



Electrical Breaks

Vacuum, Water, and Cryogenic Breaks



Electrical Breaks / Isolators

Accu-Glass Products, Inc. offers a complete line of tubular electrical breaks for vacuum applications requiring cryogenic, water and/or vacuum transmission lines. Cryogenic and vacuum breaks consist of ceramic insulating tubes with metal tubes brazed to each end and welded to either Conflat® compatible CF flanges or standard ISO KF flanges. Water breaks consist of ceramic tubes brazed to copper tubes that can be easily brazed to existing copper water supply-lines. The central ceramic tube provides electrical isolation between the conductive metal ends. If the breaks are used between two rigid components, a bellows should be used in the system to reduce mechanical stress that may cause the ceramic to break.

Accu-Glass Products' electrical breaks are all suitable for service in ultrahigh vacuum environments. Cryogenic and vacuum breaks are not suitable for water service because of corrosion, while water and vacuum breaks are not suitable for cryogenic service because of expansion differentials and material embrittlement.

Features

- Vacuum, water and cryogenic types
- Low temperature service to -200°C (Cryogenic)
- High temperature service to 400°C (450°C short term)
- Alumina ceramic electrical insulator
- Custom solutions on request

Specifications

Electrical¹

Voltage See Tables

Material

Tube (weld ends)	
Water	Copper
Vacuum / Cryogenic	304 Stainless Steel
Ceramic Insulator	
Vacuum, Water, and Cryogenic	Alumina

Vacuum Range

UHV, Ultrahigh vacuum	1x10 ⁻¹⁰ Torr
HV, High vacuum	1x10 ⁻⁸ Torr

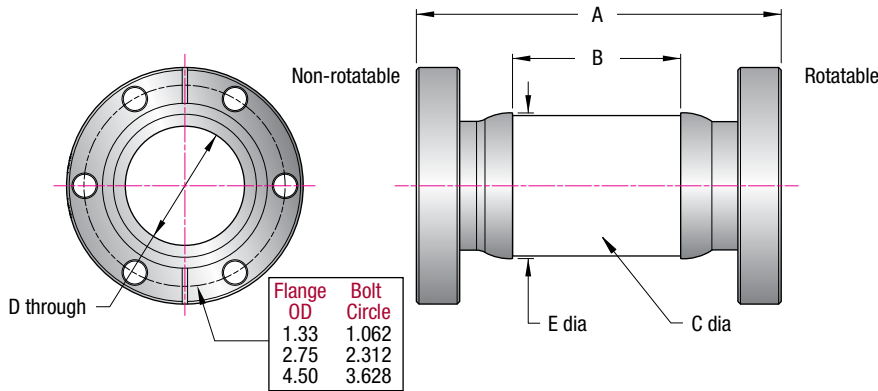
Temperature Range^{2,3}

Cryogenic	-200° to 400°C
Water ⁴	0° to 100°C
Vacuum	
CF Flange	-55° to 450°C
ISO Flange	-25° to 200°C
Thermal Gradient	25°C / Minute Maximum

Notes

1. Electrical ratings are maximum test values, with break's vacuum side at $\leq 1 \times 10^{-4}$ Torr. Also, see 'glow discharge' information on page 270.
2. Overall assembly ratings must be adjusted to that of its lowest rated component. For cryogenic service, the lowest recommended temperature is -80°C
3. Ceramic-to-metal assemblies subjected to sudden and/or repeated thermal shock will have shorter life spans. For optimum product life, heating and cooling must always be performed gradually, and within specified thermal gradient limits.
4. Water breaks have been designed for use with properly grounded, closed-loop cooling systems that use deionized water and/or other non-conductive coolants.

§ Unless specified otherwise, dimensional units in all sections of this catalog are expressed in inches.



Vacuum Breaks are designed for service in ultrahigh vacuum applications. A maximum thermal gradient of 25°C per minute across the break must be observed to prevent seal damage. Vacuum breaks with CF flanges attached have one non-rotatable flange on one end and a rotatable flange on the other.

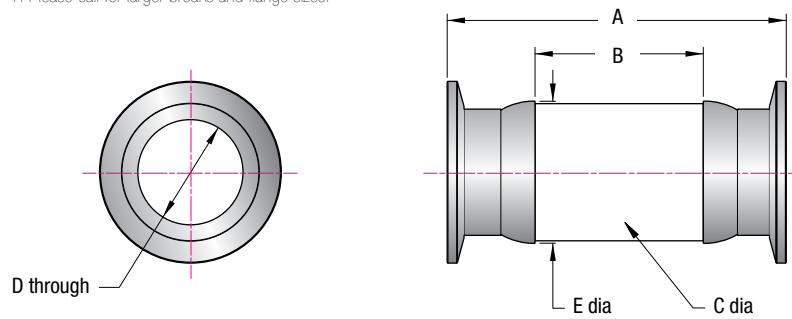
CF Flange¹ — -55° to 450°C / UHV to 1x10⁻¹⁰ Torr

Flange Size	Voltage Isolation	A	B	C	D	E	Model Number	Part Number	Unit Price \$
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Vacuum Breaks — CF Flange

1.33 CF	20 kV	3.62	1.00	1.00	0.625	1.04	BRK-VAC20KV-133	111183	347
1.33 CF	35 kV	4.60	2.00	1.00	0.630	1.04	BRK-VAC35KV-133	111184	447
2.75 CF	5 kV	2.58	0.25	1.63	1.250	1.69	BRK-VAC5KV-275	111185	357
2.75 CF	15 kV	4.20	2.00	1.66	1.250	1.69	BRK-VAC15KV-275	111186	373
4.50 CF	10 kV	4.50	0.75	3.20	2.300	3.23	BRK-VAC10KV-450	111187	1302

1. Please call for larger breaks and flange sizes.



Vacuum Breaks are designed for service in ultrahigh vacuum applications. A maximum thermal gradient of 25°C per minute across the break must be observed to prevent seal damage.

ISO KF Flange¹ — -25° to 200°C / HV to 1x10⁻⁸ Torr

Flange Size	Voltage Isolation	A	B	C	D	E	Model Number	Part Number	Unit Price \$
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Vacuum Breaks — ISO KF Flange

NW16 KF	20 kV	3.62	1.00	1.00	0.625	1.04	BRK-VAC20KV-K16	111191	347
NW16 KF	35 kV	3.88	2.00	1.00	0.630	1.04	BRK-VAC35KV-K16	111192	447
NW40 KF	5 kV	2.50	0.25	1.63	1.250	1.69	BRK-VAC3KV-K40	111193	357
NW40 KF	15 kV	4.03	2.00	1.63	1.250	1.69	BRK-VAC15KV-K40	111194	373

1. Please call for larger breaks and flange sizes.



111183 / 20kV Vacuum Break



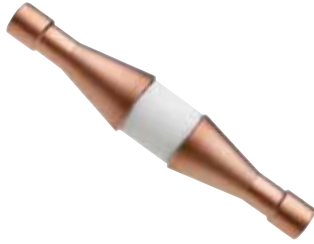
111187 / 10kV Vacuum Break



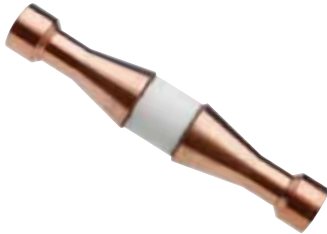
111191 / 20kV Vacuum Break



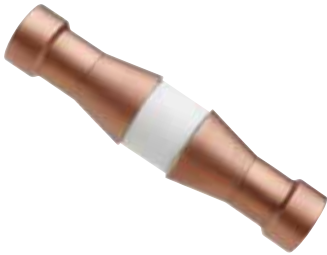
111194 / 15kV Vacuum Break



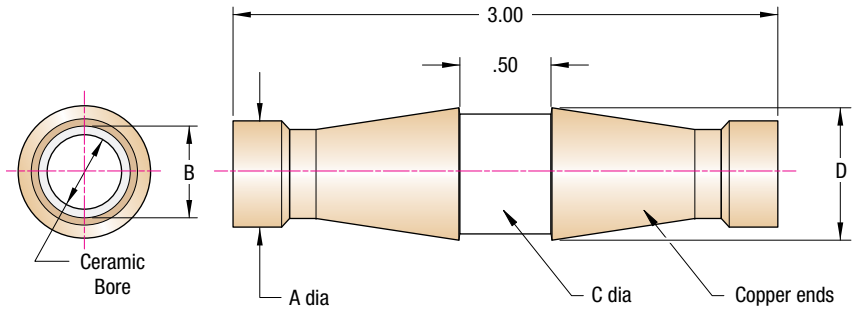
111180 / 1/4" Water Break



111181 / 3/8" Water Break



111182 / 1/2" Water Break

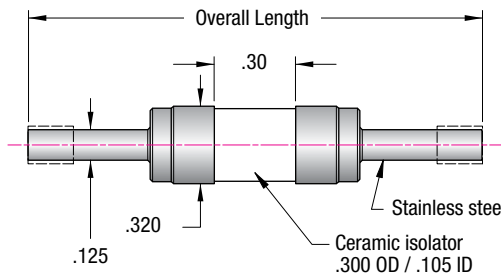


Water/Liquid Breaks are designed for the transmission of water or other coolant fluids. These components are rated for a maximum line pressure of 75 psig. A maximum thermal gradient of 25°C per minute across the break must be observed to prevent seal damage. During installation, brazing or soldering temperatures must not exceed 700°C.

Water Breaks — 5 kVDC / 100°C / UHV to 1×10^{-10} Torr

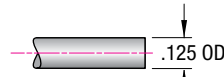
Tube Size	A	B Nominal	Ceramic Bore	C	D	Model Number	Part Number	Unit Price \$
5 kVDC Isolation								
1/4"	0.32	0.25	0.21	0.52	0.59	BRK-WTR-250	111180	195
3/8"	0.44	0.378	0.25	0.52	0.59	BRK-WTR-375	111181	200
1/2"	0.59	0.5	0.41	0.66	0.74	BRK-WTR-500	111182	216

Figure-1 — Cryogenic 1/8 Inch Tube Diameter

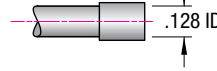


Weld Configurations

1.1
tube-weld

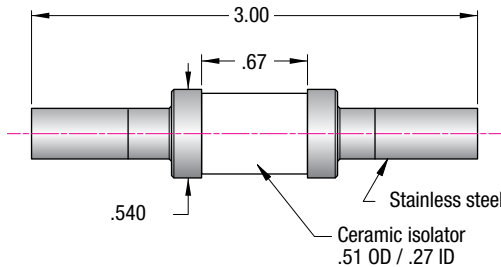


1.2
socket-weld
(dashed lines,
both ends)

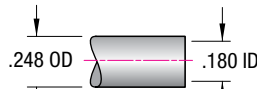


112060 / 1/8" Cryogenic Break
1.1 Tube-Weld

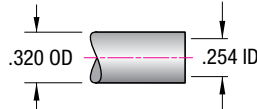
Figure-2 — Cryogenic 1/4 Inch Tube Diameter



2.1
tube-weld

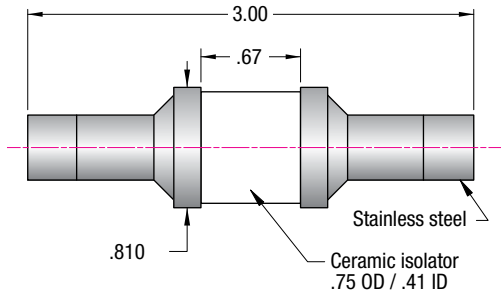


2.2
socket-weld



112062 / 1/4" Cryogenic Break
2.1 Tube-Weld

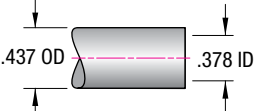
Figure-3 — Cryogenic 3/8 Inch Tube Diameter



3.1
tube-weld



3.2
socket-weld



112063 / 3/8" Cryogenic Break
2.2 Socket-Weld



112065 / 3/8" Cryogenic Break
3.1 Tube-Weld



112064 / 3/8" Cryogenic Break
3.2 Socket-Weld

Cryogenic Breaks are designed for transmission of cryogenic fluids at liquid nitrogen temperatures of -200°C. A maximum thermal gradient of 25°C per minute across break must be observed to prevent seal damage. Thin metal transitions provide flexibility at cryogenic temperatures and limited to a line pressure of 15 psig maximum.

Cryogenic Breaks — 5 and 10 kVDC / -200°C to 400°C / UHV to 1x10⁻¹⁰ Torr

Nominal Tube Size	Figure	Weld Configuration	Overall Length	Model Number	Part Number	Unit Price \$
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5 kVDC Isolation

1/8"	1.1	Tube	1.87	BRK-CRYO-125T	112060	69
1/8"	1.1	Tube	2.37	BRK-CRYO-125LT	112061	69
1/8"	1.2	Socket	2.37	BRK-CRYO-125S	112066	74

10 kVDC Isolation

1/4"	2.1	Tube	3.00	BRK-CRYO-250T	112062	105
1/4"	2.2	Socket	3.00	BRK-CRYO-250S	112063	105
3/8"	3.1	Tube	3.00	BRK-CRYO-375T	112065	142
3/8"	3.2	Socket	3.00	BRK-CRYO-375S	112064	142