

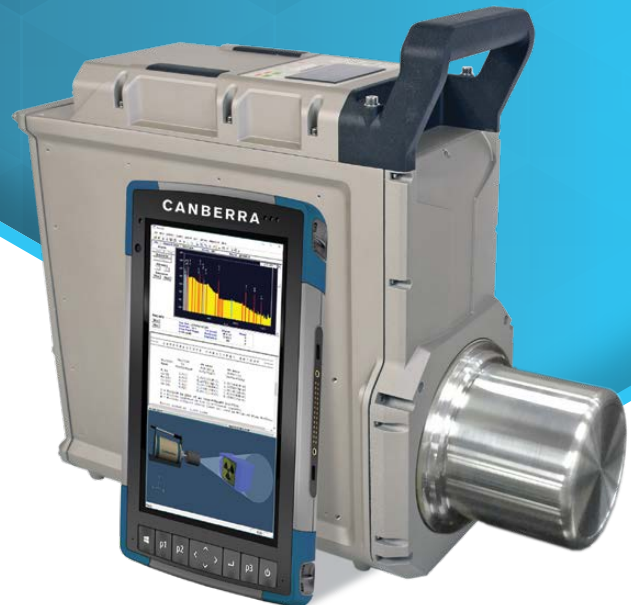


MULTI-USE HPG_e SPECTROMETER

Aegis™

Portable HPG_e Spectrometer

The unit is remotely controlled via a wired or wireless connection, it can be operated from a comfortable and safe location.



FEATURES

- LN₂-free cooler
- Thermal-cycle free cryostat
- IP65 ingress protection rating
- Operational in -20 °C to +50 °C (-4 °F to 122 °F) ambient temperature when cooled down
- Laboratory-grade energy resolution
- Choice of large 40% and 50% HPG_e crystals with or without RDC
- RDC option enabling backshielding
- Easy to deploy all-in-one design
- Wireless or wired remote control
- Internal hot-swappable batteries enabling uninterrupted battery operation
- System control via Genie™ 2000 software
- General and detailed hardware status via a web-based user interface
- Generic ISOCS™ characterization
- No maintenance required

BENEFITS

- Wide energy range covering all field situations and many lab applications
- Built-in UPS and thermal-cycle free cryostat for maximum operational time
- Compatible with the Canberra™ ISOCS cart
- Multi-use (lab, ISOCS cart, mobile units, field)
- Instant ISOCS/LabSOCS™ calculations of activities for complicated or unanticipated geometries
- Deployable in heavy rain and dusty environments
- No risk of internal contamination

DESCRIPTION

The Aegis Portable HPG_e Spectrometer is the newest transportable, battery-powered HPG_e gamma spectrometer in Mirion's portfolio. Like its Falcon 5000® predecessor, it offers many state-of-the-art features, such as a thermal-cycle free cryostat, an integrated all-in-one design and laboratory-grade energy resolution. All this, however, is now also combined with an IP65 ingress protection rating, larger HPG_e crystals and the option to provide the portable spectrometer with a Remote Detector Chamber (RDC) cryostat

DESCRIPTION continued

(enabling detector backshielding). Furthermore, the Aegis system is 12% lighter than the previous Falcon 5000 system. All these features make the Aegis spectrometer easily deployable for multiple use in the field ... and in the lab.

With the IP65 ingress protection rating and *no cooling fans*, the system can be deployed without any problem in heavy rain conditions and dusty environments without the risk of contaminating any internal parts. The exterior surface is designed such that it can be easily decontaminated and put back into service quickly. With the integration of a highly efficient cooler, the detector can remain cooled down in a wide ambient temperature range up to 50 °C (or 122 °F). The combination of the IP65 rating and the wide operational temperature range make the unit the system of choice in practically any environmental condition.

MULTIPLE STANDARD CONFIGURATIONS

This is the first portable HPGe gamma spectrometer on the market where there is a choice of multiple (6) detector and cryostat options: three different HPGe crystal types with the option to add a Remote Detector Chamber (RDC) to each one. The standard crystal offering is a large 40% coaxial crystal featuring excellent sensitivity for gamma photon energies ranging from 40 keV up to 10 MeV. If the best efficiencies are required below 100 keV (down to 15 keV), a 40% XtRa™ coaxial crystal is better suited. For the ultimate performance in sensitivity, the BE5030 crystal can be chosen which also offers the best possible energy resolution down to 15 keV, as well as ~50% relative efficiency at 1332 keV.

While transportable HPGe spectrometers have always been designed with the HPGe crystal integrated in the body of the device, the Aegis spectrometer is also available with an optional RDC cryostat. This feature separates the HPGe crystal from the rest of the unit enabling backshielding the crystal. As a result:

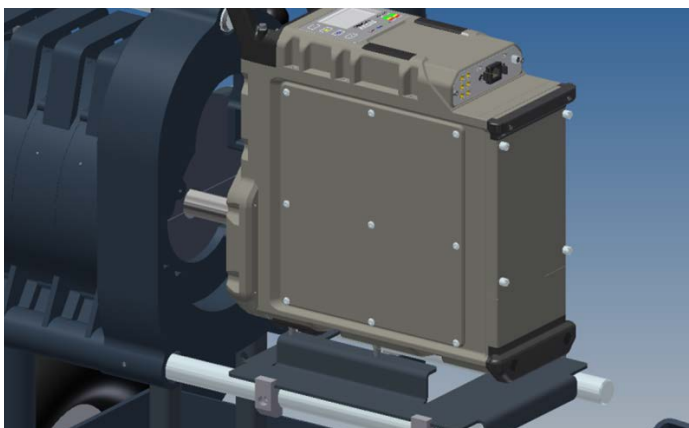
- On top of the ultimate HPGe gamma-photon efficiencies and energy resolutions, the best possible background conditions can be obtained in any field application and also in lab applications;
- The Aegis spectrometer can be deployed as a Multi-Use system. For example, Emergency Responders can set up the system under a standard lab lead shield, and in case of emergency, it can be taken out for specific field applications;
- Compatible with standard ISOCS Carts as well as most laboratory HPGe Shields.



As switching between different measurement setups is quick and easy thanks to the all-in-one design and the modest weight of 13.5 kg (30 lb), multi-use of this portable counting system indeed becomes an attractive option. Accurate on-line activity information is available by simply connecting a Genie 2000 computer to the Aegis spectrometer through Wi-Fi or a single Ethernet cable. The Wi-Fi interface simplifies the measurement of difficult-to-access, uncomfortable, and/or contaminated areas by minimizing the stay-time for the operator. Just set the system up and move to a more desirable location to initiate and analyze a count.

Four mounting holes at the bottom and six mounting holes on each side are positioned according to the VESA 100 x 100 mm² standard enabling easy mounting solutions for any application. With the optional AEGIS ISOXADAPT, the Aegis spectrometer can also be mounted on any new or existing Canberra ISOCS cart.





Aegis spectrometer mounted on any Canberra ISOCS cart

BATTERIES

The system is equipped with two rechargeable LiFePO₄ batteries, which are hot swappable and are expected to provide about four hours in total of operation in a cooled-down state. The batteries are designed and sized to be UN3481-certified for shipping in, or with, the equipment via air freight. The system can be powered through the provided AC supply or through any 12-19 V dc power supply which can provide a minimum of 10 A (Example: an automobile auxiliary power outlet). The fact that the batteries are hot swappable means that the unit can be deployed in the field for continued uninterrupted operation with the use of additional charged batteries. The fully charged batteries can then replace the batteries in use one by one before they are completely depleted without interrupting the ongoing measurement. The system is provided with a total of four batteries (two internal and two spare batteries), and additional spares can be purchased.

Why LiFePO₄ battery packs?

The lithium iron phosphate battery, known as LiFePO₄ or LFP, is a lithium-ion battery with lithium iron phosphate as cathode material. The LiFePO₄ battery pack has many advantages over standard Li-ion packs:

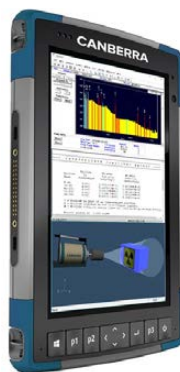
- 1 Inherently safe:** This technology is much less likely to experience “thermal runaway” or sudden and continued overheating, possibly leading to an explosion. It is, thus, more stable and safer than Li-ion in terms of flammability and explosion risk.
- 2 Longer service life:** Typically 1000-2000 charge-discharge cycles, which is more than other lithium-ion technologies. Also, LFP cells have a lower internal discharge rate and can typically support longer storage times.
- 3 Environmentally friendly:** This technology does not contain any metallic chemical element or precious metals.
- 4 Wide operating temperature range:** LFP cells tend to have less life cycle degradation at extreme temperature levels.

THERMAL-CYCLE FREE CRYOSTAT DESIGN

The fact that the Aegis spectrometer comes with a thermal-cycle free cryostat design guarantees minimal down time in case battery power is accidentally depleted while in a cooled-down state. At 25°C (or 77 °F) ambient temperature, it takes about two hours for the Aegis cryostat to warm up from operating temperature to a critical temperature where the HV needs to be cut. Even in the case HV is cut, as soon as the operator notices the power loss, he can correct the problem at his earliest convenience and cool the system down again immediately, instead of having to wait for a full thermal cycle. Cooling down from room temperature requires 10 to 11 hours at an ambient temperature of 25 °C.

USER INTERFACE

Control of the system is established via Genie 2000 software with an Ethernet or Wi-Fi connection. In addition, a GPS module is integrated into the unit. The Wi-Fi and/or GPS modules can be physically removed in the factory upon request.



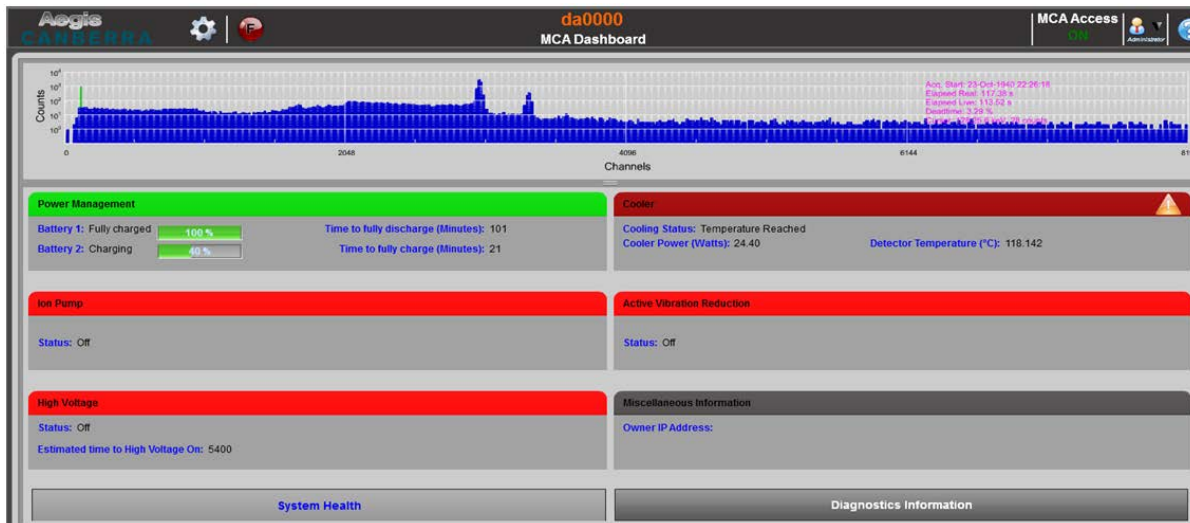
An RJ-45 connector is provided on the back panel along with the power supply jack and six multi-purpose GPIO connectors which enable processing of TTL compatible signals (e.g., as required for sample changers).

While the system is controlled from Genie 2000 software, the Aegis Dashboard can be opened via a web browser providing an overview of the system operation.

It shows:

- The spectrum in the Aegis MCA memory;
- General and detailed status information related to batteries, cooler, detector temperature, high voltage, ion pump status indications and diagnostics;
- Basic functions, such as:
 - Firmware Update
 - User account management
 - Network and Wi-Fi manager

Future firmware upgrade releases will be made available on the Mirion website and can be installed by using the Firmware Update functionality in the Aegis Dashboard.



Aegis Dashboard

The Aegis spectrometer is also provided with an integrated back lit LCD screen, LED indications and keypad control buttons on the top panel of the system. The LCD displays the State of Health (SoH) of the MCA, Cooler, Ion pump, Preamplifier and the computer unit. The four keypad control buttons are used for control of the system power, the detector bias high voltage, the cooler, and navigation through the various LCD screen pages. Two battery level indicators are provided with 25% increment indications. The screen also lists the system's IP address to simplify connection to the host Genie 2000 computer.



AVAILABLE MODELS

- AEGIS-GC40: Aegis HPG_e spectrometer with a 40% GC crystal (and no RDC)
- AEGIS-GX40: Aegis HPG_e spectrometer with a 40% GX crystal (and no RDC)
- AEGIS-BE5030: Aegis HPG_e spectrometer with a BE5030 crystal (and no RDC)
- AEGIS-GC40-RDC: Aegis HPG_e spectrometer with a 40% GC crystal and RDC option
- AEGIS-GX40-RDC: Aegis HPG_e spectrometer with a 40% GX crystal and RDC option
- AEGIS-BE5030-RDC: Aegis HPG_e spectrometer with a BE5030 crystal and RDC option

ALL MODELS INCLUDE:

- Rugged shipping case
- Two internal batteries
- Two spare batteries
- AC power supply
- External AC battery charger for one Aegis battery
- S500/S502/S504 Genie 2000 software V3.4.1 R3
- Generic ISOCS/LabSOCS characterization
- Manual

AVAILABLE MODELS continued

REMARKS:

- Laptop or tablet computer is not included
- End cap diameters fit in a standard ISOXSHLD
- Specific ISOCS/LabSOCS characterization can be ordered via the standard ISOXCAL model number

OPTIONAL ACCESSORIES:

- AEGIS-NGW: Physically remove the GPS and Wi-Fi from the Aegis unit
- AEGIS-NGPS: Physically remove the GPS from the Aegis unit
- AEGIS-NWIFI: Physically remove the Wi-Fi from the Aegis unit
- AEGIS AC-SUPPLY: 100-240 V ac power supply
- AEGIS DC-SUPPLY: 12 V dc car power supply
- AEGIS AC-BATTCHG: 100-240 V ac external battery charger for one Aegis battery
- AEGIS BATT: Spare Aegis battery
- AEGIS ISOXADAPT: Adapter kit enabling Aegis to be mounted on any Canberra ISOCS cart

SPECIFICATIONS

NUCLEAR

Detectors

BE5030 with or without RDC:

- Energy range: 15 keV – 10.0 MeV
- FWHM
 - ≤ 2.1 keV at 1332 keV
 - ≤ 1.4 keV at 122 keV

GC40 with or without RDC:

- Energy range: 40 keV – 10.0 MeV
- FWHM
 - ≤ 2.1 keV at 1332 keV
 - ≤ 1.4 keV at 122 keV

GX40 with or without RDC:

- Energy range: 15 keV – 10.0 MeV
- FWHM
 - ≤ 2.1 keV at 1332 keV
 - ≤ 1.4 keV at 122 keV

Remarks:

- The FWHM value specifications are subject to future improvements and communications.
- The specifications are defined in nominal (laboratory) conditions.

Electrical cooler

- Type: Stirling
- Time to cool: 10-11 hours at 25 °C (77 °F)
- Warranty: 5 years pro-rated by 100%, 100%, 60%, 40%, 20%

MCA

- 256-32768 channels, support for two memory groups of equal size
- Live time correction
- High voltage inhibit: High voltage is automatically inhibited until the detector has reached operating temperature
- Coarse gain: x2.0 – x430.5 in 19% increments
- Fine gain: x0.8 – x1.2 in 0.004% increments
- Gain attenuator: ON/OFF; when ON is selected it enables a divide by four input attenuator to minimize overload due to preamp signals with large pulse amplitudes
- Monitor OUT: Real-time image of the internally-shaped energy signal for use with an external oscilloscope
- GPIO: Three General Purpose I/O

ERGONOMIC

Display

- Small-character LCD display, on top of the Aegis unit with different pages for System-of-Health status

Handle

- Removable handle on top of instrument

Operating controls

- Keypad:
 - Power On/Off
 - Cooler On/Off
 - HV On/Off
 - Page navigation for LCD

COMMUNICATION

Between Aegis system and PC

- Wireless: Wi-Fi 802.11b,g,n, option to physically remove in factory
- Wired: RJ-45 (Ethernet cable)

GPS

- Accuracy: <5 meters
- Option to physically remove in factory

GP I/O ports

- Six buffered input/output MCX signal connectors, of which three GP I/O ports are controlled by MCA enabling processing of TTL compatible signals

SOFTWARE

Aegis Dashboard: Providing an overview of system operation when Genie 2000 software is controlling the instrument:

- Spectrum window
- General and detailed status: Batteries, cooler, detector temperature, high voltage, ion pump status indications and diagnostics
- Basic functions:
 - Firmware update
 - User account management
 - Network and Wi-Fi manager
 - Instrument settings
 - Log file download
 - Data Archive
 - Backup/Restore
 - Preferences
 - Certificate upload
 - Reboot

ELECTRICAL

Instrument

- Universal AC adapter with 100-240 V, 50-60 Hz input
- Standard and (optional) spare batteries: Two rechargeable LiFePO₄ 54.7 Wh, hot swappable, providing up to four hours operation* with two batteries. Charging time inside Aegis unit <2.5 hours. Batteries are UN3481 certified for shipping in or with equipment via air freight
- Battery charger outside of Aegis unit: Universal 100-240 V ac, 50-60 Hz input charger for one battery at a time. Charging time with external battery charger <1.75 hours

*Nominal value only. Actual run time depends on application specifics.

MECHANICAL

- Housing: Painted magnesium, easy to decontaminate
- Dimensions: 420 x 356 x 160 mm (16.5 x 14.0 x 6.3 in.) (L x H x W) with handle, without RDC
- Weight: 13.6 kg (30 lb) with one battery and the GC40 without RDC configuration

ENVIRONMENTAL

- Ambient temperature:
 - Keeping the unit cooled down: -20 °C to +50 °C (-4 °F to 122 °F)
 - Cool down from environmental temperature: -20 °C to +30 °C (-4 °F to 86 °F)
- Relative humidity: 93%, non-condensing
- Enclosure: IP65 ingress protection rating

Norm

- EMC: Conform
- CE: Meets CE requirements

