PUMPKIN™
SPACE SYSTEMS
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DVC 2

Hardware Revision: A

Desktop Vacuum Chamber

Applications

- R & D
- Education
- Production
- Prototyping
- Test & Validation

Features

- Provides rapid access to device under test
- Small size yields economical operation
- Utilizes standard safety glass plate as cover, provides visual inspection of devices under test and RF transparency
- Monolithic aluminum base is hard-anodized for toughness and electrical insulation
- Three ISO KF NW16 standard access ports for vacuum, fluid, electrical and other feedthroughs
- Large interior volume to accommodates device under test, plus sensors, wiring and cabling, thermal components, etc.
- Suitable for roughing and HV applications
- Portable, with small footprint
- Standard O-ring sizes and simple glass lid simplify maintenance and reduce consumables costs
- Affordable

711-00934 shown as delivered

ORDERING INFORMATION

Pumpkin P/N	Configuration
711-00951	Natural Aluminum Base
711-00934	Hard-anodized Aluminum Base

Option Code	Configuration
/00 (standard)	With three capped ISO KF NW16 ports. Supplied with Viton® O-rings

Contact factory for availability of optional configurations.

CHANGELOG

Rev.	Date	Author	Comments
A	20130421	AEK	Initial release.

OPERATIONAL DESCRIPTION

Pumpkin's Desktop Vacuum Chamber DVC 2 incorporates many user-friendly features for enhanced versatility and performance over large and expensive traditional chambers, all in a manageable desktop form factor. Its relatively small volume permits rapid purging and evacuation of the chamber. The DVC1 use standard-size O-rings to help minimize operating costs. The clear glass lid permits visible evaluation of the device under test, and offers RF transparency. The base is available in a variety of materials for different applications.

The high emissivity of glass (ε = .93) and anodized aluminum (ε = .82) enable a considerable heat transfer from the external environment into the DVC 2.

For the outgassing and adsorption concerns of HV applications, the materials that form the chamber's interior are limited to:

- Lid: Glass
- Base: Aluminum (hard-anodized or natural)
- O-rings: fluorocarbon / Viton®, EPDM, or other user-provided materials

The DVC 2 base can be baked to remove residual water, etc. for applications requiring vacuum levels beyond 1 x 10^{-3} Torr.

Each DVC 2 base has three identical ISO KF NW16-size ports, to which feedthroughs and other vacuum components can be attached. ISO KF flanges use replaceable O-rings for sealing.

Each DVC 2 base is made from a single piece of monolithic material, with an isogrid pattern on the inner floor. As a result, the DVC 2 base is stable and strong. No welds or other joining methods are used.

ABSOLUTE MAXIMUM RATINGS

Parameter	Conditions / Notes	Symbol	Value	Units
Operating temperature	EPDM O-rings	$T_{A\ EPDM}$	-55 to +150	ºC
	Viton® O-rings	$T_{A\ VITON}$	-25 to +200	ºC
Thread length into ISO KF flange bolt circle holes			6	mm

MATERIALS & CONSTRUCTION

Parameter	Conditions / Notes	Value
Lid	Flat, polished, clear glass	Tempered, 12.0” x 17.25” x 0.5”
Base	Natural Aluminum	Aluminum 6061-T6
	Hard-anodized Aluminum	Aluminum 6061-T6, hard anodized (MIL-A-8625F Type III, Class I)[1]
O-rings		EPDM or Viton®

[1] Clear hard anodizing, followed by sealing via deionized water (DI).

PHYSICAL CHARACTERISTICS

Parameter	Conditions / Notes	Min	Typ	Max	Units
Exterior dimensions	Height		63.5		mm
	Width		304.8		
	Length		438.2		
Interior dimensions	Height (top of isogrid to bottom of glass lid)		38.1		
	Width		279.4		
	Length		409.7		
Total O-ring length	Lid O-ring and three ISO KF NW16 O-rings		158.8		cm
Interior surface area	Base		2155		cm^2
	Lid		1161		
Interior volume	Enclosed by base and lid		4850		cm^3
Mass	Aluminum base only		4120		g
	Glass lid only		5170		
	Complete assembly (base + lid) with all O-rings present and with ISO KF bolted bulkhead clamps sealing chamber via NW16 blanks		9500		

CONSUMABLE COMPONENTS

Parameter	Conditions / Notes	Specification
Lid	One per unit	Tempered glass with beveled edges, 12 x 17¼" (305 x 438mm), ½" (13mm) thick
Lid O-ring	One per base	AS568 - 283
ISO KF O-ring	One per feedthrough (three per base), for sealing ISO KF NW16 flanges	AS568 - 314

Also, see **Vacuum Ports / Feedthroughs**, below.

PERFORMANCE

Parameter	Final Vacuum	Conditions / Notes	Min	Typ	Max	Units
Pumpdown time[2]	<4 x 10^{-4} Torr	50l/s turbopump backed by 16m^3/h roughing pump evacuating a total volume of ca. 10l. Minimal bakeout.		4		min
	<4 x 10^{-5} Torr			8		hr
	<4 x 10^{-6} Torr			4		days

[2] For hard-anodized aluminum base.

SIMPLIFIED MECHANICAL LAYOUT [3]

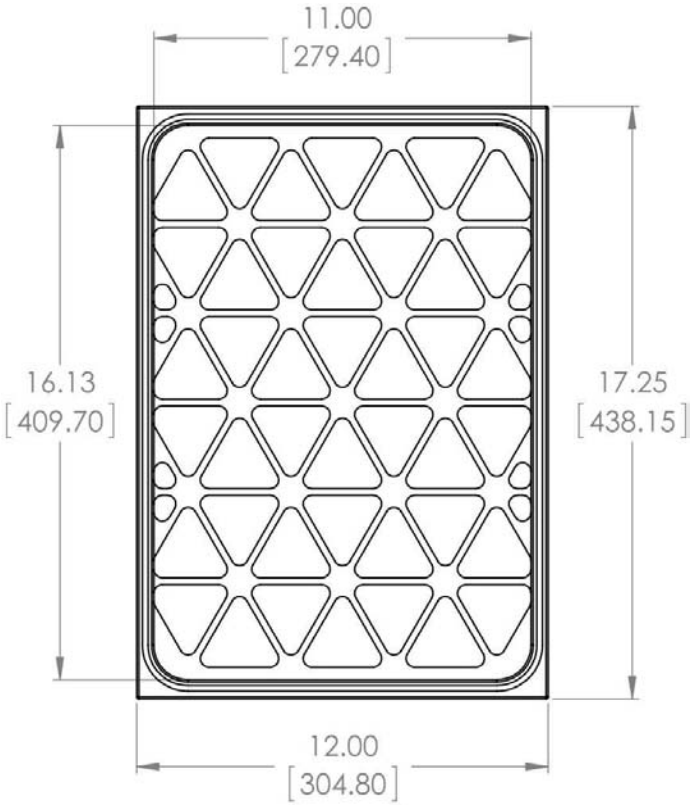

Figure 1: External and internal dimensions, top view.

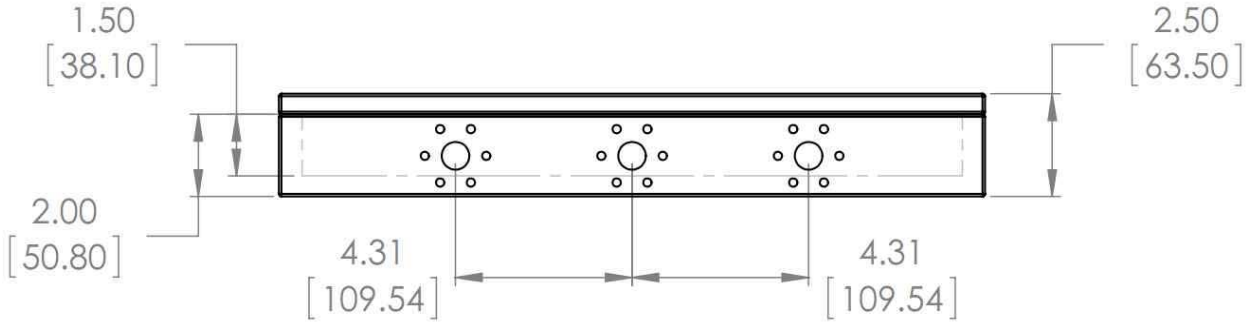

Figure 2: External and internal dimensions, side view, with glass lid, showing port spacing.

[3] Dimensions in inches [mm].

Vacuum Ports / Feedthroughs

Along one of its long sides the DVC 2 accepts three ISO KF NW16-size flanges via bolted bulkhead clamps (supplied). Each clamp is bolted to the DVC 2 via six M5-0.8x16 stainless-steel socket-head cap screws. Stainless-steel threaded M5 inserts are used in the DVC 2 body.

Figure 3: DVC 2 central ISO KF port with NW16-size vacuum valve (not included) attached via bolted bulkhead clamp and sealed via NW16 centering ring + O-ring

Each of the DVC 2's multipurpose side ports can be used as a vacuum port, an electrical feedthrough, a fluid feedthrough, a purge line, etc. Each bolted bulkhead clamp holds an ISO KF NW16-size fitting and seals it to the DVC 2 via an ISO KF NW16-size centering ring and matching O-ring. The hardware supplied with these ports is listed below. As ISO KF fittings are standardized, similar parts from other manufacturers may also be compatible.

Description	Conditions / Notes	Supplier / Manufacturer	P/N
Bolts for bulkhead clamps	M5-0.8x16 Socket Head Cap Screw (SHCS), stainless steel (SST)	Generic, e.g. McMaster-Carr	91292A126
Bolted bulkhead clamp	NW16, aluminum, two C-shaped sections each with three bolt holes on a 1.50" bolt circle[4]	MDC Vacuum Products LLC[5]	716000 REF# K075-BC
Centering ring	NW16, stainless steel (supplied with Viton® O-ring)		716000 REF# K075-CR
Replacement O-ring	NW16, Viton®		711000 REF# K075-O
	NW16, Buna-N		711021 REF# K075-OB
	NW16, Silicone		711006 REF# K075-OS
Blank (cap)	NW16, SST		712000 REF# K075-B

Important Note: If purchasing replacement bolted bulkhead clamps from MDC, discard the supplied 10-32x5/8" bolts -- the DVC 2 uses metric M5 screws to hold the bulkhead clamps in place.

[4] Supplied with six 10-32x5/8" bolts and matching washers.
[5] http://mdcvacuum.com .

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