

# CMS Interlock SIL

Interlock gamma monitor



## Key features

- Fast alarm
- Hardware-only SIL safeguard monitor
- IEC 61508 compliant
- SIL2 independently certified by SIRA and CASS
- Proven detectors and amplifier electronics

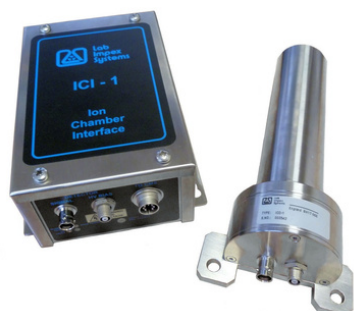
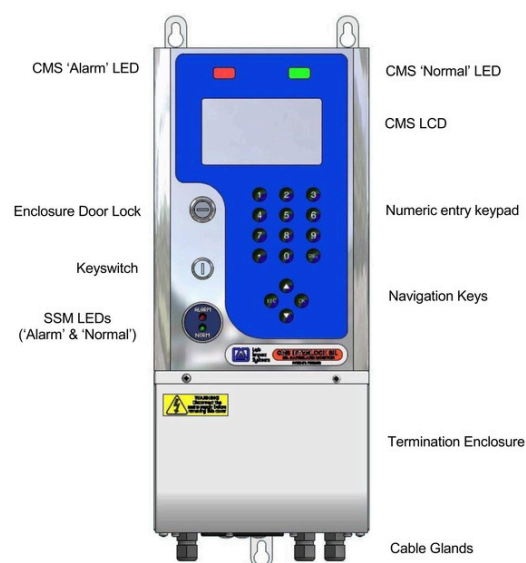
## Overview

The CMS Interlock SIL is a safety related gamma monitor intended to be installed where interlock control is required to restrict access to high dose areas. Typical applications include use within accelerator facilities or nuclear hot cell containment areas where high levels of activity are present. The device may be used with a range of sensor options including GM, scintillation, and ion chamber detectors.

## Technical specifications

The CMS Interlock SIL is based on the standard Ultra Energy area monitor, the CMS Gamma. While retaining all the features and functionality of the CMS, the CMS Interlock SIL also includes an additional counting circuit called the SIL Safeguard Monitor (SSM). The SSM works in parallel with the CMS, and provides safety related interlock relays.

Housed within a rugged stainless-steel enclosure, the CMS element provides an indication of dose equivalent levels via a large LCD. Fault conditions are controlled by the SSM, providing the high level and fault alarms.



### SSM and IEC61508

This SSM has been designed, manufactured, commissioned and is maintained to IEC 61508. The SSM is also the first of its type to achieve SIRA (Scientific Instrument Research Association) and CASS (Conformity Assessment of Safety-Related Systems) independent product certification.

The monitor offers fast alarm, security of operation, and SIL 2 compliance on the system relay outputs. The monitor has a SIL2 Alarm (SIL2 high alarm) and one fail diagnostic alarm. The 'high' alarm is triggered when the ambient radiation level exceeds the preset threshold the preset number of times. The 'fail' alarm is set when the count-rate falls below the preset level for the detector (detector in failure).

### Outputs and Communications

External connections to the CMS Interlock SIL are via a separate but integral terminal box at the base of the instrument. The unit contains two external relays, one for the alarm and one for the fault function. Each relay contains three sets of contacts, two two-pole change-over and one single pole normally open contact set. Relays operate in the fail-safe mode, i.e. are energised during normal operation. The separate termination box and interface PCB with optoisolator is provided to isolate external terminations from the main instrument electronics to ensure SIL 2 integrity is maintained during the installation process.

### Dose rate indicators

The monitor's LCD display with LED backlighting provides two separate indications of dose rate. One is a bar graph that represents percentage of the alarm set point selected and the second is a numerical indication.

### Calibration

The CMS Interlock SIL can be calibrated using a suitable gamma source providing a traceable dose rate. Ultra Energy can supply details of calibration sources if required.

## Technical specifications



### Self-test facilities

The CMS SIL Interlock continuously self-monitors for faults, such as detector and power failure or detector over-range. Occurrence of any faults will trip the fault relay. The nature of the fault will be displayed on the LCD. A holdup source is an option, providing better statistics for detector failure.

### Visual alarms

A visual indication is provided in the form of two LEDs for SSM failure and alarm. Failure indications include mains failure, and SSM failure. The type of failure is also displayed on the LCD screen. It is also possible to provide attention, alert, and alarm visual indications for the CMS portion of the Interlock SIL monitor via red and green LEDs located on the front panel.

### Approvals and standards

The CMS Interlock SIL complies with the following standards and has gained the relevant approvals.

- IEC 61508 Safety Integrity Systems
- Type approval at NRTL
- Designed to IEC 60532 (Installed Gamma)
- EMC/LVD standards:
  - 2014/30/EU
  - 2014/35/EU
  - 2011/65/EU
  - BS EN 61010-1:2010
  - BS EN 61326-1:2013



# Performance specifications

CMS Interlock SIL performance specifications	
GM detectors	<ul style="list-style-type: none"> <li>• GM-1/304 Range: 0.1 mSv/h - 10 Sv/h (10 mrem/h - 1000 rem/h)</li> <li>• GM-1/314 Range: 10 <math>\mu</math>Sv/h - 3 Sv/h (1 mrem/h - 300 rem/h)</li> <li>• GM-1/324 Range: 0.3 <math>\mu</math>Sv/h - 0.1 Sv/h (30 <math>\mu</math>rem/h - 10 rem/h)</li> <li>• GM-1/202 Range: 0.1 <math>\mu</math>Sv/h - 40 mSv/h (10 <math>\mu</math>rem/h - 4 rem/h)</li> <li>• GM-1/301 Range: 0.1 mGy/h - 10 Gy/h (10 mrad/h - 1000 rad/h)</li> <li>• GM-1/313 Range: 10 <math>\mu</math>Gy/h - 3 Gy/h (1 mrad/h - 300 rad/h)</li> <li>• GM-1/321 Range: 3 <math>\mu</math>Gy/h - 0.1 Gy/h (0.3 mrad/h - 10 rad/h)</li> </ul>
Futher detector types	<ul style="list-style-type: none"> <li>• Also available with a range of Ion Chamber and Scintillator detector options - contact us for details</li> </ul>
Detector interface	<ul style="list-style-type: none"> <li>• Universal Detector Interface (UDI-1G)</li> <li>• Provides a high performance interface between detector and measurement system</li> <li>• The output stage is designed to drive long cables reliably</li> <li>• UDI - Detector Max 10 m</li> <li>• CMS - UDI Max 100 m - inclusion of a separate external power supply distances greater than 1000 m can be achieved</li> </ul>
Alarm facilities	<ul style="list-style-type: none"> <li>• Fast, valid warning of high activity or fault</li> </ul>
Outputs	<ul style="list-style-type: none"> <li>• Fail-safe relay contacts for faults and alarms</li> <li>• Ethernet 10BaseT (HTTP, FTP)</li> </ul>
Communications (non-SIL - optional)	<ul style="list-style-type: none"> <li>• 1 x RS232 port</li> <li>• 1 x RS485 port</li> <li>• Ethernet 10BaseT (HTTP, FTP)</li> <li>• Detector Interface RS-422 (balanced differential line)</li> </ul>
Data storage	<ul style="list-style-type: none"> <li>• Non-volatile data capability for seven days at minimum five-minute data log interval with historical review on LCD display</li> <li>• Non-volatile data capability for event history (last 100 events)</li> <li>• Non-volatile storage for operating parameters</li> </ul>

# Performance specifications

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Environmental	<ul style="list-style-type: none"> <li>• IP54 (IP65 detector option available)</li> </ul>
Operating environment	<ul style="list-style-type: none"> <li>• Indoor use (or suitably enclosed) designed to IP54</li> <li>• Operating temperature range -10 to 50°C (-4°F to 122°F)</li> <li>• Maximum relative humidity 95% (up to 30°C)</li> </ul>
Power	<ul style="list-style-type: none"> <li>• Mains AC single phase connection 85-265 VAC</li> <li>• Frequency: 50 or 60 Hz</li> <li>• Max. Current: 100 mA</li> <li>• Internal 1A anti surge fuse</li> </ul>
Physical characteristics	<ul style="list-style-type: none"> <li>• Stainless steel enclosure</li> <li>• Wall, trolley, or transport frame</li> <li>• Designed for quick, low cost installation with easy access</li> </ul>
Dimensions and weight	<ul style="list-style-type: none"> <li>• Height: 458 mm (18")</li> <li>• Depth: 150 mm (5.5")</li> <li>• Width: 200 mm (8")</li> <li>• Weight: approx 7 kg (15.5lb)</li> </ul>
Visual display	<ul style="list-style-type: none"> <li>• Large LCD graphic display 114mm x 64mm (4.5" x 2.5") with backlight</li> <li>• Fully sealed membrane keypad</li> <li>• Both digital and analogue display</li> <li>• Key switch</li> </ul>
Security	<p>The following actions may be pass code/key switch protected:</p> <ul style="list-style-type: none"> <li>• Change parameters</li> <li>• Clear historic count data</li> <li>• Clear event log</li> <li>• Reset pass codes</li> <li>• Modify pass codes</li> <li>• Reset instrument</li> <li>• Test/calibrate analogue I/O</li> <li>• Test digital outputs</li> </ul>

## About Ultra Energy

Organizations working with nuclear and industrial technologies have a responsibility to safeguard people, the environment and infrastructure. We provide solutions that give our customers complete, long-term protection and control of safety critical systems, while helping them increase the net value derived from investments over their total lifespan.

Part of Curtiss-Wright, Ultra Energy has worked with nuclear and industrial customers for over 60 years. We're embedded in strategic national infrastructure and helping organizations develop future applications. We support continuous operation of industrial sites with protection and control solutions that monitor and manage factors such as radiation, neutrons, temperature and pressure within safety critical systems.

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