



Annual Users' Conference

**ADVANCING RADIATION SAFETY.
EMPOWERING PROGRESS.**

M Resort, Henderson, NV | June 15 – June 18



MIRION
TECHNOLOGIES

*Advancing Radiation Safety.
Empowering Progress.*

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Automated Solutions for Spectroscopy

Improving Speed and Precision

Dieter Pauwels

PLM Standard HPGe Detectors

Mirion Connect | Annual Users' Conference 2026

Henderson, NV

**Scan QR code to log your
attendance for today's
(Thursday, June 18th)
breakout session**



Agenda

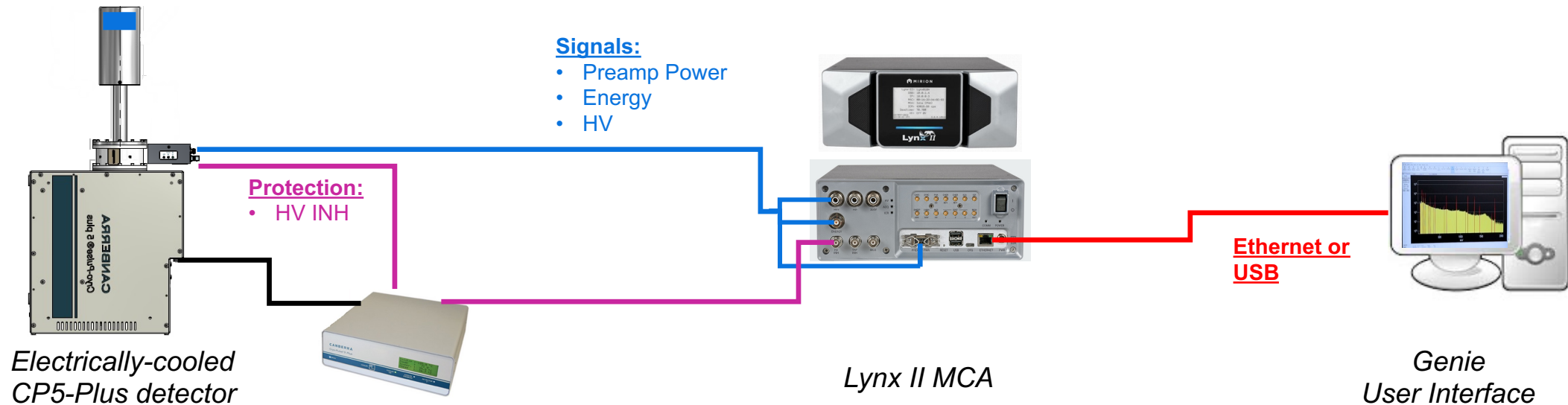


- *Introduction:*
 - *Ways to help you improving*
- *LN₂-free cooling (and the iCP5)*
- *Enhanced access to relevant data*
- *Automated solutions*
 - *Current status*
 - *Group discussion on what to focus on next*

Introduction



What effort is needed to get to the report?



Phase	Relative time spend* (%)
Setup	~10%
Operation & Maintenance (incl. Troubleshooting)	~90% (accounting for 25%)

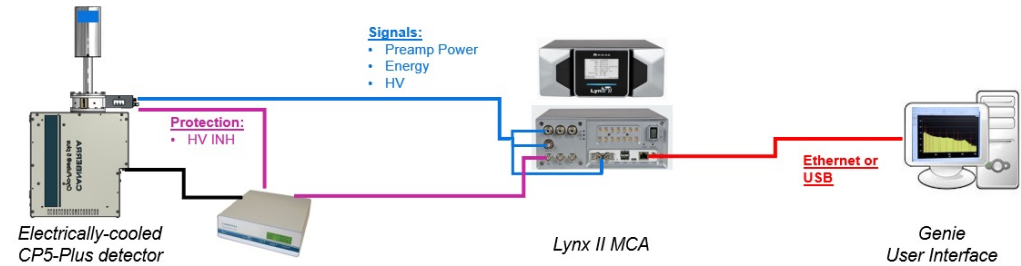
* Results based on MC25 Survey with a total of 21 completed surveys.
Time split based on 3-year operating cycle.

➡ When failing QA/QC or getting unexpected results:

- Reactive Mode
- Significant (and usually unexpected) time spend

Wanted: HPGe expert (... and time)

Phase	Activity	Time spend*
Setup	Cabling	Several days – Several weeks or more (80%)
	Cool down	
	HW parameters	
	Energy/Shape Calibration	
	Efficiency Calibrations	
	QA/QC	
	Troubleshooting	
Operation & Maintenance	QA/QC	0.5-2 h/week (55%) 2-8h/week (35%)
	(LN ₂ refilling)	
	Sample Measurement	
	Data Review & Interpretation	
	(SoH Monitoring)	
	Troubleshooting	
Troubleshooting	Spectral features	>1h/month (25%)
	SoH Data	



Most important feature?*	Accuracy (70%)
Most significant challenge/problem?*	Uptime/Readiness (57%)

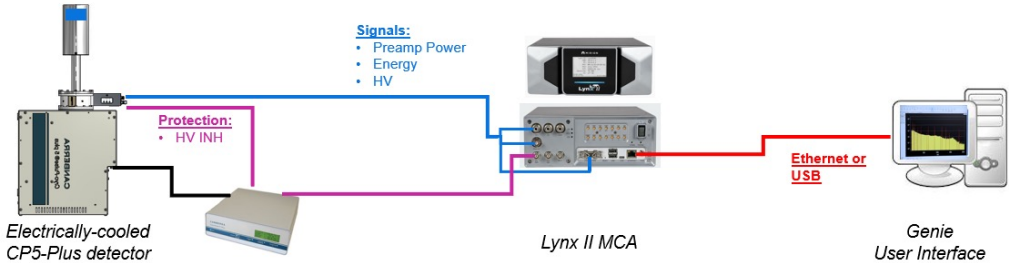
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Operation & Maintenance	QA/QC	0.5-2 h/week (55%)
	(LN ₂ refilling)	
	Sample Measurement	
	Data Review & Interpretation	2-8h/week (35%)
	SoH Monitoring	
	Troubleshooting	
Troubleshooting	Spectral features	>1h/month (25%)
	SoH Data	

* Results based on MC25 Survey with a total of 21 completed surveys.



Expert required to:

- Optimize initial setup
- Ensure adequate system performance
- Make any setup corrections when needed

Based on which information?

- Spectrum
- HPGe Spec Sheet
- SoH data (multimeter or digital readout?)
- (Oscilloscope)

What else?

- Regular LN₂ refilling

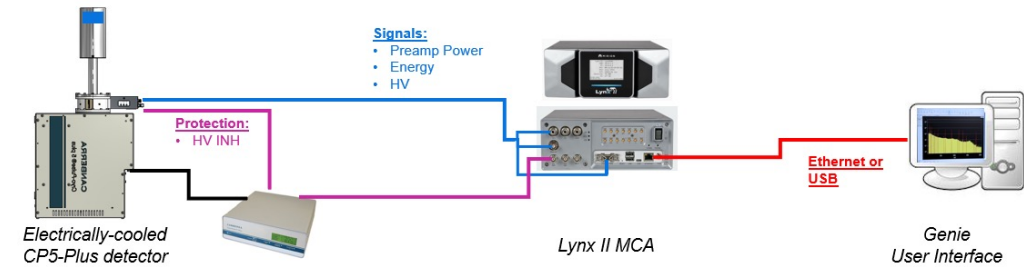
Wanted: HPGe expert (... and time)

So, how can Mirion help you to improve?

- Optimizing initial **setup**, more efficiently
- Reducing regular **maintenance** burden
- Catching (potential) issues **earlier**, allowing to plan more efficiently
- Catching (potential) issues **more accurately**, allowing to plan more efficiently
- Making any setup **corrections** when needed, more efficiently

Answer:

- Provide LN₂-free cooling system with **uncompromised reliability and performance** (vs LN₂ cooling)
- Provide **spec sheet and SoH data**, at your fingertips
- Provide comprehensive **SoH Dashboard**, at your fingertips
- Provide **automated** setup and auto-correct features
- Provide advanced **Predictive** Maintenance features

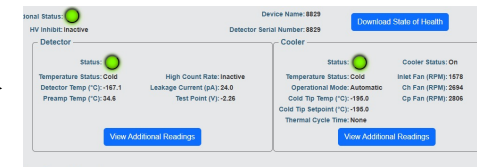
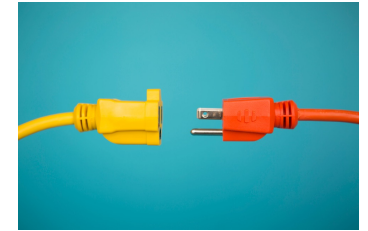


Mirion life with LN_2 -free cooling



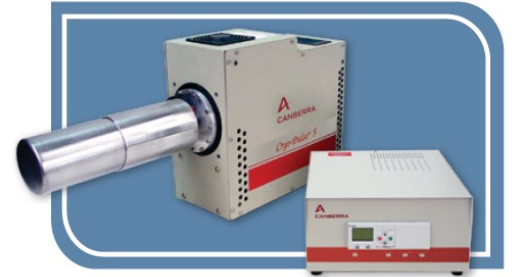
Advantages of LN₂-free cooling

- No safety hazards
 - Eliminate LN₂ handling and associated hazards:
 - Asphyxiation
 - Frostbite
 - Pressure risks
 - Enable remote operation reducing dose exposure in controlled or high-dose environments
- Lower operational cost and infrastructure requirements
 - Removes the need for LN₂ supply, storage, and associated infrastructure/maintenance
 - Eliminate regular LN₂ refilling, reducing labor, and downtime
- Easier to monitor status
- A **maintenance-free** cooling solution

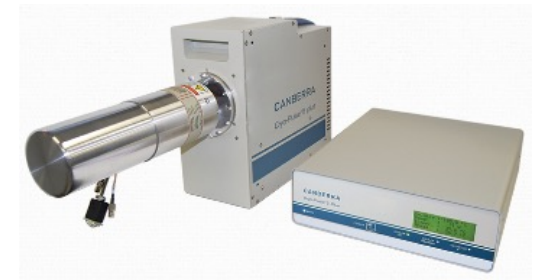


Mirion's Cryo-Pulse[®] Technology: reliable and performant

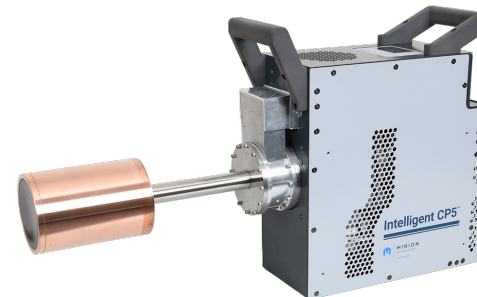
- 2006: Cryo-Pulse 5 (CP5) released in the market as HPGe detector cooler
- 2012: Cryo-Pulse 5 Plus (CP5-Plus) update – but still identical cooler
- **20 years** of field-proven Cryo-Pulse **reliability**:
 - ~6 Million hours MTTF
 - >15 years lifetime (more than HPGe detector)
- **20 years** of field-proven Cryo-Pulse **performance**:
 - Uncompromised HPGe detector resolution performance
- 2026: Intelligent CP5 update – still identical cooler



CP5: 2006 - 2012



CP5-PLUS: 2012 - present



Intelligent CP5: Coming soon!

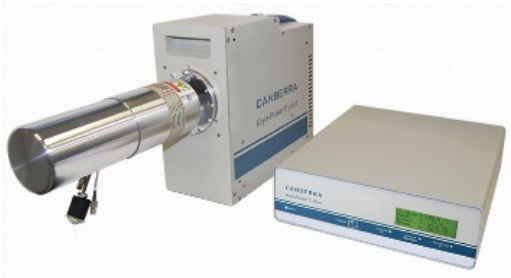
Uncompromised reliability and performance

Phase	Activity	Time spending*
Setup	Cabling	Several days – Several weeks or more (80%)
	Cool down	
	HW parameters	
	Energy/Shape Calibration	
	Efficiency Calibrations	
	QA/QC	
Operation & Maintenance	Troubleshooting	0.5-2 h/week (55%)
	QA/QC	
	(LN ₂ refilling)	
	Sample Measurement	
	Data Review & Interpretation	
Troubleshooting	SoH Monitoring	2-8h/week (35%)
	Troubleshooting	
	Spectral features	
	SoH Data	
		>1h/month (25%)

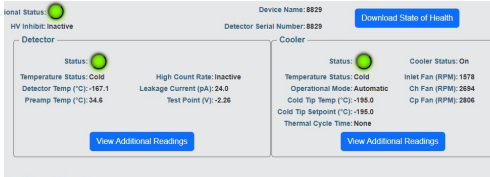
i.e.: Flip the switch

Compare to weekly refills for dipstick in 30-liter Dewar:

- Switch off HV
- Do refill
- Switch on HV again
- Check if all is still OK
- All with limited SoH monitoring



* Results based on MC25 Survey with a total of 21 completed surveys.



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Mirion life with more accessible data

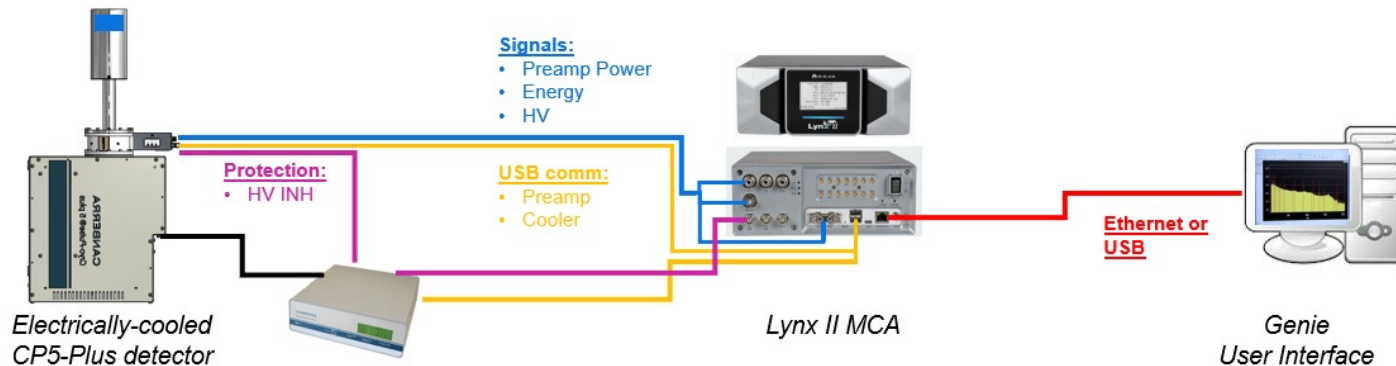


SoH data

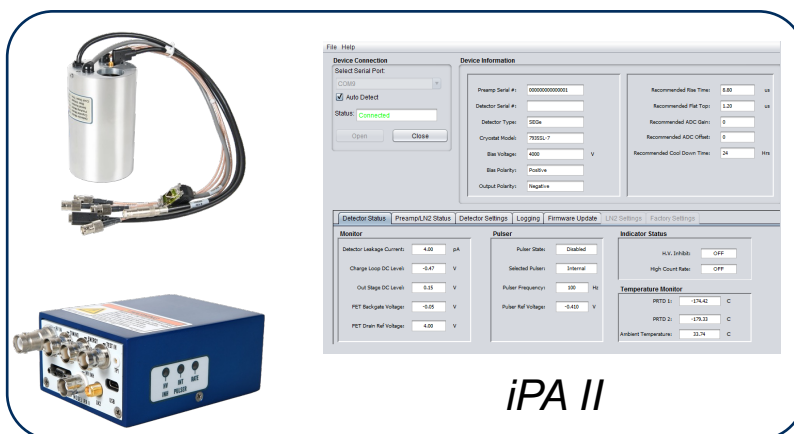
Building-block specific SW tools

vs

Central **Lynx II** Web UI



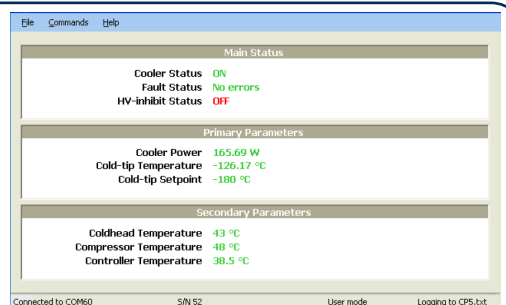
Preamp -
Detector



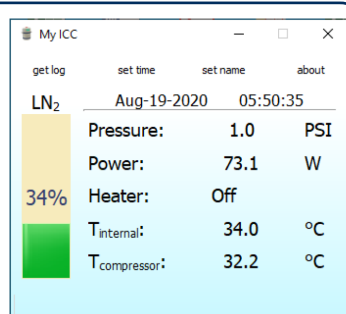
Cooling



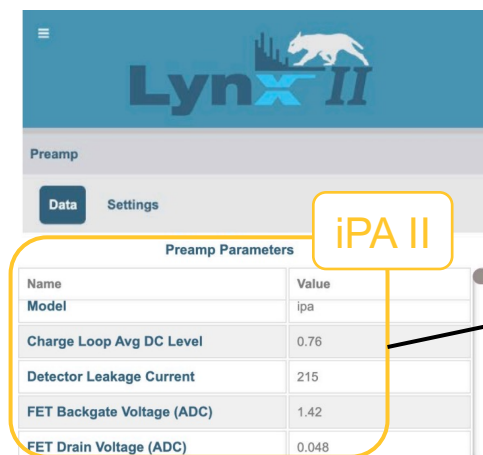
CP5-Plus



iCC



Decentralized/Uncorrelated SW tools



Can also include LN₂ level info

**CP5-Plus
iCC**

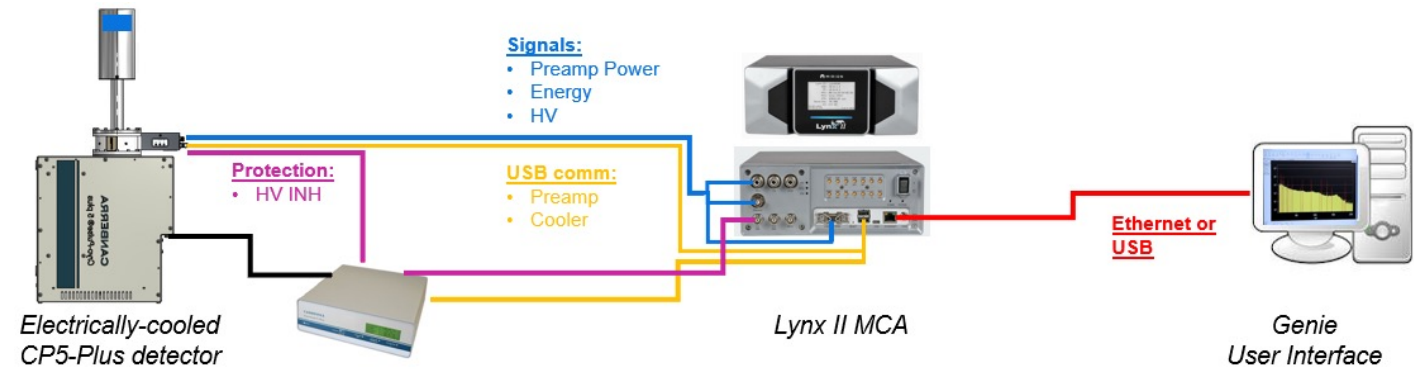
Centralized Lynx II Web UI

Who uses the Lynx II central SoH data feature?

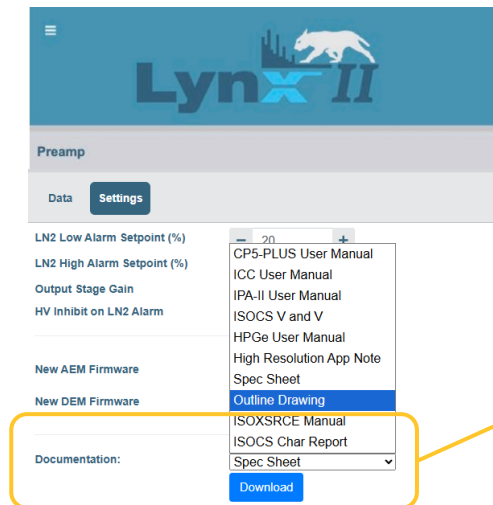
HPGe spec sheet data

iPA II - Lynx II setup:

Digital access to the HPGe spec sheet



- Download pdf version from Lynx II Web UI:
 - In Preamp Settings menu:



As stored in iPA II memory

Doc. No.: DPF-009
Rev: H
Date: 10/5/2012

DETECTOR SPECIFICATION AND PERFORMANCE DATA

Specifications			
Detector Model	BE5030	Detector Serial Number	8829
Preamplifier Model	IPA-II-10	Preamplifier Serial Number	260309-0027
Cryostat Model	ICP5-F-RDC-6-ULB	Order Number	C20077
CryoCooler Model	7100344	CryoCooler Serial Number	4195
Relative Efficiency	---	%	
Resolution	---	keV FWHM @ 1.33 MeV	
	---	keV FWTM @ 1.33 MeV	
	---	keV FWHM @ 122 keV	
	---	keV FWHM @ 5.9 keV	
Peak/Compton	---	:1	
Well Diameter	---	mm	Well Depth --- mm
Endcap Size	4.00	" Dia	Endcap Length 5.25 " Length
Cryostat Description	---		

iCP5: SoH Dashboard

Central SoH data in Lynx II Web UI

VS

Central SoH Dashboard in iCP5 Web UI

Preamp Parameters

Name	Value
Model	ipa
Charge Loop Avg DC Level	0.76
Detector Leakage Current	215
FET Backgate Voltage (ADC)	1.42
FET Drain Voltage (ADC)	0.048

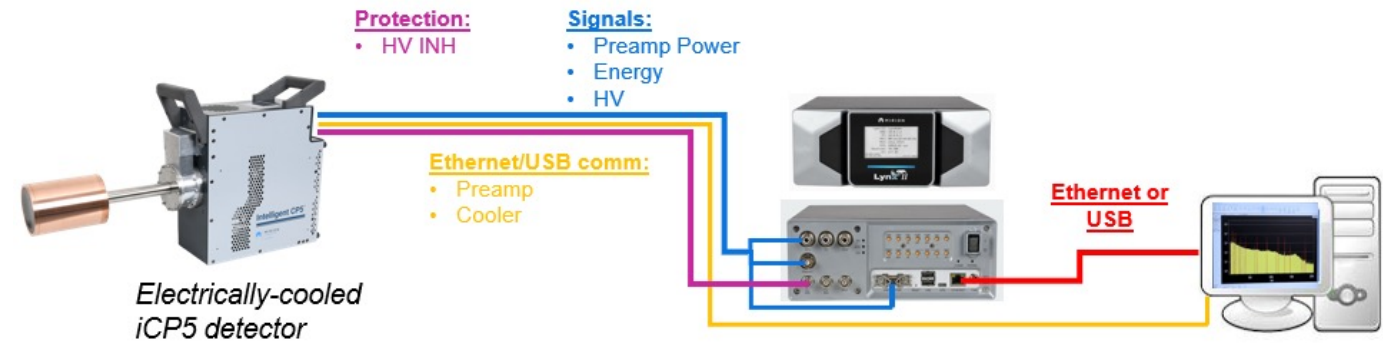
Cooler Parameters

Name	Value
Model	cp5
Cold Head Temperature (°C)	19.9
Cold Tip Set Point (°C)	-185
Cold Tip Temperature (°C)	19.48
Compressor Temperature (°C)	18.9

Documentation:

- CP5-PLUS User Manual
- ICC User Manual
- IPA-II User Manual
- ISOCS V and V
- HPGe User Manual
- High Resolution App Note
- Spec Sheet
- Outline Drawing
- ISOXSRCE Manual
- ISOCS Char Report
- Spec Sheet

Centralized Lynx II Web UI



Operational Status:

Device Name: 8829
Detector Serial Number: 8829

Detector:

Status: ●

Temperature Status: Cold
Detector Temp (°C): -167.1
Preamp Temp (°C): 34.6

High Count Rate: Inactive
Leakage Current (pA): 24.0
Test Point (V): -2.26

Cooler:

Status: ●

Cooler Status: On
Inlet Fan (RPM): 1578
Ch Fan (RPM): 2694
Cp Fan (RPM): 2806

Temperature Status: Cold
Operational Mode: Automatic
Cold Tip Temp (°C): -195.0
Cold Tip Setpoint (°C): -195.0
Thermal Cycle Time: None

Detector Spec Sheet

DETECTOR SPECIFICATION AND PERFORMANCE DATA

Doc. No.: DPF-009
Rev: H
Date: 10/5/2012

Specifications

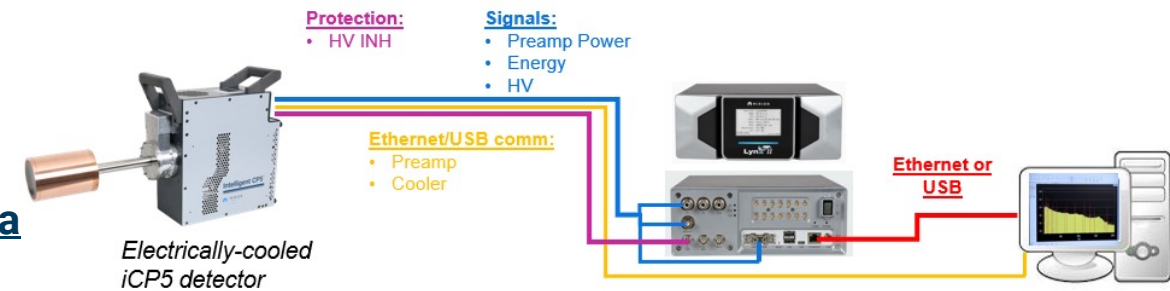
Parameter	Value
Detector Model	BE5030
Detector Serial Number	8829
Preamp Model	IPA-II-10
Preamp Serial Number	260309-0027
Cryostat Model	ICP5-F-RDC-6-ULB
Order Number	C20077
CryoCooler Model	7100344
CryoCooler Serial Number	4195
Relative Efficiency	---
Resolution	---
Peak/Compton	---
Well Diameter	---
Endcap Size	4.00
Cryostat Description	---

Centralized iCP5 Dashboard Web UI

More accessible data: Summary

- **iPA II, CP5-Plus, iCC:** Digital building blocks, providing **SoH data**
- **Lynx II:** provide **spec sheet and centralized SoH data**
- **iCP5:** Provide comprehensive **SoH Dashboard**, at your fingertips

iCP5:

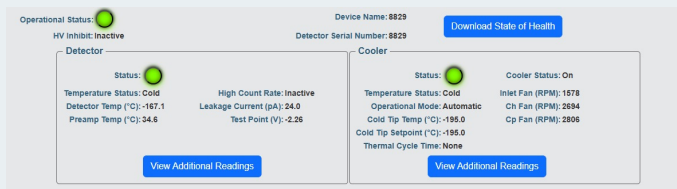


01

EARLY ISSUE DETECTION

Enable early detection of (potential) issues, providing sufficient lead time for service review and planning

- Centralized State of Health Monitoring

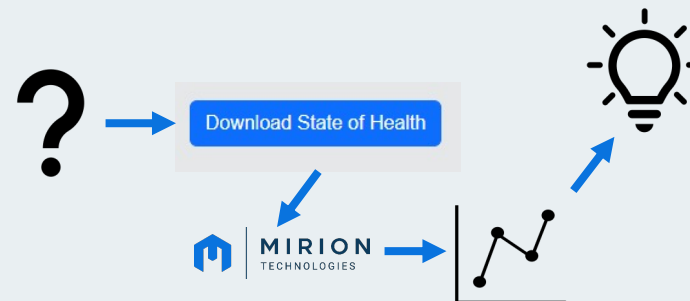


02

STREAMLINED ASSESSMENT

Streamlined assessment phase delivering greater speed and accuracy

- Transition from anecdotal observations to data-driven troubleshooting (on-board data logging)



03

FIELD SERVICEABILITY

Improved maintenance workflows and enhanced field serviceability for:

- Fans
- Heat sinks
- RTC battery
- Preamplifier



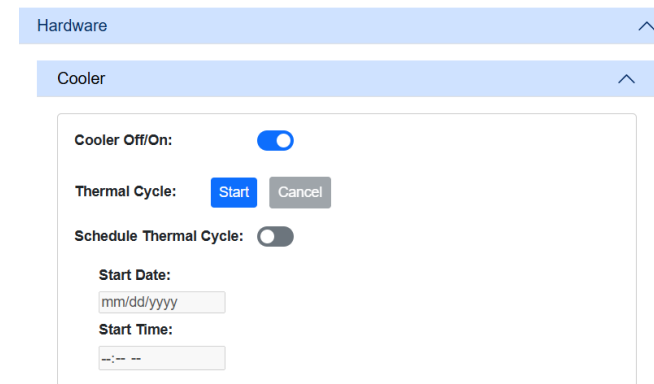
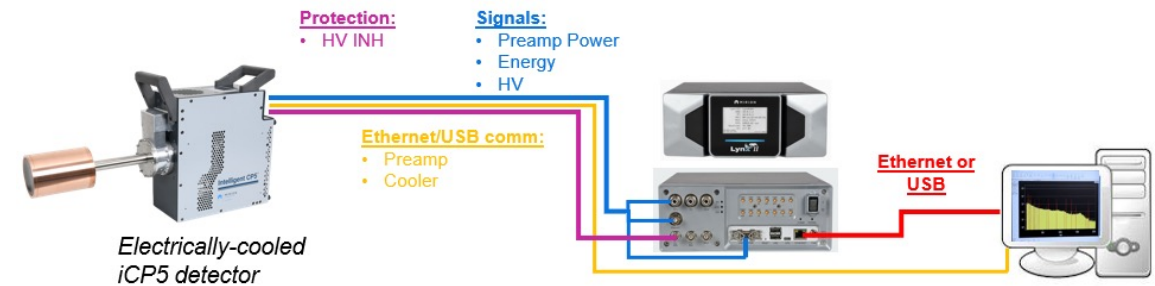
Mirion life with automated solutions



iCP5 Automated Features

■ Cooler control:

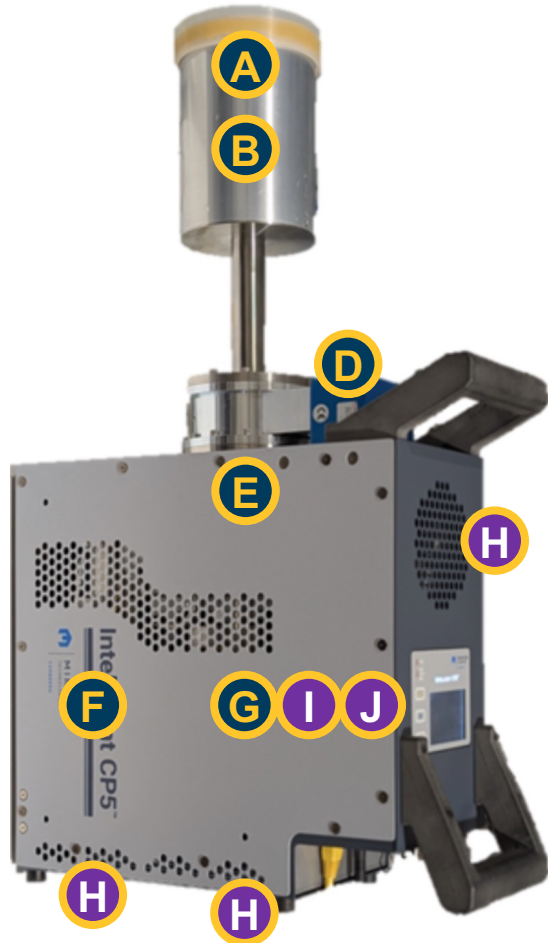
- Built-in intelligence ensuring proper and fast detector cool down (without user interaction):
 - Auto Start
 - Auto Thermal Cycle
- Complemented with Intuitive manual control



■ On-board storage of all available HPGe detector data:

- As soon as system is powered
- Expanded set of sensor data

iCP5: Expanded set of sensor data

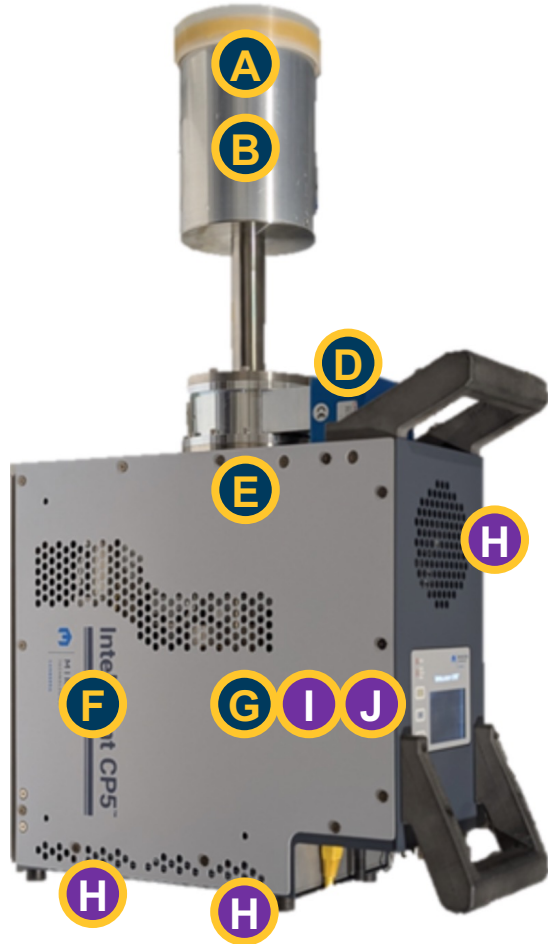


Electrically-cooled
iCP5 cryostat

Building block	SoH parameter	Short description
iCP5 (CP5-Plus legacy)	A Detector leakage current	Leakage current
	B PRTD1	HPGe temperature
	C Ambient Temp	iPA II electronics temperature
	D Cold-tip Temp	Cold-tip temperature
	E Compressor Temp	Compressor temperature
	F Coldhead Temp	Cold-tip (warm end) temperature
	G Cooler Power	Cooler input power
iCP5 (New)	Fan Temps	Inlet (true ambient), Exhausts (coldhead/compressor)
	H Fan speeds	Inlet and exhausts
	I Accelerometer	Detector orientation
	J Cooler board Temp	iCP5 electronics temperature

- *More complete data set available to evaluate:*
 - Cooler performance
 - Ambient conditions

iCP5: Benefits of new sensor data



*Electrically-cooled
iCP5 cryostat*

Accelerometer

*Verify detector orientation
during setup.*

*Provides historical data to
support cooler performance
analysis.*

Fan Temps Fan Speeds Accelerometer

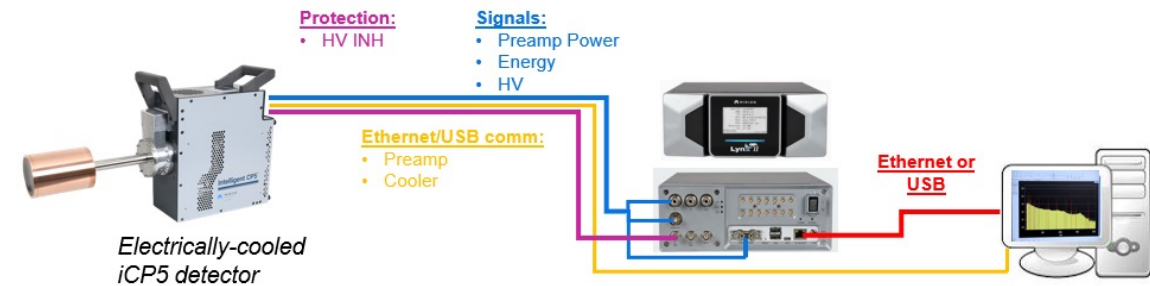
*Additional insight into cooler
performance.*

*Help identify when heat sink
cleaning or maintenance is
required.*

Cooler Board Temp

*Along with the other system
parameters, insurance of
operation within safe limits.*

The Lynx II platform



- *Lynx II MCA as the central detector system hub:*
 - *Traditional use: HPGe detector pulse processing into spectrum*
 - *Start also using for:*
 - *Digital readouts of Intelligent building blocks: iPA (II), iCC, CP5-Plus, iCP5*
 - *Strong local processing power capability, enabling:*
 - *Smart SoH Dashboard*
 - *Automated setup and Auto-Correct features*
 - *Advanced Predictive Maintenance features*

Lynx II

Preamp

Data Settings

iPA II

Preamp Parameters

Name	Value
Model	ipa
Charge Loop Avg DC Level	0.76
Detector Leakage Current	215
FET Backgate Voltage (ADC)	1.42
FET Drain Voltage (ADC)	0.048

Can also include LN₂ level info

CP5-Plus iCC

Cooler Parameters

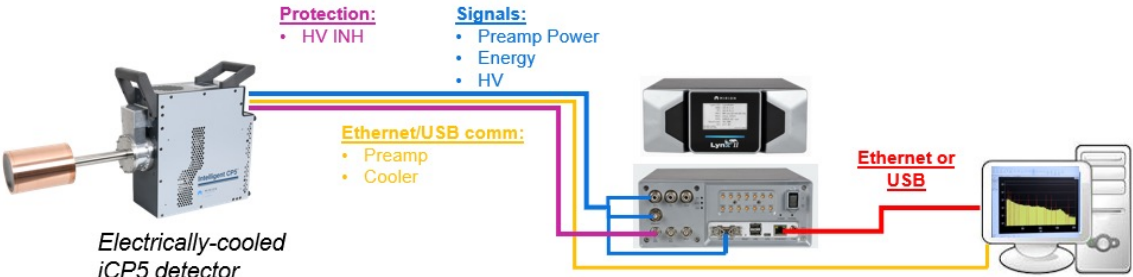
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Cold Head Temperature (°C)	19.9
Cold Tip Set Point (°C)	-185
Cold Tip Temperature (°C)	19.48
Compressor Temperature (°C)	18.9

Centralized Lynx II Web UI

But what roadmap to focus on?

Phase	Activity	Time spending*
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	HW parameters	
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	QA/QC	
	Troubleshooting	
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	SoH Monitoring	
	Troubleshooting	
Troubleshooting	Spectral features	>1h/month (25%)
	SoH Data	

* Results based on MC25 Survey with a total of 21 completed surveys.



- Many ideas/options to chose from...
- Focus on what is most valuable to you:
 - What do you spend most time on?
 - What is key for you to improve?
 - In which part of the process do you need assistance the most?
- Can Auto features be accepted in your environment? What restrictions do you see?

Survey for:

Automated Solutions for Spectroscopy



*Please take a moment
to fill out a short survey
on this session.*

Thank you

