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Technical Data

1040-4

In-Line Liquid Effluent Monitor

The 1040-4 In-Line Liquid Effluent Monitor assures radioactive materials within effluents do not exceed maximum permissible concentrations (MPC), protecting personnel against possible exposure to excessive radiation. Scintillation detectors are utilized because of their sensitivity and reliability.

The Code of Federal Regulations requires any effluent that could possibly contain radioactivity be monitored, and the 1040-4 In-Line Liquid Effluent Monitor meets the guidelines set forth in the United States Nuclear Regulatory Commission (USNRC) radiation protection standards.

The 1040-4 In-Line Liquid Effluent Monitor includes an easily-installed effluent sampler furnished with flanged ends to be inserted directly into the process line. To reduce the effects of background radiation, the sampler includes several inches of lead shielding. The assembly requires a separate structure to support its considerable weight. The detector measures gross gamma or beta radiation in the process fluid, amplifies and shapes the pulse output from the photomultiplier tube, and transmits the signal to a Universal Digital Ratemeter (UDR). The ratemeter may be locally-mounted or remotely-mounted up to 1500 feet. The ratemeter displays measured radiation in CPM.

The ratemeter also provides output alarm contacts for Alert, High Radiation, and Channel Fail. Check-source actuation is manual from the ratemeter, with alarms muted when in the check-source mode. The In-Line assembly may be furnished with a standard or high temperature gamma scintillation detector (up to 300 °F) for high temperature process liquid applications.



Key features

- Universal Digital Ratemeter with dynamic range up to 10^7 CPM
- Mounts directly in process line
- Gamma or beta scintillation detector for sensitivity and reliability
- Removable for decontamination
- Applicable for 1 inch or larger process lines

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Technical specifications

Dimensions

(w x d x h) Sampler size will vary depending on process line size and background radiation. For 4-inch schedule 40 process line and 4-inch lead shielding, size will be approximately 13.3 in x 25.5 in x 22.6 in.

Weight

Sampler weight will vary depending on process line size and the amount of lead shielding required. For a 4-inch schedule 40 process line and 4-inch lead shielding, weight will be approximately 1240 lb

Detector

Crystal

Nal (Tl), 2 x 2 in

Preamplifier

Integral, 1,500 ft drive capability

Efficiency

Approximately 1E6 CPM/ μ Ci/cc for 85Kr

Temperature

32 °F to 122 °F (160 °F to 360 °F optionally available)

Dimensions

10.5 (l) in x 2.5 in \varnothing (26.67 cm x 6.35 cm)

Weight

3 lb (1.36 kg) approx.

Universal Digital Ratemeter

Note: See 1042A Datasheet

Main display

5 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, tricolor, indicating channel status. 10 to 10⁷ CPM.

Alarm indicators

- HIGH (red LED)
- WARN (amber LED)
- FAIL (red LED)
- RANGE (red LED)

Pushbuttons

Set points:

- HIGH-High Alarm limit
- WARN-Warn Alarm limit
- Check source:
- Activates check source and associated green LED indicator
- Momentary non-latching pushbutton operation

Alarm acknowledgment: Causes alarm indicators to go to a steady on state after acknowledgment

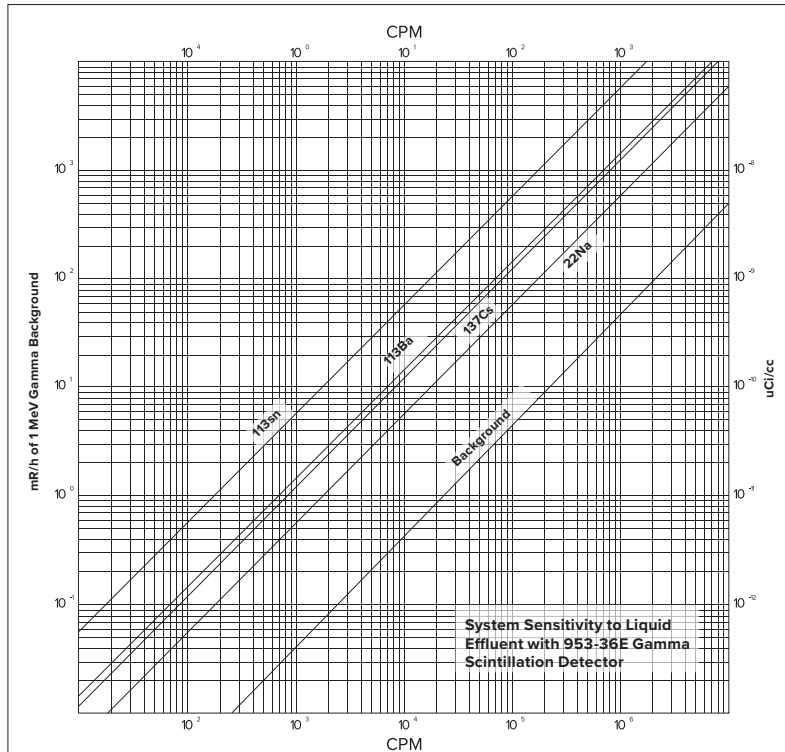
Power ON/OFF: Alternate action pushbutton for AC power to unit

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 1400 V dc max @ 0.5 mA





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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 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

120 V ac $\pm 10\%$, 50/60 Hz, 28 W

Heat loading

Approximately 96 BTU/hr

Environmental

- Operating temperature:
32 °F to 122 °F (0 to 50 °C)
- Storage temperature:
32 °F to 122 °F (0 to 50 °C)
- Relative humidity:
0 to 95 %, non-condensing

Mounting

948-1 Rack Chassis, designed to mount
3 UDRs in a 19-inch wide cabinet

Model

1040-4: In-Line Liquid Effluent Monitor
Standard accessories **1042A:** Universal Digital
Rateometer 953: Gamma Scintillation Detector

Optional accessories

948-1: Rack Chassis

940-4 In-Line Liquid Effluent Monitor available with
942 series UDRs

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