

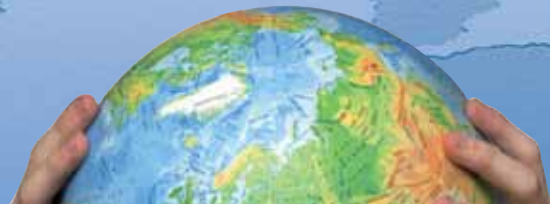
CARTEN[®]
Ultra High Purity Valves

HB SERIES

**Ultra-High Purity Bellows Valves (HB)
Ultra-High Purity Air-Actuated Bellows Valves
(HBA & GBA)**



HB SERIES



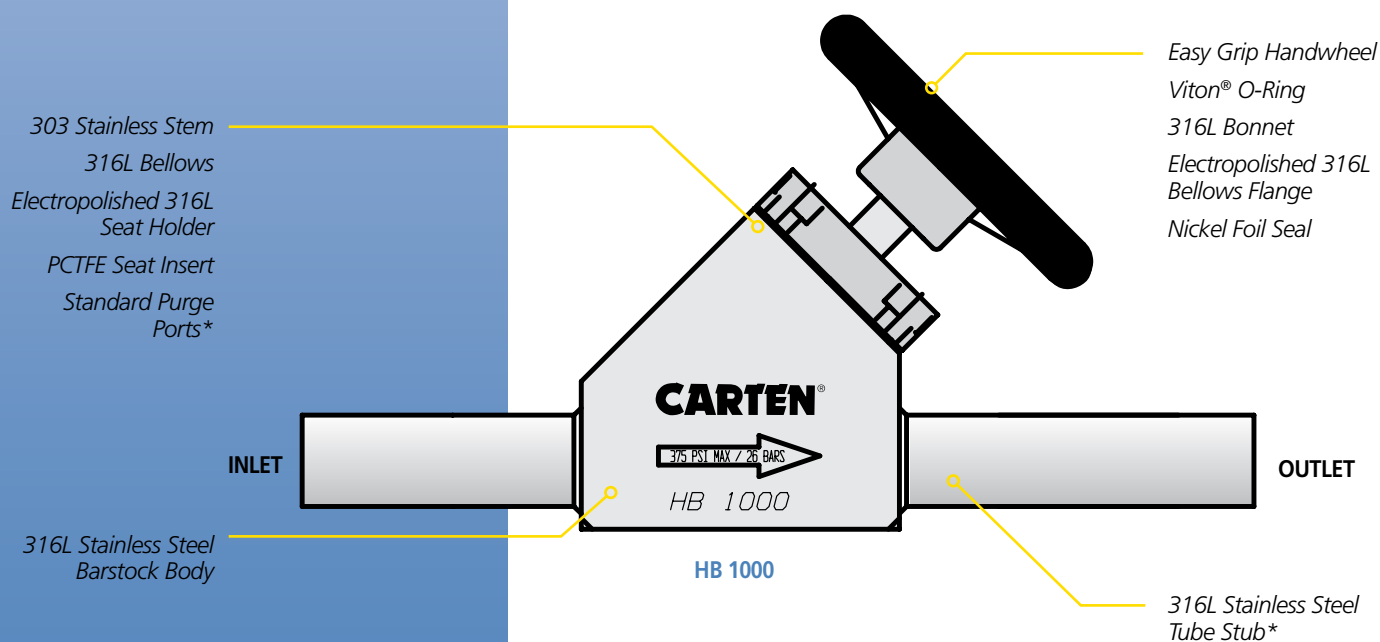
This HB stainless steel (bellows design) valve series[†] is intended for bulk gas distribution service where containment, cleanliness and purity are of utmost importance. Applications for these valves include:

- **High purity gas distribution system control**
- **High purity gas valves for point-of-use service**
- **Superior containment and cleanliness for you most critical valve applications**
- **Use with inert and most toxic gases**

HB Series Product Features

- Bellows Design for Ultra-High Purity and Long Cycle Life
- Compact Design
- Ultra Smooth Seat Holder for Cleanliness
- Electropolished Wetted Surfaces to 10 Ra Max (Optional surface finishes available)
- Inboard and Across the Seat Leak Tested with Helium
- Industry Leading Design in Ultra-High Purity Gas Containment
- Purge Connections and Purge Valves are Integral in Valve Body
- Assembled and Tested in Class 10 Cleanroom
- Valve Bodies and Tube Stubs are Serialized for Material Certification
- Cleaned for Ultra-High Purity Gas Service
- Purged and Final Packaged in Class 1 Cleanroom. Double-Bag Packaging with Ultra-High Purity N₂ Gas Environment

HB Construction Materials



*See corresponding Code Chart for available end connections.

† U.S Patent # D347,882 and other patents worldwide

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HB and GBV Series Technical Data

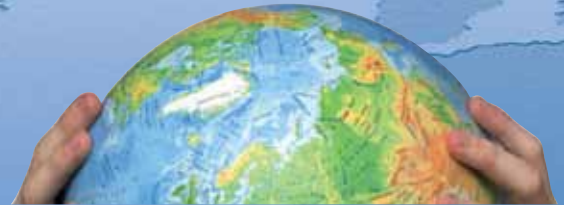
MATERIAL OF CONSTRUCTION	Wetted Areas	316L Stainless Steel, Nickel, PCTFE
	Non-Wetted Areas	316L Stainless Steel, Brass (GBV 500 only)
MAXIMUM OPERATING PRESSURE	HB Series	Vacuum to 375 psig (25.8 bar)
OPERATING TEMPERATURE RANGE	HB Series	-22°F (-30°C) to 180°F (82°C)
FLOW COEFFICIENT (C _V)	GBV 500	1.93
	HB 751	10.2
	HB 1000	14.3
	HB 1501	16.6
	HB 1502	63.3
	HB 2000	74.1
	HB 3002	78.0
	HB 3004	175.0
	HB 4000	181.0
	HB 6004	185.0
HELIUM LEAK TEST	Inboard	1 x 10 ⁻¹¹ Pa-m 3/s (1 x 10 ⁻¹⁰ atm.cc (He) /s)
	Across the Seat	1 x 10 ⁻¹⁰ Pa-m 3/s (1 x 10 ⁻⁹ atm.cc (He) /s)
	Outboard Pressure Test	1 x 10 ⁻⁷ Pa-m 3/s (1 x 10 ⁻⁶ atm.cc (He) /s)
CLEANLINESS AND PACKAGING	Assembled and tested in CLASS 10 cleanroom. Purged and final packaged in Class 1 cleanroom. Double-bag packaging (2 mil nylon inner bag, 6 mil polyethylene outer bag) with Ultra-High Purity N ₂ gas environment.	
STANDARD FINISH	Electropolished to 10 Ra Max (0.25 Ra µm) on all wetted surfaces	
OPTIONS	Particle, moisture, THC and O ₂ testing SEM and ESCA testing, Auger analysis Fitting connections available for up to 1.00" size – inlet/outlet Material: Vespel® seat Handwheel color (Std. Black, GBV White) JIS tube stubs and tube length	

Specifications are subject to change without notice. Viton® and Vespel® are registered trademarks of DuPont Company.

HB and GBV Series Technical Dimensions

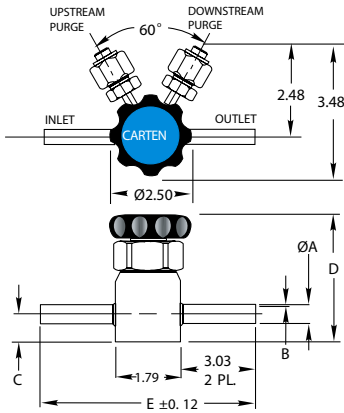
Size	A	B	C	D	E	F	G
GBV 500	Ø 0.50 (12.71mm)	0.049 (1.2mm)	0.715 (18.1mm)	3.72 (94.4mm)	7.84 (199.1mm)	NA	NA
HB 751	Ø 0.75 (19.0mm)	0.065 (1.6mm)	0.75 (19.0mm)	5.62 (142.8mm)	11.61 (294.9mm)	4.51 (114.5mm)	2.50 (63.5mm)
HB 1000	Ø 1.00 (25.4mm)	0.065 (1.6mm)	0.75 (19.0mm)	5.62 (142.8mm)	9.61 (244.0mm)	6.60 (167.6mm)	2.50 (63.5mm)
HB 1501	Ø 1.50 (38.1mm)	0.065 (1.6mm)	0.75 (19.0mm)	5.62 (142.8mm)	13.51 (343.2mm)	5.55 (140.9mm)	2.50 (63.5mm)
HB 1502	Ø 1.50 (38.1mm)	0.065 (1.6mm)	1.25 (31.7mm)	8.64 (219.4mm)	15.40 (391.2mm)	7.00 (177.8mm)	2.50 (63.5mm)
HB 2000	Ø 2.00 (50.8mm)	0.065 (1.6mm)	1.25 (31.7mm)	8.64 (219.4mm)	13.59 (345.1mm)	6.12 (155.4mm)	2.50 (63.5mm)
HB 3004	Ø 3.00 (76.2mm)	0.065 (1.6mm)	2.13 (54.1mm)	13.93 (353.8mm)	25.62 (650.7mm)	10.43 (264.9mm)	4.25 (107.9mm)
HB 4000	Ø 4.00 (101.6mm)	0.083 (2.1mm)	2.13 (54.1mm)	13.93 (353.8mm)	17.86 (453.6mm)	6.55 (166.3mm)	4.25 (107.9mm)
HB 6004	Ø 6.00 (152.4mm)	0.109 (2.7mm)	2.13 (54.1mm)	13.93 (353.8mm)	32.90 (835.7mm)	14.07 (357.4mm)	4.25 (107.9mm)

HB SERIES

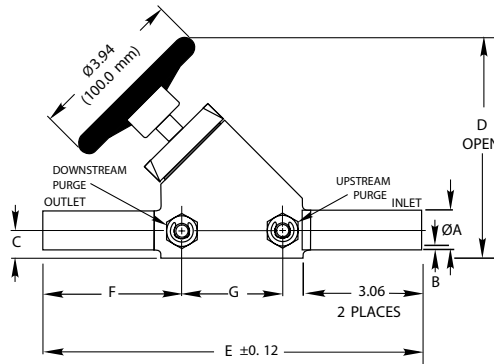


HB and GBV Series Typical Valve Dimensions (1/2" to 6")

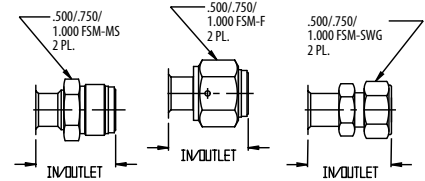
**GBV 500 BODY
(500)**



**HB 1000 BODY
(751/1000/1501)**

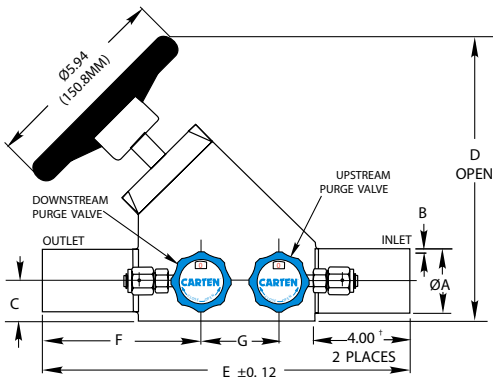


**OPTIONAL VALVE END CONNECTIONS
AVAILABLE ON HB 1/2" - 1" BODY SIZES**

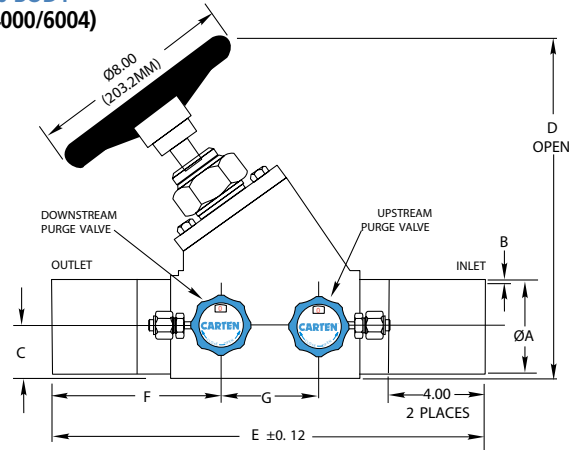


Size	Length		
	FSM-M	FSM-F	SWG
500	1.54 (39.1mm)	1.54 (39.1mm)	2.10 (53.3mm)
750	2.04 (51.8mm)	2.04 (51.8mm)	2.03 (51.6mm)
1000	2.36 (59.9mm)	2.36 (59.9mm)	2.49 (63.2mm)

**HB 2000 BODY
(1502/2000/3002)**

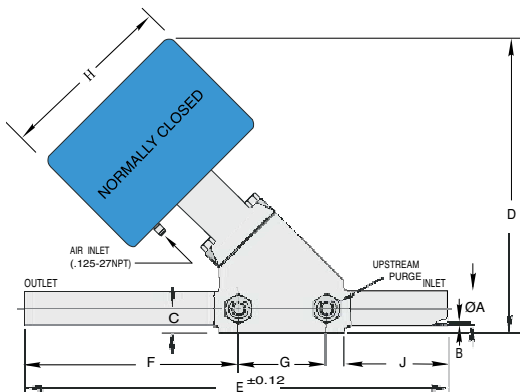


**HB 4000 BODY
(3004/4000/6004)**



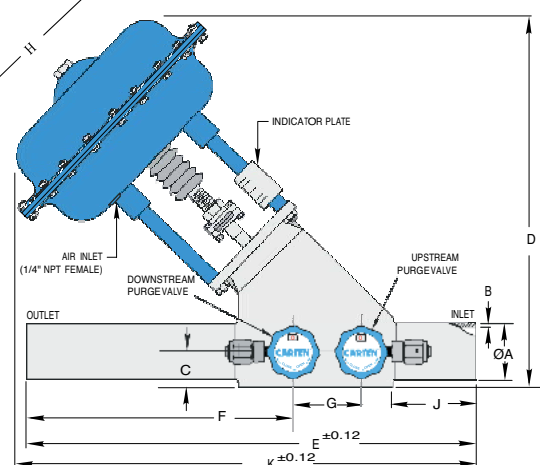
HBA Series Typical Valve Dimensions (3/4" to 6")

**HBA 1000 BODY
(751/1000/1501)**



**HBA 2000 BODY
(1502/2000/3002)**

**HBA 4000 BODY
(3004/4000/6004)**



NOTE 1: All tolerances are ± 0.06 in. (± 1.52 mm) unless otherwise stated.

NOTE 2: Dimensional drawings shown are for reference only. Please contact CARTEN® for customer drawings.

HB SERIES

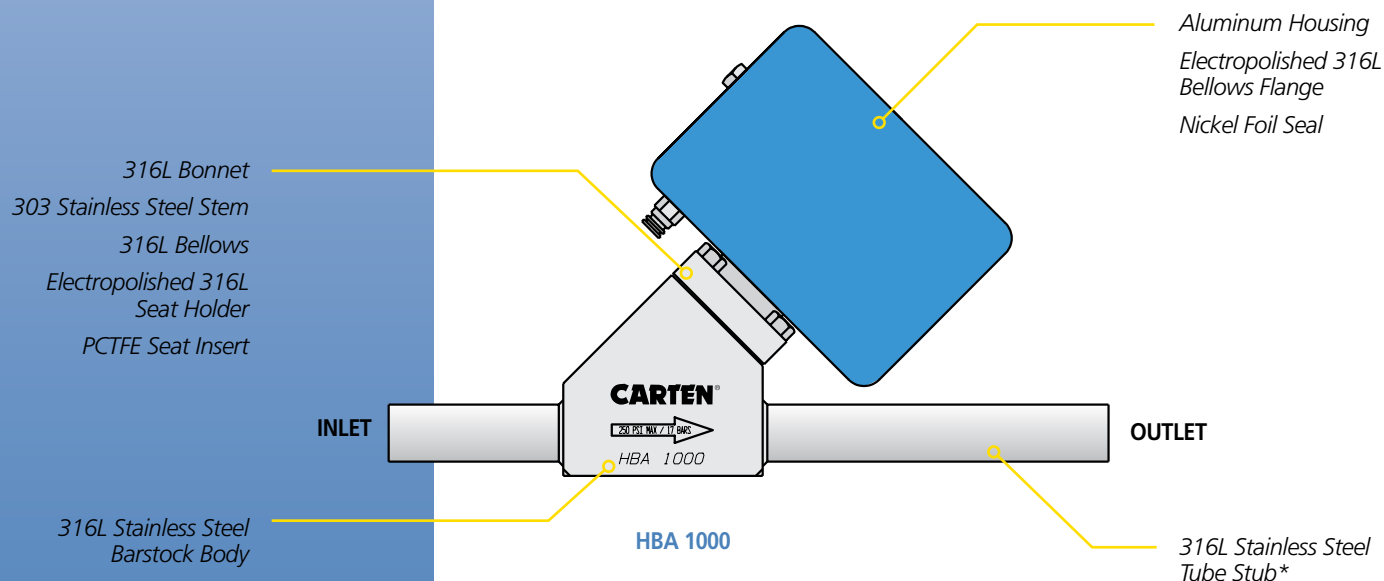
This HBA stainless steel (bellows design) valve series is intended for bulk gas distribution service where containment, cleanliness and purity are of utmost importance. Applications for these valves include:

- **High purity gas distribution system control**
- **High purity gas valves for point-of-use service**
- **Superior containment and cleanliness for your most critical valve applications**
- **Use with inert and most toxic gases**

HBA Series Product Features

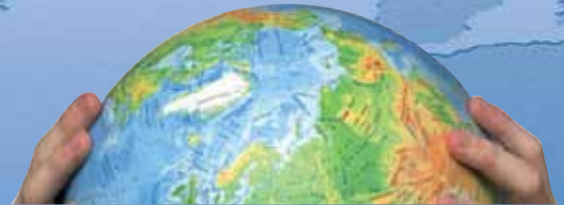
- Bellows Design for Ultra-High Purity and Long Cycle Life
- Compact Design
- Ultra Smooth Seat Holder for Cleanliness
- Electropolished Wetted Surfaces to 10 Ra Max (Optional surface finishes available)
- New Seat Design with Minimal PCTFE Volume
- Industry Leading Design in Ultra-High Purity Gas Containment
- Inboard and Across the Seat Leak Tested with 100% Helium
- 1/4 " Purge Connections and Purge Valves are Integral in Valve Body, 1/2 " Available
- Assembled and Tested in Class 10 Cleanroom
- Valve Bodies and Tube Stubs are Serialized for Material Certification
- Cleaned For Ultra-High Purity Gas Service
- Purged and Final Packaged in Class 1 Cleanroom. Double-Bag Packaging with Ultra-High Purity N2 Gas Environment

HBA Construction Materials



*See corresponding Code Chart for tube sizes, purge and locations.

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HBA Series Technical Data

MATERIAL OF CONSTRUCTION	Wetted Areas	316L Stainless Steel, Nickel, PCTFE	
	Non-Wetted Areas	316L Stainless Steel	
MAXIMUM OPERATING PRESSURE	HBA Series	Vacuum to 250 psig (0-17.2 bar)	
OPERATING TEMPERATURE RANGE	HBA Series	-22° F (-30°C) to 180° F (82°C)	
FLOW COEFFICIENT (C _V) AND ACTUATION PRESSURE	Model	C _V	Actuation Pressure
	HBA 751	10.2	60-80 (psi) 5-6 bar
	HBA 1000	14.3	60-80 (psi) 5-6 bar
	HBA 1501	16.6	60-80 (psi) 5-6 bar
	HBA 1502	63.3	60-80 (psi) 5-6 bar
	HBA 2000	74.1	60-80 (psi) 5-6 bar
	HBA 3002	78.0	60-80 (psi) 5-6 bar
	HBA 3004	175.0	50-60 (psi) 3-4 bar
	HBA 4000	181.0	50-60 (psi) 3-4 bar
HBA 6004	185.0	50-60 (psi) 3-4 bar	
HELIUM LEAK TEST	Inboard	1 x 10 ⁻¹¹ Pa·m 3/s (1 x 10 ⁻¹⁰ atm·cc (He) /s)	
	Across the Seat	1 x 10 ⁻¹⁰ Pa·m 3/s (1 x 10 ⁻⁹ atm·cc (He) /s)	
	Outboard Pressure Test	1 x 10 ⁻⁷ Pa·m 3/s (1 x 10 ⁻⁶ atm·cc (He) /s)	
CLEANLINESS AND PACKAGING	Assembled and Tested in Class 10 Cleanroom. Purged and Final Packaged in Class 1 Cleanroom. Double-bag packaging (2 mil nylon inner bag, 6 mil polyethylene outer bag) with Ultra-High Purity N ₂ gas environment.		
STANDARD FINISH	Electropolished to 10 Ra Max (0.25 µm) on all wetted surfaces		
OPTIONS	Normally open, normally closed, dual acting Proximity sensor Surface finish – 5 Ra, 20 Ra Testing: Particle, moisture, THC, O ₂ , SEM, ESCA and AES analysis	Purge fitting type and location Material: Vespel® seat Handwheel color (Std. Black, GBV White) JIS tube stubs and tube length Fitting connections available for up to 1.00" size – inlet/outlet	

Specifications are subject to change without notice. Vespel® is a registered trademark of Dupont Company.

Air-actuator Options: Proximity sensors are available on HBA's using the 1" body. Application notes: Use 1/4" piping for air supply. Avoid air flow restrictions to optimize actuation speed.

HBA Series Technical Dimensions

Size	A	B	C	D	E	F	G	H	J	K
HBA 751	Ø 0.75 (19.0mm)	0.065 (1.6mm)	0.75 (19.0mm)	7.88 (200.1mm)	14.53 (369.1mm)	7.52 (191.0mm)	2.50 (63.5mm)	5.48 (139.1mm)	4.06 (103.1mm)	N/A
HBA 1000	Ø 1.00 (25.4mm)	0.065 (1.6mm)	0.75 (19.0mm)	7.88 (200.1mm)	12.61 (320.2mm)	6.60 (167.6mm)	2.50 (63.5mm)	5.48 (139.1mm)	3.06 (77.7mm)	N/A
HBA 1501	Ø 1.50 (38.1mm)	0.065 (1.6mm)	0.75 (19.0mm)	7.88 (200.1mm)	16.51 (419.4mm)	8.55 (217.2mm)	2.50 (63.5mm)	5.48 (139.1mm)	5.01 (127.3mm)	N/A
HBA 1502	Ø 1.50 (38.1mm)	0.065 (1.6mm)	1.25 (31.7mm)	18.30 (464.8mm)	22.42 (569.4mm)	12.98 (329.6mm)	2.50 (63.5mm)	13.18 (334.7mm)	5.94 (150.8mm)	23.88 (606.5mm)
HBA 2000	Ø 2.00 (50.8mm)	0.065 (1.6mm)	1.25 (31.7mm)	18.30 (464.8mm)	18.50 (469.9mm)	11.44 (290.5mm)	2.50 (63.5mm)	13.18 (334.7mm)	4.00 (101.6mm)	21.92 (556.7mm)
HBA 3004	Ø 3.00 (76.2mm)	0.065 (1.6mm)	2.12 (53.8mm)	23.38 (593.8mm)	25.62 (650.7mm)	10.43 (264.9mm)	4.25 (107.9mm)	16.54 (420.1mm)	7.83 (198.8mm)	29.19 (741.4mm)
HBA 4000	Ø 4.00 (101.6mm)	0.083 (2.1mm)	2.12 (53.8mm)	23.38 (593.8mm)	19.90 (505.4mm)	8.57 (217.6mm)	4.25 (107.9mm)	16.54 (420.1mm)	4.50 (114.3mm)	25.08 (637.0mm)
HBA 6004	Ø 6.00 (152.4mm)	0.109 (2.7mm)	2.12 (53.8mm)	23.38 (593.8mm)	32.90 (835.6mm)	13.54 (343.9mm)	4.25 (107.9mm)	16.54 (420.1mm)	12.00 (304.8mm)	32.57 (827.2mm)

HB SERIES

This air-actuated, GBA stainless-steel bellows valve series is intended for bulk gas distribution service where containment, cleanliness and purity are of the utmost importance. Applications for this valve series include:

- ***Ultra-high purity gas service for the semiconductor industry***
- ***Ultra-high purity gas control for point-of-use service or gas cabinets***
- ***Superior containment and cleanliness for your most critical valve applications***
- ***Suitability for inert and most toxic gases***

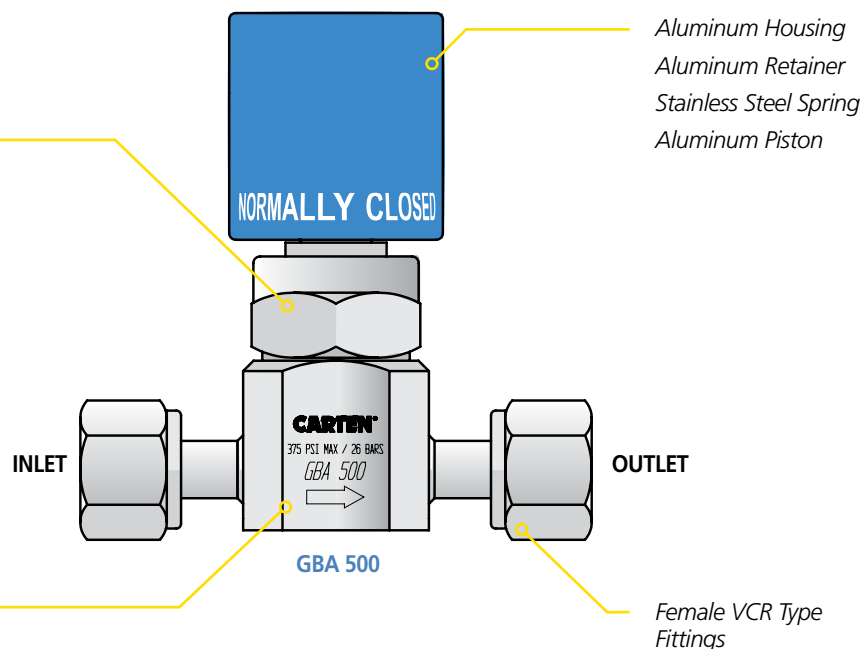
321 Stainless Steel Bellows
PCTFE Seat Insert
316L Stainless Steel Bonnet
303 Stainless Steel Bonnet Nut

316L Stainless Steel
Barstock Body

GBA Series Product Features

- Bellows Design for Ultra-High Purity and Long Cycle Life
- High Purity Stainless/PCTFE Gas Containment
- 321 Stainless Steel Bellow for Maximum Flow
- No Internal Particle Shedding Components
- Electropolished Wetted Surfaces to 10 Ra Max (Optional surface finishes available)
- Industry Leading Design in Ultra-High Purity Gas Containment
- Optional Tube Extensions, Purge Connectors or Fittings Available
- Assembled and Tested in Class 10 Cleanroom
- Inboard and Across the Seat Leak Tested with Helium
- Valve Body and Tube Stubs Are Serialized for Material Certification
- Purged and Final Packaged in Class 1 Cleanroom. Double-Bag Packaging with Ultra-High Purity N₂ Gas Environment
- Cleaned For High-Purity Gas Service

GBA Construction Materials



*See corresponding Code Chart for tube sizes, purge and locations.

GBA Series Technical Data

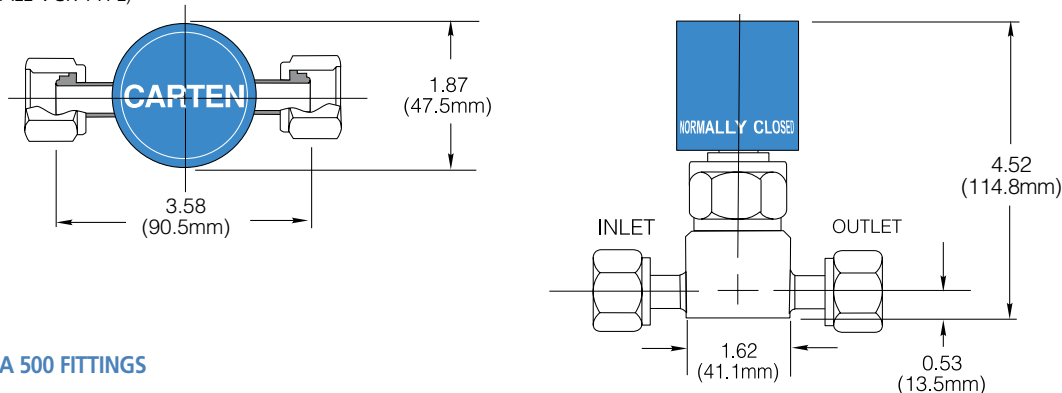
MATERIAL OF CONSTRUCTION	Wetted Areas	316L Stainless Steel, PCTFE, 321 Stainless Steel
	Non-Wetted Areas	316L Stainless Steel, Aluminum, 303 Stainless Steel
ACTUATION PRESSURE	GBA Series	60 – 75 psig (4.14-5.17 bar)
MAXIMUM OPERATING PRESSURE	GBA Series	Vacuum to 250 psig (0-17.2 bar)
MAXIMUM OPERATING TEMPERATURE	GBA Series	180°F (82°C)
FLOW COEFFICIENT (C _v)	GBA 500	1.93
HELIUM LEAK TEST	Inboard	1 x 10 ⁻¹¹ Pa·m 3/s (1 x 10 ⁻¹⁰ atm·cc (He) /s)
	Across the Seat	1 x 10 ⁻¹⁰ Pa·m 3/s (1 x 10 ⁻⁹ atm·cc (He) /s)
	Outboard Pressure Test	1 x 10 ⁻⁷ Pa·m 3/s (1 x 10 ⁻⁶ atm·cc (He) /s)
LIFE CYCLE TEST	GBA 500	>500,000 cycles at 150 psi
CLEANLINESS AND PACKAGING	Assembled and tested in Class 10 Cleanroom. Purged and Final Packaged in Class 1 Cleanroom. Double-bag packaging (2 mil nylon inner bag, 6 mil polyethylene outer bag) with Ultra-High Purity N ₂ gas environment supplied from a liquid source.	
STANDARD FINISH	Electropolished to 10 Ra Max (0.25 µm) on all wetted surfaces	
OPTIONS	Proximity sensor (open/close) Surface finish – 5 Ra, 20 Ra Testing: Particle, moisture, THC and O ₂	Fitting connections available for up to 1.00" size – inlet/outlet SEM and ESCA testing, Auger analysis Note: Normally open option not available

Specifications are subject to change without notice.

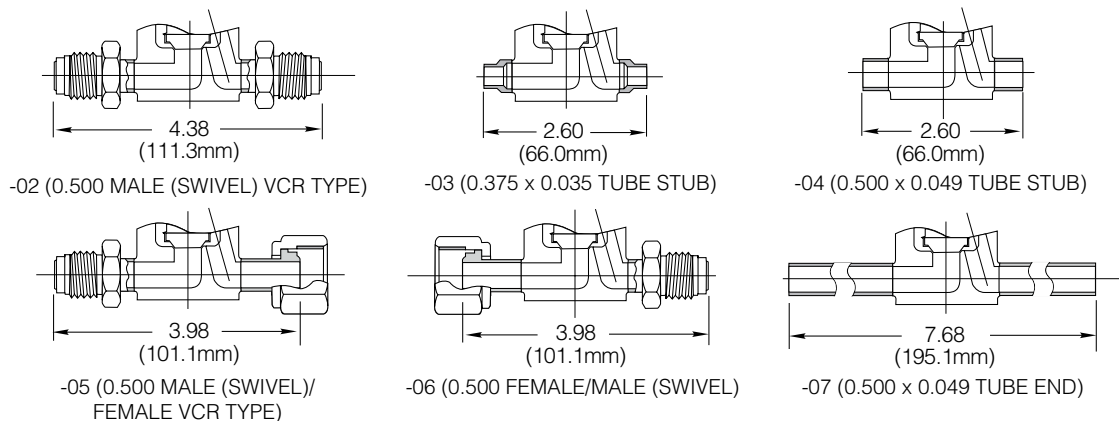
GBA Series Typical Valve Dimensions

GBA 500

-01 (0.500 FEMALE VCR TYPE)



OPTIONAL GBA 500 FITTINGS



NOTE 1: All tolerances are ±0.06 in. (±1.52mm) unless otherwise stated. NOTE 2: Dimensional drawings shown are for reference only. Please contact CARTEN® for customer drawings.

CARTEN®
Ultra High Purity Valves

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