GAMMA & NEUTRON
HIGH RANGE UNDERWATER PORTABLE MONITOR

Model Series ~ CP-MU-GN

FEATURES:
- USE IN REACTOR CORE & SPENT FUEL POOL & CONTAINMENT ROOM
- FULLY SUBMERSIBLE, RUGGED PROBE
- FOUR LINEAR RANGES
  - DMU-1- UP TO 1,000,000 R/hr (GAMMA)
  - DMU-100 FROM 1 mR/hr to 1,000 R/hr (GAMMA)
  - DMU-1000 FROM 100 mR/hr to 1,000 R/hr (GAMMA)
  - CP - MU - 7 READS UP TO $10^7$ R/hr (GAMMA)
  - CP-MU-GN - DMU-GN PROBE (GAMMA & NEUTRON DETECTOR)
- ENGINEERING UNITS IN SIEVERTS AVAILABLE
- WATERPROOF DETECTOR SYSTEM
- WEIGHTED PROBES
- STABLE AND DEPENDABLE
- FAST RESPONSE
- LIGHTWEIGHT AND PORTABLE
- BATTERY OPERATED

APPLICATION:
Underwater monitoring (and in hot cell monitoring) of Reactor Spent Fuel Elements, Reactor components and dose rate measurements of irradiated objects is available in this extremely high range capability instrument and the waterproof construction of the ion chamber detection system.

Useful in determining the fuel burn up rate as well as security in detecting stolen fuel rods.

GENERAL DESCRIPTION:
- Model Series CP-MU Underwater Monitor System consists of an electronic package (Model CP-MU) coupled to a High Range DMU-1, Mid Range DMU-100 or Low Range DMU-1000 Detectors.
- The system includes 60 feet (optional 100 feet) of special low noise cable with a waterproof coupling to a 8” long x 1/4” diameter aluminum tube containing an ion chamber (Model DMU-1) or
- The DMU-100 probe has a 100 cc ion chamber
- 8” long x 5-3/4” diameter aluminum ion chamber (Model DMU-1000).
- Model CP-MU-GN has dual in line detectors, Gamma & Neutron.

CP-MU-D1 (GAMMA)
CP-MU-D100 (GAMMA)
CP-MU-D1000 (GAMMA)
CP-MU-7-D1 (GAMMA)
CP-MU-GN (GAMMA & NEUTRON)
DESCRIPTION DETAILS:

- Calibration is fully adjustable.
- The instrument case is made of drawn aluminum with epoxy lettering for easy decontamination. Case openings are sealed by gasket or screw closure for protection of electronics.
- A reliable MOSFET electrometer circuit and improved solid state electronics assure long uninterrupted service. Mechanical switching of the high impedance circuit has been eliminated.
- Protection against influence by magnetic fields up to 60 gauss has been built into the instrument.
- A top handle and four rubber feet achieve a stable base with no loss of display visibility.

RANGES

<table>
<thead>
<tr>
<th>CP-MU</th>
<th>PROBE</th>
<th>RANGE</th>
<th>RANGE</th>
<th>DETECTOR</th>
<th>PROBE</th>
<th>DETECT</th>
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</thead>
<tbody>
<tr>
<td>CP-MU-</td>
<td>MODEL</td>
<td></td>
<td>Sv</td>
<td>SIZE</td>
<td>LENGTH</td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>DMU-1</td>
<td>0.1KR/hr to 1000.0 KR/hr</td>
<td>1 Sv/h to 10,000Sv/h</td>
<td>0.25&quot; Dia. x 8&quot; Long 1.0cc internal</td>
<td>8 inches or 5 feet</td>
<td>GAMMA</td>
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<tr>
<td>CP-MU-</td>
<td>DMU-100</td>
<td>1 mR/hr to 1000 R/hr</td>
<td>1 µSv/h to 10 Sv/h</td>
<td>100 cc internal</td>
<td>8 inches or 5 feet</td>
<td>GAMMA</td>
</tr>
<tr>
<td>CP-MU-</td>
<td>DMU-1000</td>
<td>0.1 R/hr to 1000.0 R/hr</td>
<td>10mSv/h to 10Sv/h</td>
<td>5.75&quot; Dia x 8&quot; Long 1000 cc internal</td>
<td>8 inches</td>
<td>GAMMA</td>
</tr>
<tr>
<td>CP-MU-</td>
<td>DMU-GN</td>
<td>0.1KR/hr to 1000.0 KR/hr</td>
<td>1 Sv/h to 10,000Sv/h</td>
<td>0.385&quot; x 12&quot; long</td>
<td>12 inches or 5 feet</td>
<td>GAMMA</td>
</tr>
<tr>
<td>CP-MU-</td>
<td>DMU-1</td>
<td>1KR/hr to 10² R/hr</td>
<td>10Sv/h to 100,000Sv/h</td>
<td>0.25&quot; Dia. x 8&quot; Long 1.0cc internal</td>
<td>8 inches or 5 feet</td>
<td>GAMMA</td>
</tr>
<tr>
<td>CP-MU-</td>
<td>DMU-1000</td>
<td>1 R/hr to 10,000.0 R/hr</td>
<td>10mSv/h to 100Sv/h</td>
<td>5.75&quot; Dia x 8&quot; Long 1000 cc internal</td>
<td>8 inches</td>
<td>GAMMA</td>
</tr>
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SPECIFICATIONS:

CP-MU SERIES MODELS:

CP-MU: ELECTRONIC PACKAGE FOR ALL MODELS IS THE SAME OR SIMILAR
CP-MU-D1: DMU-1 Probe with 60-foot cable. (GAMMA Ion Chamber)
CP-MU-D100: DMU-100 Probe and 60-foot cable. (GAMMA Ion Chamber)
CP-MU-D1000: DMU-1000 Probe and 60-foot cable. (GAMMA Ion Chamber)
CP-MU-GN: DMU-GN Probe with two channel version & two detectors (GAMMA Ion Chamber & NEUTRON Proportional Chamber)
Accuracy: ± 10% (DECADE)
Calibration: Gamma - Cs-137 (Co-60 Optional)
Neutron - RaBe
Time Constant: 2 seconds fast, 12 seconds slow
Temperature Range: -30°C to +57°C
Drift: At room temperature - less than 0.5% per ºC

ELECTRONICS
Readout: LCD 8 digits.
Indicator Lamp: LED High Level: Green; Over-Range Indicator: Red
Electrometer: Solid State MOSFET input
Range Adjusts: 1 (one) internal screwdriver adjustment
Zero Adjust: Knob
MOSFET Protection Circuit: Prevents damage to MOSFET when coupling or decoupling detector system.
Serial Port: 2 way RS-232 for data collection or remote computer readout.
Battery: 6 "AA" cells, carbon-zinc, alkaline, Li or Nimh type batteries can be interchanged without instrument adjustments.
Use alkaline batteries below 0°C
Battery Check: Pushbutton with LED indicator
Electronics: A-D converter, LCD drivers

WEIGHT & DIMENSIONS:
Dimensions: 6-1/2"long x 3-1/2" x 9" tall including handle
Weight: Electronics 28 oz.
Detector System: DMU-1 - Sealed ion chamber 0.25" dia x 8" long. Internal 1.0 cc
Detector System: DMU-1000 - Sealed ion chamber 5.75" dia x 8" long. Internal 1000 cc
Detector System: DMU-GN - Sealed proportional chamber He3 or Bf-3

OPTIONAL:
~ Readout in Si units: Sv and Sv/h  ~ Cable length 100ft (30 meters)
~ WIN-W -- RS-232 Software  ~ Alarm settable visual alarm LED
~ USB Port  ~ Lighter weight chamber MODEL ~ DMU-1000LW, non-submersible