



DETECTORS

Retractable™

Cryostats

Retractable cryostats provide a means of moving the detector element in relation to the sample with both under vacuum.



FEATURES

- Variable geometry
- Windowless operation
- UHV compatible
- Rugged and reliable
- Use with Si(Li) or Ge detectors

DESCRIPTION

These retractable cryostats from Mirion are used with Si(Li), LEGe™, and Ultra-LEGe™ detectors in x-ray applications. Retractable cryostats provide a means of moving the detector element in relation to the sample with both under vacuum. They also make it possible to operate the detector in windowless mode, i.e. without a window (absorber) between the detector element and the sample.

As with any detector that is not permanently sealed, care must be exercised in using windowless detectors to avoid contamination of the detector element. The vacuum chamber to which the detector is attached must be clean and dry and under good vacuum before the gate valve is opened. Under no circumstances is the detector to be exposed to atmosphere while it is cold. Damage to detectors caused by contamination is not covered under warranty.

The following standard models are available:

Model	Description
7905-R	Retractable unit with conventional window and sliding O-ring seal.
7905-WR	Windowless retractable unit with sliding O-ring seal.
7905-BWR	Windowless retractable unit with metal bellows seal.

The 7905-R provides variable geometry and vacuum chamber operation only. This cryostat comes with a conventional window. Refer to the relevant detector spec sheet for window options.

The 7905-WR provides variable geometry as well as windowless operation. An integral gate valve allows the detector to be retracted and sealed while the sample chamber is serviced. When the sample chamber is re-evacuated, the gate valve is reopened to admit the detector.

The 7905-BWR is similar to the 7905-WR. Instead of a sliding O-ring seal, however, it has a flexible metal bellows which extends to provide detector movement. This version is preferred for UHV applications as outgassing properties are more favorable than that of a sliding O-ring seal. Of course, the Dewar and internal cryostat hardware are a source of outgassing in windowless systems but the cryogenic absorber used in the Dewar is fairly effective at pumping into the 10^{-4} – 10^{-5} Torr (133 – 13.3 kPa) pressure range and users report using such detectors successfully in vacuum systems operating at 10^{-8} Torr (13×10^{-5} Pa) or lower pressures.

Both the 7905-WR and 7905-BWR cryostats are factory equipped with a removable 1 mil Be window. This allows the user to check out the detector before exposing it to a foreign atmosphere. Once the detector is checked out and found to be operating properly, the window assembly can be removed. At this time the user becomes responsible for the welfare of the detector. The window assembly may be left in place indefinitely should the application not require windowless operation. These models are also equipped with a seal-off valve and detachable valve operator. This valve is located in a mini-conflat flange near the gate valve. It provides a means of pumping the space occupied by the gate valve and bellows or sliding seal when the beryllium window is in place and for evacuating the entire cryostat assembly when the beryllium window is removed.

Detectors operating in windowless mode can pick up water vapor and other condensable contaminants from the user's vacuum system. Water vapor will freeze on the detector assembly, building up an ice layer which attenuates low energy photons. It isn't good for the detector element either. The 7905-WR and the 7905-BWR are equipped with an internal heater and temperature sensor which allow the user to warm up the detector assembly and evaporate the ice without emptying the cryostat. The heater has a resistance of 1325 ohms and accepts up to 10 watts of power at 115 V ac. The temperature sensor is a 100 ohm platinum resistance temperature detector (PRTD). Care must be exercised in using this feature to avoid overheating the detector assembly. Depending on conditions, deicing can be done in as little as four hours or so.

Some variations on the standard designs shown on the next page are practical while others are not. For example, it is practical to increase or decrease the stroke, to substitute a 15 liter Dewar, or to change the vacuum flange (conflat 2 3/4 in. is shown). It is not, however, practical to install a detector of greater than 80 mm² (Si(Li)) or 100 mm² (LEGe or Ultra LEGe) active area. Consult the factory for price and availability of any modifications you require.

Other (than 1 mil) removable vacuum windows and removable contamination shields are available. The former make it possible to convert a windowless detector to windowed for applications not requiring extremely low energy response. The latter is a ultrathin window (not vacuum tight) which reduces the potential for contamination between the detector and the user's vacuum chamber.

Consult the factory for more information on these options.

