Class IV seat leakage

### OPTIONAL FEATURES

- Casing flange
- Weldable mounting sleeve
- Stellite innervalue material
- Soft seated innervalves
- Bellows bonnet
- Wide variety of end fittings: standard NPT or socket weld, butt weld nipples or flanges

**SPECIFICATIONS**

**1/2 in. (12.7 mm) Size Value**  
Pressure vs Temperature Rating

Temp °F	Pressure in psi	Temp °C	Pressure in bar
100	2300	38	158.5
200	2200	93	151.6
300	2000	149	137.8
400	1670	204	115.0
500	1550	260	106.8
600	1400	196	96.4
700	1300	371	89.6
800	1275	427	87.8
850	1250	454	86.1

**NOTE:** Unit is rated at maximum pressure at cryogenic temperatures from -450...100° F (-297.8...38° C).

**1 in. (25.4 mm) Size Value**  
Pressure vs Temperature Rating

Temp °F	Pressure in psi	Temp °C	Pressure in bar
100	1500	38	103.3
200	1500	93	103.3
300	1400	149	96.4
400	250	204	17.2
500	250	260	17.2
600	250	196	17.2
700	250	371	17.2

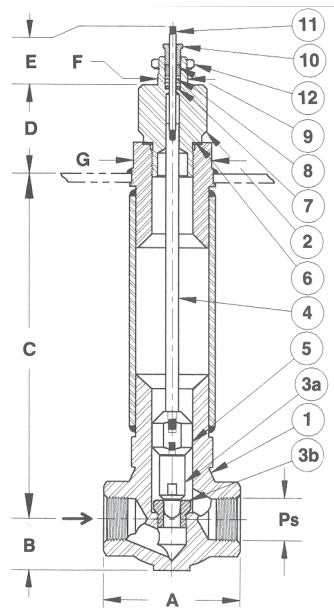
**NOTE:** Unit is rated at maximum pressure at cryogenic temperatures range -450...100° F (-297.8...38° C).

**INNERVALVE CHART**

Valve Size	Trim Size	Nominal Cv	Theoretical Turbulent Cv	Orifice Dia. in. (mm)	Orifice Area in. <sup>2</sup> (mm <sup>2</sup> )	Nominal Rangeability	
						Linear	Equal %
1 in. (25.4 mm)	6.0	6.0	6.0	0.6250 (15.9)	0.3068 (197.9)	50:1	60:1
	5.0	5.0	5.0	0.6250 (15.9)	0.3068 (197.9)	50:1	60:1
	4.5	4.5	4.5	0.5000 (12.7)	0.1963 (129.6)	50:1	60:1
1 in. (25.4 mm)	4.0	4.0	4.0	0.4375 (11.1)	0.1503 (96.9)	50:1	60:1
	3.5	3.5	3.5	0.4375 (11.1)	0.1503 (96.9)	50:1	60:1
1/2 in. (12.7 mm), 1 in. (25.4 mm)	A	2.5	2.5	0.3750 (9.5)	0.1104 (71.2)	40:1	50:1
	B	2.0	2.0	0.3750 (9.5)	0.1104 (71.2)	40:1	50:1
	C	1.25	1.25	0.2810 (7.1)	0.0620 (40.0)	40:1	50:1
	D	0.8	0.8	0.2500 (6.4)	0.0491 (31.7)	40:1	50:1
	E	0.5	0.5	0.2500 (6.4)	0.0491 (31.7)	40:1	50:1
1/2 in. (12.7 mm), 1 in. (25.4 mm)	F	0.32	0.32	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	G	0.2	0.2	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	H	0.13	0.13	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	I	0.08	0.08	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	J	0.05	0.05	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	K	0.03	4.8E-02	0.0860 (2.2)	0.0058 (3.7)	25:1	—
	L	0.02	3.4E-02	0.0860 (2.2)	0.0058 (3.7)	25:1	—
	M	0.01	1.6E-02	0.0860 (2.2)	0.0058 (3.7)	25:1	—
	N	0.006	1.0E-02	0.0860 (2.2)	0.0058 (3.7)	25:1	—
	O	0.003	5.3E-03	0.0860 (2.2)	0.0058 (3.7)	25:1	—

**NOTE:** Trim sizes K...O are optional reduced trims.

**DIMENSIONS**



1. Body
  2. Bonnet
  3. (A & B) Innervalue set
  4. Stem (lower)\*
  5. Holder (innervalue)
  6. Gasket (body-bonnet)
  7. Adapter (packing)
  8. Packing (TFE chevron ring)
  9. Follower (packing)
  10. Gland (packing)
  11. Stem (upper)\*
  12. Locknut
- \*Should be purchased together

Dimension	1/2 in. (12.7 mm) Unit	1 in. (25.4 mm) Unit
A	2.75 in. (69.8 mm)	4.0 in. (101.6 mm)
B	1 in. (25.4 mm)	1.5 in. (38.1 mm)
C (1)	14 in. (355.6 mm)	14 in. (355.6 mm)
D (2)	2.25 in. (57.1 mm)	2.5 in. (63.5 mm)
E	1.688 in. (42.9 mm)	1.688 in. (42.9 mm)
F	0.875 in. (22.2 mm)	0.875 in. (22.2 mm)
G	1.44 in. (35.6 mm)	2.25 in. (57.1 mm)
Ps	1/2 in. (12.7 mm) NPT	1 in. (25.4 mm) NPT

(1) Ref dimension to top of casing flange  
(2) Based on standard bonnet.

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