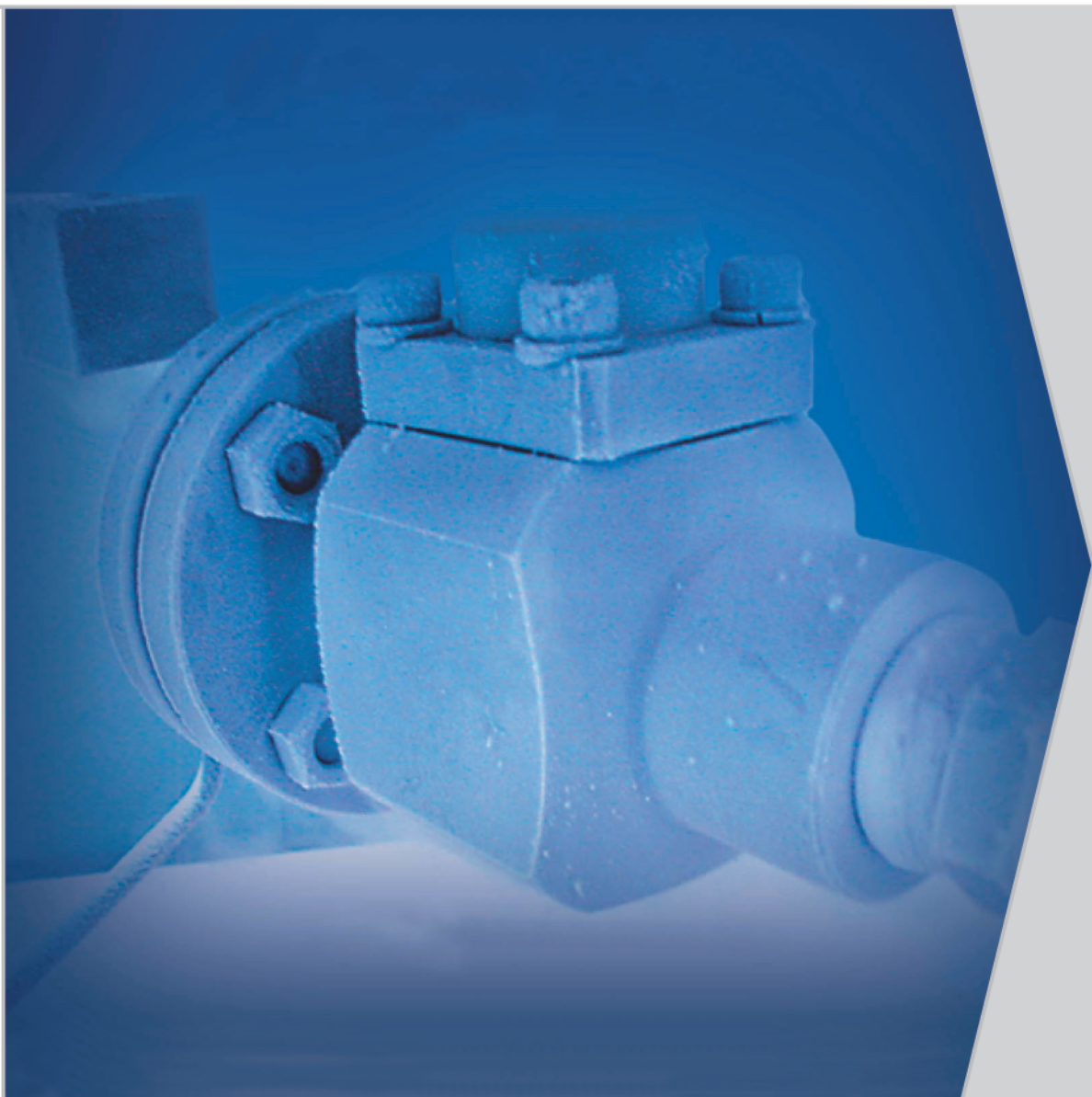


Hy-Lok *Cryogenic Valves*

Needle, Ball Valves

Catalog No. H - CRYO100
May 2006



HY-LOK CORPORATION

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Quality System Certificates

- ISO 9001
- ASME QSC
- API Q1 & 6D

HSE Management Certificates

- ISO 14001
- OHSAS 18001

Type Approval Certificates

Lloyd's Register

LR Type Approval Certificate

This is to certify that the undermentioned product has been tested with satisfactory results in accordance with the relevant requirements of the LR Type Approval System.

This certificate is issued to:

PRODUCER Hy-Lok Corporation

PLACE OF PRODUCTION 1407, Sanggye-dong, Kanggye-gu, P.O. Box 457, Korea

DESCRIPTION Cryogenic needle valve with extended bonnet

TYPE CRON-1 series

APPLICATION Marine use for cargo tanks and cargo piping systems in ships for carriage of liquefied gases in bulk

STANDARD Chapter 3 of Lloyd's Register's Rules and Regulations for the Construction and Classification of Ships for the Carriage of Liquefied Gases in Bulk (January 2002)

RATING Normal class, 15 mm & 25 mm
Nominal pressure rating: 10 bar
Minimum service temperature: -190 °C

PERFORMANCE TEST Representative samples of 15 mm & 25 mm size were tested in accordance with BS 6841:1994. Valves for cryogenic service with BS 6841:1994. Valves for cryogenic service.

The following tests have been carried out:

- 1) Operating torque test
- 2) Tightness test
- 3) Seat tightness test

Certificate No. 05/10000

Issue Date 01 December 2005

Expiry Date 01 December 2008

Sheet 1 of 2

Lloyd's Register Asia, registered office: 25 Lombard Street, London EC3N 3AF

Validation Plan Approval System

LR (Needle)

Lloyd's Register

Type Approval Certificate

This is to certify that the undermentioned product has been tested with satisfactory results in accordance with the relevant requirements of the LR Type Approval System.

This certificate is issued to:

PRODUCER Hy-Lok Corporation

PLACE OF PRODUCTION 1407, Sanggye-dong, Kanggye-gu, P.O. Box 457, Korea

DESCRIPTION Cryogenic ball valve, one-piece body, top entry, extended bonnet

TYPE CRON-1 series

APPLICATION Marine use for cargo tanks and cargo piping systems in ships for carriage of liquefied gases in bulk

STANDARD Chapter 3 of Lloyd's Register's Rules and Regulations for the Construction and Classification of Ships for the Carriage of Liquefied Gases in Bulk (January 2002)

RATINGS Normal class (size)
Nominal pressure rating (MPa) 1.6
Nominal service temperature (°C) -190

PERFORMANCE TEST The following tests were carried out on representative samples of 15 mm and 25 mm size in accordance with BS 6841:1994, API Standard 607 9th edition, May 1995 to BS 6841:1994 or equivalent standard:

- 1) Operating torque test
- 2) Tightness test
- 3) Seat tightness test
- 4) Pressure test
- 5) Anti-static test

Certificate No. 05/10001

Issue Date 01 April 2005

Expiry Date 01 April 2008

Sheet 1 of 2

Lloyd's Register Asia, registered office: 25 Lombard Street, London EC3N 3AF

Validation Plan Approval System

LR (Ball)

KORAN REGISTER OF SHIPPING

TYPE APPROVAL CERTIFICATE

영역승인증서

Certificate No. (KCR)0204-VV001 Date of Approval: 25th July, 2002

Product Valve

Manufacturer HY-LOK Corporation

Product Description Cryogenic Needle Valve

Approval Condition 1. See Appendix 1

THIS IS TO CERTIFY that the above-mentioned product has been approved in accordance with the relevant requirements of this Society's Rules and/or of the recognized standards as follows and entered in the "List of Approval Manufacturers and Type Approval Equipments".

This Certificate is valid until 24th day of July, 2007.
Renewed at Daegu, Korea on 18th June, 2005.

KORAN REGISTER OF SHIPPING

Manager of Machinery Dept.

KR

Certificate Number: 05-04074027-A

ABS

TYPE APPROVAL PROGRAM

Confirmation of Type Approval

This is to certify that, pursuant to the Rules of American Bureau of Shipping, Inc. (ABS), the manufacturer of the undermentioned product has been tested with satisfactory results in accordance with the relevant requirements of the ABS Rules and/or of the recognized standards as follows and entered in the "List of Approval Manufacturers and Type Approval Equipments".

Hy-Lok Corporation

Model Name(s): CRON-8FA, CRON-8FAWA, CRON-8FABN, CRON-8N, CRON-8BWA, CRON-8BWB, CRON-8BWBWA, CRON-8BWBFA, CRON-8BWBFA, CRON-8BWA

Intended Service: Cryogenic Liquid and Gas Transportation

Description: HY-PIED 1/2" Cryogenic Needle Valves - Class 150

Rating: Design Pressure: 15 bar; Design Temperature: -190 degrees C; Body 80 degrees C; Material Body (ASTM A352 LF 3)

Service Restrictions: Use Certification is not required for this product.

Comments: For body material, impact test may be required subject to the special requirement of the Flag Administration in accordance with 9-2-1/1-4 of the 2002 Rules.

Notes / Documentation: The product is covered under Product Design Approval (PDA) Certificate # 03-04074027-PDA, dated 25 Jan 2002. The PDA Certificate expires on 25 Jan 2007. It is recommended that the user follow the rules of the Rules of the ABS Rules and/or of the recognized standards as follows and entered in the "List of Approval Manufacturers and Type Approval Equipments".

ABS Rules: 2002 Steel Vessel Rules 9-2-1/1-4 & 9-2-1/1-5

National Standards: N/A

International Standards: ISO 5533-1 & ISO 5534-1:1994

ABS

Pioneer in development of cryogenic valves for LNG, Hy-Lok is always keeping its Valves on the cutting edge of technology to provide high performance valves to the great satisfaction of its clients as attested by numerous references.

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CRYOT Series Trunnion Ball Valves

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CRYON Series Needle Valves

Introduction

CRYON series valves have been designed and engineered for use at pressures up to 750 psi (52 bar) and temperatures down to -320 °F (-196 °C). (Stainless Steel extended needle valve with the non-rotating disc design for bubble tight shut-off)

The valve is of the bolted bonnet easy maintenance in-line, with lower bolting torques than union bonnet. Screwed, flanged, butt-weld ends are in standard connection and both reduced and full bore are available from 1/2" to 1-1/2" size.

Features and Benefits

- Austenite Stainless Steel construction for marine service
- Long cycle life, packing blow thread design
- Metall seat to bubble tight shut-off at all the time
- Anti-blow out proof stem, one piece design
- Non rotating seat contact
- Easy maintenace in-line guarantee
- Compact and easy operation
- Self aligning disc construction
- Bolted extension bonnet
- Dust cap functions as position indicator as well
- Fire safe design to BS 6755 Part 2

Specifications

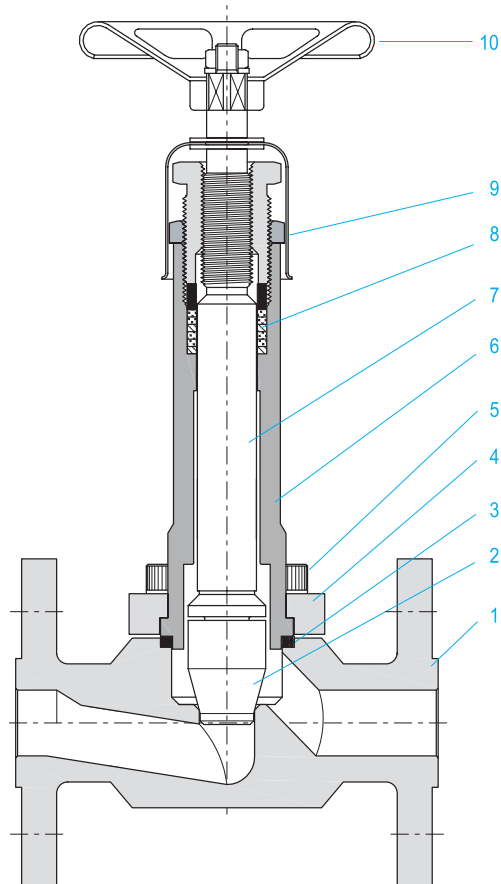
- Pressure Rating
750 psi (52 bar) at -320 °F to 100 °F (-196 °C to 38 °C)
- Temperature Rating
-320 °F to 700 °F (-196 °C to 371 °C)
- Size Range
Screwed ends : 3/8" to 1"
Flanged ends : 1/2" to 1-1/2"
Butt - weld ends : 1/2" to 1-1/2"

Pressure Tests

- Ambient Test(100%) : Nitrogen
Shell Test : 1.5 times working pressure
Seat Test : 1.1 time working pressure
- Cryogenic Test(10%) : Helium
Shell Test : 1.5 times working pressure
Seat Test : 1.1 times working pressure

Applications

- Cryogenic, LNG, LPG, and Nitorogen

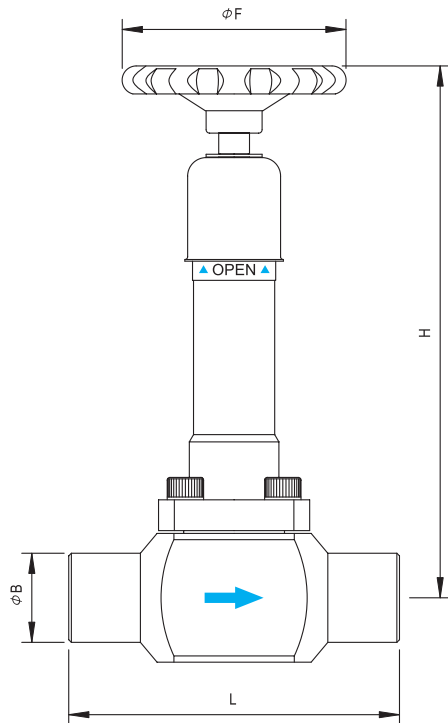


Materials of Construction

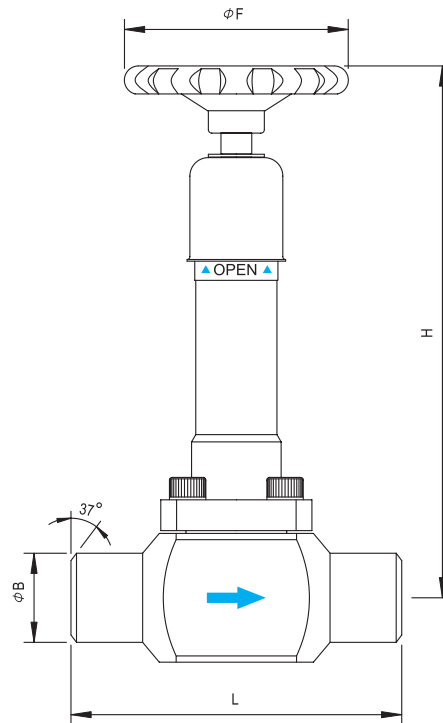
No.	Description	Material
1	Body	ASTM A182 F316/A351 CF 8M
2	Non Rotating Disc	ASTM A479 TP316
3	Bonnet Gasket	Graphite & SS 316
4	Bolted Bonnet	ASTM A479 TP316
5	Bonnet Bolt	ASTM A320 B8M.2
6	Extension Bonnet	ASTM A182 F316/A351 CF 8M
7	Extension Stem	ASTM A479 TP316
8	Stem Packing	Graphite
9	Position Indicator	SS 316
10	Hand Wheel	ASTM A240 TP304

CRYON Series Needle Valves

Screwed Ends



Butt-weld Ends



Screwed Ends Dimensions & Weights

Basic Ordering Number	Connection Size		Dimensions(mm)				Flow Data		Weight
	Inlet	Outlet	B	L	H	F	Cv	Kv	Kg
CRYON - 6N	3/8" Female NPT	3/8" Female NPT	22.0	114.0	198.0	80.0	3.6	3.1	2.7
CRYON - 8N	1/2" Female NPT	1/2" Female NPT	26.0						
CRYON - 12N	3/4" Female NPT	3/4" Female NPT	32.0	140.0	260.0	100.0	13.2	11.3	3.9
CRYON - 16N	1" Female NPT	1" Female NPT	42.0						

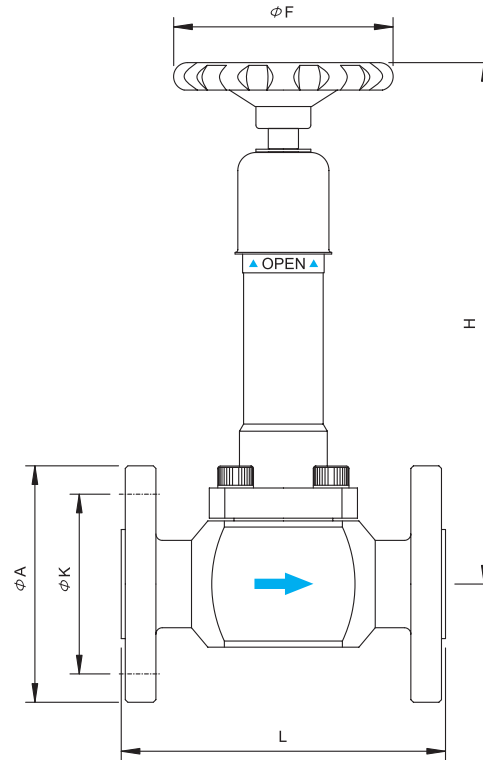
Butt-weld Ends Dimensions & Weights

Basic Ordering Number	Connection Size		Dimensions(mm)				Flow Data		Weight
	Inlet	Outlet	B	L	H	F	Cv	Kv	Kg
CRYON - 8BW	1/2" X SCH40	1/2" X SCH40	21.3	114.0	198.0	80.0	3.6	3.1	2.7
CRYON - 12BW	3/4" X SCH40	3/4" X SCH40	26.7						
CRYON - 16BW	1" X SCH40	1" X SCH40	33.4	140.0	260.0	100.0	13.2	11.3	3.9
CRYON - 20BW	1-1/4" X SCH40	1-1/4" X SCH40	42.2						
CRYON - 24BW	1-1/2" X SCH40	1-1/2" X SCH40	48.3	223.0	260.0	120.0	26.5	22.7	4.2

All dimensions are in millimeters unless otherwise specified. Dimensions are for reference only, subject to change.

CRYON Series Needle Valves

Flanged Ends



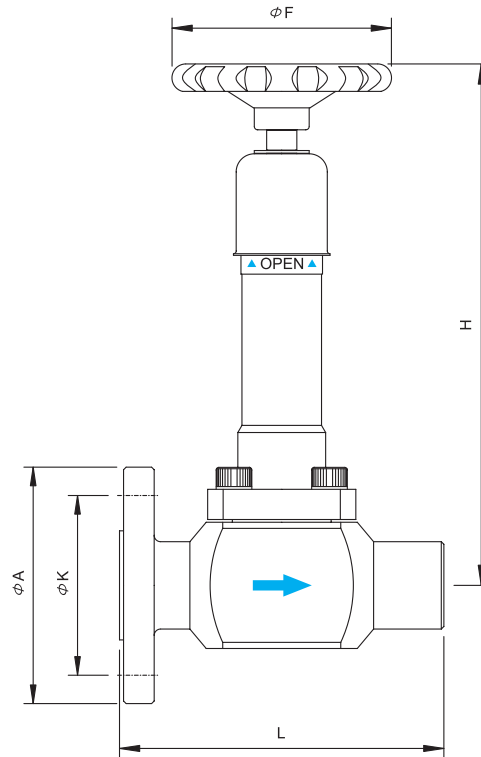
Flanged Ends Dimensions & Weights

Basic Ordering Number	Connection Size		Dimensions(mm)					Flow Data		Weight
	Inlet	Outlet	A	K	L	H	F	Cv	Kv	Kg
CRYON - 8FA	1/2" CL150 RF	1/2" CL150 RF	88.9	60.3	114.0	198.0	80.0	3.6	3.1	4.5
CRYON - 12FA	3/4" CL150 RF	3/4" CL150 RF	98.4	69.8	140.0	260.0	100.0	13.2	11.3	6.9
CRYON - 16FA	1" CL150 RF	1" CL150 RF	107.9	79.4						7.5
CRYON - 20FA	1-1/4" CL150 RF	1-1/4" CL150 RF	117.5	88.9	223.0	260.0	120.0	26.5	22.7	9.0
CRYON - 24FA	1-1/2" CL150 RF	1-1/2" CL150 RF	127.0	98.4						10.4

All dimensions are in millimeters unless otherwise specified. Dimensions are for reference only, subject to change.

CRYON Series Needle Valves

Flanged to Screwed Ends



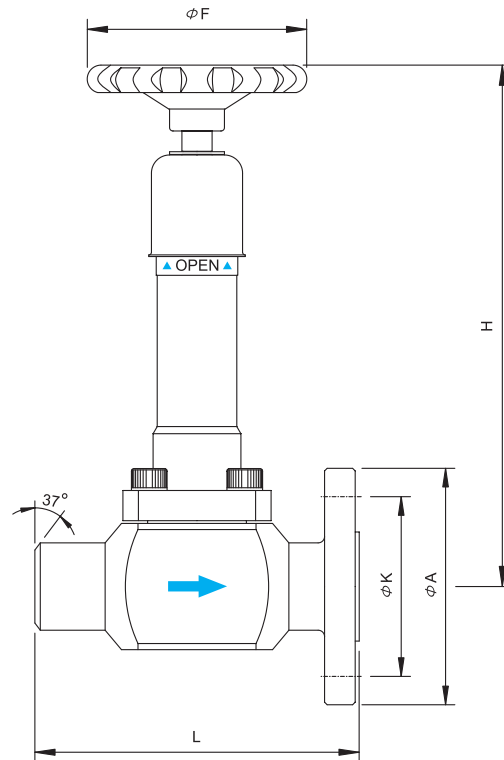
Flanged to Screwed Ends Dimensions & Weights

Basic Ordering Number	Connection Size		Dimensions(mm)					Flow Data		Weight
	Inlet	Outlet	A	K	L	H	F	Cv	Kv	Kg
CRYON - 8FA6N	1/2" CL150 RF	3/8" NPT	88.9	60.3	114.0	198.0	80.0	3.6	3.1	3.6
CRYON - 8FA8N	1/2" CL150 RF	1/2" NPT								
CRYON - 12FA8N	3/4" CL150 RF	1/2" NPT	98.4	69.8	140.0	260.0	100.0	13.2	11.3	5.4
CRYON - 12FA12N	3/4" CL150 RF	3/4" NPT								
CRYON - 16FA8N	1" CL150 RF	1/2" NPT	107.9	79.4	140.0	260.0	100.0	13.2	11.3	5.7
CRYON - 16FA12N	1" CL150 RF	3/4" NPT								
CRYON - 16FA16N	1" CL150 RF	1" NPT								
CRYON - 20FA8N	1-1/4" CL150 RF	1/2" NPT	117.5	88.9	223.0	260.0	120.0	26.5	22.7	6.6
CRYON - 20FA12N	1-1/4" CL150 RF	3/4" NPT								
CRYON - 20FA16N	1-1/4" CL150 RF	1" NPT								
CRYON - 24FA8N	1-1/2" CL150 RF	1/2" NPT	127.0	98.4	223.0	260.0	120.0	26.5	22.7	7.3
CRYON - 24FA12N	1-1/2" CL150 RF	3/4" NPT								
CRYON - 24FA16N	1-1/2" CL150 RF	1" NPT								

All dimensions are in millimeters unless otherwise specified. Dimensions are for reference only, subject to change.

CRYON Series Needle Valves

Butt-weld to Flanged Ends



Butt-weld to Flanged Ends Dimensions & Weights

Basic Ordering Number	Connection Size		Dimensions(mm)					Flow Data		Weight
	Inlet	Outlet	A	K	L	H	F	Cv	Kv	Kg
CRYON - 8BW8FA	1/2" X SCH40	1/2" CL150 RF	88.9	60.3	114.0	198.0	80.0	3.6	3.1	3.6
CRYON - 12BW12FA	3/4" X SCH40	3/4" CL150 RF	98.4	69.8	140.0	260.0	100.0	13.2	11.3	5.4
CRYON - 16BW16FA	1" X SCH40	1" CL150 RF	107.9	79.4						5.7
CRYON - 20BW20FA	1-1/4" X SCH40	1-1/4" CL150 RF	117.5	88.9	223.0	260.0	120.0	26.5	22.7	6.6
CRYON - 24BW24FA	1-1/2" X SCH40	1-1/2" CL150 RF	127.0	98.4						7.3

All dimensions are in millimeters unless otherwise specified. Dimensions are for reference only, subject to change.

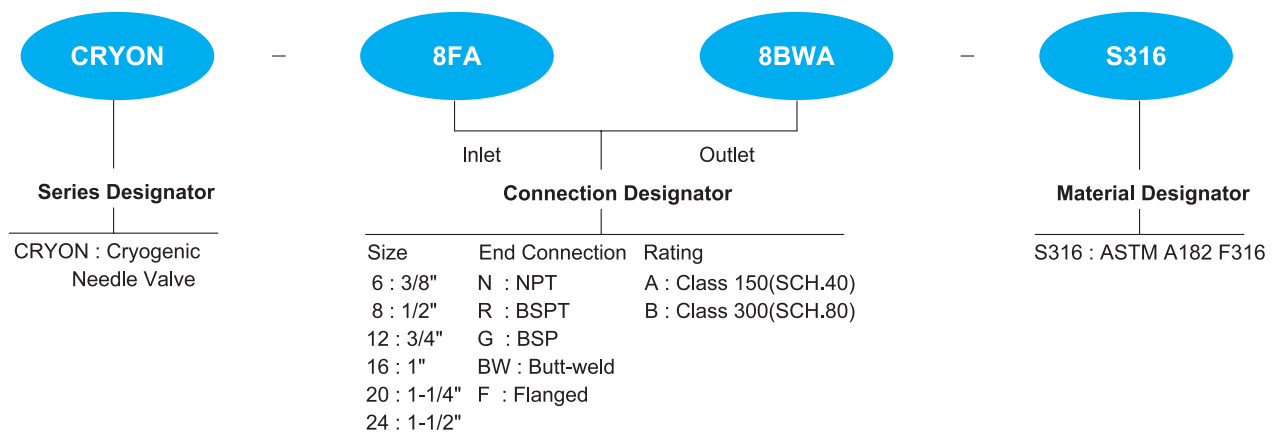
CRYON Series Needle Valves

Ordering Information

The correct ordering number is easily derived from the following numbering system. The four designators required are coded as shown below. *Note : if the inlet and outlet connections are the same, eliminate the inlet connection designator.

Numbering System

Example :



CRYOT Series Trunnion Ball Valves

Introduction

CRYOT series valves have been designed and engineered for use at pressures up to 750 psi (52 bar) and temperatures down to -320 °F (-196 °C). (Stainless Steel extended ball valve with trunnion mounted ball) The valve is of the top entry bolted bonnet easy maintenance in-line. Screwed, flanged, butt-weld ends are instandard connection and both reduced and full bore are available from 1/2" to 1-1/2" size.

Features and Benefits

- Austenite Stainless Steel construction for marine service
- Long cycle life
- trunnion mounted ball
- Pressure relief device
- Anti-blow out proof stem, two-piece ball & stem
- Anti-static device
- Easy maintenace in-line guarantee
- Low operating torque
- Positive handle stops
- Bolted extension bonnet
- Locking device
- Fire safe design to BS 6755 Part 2

Specifications

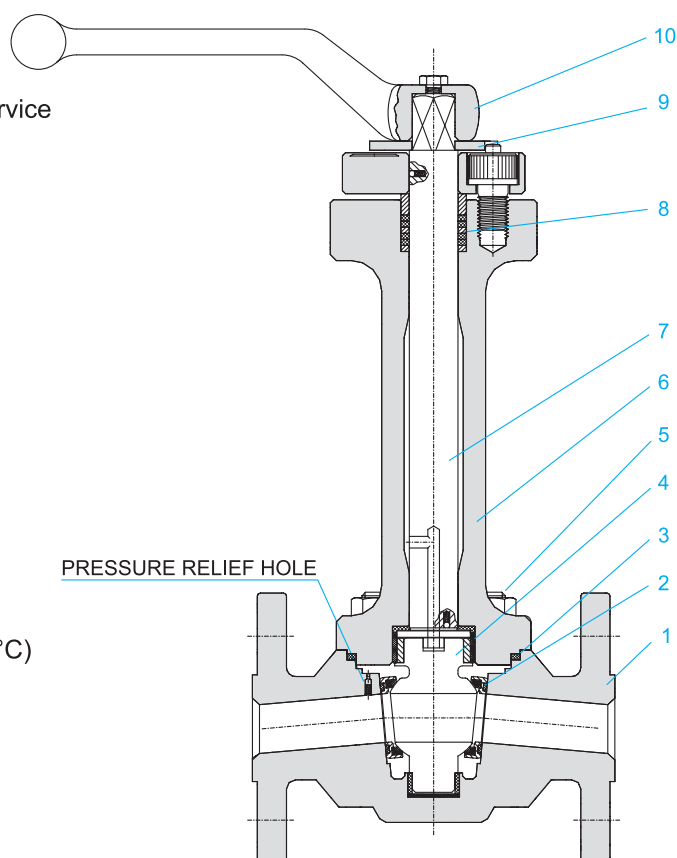
- Pressure Rating
750 psi (52 bar) at -320 °F to 100 °F (-196 °C to 38 °C)
- Temperature Rating
-320 °F to 250 °F (-196 °C to 120 °C)
- Size Range
Screwed ends : 3/8" to 1"
Flanged ends : 1/2" to 1-1/2"
Butt - weld ends : 1/2" to 1-1/2"

Pressure Tests

- Ambient Test(100%) : Nitrogen
Shell Test : 1.5 times working pressure
Seat Test : 1.1 time working pressure
- Cryogenic Test(10%) : Helium
Shell Test : 1.5 times working pressure
Seat Test : 1.1 times working pressure

Applications

- Cryogenic, LNG, LPG, and Nitrogen

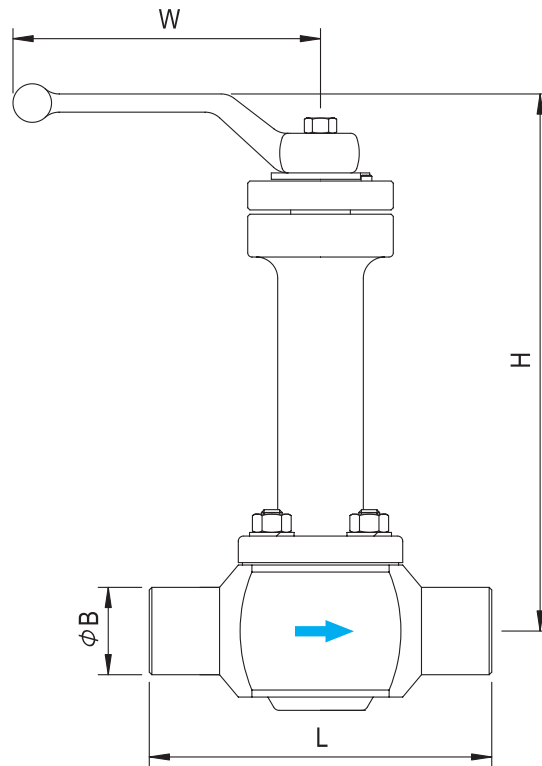


Materials of Construction

No.	Description	Material
1	Body	ASTM A182 F316/A351 CF 8M
2	Ball Seat	PCTFE & Graphite
3	Bonnet Gasket	Graphite & SS 316
4	Trunnion Ball	ASTM A479 TP316
5	Stud Bolt	ASTM A320 B8M.2
6	Bolted Bonnet	ASTM A182 F316/A351 CF 8M
7	Extension Stem	ASTM A479 TP316
8	Stem Packing	Graphite
9	Locking Device	SS 316
10	Lever Handle	SS 316

CRYOT Series Trunnion Ball Valves

Screwed Ends



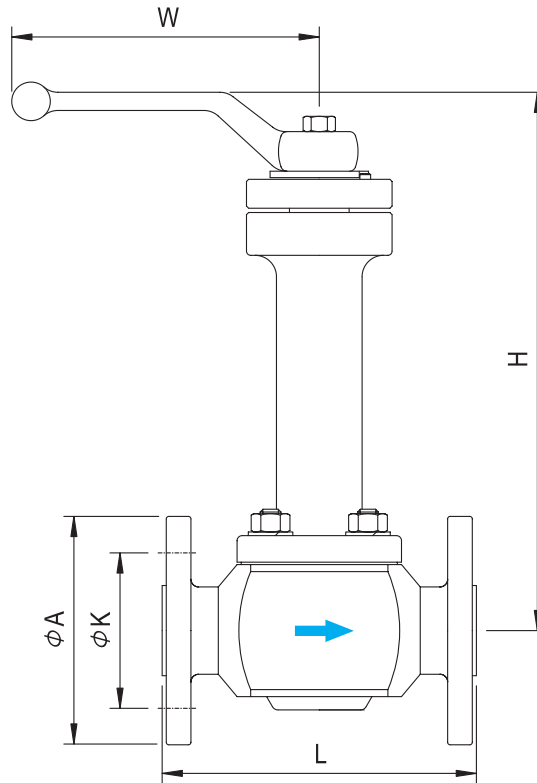
Screwed Ends Dimensions & Weights

Basic Ordering Number	Connection Size		Dimensions(mm)				Flow Data		Weight
	Inlet	Outlet	B	L	H	W	Cv	Kv	Kg
CRYOT - 6N	3/8" Female NPT	3/8" Female NPT	22.0	115.0	210.0	140.0	12.0	10.3	4.7
CRYOT - 8N	1/2" Female NPT	1/2" Female NPT	26.0	115.0	210.0	140.0			
CRYOT - 12N	3/4" Female NPT	3/4" Female NPT	32.0	140.0	210.0	240.0	31.0	26.6	7.4
CRYOT - 16N	1" Female NPT	1" Female NPT	42.0	160.0	210.0	240.0	38.0	32.6	12.2

All dimensions are in millimeters unless otherwise specified. Dimensions are for reference only, subject to change.

CRYOT Series Trunnion Ball Valves

Flanged Ends



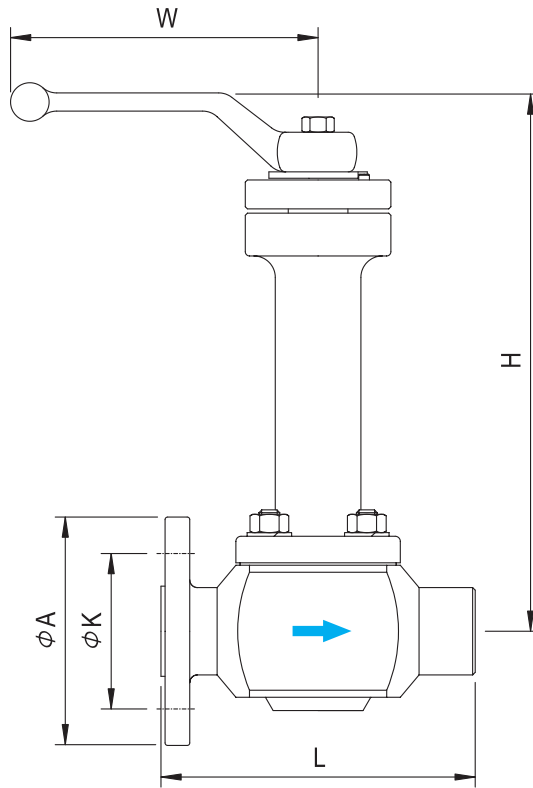
Flanged Ends Dimensions & Weights

Basic Ordering Number	Connection Size		Dimensions(mm)					Flow Data		Weight
	Inlet	Outlet	A	K	L	H	W	Cv	Kv	Kg
CRYOT - 8FA	1/2" CL150 RF	1/2" CL150 RF	88.9	60.3	115.0	210.0	140.0	12.0	10.3	6.5
CRYOT - 12FA	3/4" CL150 RF	3/4" CL150 RF	98.4	69.8	140.0	210.0	240.0	31.0	26.6	10.4
CRYOT - 16FA	1" CL150 RF	1" CL150 RF	107.9	79.4	160.0	210.0	240.0	38.0	32.6	15.8
CRYOT - 12FA	1-1/4" CL150 RF	1-1/4" CL150 RF	117.5	88.9	200.0	240.0	240.0	90.0	77.1	17.2
CRYOT - 16FA	1-1/2" CL150 RF	1-1/2" CL150 RF	127.0	98.4	220.0	240.0	240.0	100.0	85.7	20.9

All dimensions are in millimeters unless otherwise specified. Dimensions are for reference only, subject to change.

CRYOT Series Trunnion Ball Valves

Flanged to Screwed Ends



Flanged to Screwed Ends Dimensions & Weights

Basic Ordering Number	Connection Size		Dimensions(mm)					Flow Data		Weight
	Inlet	Outlet	A	K	L	H	W	Cv	Kv	Kg
CRYOT - 8FA6N	1/2" CL150 RF	3/8" NPT	88.9	60.3	115.0	210.0	140.0	12.0	10.3	5.6
CRYOT - 8FA8N	1/2" CL150 RF	1/2" NPT								
CRYOT - 12FA8N	3/4" CL150 RF	1/2" NPT	98.4	69.8	140.0	210.0	240.0	31.0	26.6	8.9
CRYOT - 12FA12N	3/4" CL150 RF	3/4" NPT								
CRYOT - 16FA8N	1" CL150 RF	1/2" NPT	107.9	79.4	160.0	210.0	240.0	38.0	32.6	14.0
CRYOT - 16FA12N	1" CL150 RF	3/4" NPT								
CRYOT - 16FA16N	1" CL150 RF	1" NPT								
CRYOT - 20FA8N	1-1/4" CL150 RF	1/2" NPT	117.5	88.9	200.0	240.0	240.0	90.0	77.1	14.8
CRYOT - 20FA12N	1-1/4" CL150 RF	3/4" NPT								
CRYOT - 20FA16N	1-1/4" CL150 RF	1" NPT								
CRYOT - 24FA8N	1-1/2" CL150 RF	1/2" NPT	127.0	98.4	220.0	240.0	240.0	100.0	85.7	17.8
CRYOT - 24FA12N	1-1/2" CL150 RF	3/4" NPT								
CRYOT - 24FA16N	1-1/2" CL150 RF	1" NPT								

All dimensions are in millimeters unless otherwise specified. Dimensions are for reference only, subject to change.

CRYOT Series Trunnion Ball Valves

Ordering Information

The correct ordering number is easily derived from the following numbering system. The four designators required are coded as shown below. *Note : if the inlet and outlet connections are the same, eliminate the inlet connection designator.

Numbering System

Example :

