

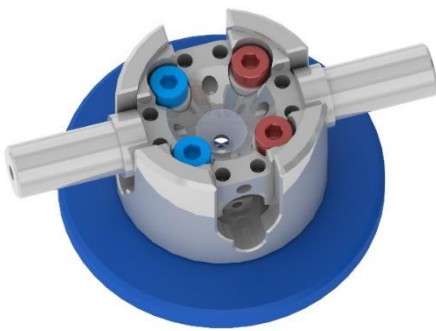


## Mini-BX80 Diamond Anvil Cells (DAC)

### Model Mini-BX80

The Mini-BX80 is a compact symmetric piston-cylinder type DAC with split piston and cylinder. It is an upgraded and optimized version of the Mini-BX90 DAC described in the paper: [BX90: A new diamond anvil cell design for X-ray diffraction and optical measurements by Kantor, I. et al. Rev. Sci. Instrum. 83, 125102 \(2012\).](#)

The main features of the Mini-BX80 DAC are compact size (OD = 39 mm), up to 80 degrees of symmetric X-ray opening (depending on diamonds and seats), short working distance, high stability and flexibility in accepting different diamond + seat combinations. These features make the Mini-BX80 DAC suitable for the whole range of techniques from optical spectroscopy (such as Raman and Brillouin) to single crystal X-ray diffraction and total scattering measurements. In particular the DAC is very suitable for double sided laser heating systems with short distance between optical elements of the laser heating systems (e.g. <42 mm between mirrors at 13-IDD station at GSECARS / APS), even in a special cryostat with remote membrane pressure control.



The DAC can be used with many diamond / seat combinations with total diamond + seat thickness from ~10 mm to ~15 mm. The typical combinations are 80 degrees conical Boehler-Almax (BA) diamond with 4.5 mm high seat, 70 degrees BA diamond with 5.5 mm seat and "Standard"/Drukker diamond with flat WC/cBN seat up to 5.3-6.0 mm high. The maximum symmetric X-ray angle of 80 degrees can be achieved with 4.5 mm high BA seats with 80 degrees BA diamonds. Modifications with larger openings, up to 115 degrees, are possible.

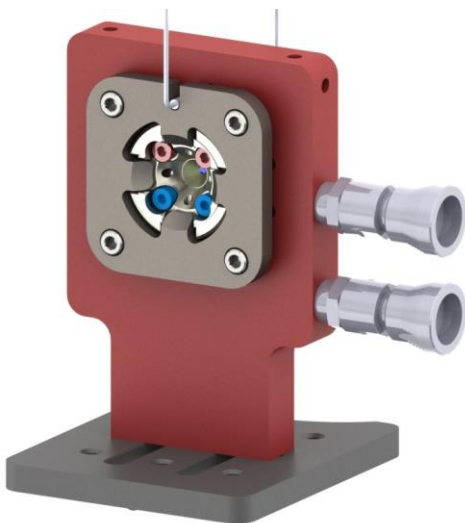
Please note that the DAC does not have a diamond tilt mechanism and thus it will only work properly if the diamond culets are parallel to the bases of the diamond seats. With proper diamond culet (<250  $\mu\text{m}$ ), diamond alignment, and sample preparation the DAC can be routinely used in sub-Megabar and Megabar pressure range.

The DAC can be readily loaded with compressed gas pressure transmitting medium (He, Ne, Ar, etc.) – appropriate gas loading gearboxes have been developed by DACTools for GSECARS, CIW, and Top Industrie types of high pressure gas loading systems.



The DACs allows for multiple ways of pressure control – either with screws, mechanical gearboxes, or with single or double membranes (see e.g. [Sinogeikin et al., Rev. Sci. Instruments 86, 072209, 2015](#)). The DAC can be preloaded to starting pressure with four M4 screws (typically two left-handed and two right-handed) and then engaged with remote pressure control device.

The DAC can be supplied as stand-alone version, with a single membrane enclosure (2.0" or 1.5" OD membrane) or double-membrane pressure frame both of which provide up to 80 degrees real symmetric X-ray and optical opening with proper choice of membranes (as well as diamonds and seats). Note that even with the membrane canister the working distance on each side of the DAC is less than 20 mm even when the total height of diamonds + seats is at maximum (15 mm).



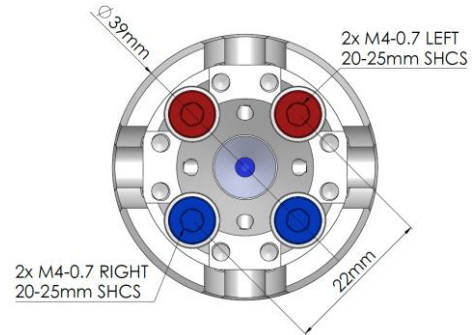


# Specifications of Mini-BX80 Diamond Anvil Cells (DAC)

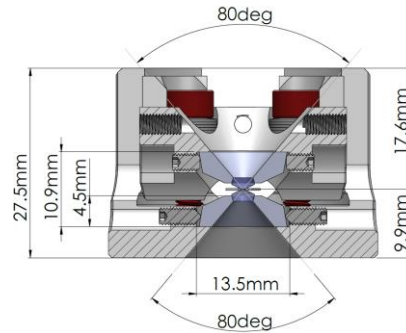
## Main DAC Specifications

- Height: ~27.5 - 31.0mm
- Diameter: 39.0 mm
- Working distance: ~9.9-12.1 mm
- Mass: ~ 150 g
- Optical / top angle: 80° max.
- X-ray angle (max): 80° symmetric max.
- DAC material: *Stainless Steel 440C or Vascomax C300/C350 Tempered to HRc ~55*
- Seats: *BA60 Tungsten carbide (typ.), BA30 Vascomax, Flat WC and cBN*
- Screws: *M4, 2RH+2LH (all RH optional), 15-25 mm long.*
- Screw position: *4x 90° apart on 22 mm BCD*
- Spring washers: *8.0 mm OD, 4.2 mm ID, 0.4 mm thick (typical)*
- Diamond seat diameter: *12.5 – 13.0 mm (13.4 mm max)*
- Range of heights of two seats+diamonds: *10.2 – 15.0 mm*

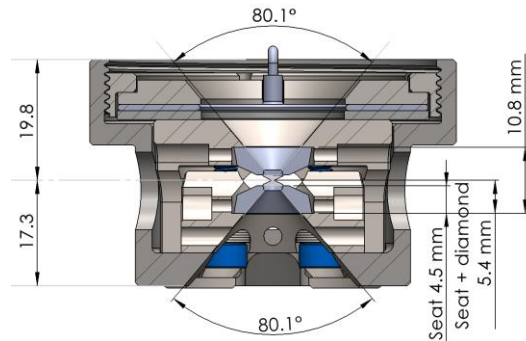
## DAC Dimensions



### BA 80° diamonds/seats

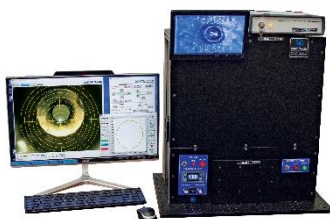


### 80 degrees diamonds, membrane can



## Related Equipment

Laser drilling systems



Ruby pressure systems



Membrane P Control



For more information please visit <http://dactools.com/diamond-cells>