

Premium detector resolution and LN₂-free operation,
for excellence in performance, safety, reliability and value.



- Supports a wide range of ORTEC detectors — GEM, GMX, PROFILE
- LN₂ free operation
- AVC[™] vibration cancellation technology
- Multi-orientation operation
- Wide operating temperature range (up to 40°C)
- Quiet, less than 55 dBA at 1 meter

ICS

Integrated Cryocooling Systems

Introduction

ORTEC's newest integrated, mechanically cooled system for HPGe radiation detectors exploits the latest generation in cryogenic technology to provide LN₂ free operation with premium detector performance. ICS is available in three versions to support a wide selection of detector models.

ICS-E and ICS-HJ models incorporate a unique, hardened cryostat, for superior integrity, reliability, and operational performance. This feature allows instant recovery after a loss of power, eliminating the need to fully thermal cycle the detector in the event of a partial warm-up.

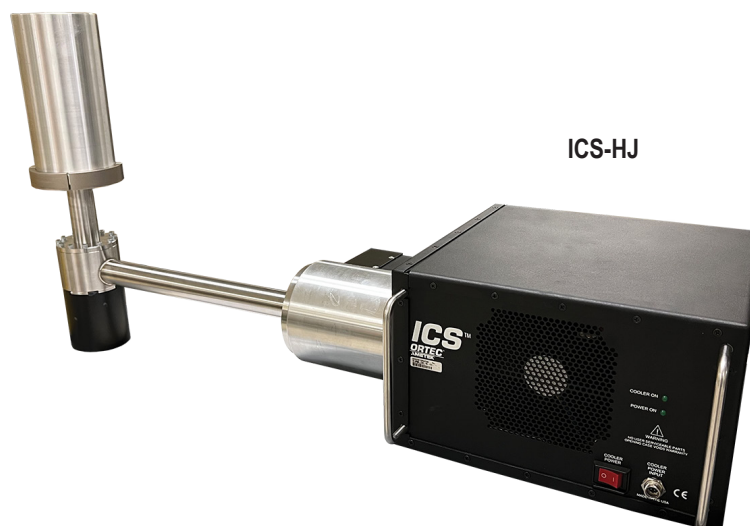
ICS-P4 (PopTop® model), uses a conventional cryostat, which provides full compatibility with ORTEC PopTop detector capsules, and can be used with either new detectors or in-field upgrades.

All ICS versions are highly reliable, maintenance free, mechanically cooled cryostats that deliver superior performance for HPGe radiation detectors. Using Sunpower's industry proven Stirling cooler, ICS is more efficient and reliable than Pulse Tube designs. Increased efficiency means improved cooling with proportionally less heat generation and lower power consumption. With a cooler Mean-Time-To-Failure (MTTF) of over 200,000 hours, ICS operational reliability is unmatched.

All ICS models incorporate AVC™ (Active Vibration Cancellation) technology, and are designed to virtually eliminate vibrational and audible noise levels. This provides resolution performance comparable to LN₂ cooled systems in all operational orientations, making it the choice for customers seeking premium resolution and versatility in a vast array of HPGe applications.



ICS-E



ICS-HJ



ICS-P4

Sunpower is a product line of AMETEK Advanced Measurement Technology (AMT), a part of AMETEK's Materials Analysis Division (MAD).

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Integrated Cryocooling Systems

Benefit	Feature
Performance <ul style="list-style-type: none"> • Resolution • Versatility • Environmental Friendly 	<ul style="list-style-type: none"> • Supports a wide range of ORTEC detectors — GEM, GMX, PROFILE • LN₂ free operation • AVC™ technology • Multi-orientation operation • Wide operating temperature range (up to 40°C) • Quiet, less than 55 dB at 1 meter
Safety	<ul style="list-style-type: none"> • LN₂ free operation
Reliability	<ul style="list-style-type: none"> • Full 2-year warranty on the cryocooler • Long service life, MTTF >200,000 hours cooler
Cost Effective <ul style="list-style-type: none"> • Low Cost of Ownership • Availability • Compatibility 	<ul style="list-style-type: none"> • LN₂ free operation • Low power consumption (Sunpower cooler) • Long service life, MTTF >200,000 hours cooler • No maintenance (no gas lines or filters) • Vacuum hardened cryostat (no molecular sieve, no need for thermal cycling on ICS-E and ICS-HJ models) • Small footprint and light weight (integrated controller, no external box) • Selectable cooling rod length at the time of the order (ICS-E models only)

Spectroscopic Performance

Warranted detector resolution (FWHM) at energies greater than 100 keV is unaffected.

At energies less than 100 keV, warranted FWHM limit is increased by 10% versus the warranted value for a liquid nitrogen cooled system.

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Typical Applications

- **Commercial, Government and Environmental Labs** – ICS is a superb choice due to no compromise of resolution performance and low audible noise. There is no requirement for refilling the LN₂ on a regular basis, providing increased cost savings, detector availability, and minimizing work hazard.
- **Nuclear Power and Industrial Plants** – ICS-E and ICS-HJ provide an advantage in deployments where power failures are frequent. The hardened cryostat increases detector availability by eliminating the need for thermal cycling and reduces equipment down time. With no need for regular maintenance and LN₂ filling, personnel spend less time in radiation “hot” zones. The compact size allows easy installation into new or existing counting setups.
- **Research and Education** – Similar to Lab applications, ICS is an excellent choice due to no compromise of resolution performance and low audible noise. No need for LN₂ gives ICS a low cost of ownership.
- **Waste Management and Field Remediation** – Hardened cryostat version makes ICS an excellent choice for applications requiring maximum “up time”. PopTop cryostat version allows field upgrades/replacements of existing detectors.
- **Health Physics** – Low heat generation, low audible noise and no compromise on resolution performance give ICS an edge for HPGe systems in the field of health physics, whether as an upgrade or as a new HPGe system.
- **Homeland Security and Safeguards** – ICS is an unmatched solution in these applications due to a combination of unique features: the hardened cryostat, which eliminates the need to fully thermal cycle the detector in the event of a partial warm-up, or PopTop cryostat, which allows field replacements/upgrades, and low power consumption.

Key Attribute	Major Market Benefits					
	Commercial, Government and Environmental Labs	Nuclear Power and Industrial Plants	Research and Education	Waste Management and Field Remediation	Health Physics	Homeland Security and Safeguards
Typical HPGe Type	GEM, GMX, PROFILE C and S	GEM, GMX, PROFILE C and S	GEM, GMX, PROFILE C, S, and SP	GEM, GMX, PROFILE S	GEM, PROFILE S and C	GEM, PROFILE S and SP
LN ₂ Free	✓	✓	✓	✓	✓	✓
LN ₂ -Like Resolution	✓		✓		✓	✓
High Reliability/ No Maintenance	✓	✓	✓	✓	✓	✓
Quiet Operation	✓		✓		✓	
Compact Size		✓		✓	✓	✓
Hardened Cryostat (ICS-E/ICS-HJ only)		✓		✓		✓
PopTop Cryostat (ICS-P4 only)		✓		✓		
Low Power Consumption					✓	✓
Wide Operating Temperature		✓		✓		✓
All Attitude Operation		✓		✓	✓	✓

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Integrated Cryocooling Systems

Specifications – Common for ICS-E, ICS-HJ, and ICS-P4

HPGe Compatibility	ORTEC GEM, GMX, and PROFILE detectors.
Cooler	AMETEK Sunpower with AVC™ (active vibration cancellation) technology.
All-Attitude Operation	Yes
Electrical Supply	100–240 V AC (50/60 Hz) auto ranging.
Low/Reduced Background Option	Yes
Audible Noise	Less than 55 dBA at 1 meter fully operational (at less than 30°C ambient).
Environmental	Temperature range: –10°C to 40°C. Vacuum Longevity*: >5 year @ 25°C.** Humidity: non-condensing. *Vacuum integrity can be restored with factory service. **Degrade by 0.3 year per °C in excess of 25°C.
Auxiliary Cooling	Internal fan (vented).
Backup Battery	ICS is compatible with uninterruptable power supplies (UPS).
Cooler Life	>200,000 hours.
Warranty	2 years on cryocooler, internal controller and active noise cancellation. 1 year on new detector and preamplifier.
CE	Conforms to CE standards for radiated and conducted emissions, susceptibility, and low-voltage power directives.
NRTL	Certification verifies, through OSHA-approved NRTL certification authority TÜV SÜD, that the product meets U.S. electrical safety standards (UL/ANSI).
Maintenance	No maintenance is required.
Stand Compatibility	Stand not included. Optional stand (ICS STAND 2) is available.

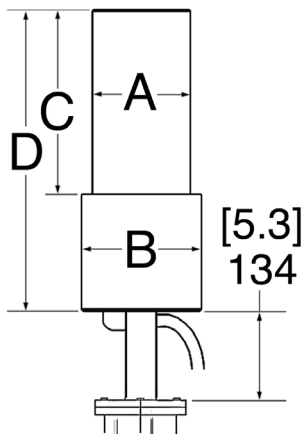
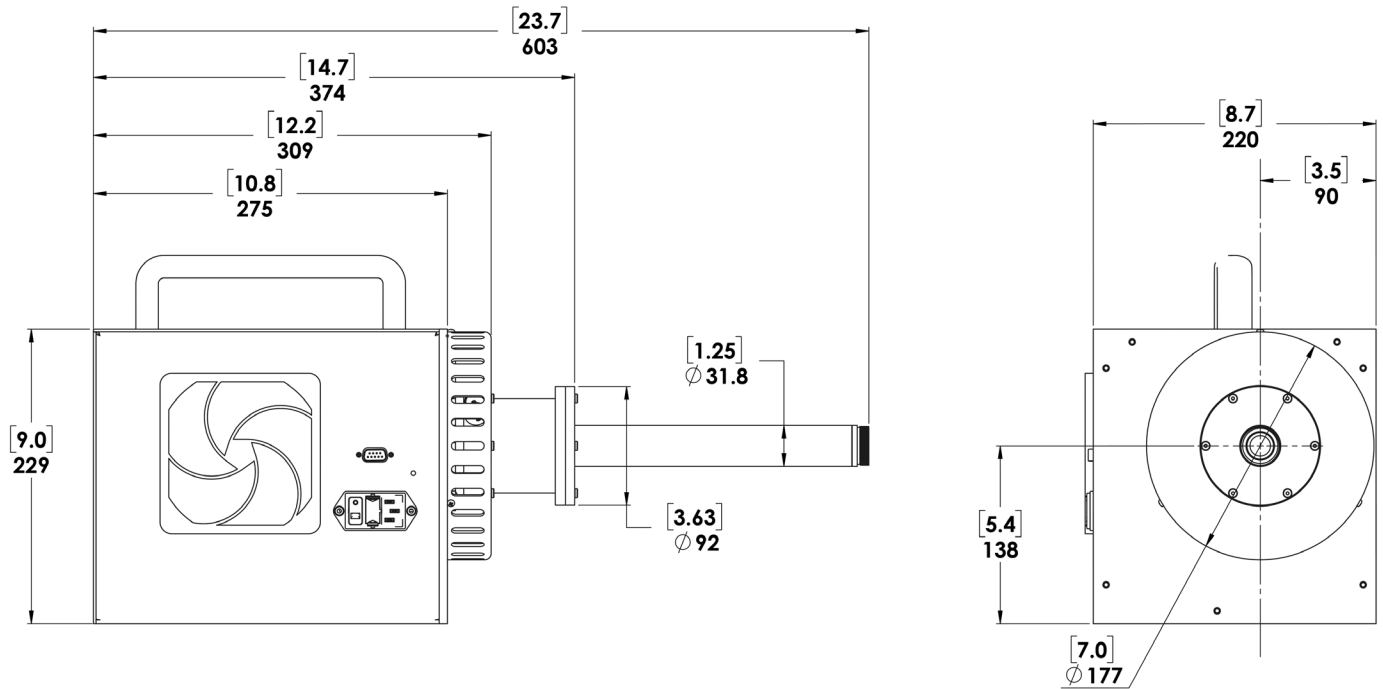
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Specifications – Unique for ICS-E, ICS-HJ, and ICS-P4

	ICS-E and ICS-HJ	ICS-P4
Hardened Cryostat	Yes	No
PopTop Compatible	No	Yes
Compatible Endcap Windows	Aluminum	Aluminum, Carbon Fiber
Molecular Sieve	No	Yes
Weight	31 lbs. (14 kg) excluding the detector.	28.5 lbs. (12.7 kg) excluding the detector capsule.
Typical Power Consumption (at room temperature)	70 W typical, 130 W maximum.	80 W typical, 200 W maximum.
Typical Cooldown Time <ul style="list-style-type: none"> • Small Detector (<40% rel. eff.) • Medium Detector (40–70% rel. eff.) • Large Detector (up to 100% rel. eff.) 	5 hours 6 hours 8 hours	6–8 hours 12–14 hours 14–18 hours
Status Display	ICS-E only 2 LED lights indicate status: POWER ON, COOLER ON. ICS-HJ only 3 LED lights indicate status: POWER ON, COOLER ON, STATUS (on preamp).	1 LED light indicate status: power on
Connectors	ICS-E only (includes detector cable set) Standard 1 ft (0.3 m) detector cable bundle comes from detector endcap. ICS-HJ only (connectors on preamp) (includes detector cable set) 6 each BNC (energy out, energy or timing out, HV Shutdown, test, temp, overrange). 1 each SHV cable (high voltage in). 1 each 9 pin (preamp power)	None (does not include detector cable set)

ICS-P4 Dimensions



ICS-P4 GEM, GMX, and PROFILE PopTop Detector Dimensions

- Dimensions are for reference only and subject to change.
- If dimensional constraints are critical, contact the factory.

Endcap Model (dia. mm)			-70	-76	-83	-95	-108
% Efficiencies available in this endcap size			0-20	25-40	45-55	60-110	120-150
Dim.	Unit	Tol.					
A	mm (in)	0.3 (0.01)	70 (2.75)	76 (3.0)	83 (3.25)	95 (3.75)	108 (4.25)
B	mm (in)	0.3 (0.01)	75 (2.95)	88 (3.45)	88 (3.45)	100 (3.95)	113 (4.45)
C	mm (in)	5 (0.2)	134 (5.3)	165 (6.4)	168 (6.6)	193 (7.6)	207 (8.2)
D	mm (in)	8 (0.3)	250 (9.8)	282 (11.2)	282 (11.2)	309 (12.2)	323 (12.7)

Ordering Information

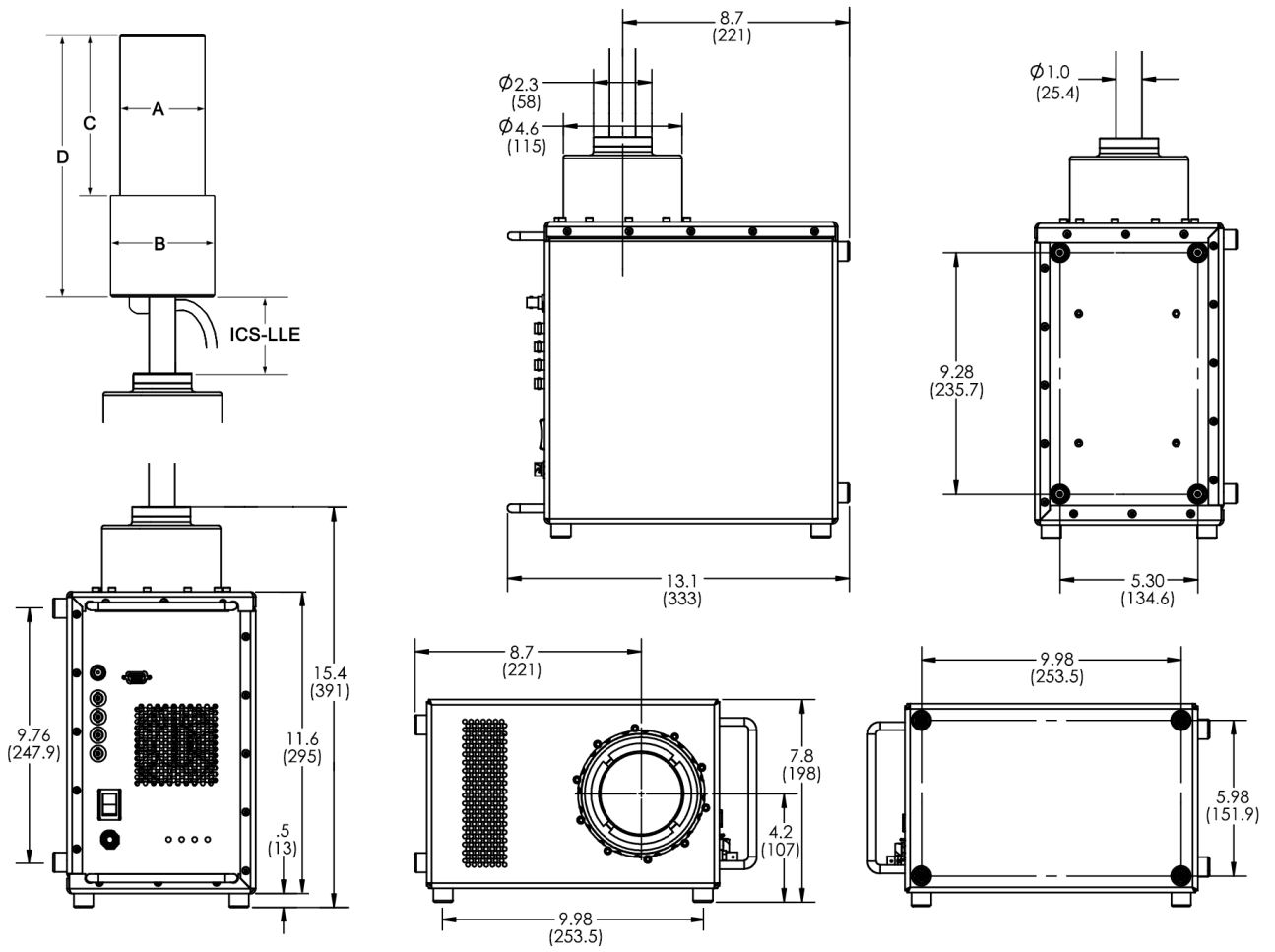
• For ICS-E and ICS-HJ, see the detector configuration guide of the detector of choice – GEM, GMX, or PROFILE.

Model	Description
CFG-ICS-P4	Integrated Cryocooling System for PopTop Detectors.

ICS

Integrated Cryocooling Systems

ICS-E Dimensions



DO NOT BLOCK AIR FLOW

ICS-E Detector Dimensions

- Dimensions listed in mm (inches) are for reference only and subject to change.
- If dimensional constraints are critical, contact the factory.

GEM and GMX Detectors							
Endcap Model (dia. mm)			-70	-76	-83	-95	-108
% Efficiencies available in this endcap size			0–20	25–40	45–55	60–110	120–150
Dim.	Unit	Tol.					
A	mm (in)	0.3 (0.01)	70 (2.75)	76 (3.0)	83 (3.25)	95 (3.75)	108 (4.25)
B	mm (in)	0.3 (0.01)	101 (4.0)	101 (4.0)	101 (4.0)	114 (4.4)	127 (5.0)
C	mm (in)	5 (0.2)	144 (5.7)	157 (6.2)	157 (6.2)	182 (7.2)	182 (7.2)
D	mm (in)	5 (0.2)	243 (9.6)	256 (10.1)	256 (10.1)	281 (11.1)	281 (11.1)
ICS-LLE	mm	3	Specify length. Choose from 025, 114, 139, 190*				

PROFILE S and SP Detectors					
Endcap Model (dia. mm)			-70	-83	-108
Dim.	Unit	Tol.			
A	mm (in)	0.3 (0.01)	70 (2.75)	83 (3.25)	108 (4.25)
B	mm (in)	0.3 (0.01)	101 (4.0)	101 (4.0)	127 (5.0)
C	mm (in)	5 (0.2)	127 (5.0)	127 (5.0)	127 (5.0)
D	mm (in)	5 (0.2)	226 (8.9)	226 (8.9)	226 (8.9)
ICS-LLE	mm	3	Specify length. Choose from 025, 114, 139, 190*		

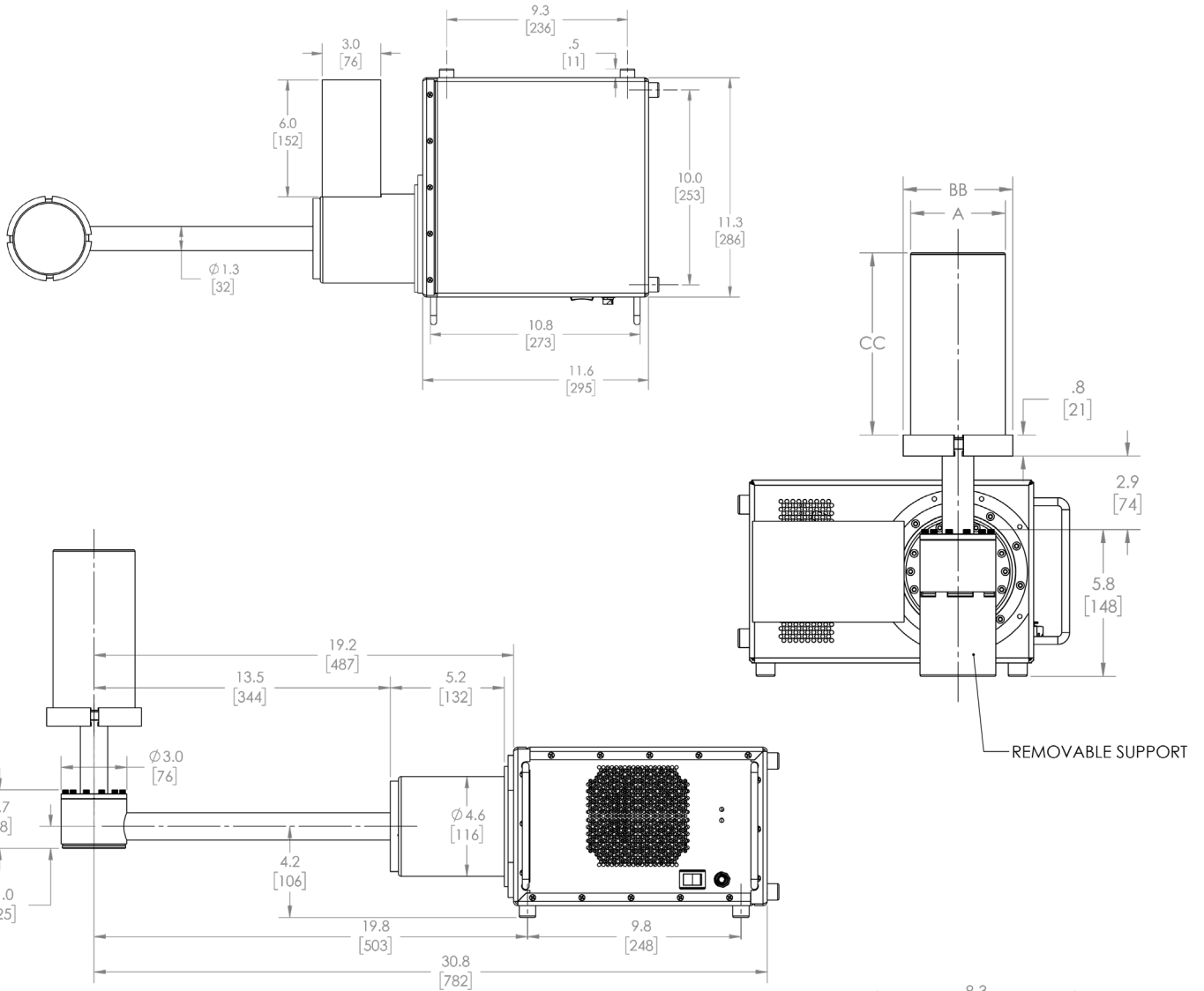
PROFILE M and C Detectors							
Endcap Model (dia. mm)			-70	-76	-83	-95	-108
% Efficiencies available in this endcap size			0–20	25–40	45–55	60–110	120–150
Dim.	Unit	Tol.					
A	mm (in)	0.3 (0.01)	70 (2.75)	76 (3.0)	83 (3.25)	95 (3.75)	108 (4.25)
B	mm (in)	0.3 (0.01)	101 (4.0)	101 (4.0)	101 (4.0)	114 (4.5)	127 (5.0)
C	mm (in)	5 (0.2)	144 (5.7)	157 (6.2)	157 (6.2)	182 (7.2)	182 (7.2)
D	mm (in)	5 (0.2)	243 (9.6)	256 (10.1)	256 (10.1)	281 (11.1)	281 (11.1)
ICS-LLE	mm	3	Specify length. Choose from 025, 114, 139, 190*				

*Recommended cooling rod length (ICS-LLE): 139 mm for use with 4" lead shield. 190 mm for use with 6" lead shield. Other lengths available by special order.

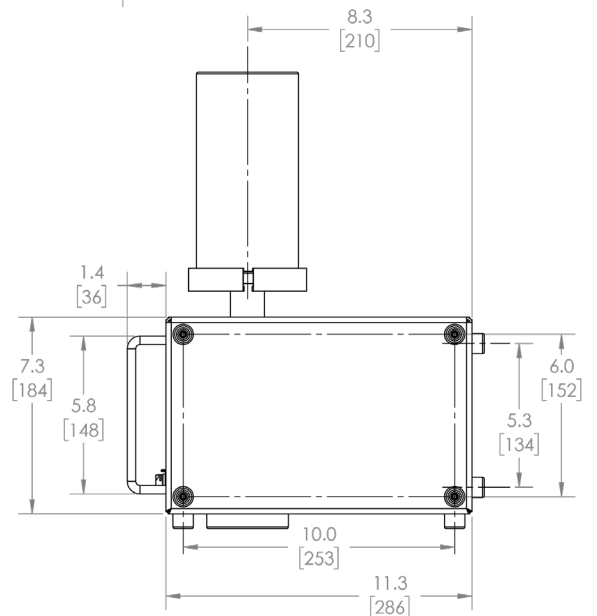
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Integrated Cryocooling Systems

ICS-HJ Dimensions



ICS-HJ GEM Detector Dimensions							
Endcap Model (dia. mm)			-70	-76	-83	-95	-108
% Efficiencies available in this endcap size			0-20	25-40	45-55	60-110	120-150
Dim.	Unit	Tol.					
A	mm (in)	0.3 (0.01)	70 (2.75)	76 (3.0)	83 (3.25)	95 (3.75)	108 (4.25)
BB	mm (in)	0.3 (0.01)	85 (3.4)	92 (3.6)	98 (3.9)	111 (4.4)	124 (4.9)
CC	mm (in)	5 (0.2)	145 (5.7)	158 (6.2)	158 (6.2)	183 (7.2)	183 (7.2)

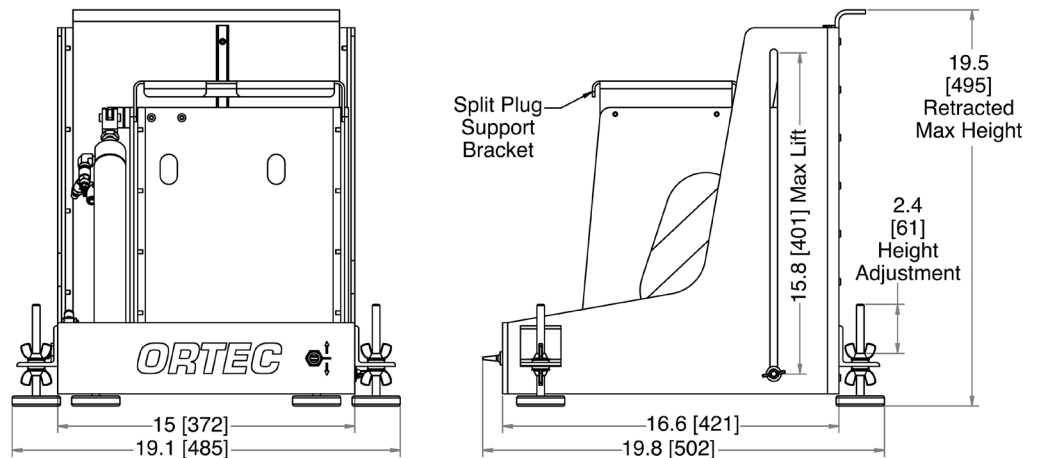
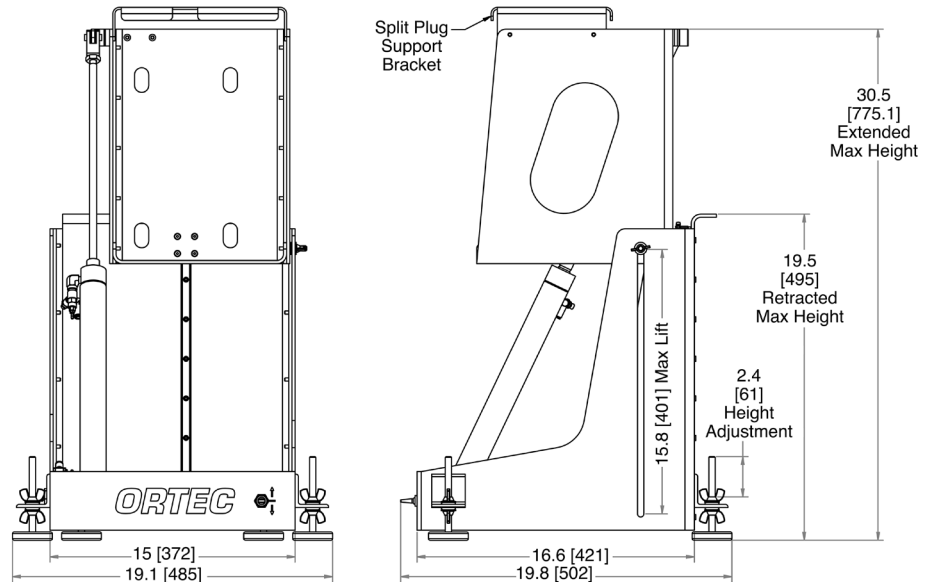


ICS Integrated Cryocooling Systems

Accessories

The ICS STAND 2 is intended for single user installation of any ICS model. It incorporates a multi-positional height selector to set overall operating height, and uses a pneumatic arm to raise and lower the ICS. This variable height selection accommodates most commercial shield tables. Note, the ICS STAND 2 is for vertical orientation only.

Caution: Since the ICS must be installed into a shield from below, the user must ensure the shield opening is greater than the detector seal-clamp diameter on the ICS-E. (Dimension B.)



Ordering Information

Model	Description
ICS STAND 2	Vertical Positioning Stand for ICS-E and ICS-P4

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Specifications subject to change
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