MIRION TECHNOLOGIES

CAM110FF Series
Continuous Air Monitors

Features

- Continuous air monitoring for beta/gamma particulate and iodine
- Modular low profile design
- Real-time data acquisition and control
- Excellent linearity and accuracy
- Scintillation detector with automatic gain stabilization
- Non-volatile historical data
- Mass flow control
- Optional RADACS integration

Major Assemblies

- Fixed filter On-line Sampler with MD Series Scintillation detector and preamplifier
- MX9B check source assembly
- ADM606M digital/analog multi-function control and display units

Quality

- Commitment to meet or exceed your quality expectations
- ISO9001

Description

The CAM110FF Series offers two options for beta/gamma particulate and iodine in air monitoring: the CAM110IFF for ^{131}I monitoring, or the CAM110PIFF for beta/gamma particulate and iodine monitoring. The collection of particulates and ^{131}I is achieved by the use of a fixed filter.

The system monitors radioactive airborne levels in either working spaces, or via a process tubing connection to a remote stack, duct or other air space. Visual indication and contact outputs for remote alarms are provided for high radiation and failure conditions. Analog outputs are provided to the plant monitoring system. The CAM110 Series CAMs can be set for isokinetic monitoring if desired.

The CAM110 Series monitor is comprised of the following major modular assemblies:

A. On-line Sampler with internal MD Series scintillation detector and external check source assembly MX9B.
   - MAP35C Iodine Sampler with MD55EV2 Gamma Scintillation detector.
   - MAP35C Particulate/Iodine Sampler with MD455V6 Beta/Gamma Scintillation detector.

B. Sample Transport System including a vacuum pump and mass flow controller.

C. ADM606M Multi-function control and display.

D. Electrical Box assembly.

CAM110FF Series Continuous Air Monitor, Iodine or Particulate/Iodine

A. On-line Sampler with internal MD Series

The MAP35C sampler is mounted on the monitor frame. The sampler has a straight through bore and all wetted surfaces are lined with stainless steel to resist corrosion effects and facilitate cleaning and purging of the sampler surfaces. The samplers include three inches of lead in a 4π geometry.

The on-line sampler includes a fixed filter collection mechanism where particulates are collected on the filter paper (57 mm) while the ^{131}I is captured by a charcoal cartridge (57 x 26.4 mm). The fixed paper filter element and charcoal cartridge are easily changed by means of a front loaded filter assembly, without disturbing the piping or the detector. The filter/charcoal cartridge assembly is sealed using “O” rings.

A solenoid operated check source assembly, MX9B is mounted on the outside of the sampler. The assembly contains a ^{137}Cs or ^{133}Ba isotope for use in checking detector, preamplifier and ratemeter operational status. The solenoid mechanism is operated from the ratemeter.

A scintillation detector is mounted inside the sampler, in close proximity to the particle/^{131}I collection point. CAM110IFF achieves ^{131}I monitoring by using MD55EV2 detector. This consists of a NaI crystal responsive to gamma radiation. CAM110PIFF achieves particulate and ^{131}I monitoring by using MD455V6 detector. This consists of a plastic scintillator for beta detection and a BGO crystal for the gamma detection.

The MD Series detectors operate with a unique gain stabilization circuitry for temperature – compensated drift-free operation. This results in improved accuracy and extended calibration cycles.

The MD Series detectors work in conjunction with three Single Channel Analyzer Preamplifiers, PA300E. The preamplifier takes the voltage from the ratemeter and generates a stable high voltage supply required by the photomultiplier tube. At low concentrations, the PA300E amplifies the detector output pulses before transmitting the signal to the ratemeter. At high concentrations, the PM tube current is converted into a proportional frequency. In very high gamma fields, the high voltage to the detector is automatically lowered to bring the PM tube into its linear range.

B. Sample Transport System

The CAM110 Series monitors house a complete Sample Transport System which includes seamless stainless steel tubing, a mass flow controller, a vacuum pump and a motor.

The Mass Flow Controller in the CAM110 Series provides flow sensing (±2% accuracy) which is relayed to the ratemeter for flow indication, totalizing and control. The ratemeter sends controlling signal back to the mass controller for system flow control.

C. ADM606M

The ADM606M Ratemeter provides display and visual/audible indication of alarm status. Each alarm will also have an associated DPDT relay contact rated at 0.5 A at 120 V ac resistive.

Condition	Visual	Audible	Relay
High Alarms	Red	Tone	DPDT
Alert Alarms	Amber	Tone	DPDT
Fail	White	Tone	DPDT
Normal	Green	None	None
Check Source	Digital	None	DPDT
Low Flow	Digital	None	DPDT
Aux	None	None	DPDT

For complete information on ADM606M principle of operations see the ADM606M Multifunction Control and Display Unit data sheet.

D. Electrical Box Assembly

The Electrical Box Assembly consists of a line filter, circuit breaker, motor starters and terminal blocks for connections to the other components of the monitor.

The optional RADACS (Radiological Assessment Display and Control System) software package offers the capability for achieving complete system integration. For complete information, see the RADACS data sheet.

CAM110FF Series Continuous Air Monitor, Iodine or Particulate/Iodine

Specifications

System
AMBIENT TEMPERATURE – 0 °C to +50 °C (+32 °F to +122 °F).

AMBIENT HUMIDITY – 0 to 95% relative humidity.

MOUNTING – Fixed (optional mobile configuration).

SIZE – 724 x 762 deep x 1041 mm (28.5 x 30 x 41 in.) (L x W x H).

WEIGHT – 340 kg (750 lb), approximately.

POWER – 120 V ac ±10%, 60 ±5 Hz, (other voltages optional).

Sample Transport System
SAMPLE TEMPERATURE – 0 °C to 50 °C (+32 °F to +122 °F).

INTERNAL PRESSURE – 0 to 0.5 atm (0 to 15 in. Hg).

FLOW RATE – 0 to 30 LPM (0 to 1 SCFM).

VACUUM PUMP – Single phase electric motor.

MAP35C Particulate/Iodine Sampler
SHIELDING – 76.2 mm (3 in.) of lead.

SAMPLER DIMENSIONS – 254 x 343 x 711 mm (10 x 13.5 (including detector) x 28 in.) (W x H x L).

WEIGHT – 147 kg (325 lb), approximately.

MD455V6 Beta/Gamma Detector
DETECTOR TYPE – Plastic scintillator, 0.25 mm (0.010 in.) thick, 50.8 mm (2 in.) diameter. BGO crystal, (1.86 in.) dia., (0.31 in.) thick.

DYNAMIC RANGE – 3.7×10^{-1} to 3.7×10^{5} Bq/m^3 (10^{-11} to 10^{-5} µCi/cc).

MD55EV2 Gamma Detector
DETECTOR TYPE – NaI, 38.1 x 25.4 mm (1.5 x 1 in.).

DYNAMIC RANGE – 3.7×10^{-1} to 3.7×10^{5} Bq/m^3 (10^{-11} to 10^{-5} µCi/cc).

PA300E Preamp
TEMPERATURE – -10 °C to +50 °C (+14 °F to +122 °F).

HUMIDITY – 0-95%, non-condensing.

HOUSING – NEMA-4X stainless steel box.

DIMENSIONS – 152.4 x 152.4 x 101.6 mm (6 x 6 x 4 in.) (L x W x H).

WEIGHT – 2.2 kg (4.9 lb).

MX9B Check Source Assembly
SIZE – 102 x 76 x 38 mm (4 x 3 x 1.5 in.).

WEIGHT – 0.5 kg (1 lb).

CHECK SOURCE – ^{137}Cs or ^{133}Ba.

ADM606M digital/analog multi-function control and display unit
TEMPERATURE – -10 °C to +50 °C (+14 °F to +122 °F).

HUMIDITY – 0-95%, non-condensing.

WEIGHT – 3.4 kg (7.5 lb).

For complete specifications, see the ADM606M Multifunction Control and Display Unit data sheet.

The CAM110FF Series is designed and manufactured under a quality system in compliance with ISO 9001.

ISO 9001 SYSTEM CERTIFIED

CANBERRA

C28095 – 06/06