MIRION TECHNOLOGIES

Radiation Safety. **Amplified.**

Cryo-Cycle™ II

Hybrid Cryostat

Nuclear | Healthcare | Homeland Security & Defense | Labs and Education | Industrial and Manufacturing

KEY FEATURES

- LN_2 redundancy
- Non-CFC/non-flammable refrigerant
- Low power demand
- Same footprint as standard LN_2 Dewar
- Long life Pulse-Tube cooler Lifetime (L5) >75 000 hours of continuous operation
- Remote read-out and control
- Low vibration/low electrical noise
- Available in dipstick and integral configurations
- 2-year full warranty + pro-rated warranty on the cooler

BENEFITS

- Low operating cost
- Higher up-time
- Field installable (dipstick version)
- Quiet
- No compromise on detector specifications

DESCRIPTION

The CANBERRA Cryo-Cycle™ II is a unique offering in the field of cryogenically cooled radiation detectors. The Cryo-Cycle II is described as a “hybrid” cryostat because it combines the advantages of electric cooling with the reliability of liquid nitrogen. The long-life Pulse-Tube cryocooler, condenses the boil-off N_2 gas back into the 25 liter Dewar. This unique capability provides the convenience of operating a detector for 12 to 18 months before LN_2 needs to be added, but at the same time keeps the detector cold in case of power failure. With the Cryo-Cycle II the LN_2 supply keeps the detector cold for up to one week without power. There is no interruption of cooling. There is no down-time due to partial warm-up as long as LN_2 level is maintained. There is no risk of detector failure because of temperature cycling. LN_2 lost during power outages may be replenished at any time.

The Cryo-Cycle II comes with a number of improvements allowing us to answer our customers’ requirements even better.

Key Improvements

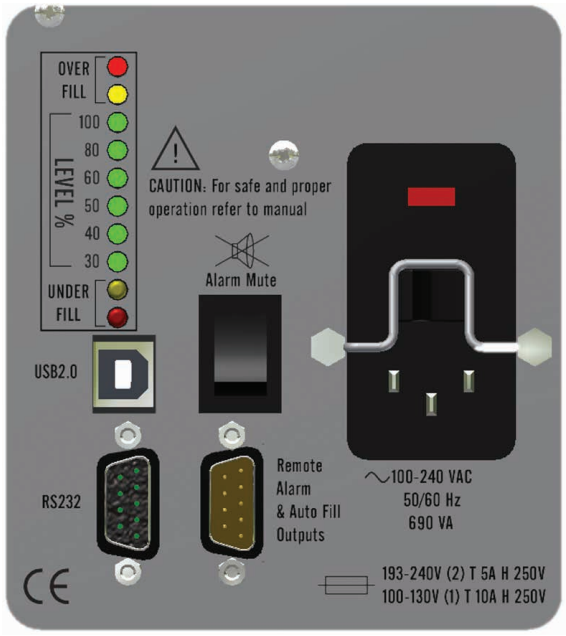
- Reduced cooler vibrations
- Improved LN_2 level sensor probe
- Single front panel
- RS-232 and USB interfaces
- Alarm and autofill relay outputs
- A Graphical User Interface (GUI)

The audible noise has been reduced to less than 60 dB(A), measured at 1 m distance, making the Cryo-Cycle II well suited for application in quiet laboratory environments.

The new LN_2 level sensor probe provides better accuracy. The measured LN_2 level is displayed through a continuous LED indicator scale on the front panel, allowing to better schedule periodic refills.

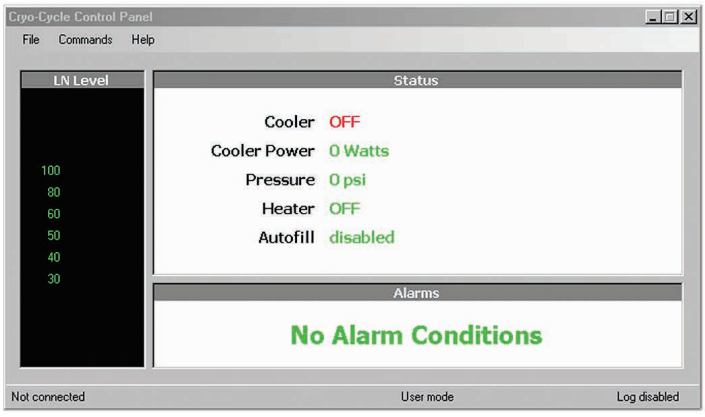
CANBERRA

All controls, connectors and indicators are integrated in a single front panel for easy access. The Cryo-Cycle II contains an auto-ranging power supply at 100-240 V and 50-60 Hz. The front panel is equipped with a DB9-M, a RS-232 and a USB connector. The DB9-M is a relay output for system status alarms and autofill functions. The serial connectors are used to connect to a PC. A dedicated GUI allows remote control and status monitoring.



Cryo-Cycle II front panel layout

The GUI is available through a Windows®-based software application, provided with the Cryo-Cycle II. This application needs to be installed on a PC connected to the Cryo-Cycle II through the USB or RS-232 serial ports. Minimum operating system requirements are Windows XP (SP3) or Windows 7.



Screenshot of the Cryo-Cycle II control panel application

The application can be operated in User mode or in Supervisor mode. The User mode only allows status and parameter monitoring, while the Supervisor mode, which can be password protected, allows access to the available commands. The displayed parameters and status indications can be continuously logged to a user-selectable .txt-file, saved on the PC's hard drive. Also each Cryo-Cycle II can be given a system name, allowing easy identification when multiple systems are monitored through the same PC. This name will be displayed in the application's title bar.

The Cryo-Cycle II is designed to accommodate both dipstick and integral configurations. Dipstick versions can be installed in the field, while integral versions must be assembled at the factory.

Due to the improved microphonics performance of the Cryo-Cycle II, when it is sold with a new CANBERRA detector, there will be NO degradation of the detector's resolution performance as stated on the detector's specification sheet. If the dipstick version is installed on older CANBERRA detectors some degradation of resolution performance may occur, depending on the age and configuration of the detector. CANBERRA guarantees no resolution degradation at energies above 500 keV and a maximum of 10% between 100 and 500 keV. Performance is not guaranteed below 100 keV. For detectors not manufactured by CANBERRA, resolution performance cannot be guaranteed.

The highly reliable and efficient Pulse-Tube cooler (lifetime of >75 000 hours) used in the Cryo-Cycle II contains a CFC free and non-flammable gas. The cooler is hermetically sealed, so no gas-refill is required. The compressor contains no oil or lubricant, so no contamination of the refrigerant occurs and no periodic filter/dryer exchange is required. This makes the Cryo-Cycle II virtually maintenance free. The nominal power consumption is very low (250 W), with a maximum of 450 W in transient operation. The Cryo-Cycle II is designed to operate between 10 ˚C and 35 ˚C.

CANBERRA's confidence in the Cryo-Cycle II is demonstrated by the two year full warranty on the complete system (detector included when purchased together) and an additional pro-rated warranty on the cooler. If the cooler fails after the second year, it will be repaired or replaced at 40, 60 or 80% of the list price in year three to five respectively. This pro-rated warranty applies to parts only.

SPECIFICATIONS

PERFORMANCE

- CANBERRA guarantees detector performance as warranted by detector model with cooler in operation (on new detectors purchased with Cryo-Cycle II).
- LN_2 loss rate <3 liters/day typically (with cryocooler OFF).
- MAINTENANCE – Cleaning as required to keep air flow unrestricted.
- LEVEL INDICATORS – Linear LED scale on front panel.

CONNECTORS

- USB 2.0 – Remote control and status read-out.
- RS-232 – Remote control and status read-out.
- DB9-M – Relay output.

COOLING

- Forced air (internal fans).

POWER REQUIREMENTS

- 100–240 V ac, 50–60 Hz, 690 VA max. (auto ranging power supply).
- FUSE – (2) T 5 A 250 V (193-240 V ac Operation). FUSE – (1) T 10 A 250 V (100-130 V ac Operation).
- NOMINAL POWER CONSUMPTION – -250 W.

PHYSICAL

COLD HEAD (EXCLUDING DETECTOR CHAMBER)

- DIMENSIONS – 43.2 cm (17 in.) diameter x 61.0 cm (24 in.) high.
- WEIGHT – 28.2 kg (62 lb) empty, without detector.
- DEWAR-CAPACITY – 25 liters.

ENVIRONMENTAL

- OPERATING TEMPERATURE – +10 to +35 °C (50 to 95 °F) on standard models and configurations.
- OPERATING HUMIDITY – RANGE: 20% to 80% relative non-condensing.
- Meets the environmental conditions specified by EN 61010, Installation Category I, Pollution Degree 2.

SOFTWARE

- SYSTEM REQUIREMENTS – Windows XP (SP3) or Windows 7 (32-bit).
- .NET framework 3.5 (will be installed if not present, requires internet connection).

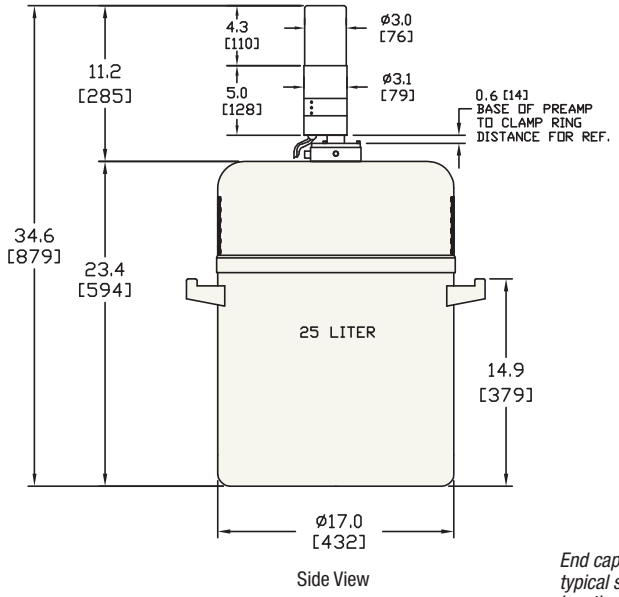
AVAILABLE DETECTOR MODELS

- Cryo-Cycle II can be ordered with all standard GC-, GX-, GR-, BE-, and GSW-detector models (see applicable detector specification sheets for details).

ORDERING INFORMATION

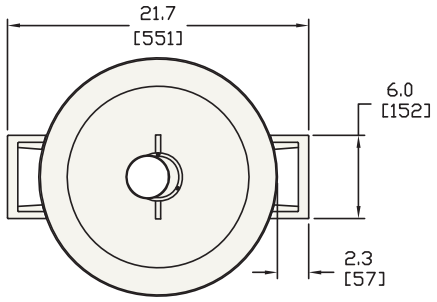
Model	Description
CCII-VD	Cryo-Cycle II for model 7500SL or 7500
CCII-HD	Cryo-Cycle II for model 7600SL or 7600
CCII-VI-SL	Cryo-Cycle II vertical integral Slimline
CCII-VI-F	Cryo-Cycle II vertical integral Flanged
CCII-HI-SL	Cryo-Cycle II horizontal integral Slimline
CCII-HI-F	Cryo-Cycle II horizontal integral Flanged
CCII-HI-U	Cryo-Cycle II horizontal U-Style

CRYO-CYCLE II WITH VERTICAL DIPSTICK CRYOSTAT (CCII-VD)



Side View

Cryo-Cycle II with 7500SL cryostat

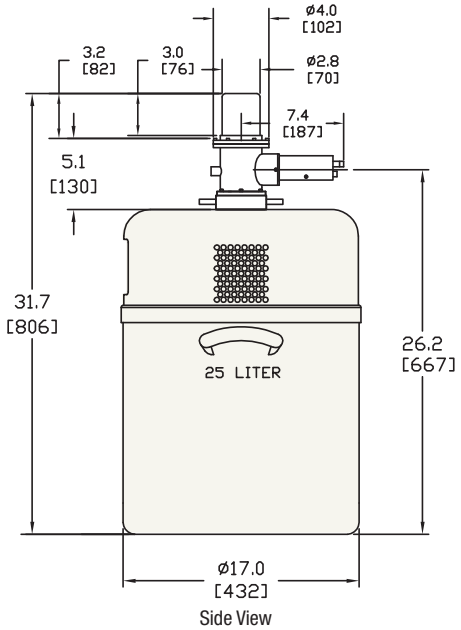


Top View

End cap dimensions depend on detector size. The tables below show the typical surface area or efficiency range vs. end cap diameter. End cap lengths are also greater for larger detectors. Consult the factory if end cap size is critical in your application.

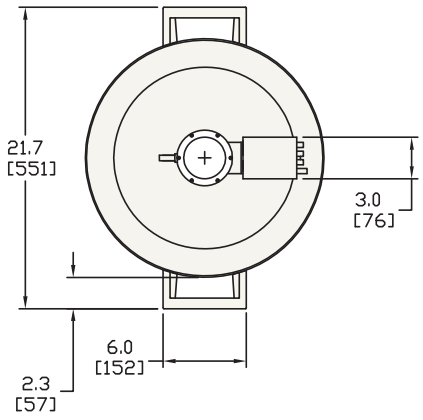
LEGe/BEGe, Nom. Area (mm^2)	End Cap Diameter, mm [in.]
=<2000	76 [3.0]
2800	83 [3.25]
3800	89 [3.50]
5000	102 [4.0]
6500	114 [4.50]

Coax Rel. Efficiency (%)	End Cap Diameter, mm [in.]
=<40	76 [3.0]
40-50	83 [3.25]
50-70	89 [3.50]
70-100	95 [3.75]
100-120	102 [4.0]
120-150	108 [4.25]
150	114 [4.50]



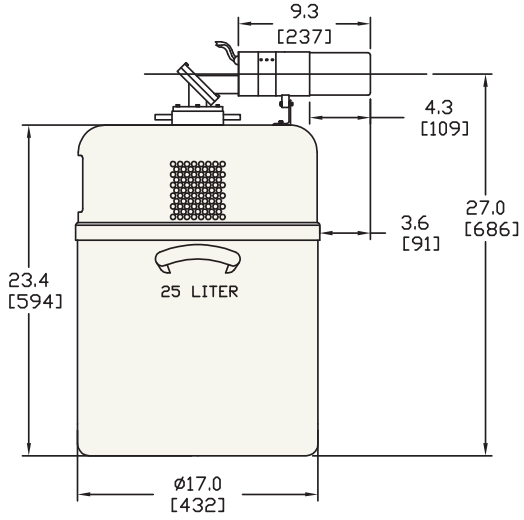
Side View

Cryo-Cycle II with 7500 cryostat



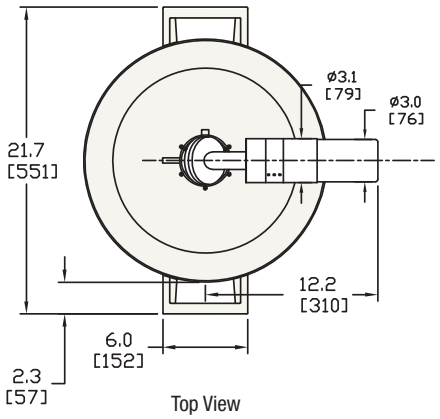
Top View

CRYO-CYCLE II WITH HORIZONTAL DIPSTICK CRYOSTAT (CCII-HD)

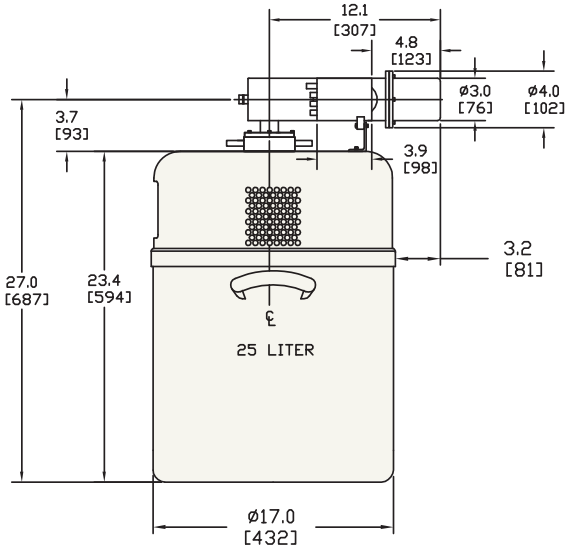


Side View

Cryo-Cycle II with 7600SL cryostat

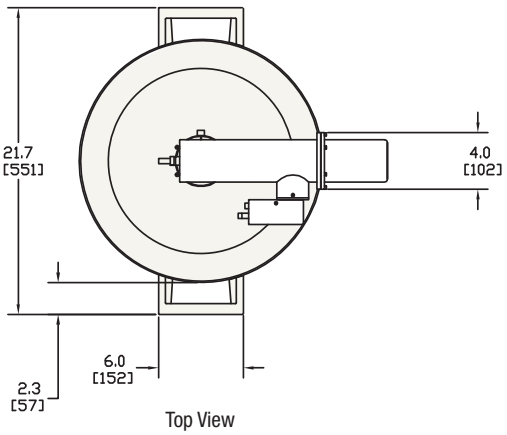


Top View



Side View

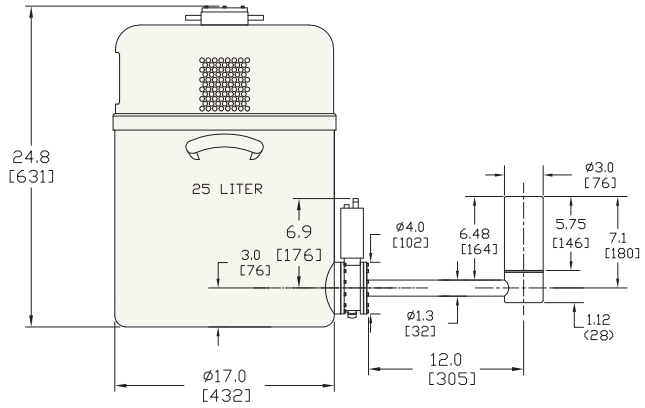
Cryo-Cycle II with 7600 cryostat



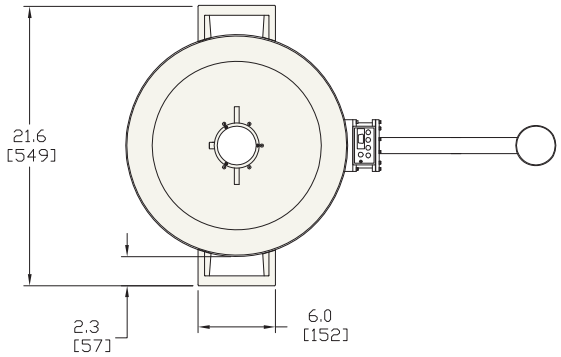
Top View

CRYO-CYCLE II WITH HORIZONTAL INTERAL CRYOSTATS

Cryo-Cycle II Horizontal Integral U-Style (CCII-HI-U)

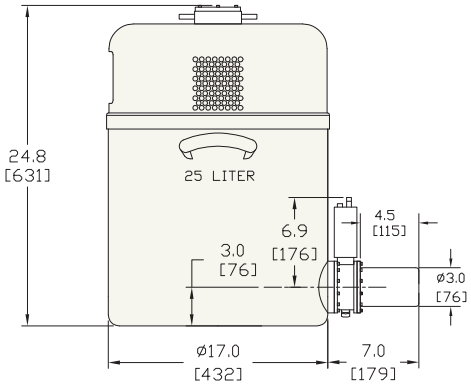


Side View

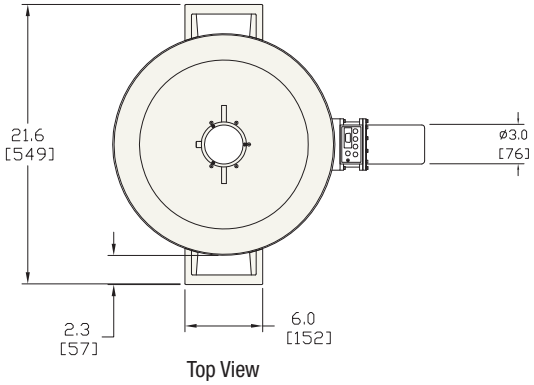


Top View

Cryo-Cycle II Horizontal Integral Flange Style (CCII-HI-F)

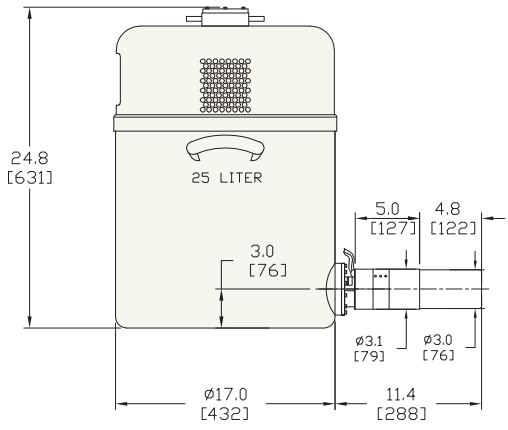


Side View

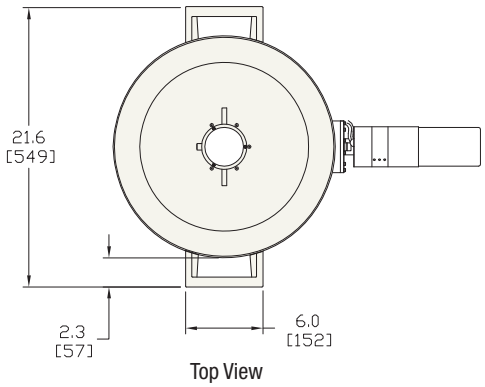


Top View

Cryo-Cycle II Horizontal Integral Slimline Style (CCII-HI-SL)



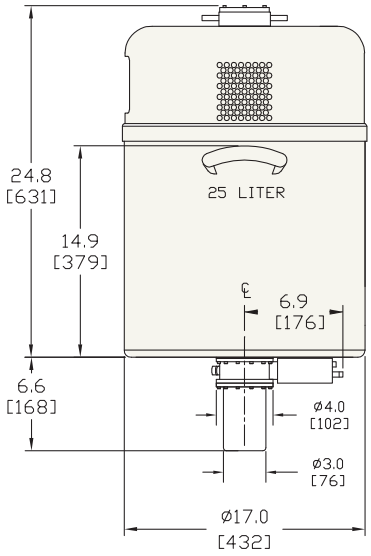
Side View



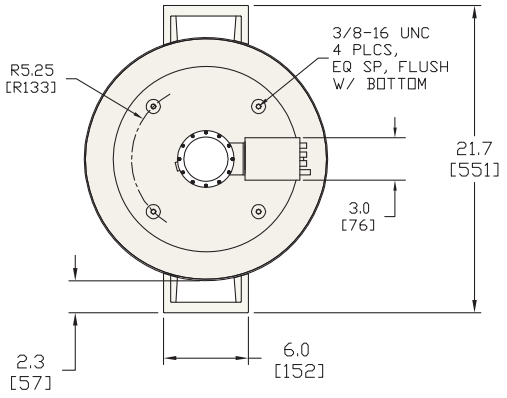
Top View

CRYO-CYCLE II WITH VERTICAL INTEGRAL CRYOSTATS

Cryo-Cycle II Vertical Integral Flange Style (CCII-VI-F)

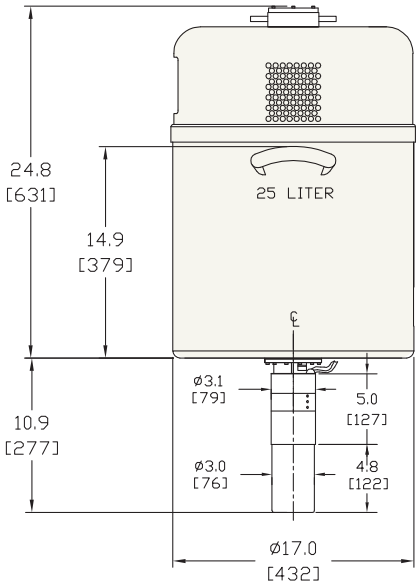


Side View

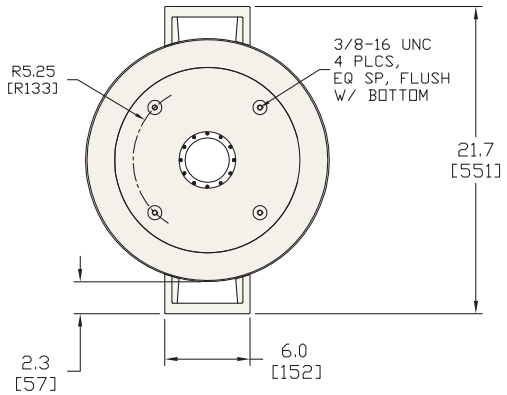


Bottom View

Cryo-Cycle II Vertical Integral Slimline Style (CCII-VI-SL)



Side View



Bottom View

CANBERRA