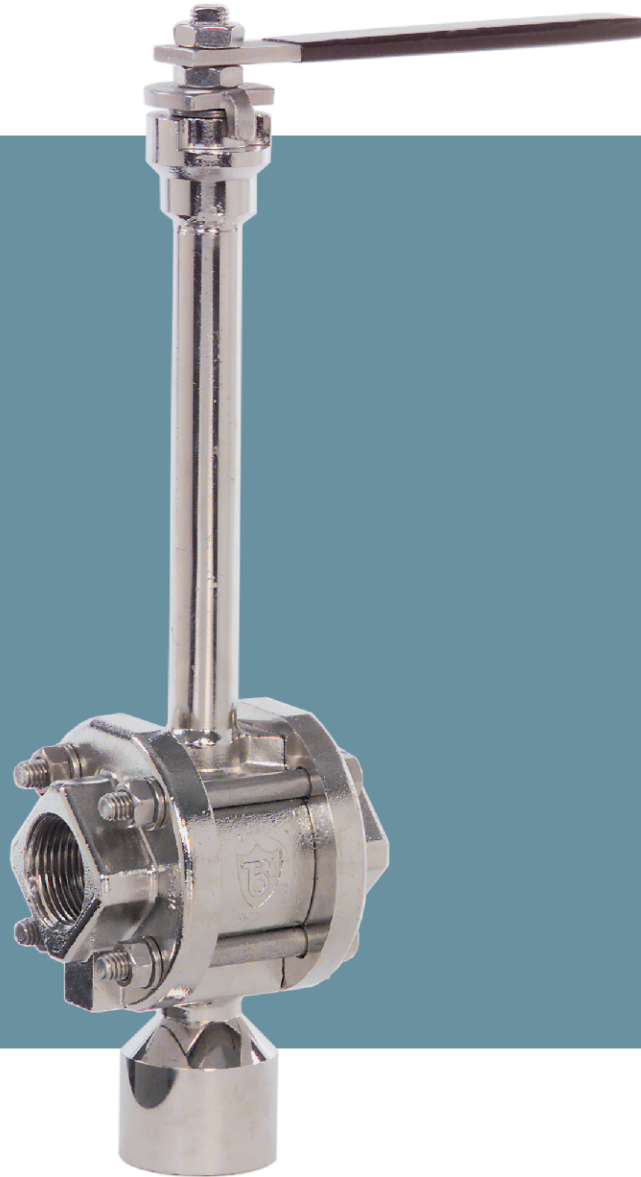


# TBV™ Series 21/51 Cryogenic Diverter Ball Valve



## SERIES 21/51 CRYOGENIC DIVERTER BALL VALVE



TBV™ Series 21/51 Cryogenic Diverter Ball Valve incorporates all features found in the 2100 and provides diverting capabilities for use where two or more two-way valves would normally be necessary.

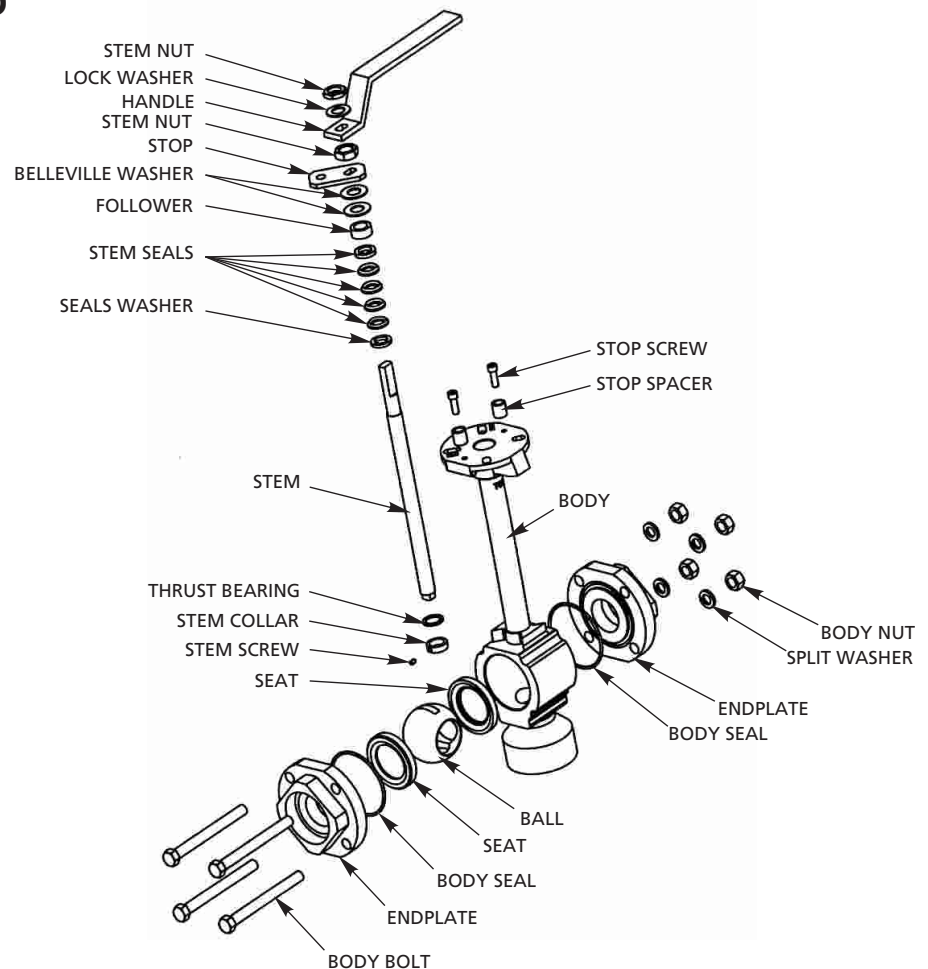
The 21/51 is available in two porting arrangements: 90° operation and 180° operation. The 90° operation allows flow from a bottom port to be diverted to either of two outlet ports over a 90° turn of a handle, but can never shut-off the flow.

The 180° operation also diverts a flow from the bottom port to either of two outlet ports, but uses a 180° turn of the handle, allowing the flow to be shut-off completely at the 90° position.

The 21/51 has temperature ratings to -452°F (-269°C) and pressure ratings up to 1500 psi. This cryogenic diverter valve is available in full port or standard port from 1/2 inch through 8 inch in 316L Stainless, or Bronze, with or without an Extended Stem. Screw Ends, Socket Weld Ends, Butt Weld Ends or ASME Class 150 through ASME Class 600 Flanged Ends are also available.

- 1/2 inch THROUGH 8 inch SIZES
- LOW OPERATING TORQUE TO -452°F (-269°C)
- VARIOUS END CONNECTIONS AVAILABLE
- EXCLUSIVE CRYOFIL SEATS
- ACTUATOR MOUNTING CAPABILITY STANDARD
- PADLOCKING DEVICE STANDARD
- OXYGEN CLEANING STANDARD

## SERIES 21/51 CRYOGENIC DIVERTER BALL VALVE 180° VALVE DEPICTED



### BILL OF MATERIALS

PART	QTY.	MATERIAL
Body	1	See Note 1 (page 4)
Endplate	2	See Note 1 (page 4)
Ball	1	See Note 1 (page 4)
Stem	1	See Note 1 (page 4)
Follower	1	300 Stainless Steel
* Seat	2	Cryofil
* Stem Seal	5	Virgin PTFE
* Body Seal	2	Virgin PTFE
Stop	1	300 Stainless Steel
Handle	1	300 Stainless Steel
* Thrust Bearing	1	Filled PTFE
Body Bolt	4	300 Stainless Steel
Body Nut	4	300 Stainless Steel
Sem Nut	2	300 Stainless Steel
Lock Washer	1	400 Stainless Steel
Set Screw	1	300 Stainless Steel
Collar	1	300 Stainless Steel
Seal Washer	1	300 Stainless Steel

### \* REPAIR KIT ITEMS:

Seats, Stem Seal, Body Seals and Thrust Bearing.  
When ordering a repair kit, customer must provide the valve code and sales order number stamped on the body of the valve:

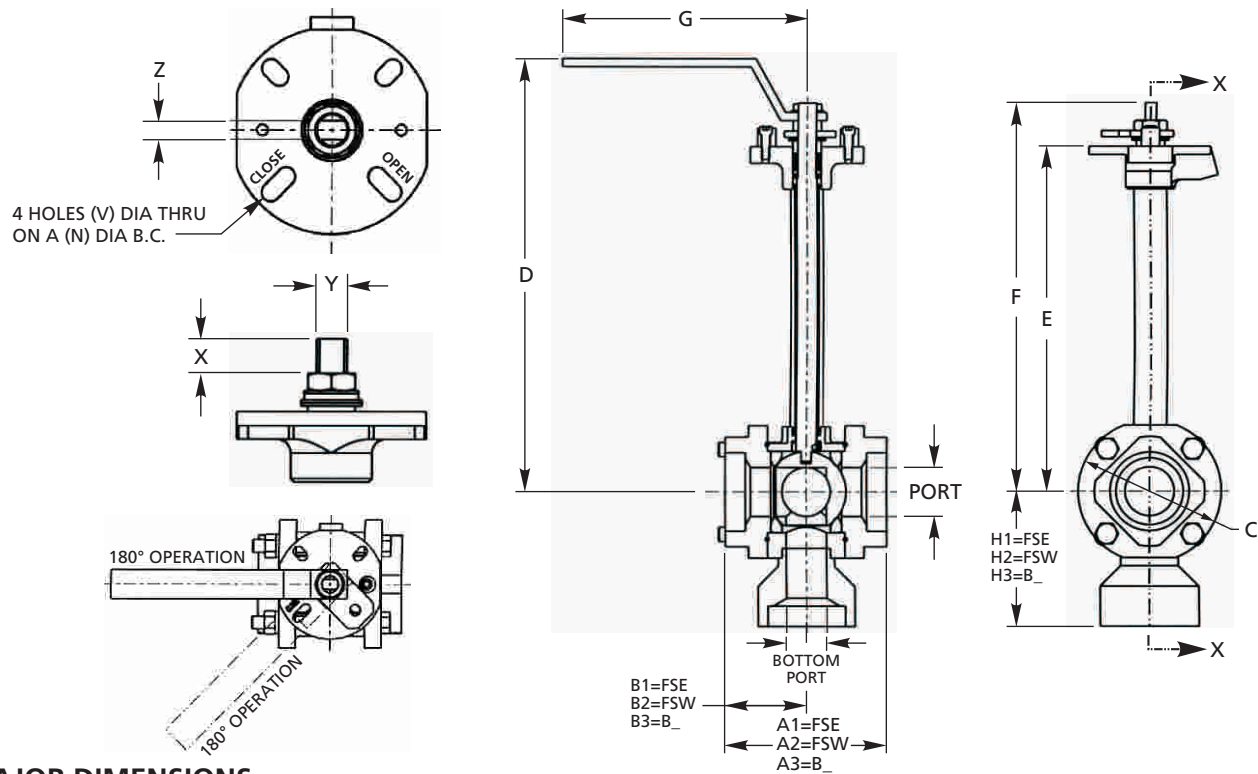
### Example:

Repair kit for 10S 2D FSE BR36 CH 2  
(Part Number) S16754-3 (Sales Order Number).

### SEAT MATERIAL IDENTIFICATION CODE

C	Cryofil	White
K	CTFE	Translucent
U	Ultrafil	Black

## SERIES 21/51 CRYOGENIC DIVERTER BALL VALVE



## MAJOR DIMENSIONS

VALVE SIZE in.	PORT DIA	BOTTOM PORT DIA	A1	A2	A3	B1	B2	B3	C	D
1/2	0.50	0.50	3.14	3.06	3.06	1.57	1.53	1.53	2.50	9.98
3/4	0.50	0.50	3.14	3.06	3.06	1.57	1.53	1.53	2.50	9.98
1	0.81	0.66	3.75	3.69	3.67	1.87	1.83	1.83	3.25	10.33
1 1/2	1.25	1.25	4.76	4.70	4.70	2.38	2.35	2.35	4.12	12.72
2	1.50	1.25	5.06	5.00	5.00	2.53	2.50	2.50	4.36	12.91

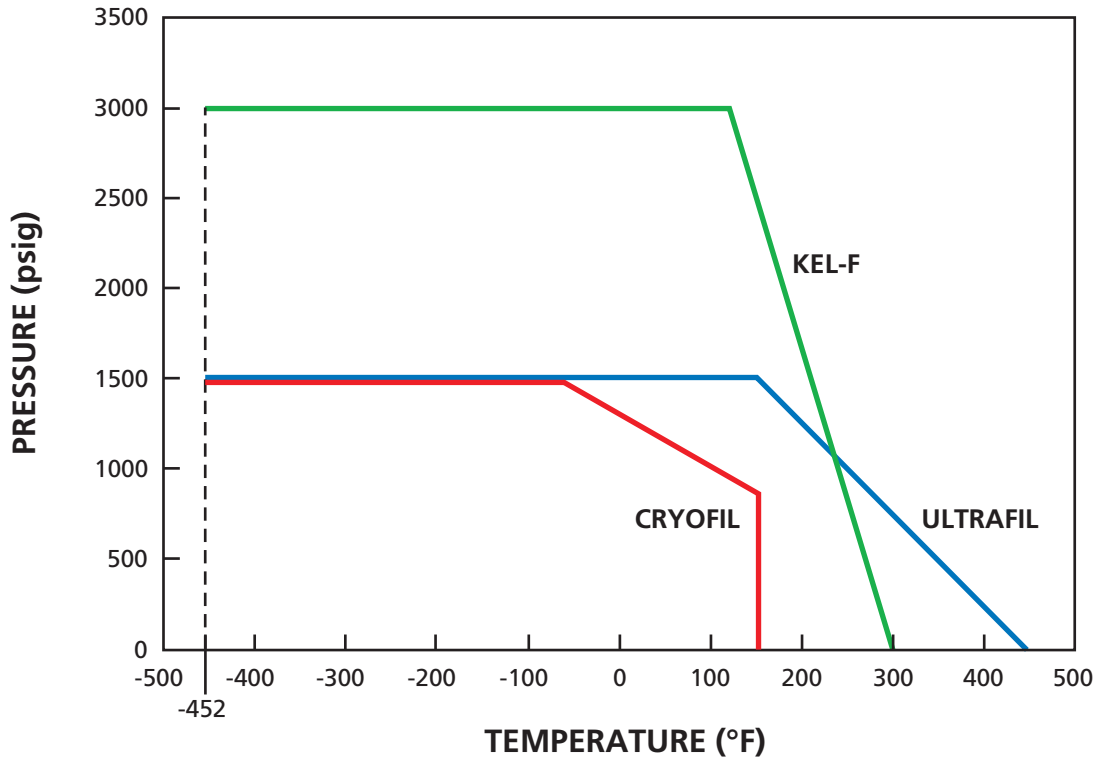
SIZE in.	E	F	G	H1	H2	H3	V	W	X	Y	Z
1/2	7.98	8.92	5.50	2.31	2.31	2.31	0.34	3.18	0.38	3/8-24	0.230
3/4	7.98	8.92	5.50	2.31	2.31	2.31	0.34	3.18	0.38	3/8-24	0.230
1	8.19	9.35	5.50	3.44	3.44	3.44	0.34	3.18	0.50	7/16-20	0.296
1 1/2	10.28	11.60	7.55	3.54	3.61	3.61	0.34	3.18	0.63	9/16-18	0.340
2	10.47	11.79	7.55	4.12	4.12	4.12	0.34	3.18	0.63	9/16-18	0.340

Consult factory for dimensions over 2 inch.

**Material and Construction Notes:**

- Standard materials for these components are 316L Stainless Steel or Bronze. A Monel ball for oxygen service may be readily substituted. Other materials are available on application.
- Optional static grounding springs can be applied between stem and ball; internal grounding springs can be applied between ball and body.
- 90° operation: The flow from the bottom inlet port may be diverted to either of the two outlet ports but never shut-off. 180° operation: The flow from the bottom inlet port may be shut-off by operating the valve only 90°. There is no stop provided for this position.
- 1/2 inch cast valves are full port as standard.
- Valve must be installed with Extension Bonnet within 30° of true vertical.

SERIES 21/51 CRYOGENIC DIVERTER BALL VALVE  
SEAT RATING CHART



Extended pressures and temperatures may be achieved by altering design for specific applications. Consult factory with service conditions.

**The valve rating is the lesser of the body rating and the seat rating.**

TBV manufactures an extensive line of high pressure valves capable of the full seat ratings shown. Consult factory for details.

## SERIES 21/51 CRYOGENIC DIVERTER BALL VALVE

### FEATURES

### BENEFITS

Raised Face End Plates	Positive alignment, elimination of radial pipe stresses.
Totally Encapsulated Body Seals	Elimination of cold flow. High performance over wide temperature and pressure range.
Variety of Seating Materials	Wide range of process media and service conditions.
Flexible Lip Seat Design	Low operating torque.
Integral Actuator Mounting Pad	Ease of automation (optional).
Live Loaded Stem	Pressure and temperature recovery, stem seal integrity with a low operating torque.
Blowout Proof Stem	Operator safety.
Heavy Duty Handle and Stop	Ease of operation, long life.
Fully Traceable Materials	Certification of all pressure retaining parts available for stringent specification requirements.
5 Ring Chevron Standard Stem Seals	Stem seal integrity.
Investment Cast	High quality casting.
Cryofil Seats	Specially designed to provide leakproof operation to -452°F.
Welded Bonnet Construction	No leak paths or exposed gaskets.
Stainless Steel Externals	Atmospheric corrosion resistance.
No lubrication Used	No possible contamination.

#### NOTES FOR TORQUE INFORMATION

- Torque values are listed in inch pounds.
- All torque values are based on maximum rated pressure, clean service, and frequent operation (more than once per month).
- The recommended safety margin for sizing purposes is a minimum of 25%.
- For valves with torques above 1440 inch lbs., gear operator or actuation should be considered.
- Lower working pressures will reduce stem operating torque. Consult factory for further assistance.
- $C_v$  values are based on the flow of water at 60°F and 14.7 psig through the valve in U.S. gallons per minute at a pressure drop of 1 psi.

#### $C_v$ VALUES AND MAXIMUM TORQUE (in. - lbs.)

SIZE in.	$C_v$	SEAT C	SEAT K	SEAT U
1/2	3	100	120	50
3/4	4	125	150	70
1	12	250	300	120
1 1/2	30	375	450	350
2	47	610	732	600
3	135	1350	1620	1900
4	252	2500	3000	2800
6	368	5800	6960	5500
8	630	10500	12600	9088

#### DESIGN SPECIFICATIONS AVAILABLE

ASME B1.20.1	NPT Pipe Threads
ASME B16.11	Socket Weld Ends (diameter & depth)
ASME B16.25	Butt Weld Ends
ASME B16.34	Steel Valves (performance & design)
ASME B31.3	Process Piping (application)
MSS SP25	Valve Marking
MSS SP61	Pressure Testing
API 607 4th Edition	Fire Safe to Atmosphere

## SERIES 21/51 CRYOGENIC DIVERTER BALL VALVE

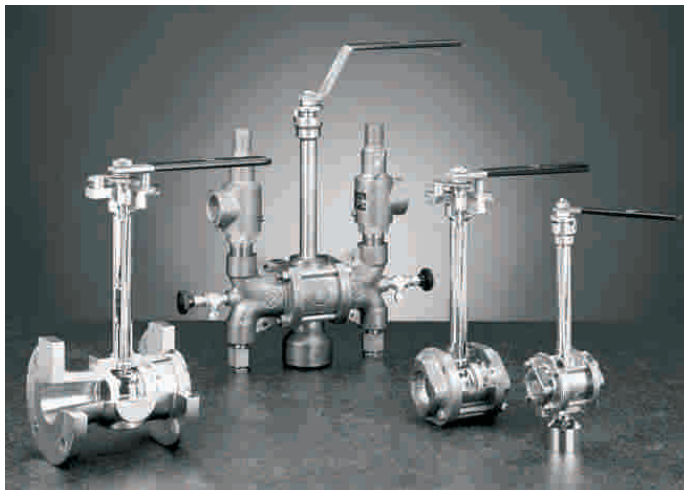
### HOW TO ORDER

SIZE	PORTING	SERIES	END CONNECTIONS	BODY/END MATERIAL	BALL/ STEM MATERIAL	SEAT MATERIAL	SEAL MATERIAL	BOLTING	MODIFIERS
05 = 1/2" 07 = 3/4" 10 = 1" 12 = 1 1/4" 15 = 1 1/2" 20 = 2" 25 = 2 1/2" 30 = 3" 40 = 4" 60 = 6" 80 = 8"	S = Standard Port F = Full Port	2D = Series 21/51 Cryogenic Diverter		BR = Brass 6L = 316L SS	BR = Brass 6L = 316L SS M4 = Monel 400 36 = 316 SS	C = Cryofil K = CTFE (KEL-F) U = Ultrafil	H = Grafoil T = Virgin PTFE	2 = 300 SS 4 = ASTM A193, B8M x A194 8M	01 = Operation 02 = 180° Operation AI = Actuator Installed AP = Prep for Actuation FS = Fire Safe GO = Gear Operator LV = Lever Handle NE = Non Extended OH = Oval Handle VS = Vacuum Service
			B = Butt Weld + Sched. BWT = Butt Weld Ext. & Tube Ends FSE = NPT Female Threaded FSW = Female Socket Weld TE_ = Tube End (K,L,M) Socket Weld 150 = ASME/ANSI Class 150 300 = ASME/ANSI Class 300 600 = ASME/ANSI Class 600						

If ball and stem are different materials, expand code to show ball first, stem second.  
 For additional ordering information, see the TBV General Brochure, Corrosion Resistant and Cryogenic Valves.

#### Example:

10S 2D FSE BR36 CH 2 = 1" Series 21/51 Cryogenic Diverter Female Screwed Ends, Bronze Body Ends, 316 Ball/Stem, Cryofil Seats, with Grafoil Seals and 300 Stainless Steel Bolting.



#### TBV Cryogenic Valves

(from left to right):

##### Series 2120

Cryogenic Flanged Ball Valve

##### Series 21/51A

Multiport High Flow Cryogenic Diverter

##### Series 2100

Cryogenic Ball Valve

##### Series 21/51

Three Piece Cryogenic Diverter Valve

CERTIFICATIONS



**VALVES & MEASUREMENT**

3250 Briarpark Drive, Suite 300

Houston, Texas 77042

USA Toll Free 800 323 9160

For the most current contact and location information go to: [www.c-a-m.com](http://www.c-a-m.com)