



Trusted
radiation
protection.

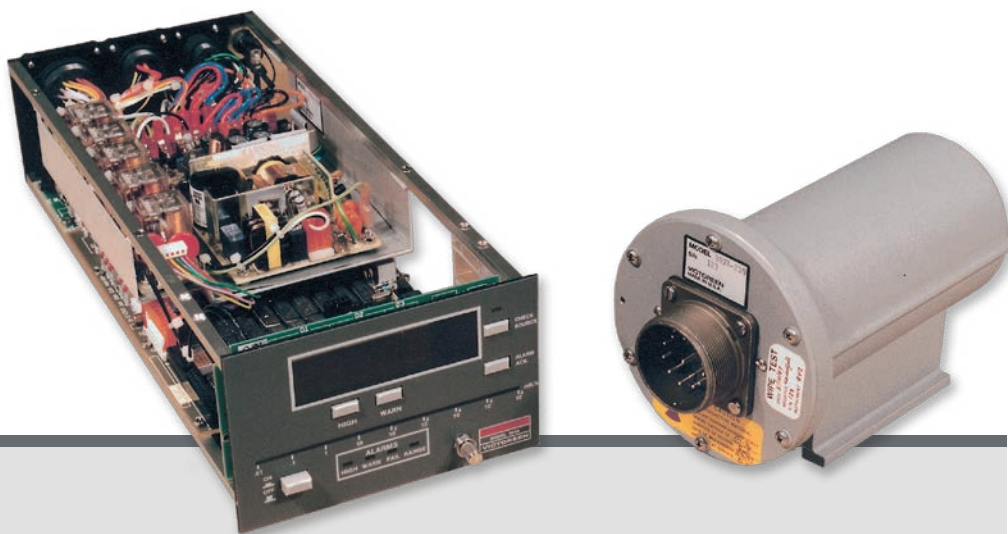
955A

Geiger-Mueller (GM) Area Monitor

The 955A is a single-channel area radiation monitoring system capable of operating over the ranges of 10^{-2} to 10^3 mR/h, 10^{-1} to 10^4 mR/h, or 10^0 to 10^5 mR/h, depending on the detector selected. The system monitors gamma radiation over a 5-decade range and provides indication when the radiation level decreases below a fail threshold, exceeds a warn set point, exceeds a high set point, or exceeds an over-range set point. The overrange feature provides two significant benefits. First, it prevents the system from displaying an on-scale, but inaccurate, reading should the detector become saturated. Second, it lessens the risk of damaging the detector by disabling it during an over-range condition. Relay outputs are available to activate alarm annunciators. Analog outputs are available for trend display

on a strip chart recorder or computer. In addition, the monitoring system has an integral check source to verify operational integrity. The system consists of an 897A Series GM Detector with integral preamplifier and a 956A Universal Digital Ratemeter (UDR). Area monitoring is used for the detection of x-ray or gamma radiation in a selected area. The monitor should be

used in any location where personnel may be exposed to an adverse amount of radiation. Applications include nuclear reactors, accelerators, hot cells, irradiators, and any area where radiation sources are handled. These monitors can be used as single channel monitors or grouped together as a multi-channel area monitoring system.



Key features

- Range: 5 decades between 10^{-2} and 10^5 mR/h
- Energy response: 15 % from 80 keV to 1.5 MeV
- No external power needed at detector location
- Preamplifier integral with detector
- Ratemeter may be remotely located up to 2000 feet (using 50-100 cable or equivalent)
- Single cable between ratemeter and detector
- 8 μCi ^{36}Cl check source
- Life expectancy: up to 10^5 rads
- Seismically tested with high reliability
- Microprocessor based digital readout
- Bargraph radiation value display



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Technical specifications

Universal Digital Ratemeter

The 956A-201 UDR, when connected to a 897A Series GM Detector, comprises a monitoring system that operates over a five-decade range. The UDR provides display, control and annunciation functions for the monitoring system, and will display readings in the range of 10^{-2} to 10^5 mR/h. Standard features for the instrument consist of a three-digit display of the radiation value and a multicolored bargraph indicator that covers the entire range of the UDR. In the event of an alarm condition, the bargraph changes color (green for normal, amber for warning and red for high). Front-panel alarm indicators and rear-panel relay outputs for alarm annunciation are also included. Front panel pushbuttons are provided to apply power, display alarm limit set points, acknowledge alarms and activate the check source. Analog outputs of 0 V dc to 10 V dc (1) and 4 mA to 20 mA (2) are provided for recording and computer monitoring. The outputs may also be used to drive a remote meter or a local (i.e. near the detector) indicator. All electronics required to interface with an 897A Series detector are included within the 956A UDR. The electronics consist of a high-voltage power supply, low-voltage DC power supply and the hardware/software required for UDR operation. The system also includes an overrange indicator to preclude the possibility of on-scale readings when the radiation field is beyond the range of the detector.

Main display

3 digits with backlighted radiation units display and floating decimal point. 3 digits plus exponent for data entry/display

Bargraph display (dynamic range)

3 segments per decade, 10^{-2} to 10^5 mR/h (24 segments), tricolor, indicating channel status

Alarm indicators

HIGH (red LED), WARN (amber LED), FAIL (red LED) and RANGE (red LED). HIGH and WARN LEDs flash until acknowledged

Pushbuttons

- Setpoints: HIGH-High Alarm limit, WARN-Warn Alarm limit
- Check source: Activates radioactive check source and associated green LED indicator. Momentary non-latching pushbutton operation
- Alarm acknowledgment: Alarm acknowledgment causes alarm indicators to go to a steady on state after acknowledgment
- Power ON/OFF: Alternate action pushbutton for AC power to unit

Relay outputs (failsafe operation)

- High alarm: One set. DPDT rated 5 A @ 120 V ac (one set 120 V ac powered for use with optional remote alarm)
- Warn alarm: Two sets. DPDT rated 5 A @ 120 V ac
- Fail alarm: Two sets. DPDT rated 5 A @ 120 V ac
- Contact rating for all relays is 5 A @ 28 V dc

High voltage output

300 V dc to 1800 V dc @ 0.4 mA

Check source power

± 15 V dc @ 20 mA

Analog outputs

4 mA to 20 mA (2) (500 ohms max) and 0 to 10 V dc (1 k-ohm min), logarithmic. May be scaled for any one decade (min) to the full range of the unit (max).

Alarm acknowledgment input

Optically isolated dc input

Detector input

Digital pulse, up to 2000 ft from UDR, 50 ohm input impedance

Detector accuracy (electronic)

$\pm 1\%$ digit ($\pm 1\%$ of the displayed value), exclusive of the detector energy response

Dimensions (w x d x h)

5.64 in x 13.73 in x 3.47 in (14.33 cm x 34.87 cm x 8.81 cm)

Weight

4 lb (1.8 kg)

Power requirements

120 V ac $\pm 10\%$, 50/60 Hz, 28 W (240 V ac optional)

Environmental

- Operating temperature: 32 °F to 122 °F (0 °C to 50 °C)
- Storage temperature: 32 °F to 122 °F (0 °C to 50 °C)
- Relative humidity: 0 to 95 %, non-condensing
- Compatible detectors: 897A Series detectors
- Heat loading: Approximately 96 BTU/hr



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Detector and Preamplifier

The 897A Series detectors use a thin-walled energy compensated GM tube to detect ionizing radiation. Each 897A series detector has a GM tube, a check source and a preamplifier. The check source is a low-level radioactive source actuated by a + 15 V dc meter movement. For positive operation, the check source is electrically driven in both the ON and OFF positions. The preamplifier provides the pulse conditioning and cable driving capability necessary to drive a 956A UDR. All 897A Series detectors are functionally identical. They differ only in housing material, tube type and range. The 897A series detectors operate in the voltage range between 500 V dc to 650 V dc. The 897A Series detector operates with the 956A UDR or with other readouts. Each detector measures a five-decade range. Three measurement ranges are available: low, medium and high. The low range covers 10^{-2} to 10^3 mR/h, the medium covers 10^{-1} to 10^4 mR/h, and the high covers 10^0 to 10^5 mR/h. The 897A Series detector may also be used with the 960 Digital Radiation Monitoring System (DRMS) equipment or the 856 Analog Readout.

Detector

Dimensions

7.12 long x 3 in \varnothing
(18.1 cm x 7.6 cm)

Weight

1 lb (0.45 kg)

Housing material

- Aluminum:
897A-210/220/230
- Stainless steel:
897A-211/221/231

Fill gas

- Neon/Argon/Halogen:
897A-210/211
- Helium/Neon/Halogen:
897A-220/221/230/231

Wall thickness (bare tube)

- 32 to 40 mg/cm²:
897A-210/211
- 80 to 100 mg/cm²:
897A-220/221/230/231

Mounting

Wall mount (bracket included)

Mating connectors

- 897A-2x0
- 92-7005-17A, 12 pin female
 - 92-7005-12A, bushing
 - 92-7005-9A, clamp
- 897A-2x1 (stainless steel)
- 92-7005-15A, 12 pin female
 - 92-7005-12A, bushing
 - 92-7005-13A, bushing

Field cable

50-100 or equivalent with two coaxial conductors, two twisted pairs, and overall shield

Maximum external pressure

30 psig

Environmental

- Storage temperature:
10 °F to 122 °F
(- 23 °C to 50 °C)
- Operating temperature:
10 °F to 122 °F
(- 23 °C to 50 °C)
- Relative humidity:
0 to 95 %, non-condensing

Operating voltage

500 V dc to 650 V dc
(supplied by digital ratemeter)

Plateau length

100 V dc to 150 V dc

Plateau slope

- 0.1 %/V: 897A-210/211
- 0.2 %/V: 897A-220/221
- 0.3 %/V: 897A-230/231

Dead time (approximate)

- 45 microseconds:
897A-210/211
- 28 microseconds:
897A-220/221
- 20 microseconds:
897A-230/231

Measurable radiation

- 10^{-2} to 10^3 mR/h:
897A-210/211
- 10^{-1} to 10^4 mR/h:
897A 220/221
- 10^0 to 10^5 mR/h:
897A-230/231

Detector element life

Exceeds 1000 hours at full-scale

Typical energy dependence

± 15 % from 80 keV to 1.5 MeV

Detector accuracy

± 20 % of actual dose for ¹³⁷Cs

Radiation detected

Gamma rays and x-rays

Preamplifier

Input impedance

> 100 k-ohms

Output impedance

50 ohms

Output pulse polarity

Positive

Output signal (50 ohm)

+ 5 V dc square wave

Low voltage

± 15 V dc (optional + 10 V dc is jumper selectable)

Power requirements

± 15 V dc @ 20 mA

Maximum field cable length

2000 ft (610 m)

Electronics life expectancy

Approximately 10^5 rads

Discriminator level

Adjustable from 0 to + 2 V dc (nominal value = 0.5 V dc)

Anti-jam level

Adjustable from 0 to + 3 V dc

Anti-jam oscillator frequency

Approximately 50 kHz

Analog and digital monitor configuration

Divide by 2, square wave output

Optional monitor configuration

Raw pulse output (jumper selectable)

Ordering information

Model

955A: GM Area Monitor

Optional accessories

848-8: Field Test Source

848-4-105: Adapter

948-1: Rack Chassis



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