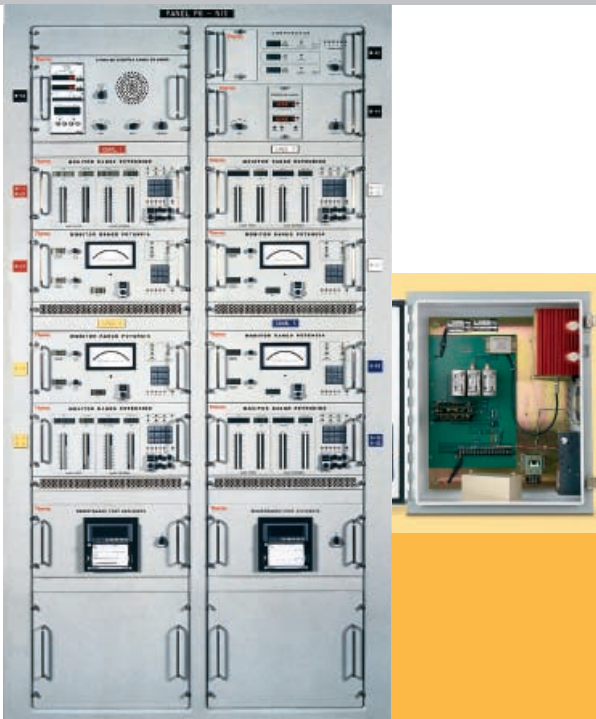


Is it time to modernize your aged or obsolete nuclear instrumentation systems to support life extension? Are your current systems unreliable and noisy, resulting in outages being extended to troubleshoot and repair or replace failures? The complete line of Thermo Scientific neutron flux monitoring system products helps nuclear power plants solve these problems.

Thermo Scientific Neutron Flux Monitoring Systems

Reliable Power Level Monitoring and Control for Nuclear Power Plants



You know it is time to upgrade when equipment obsolescence and safety concerns demand excessive time to maintain the reliability and qualification of your reactor instrumentation. With minimal impact and cost, nuclear power plants can easily upgrade their existing ex-core neutron flux monitoring systems (detectors, cables and electronics) to the simpler and more reliable Thermo Scientific NFMS line of products.

By installing the Thermo Scientific NFMS, peace of mind is achieved from higher reliability, lower maintenance costs, better accuracy, and satisfying all pertinent regulatory guides. Since 1981, we have installed the majority of neutron flux monitoring systems in pressurized water reactors throughout the United States. Our neutron flux monitoring systems are also being provided to new plants under construction.

Rugged, field-proven components and a streamlined design give the Thermo Scientific NFMS superior reliability and qualify it to last the life of the reactor. No longer must nuclear power plants be forced to routinely replace short-lived detectors or continually service obsolete electronics.

Plants began to replace aging, failure-prone systems to comply with new regulations in the early 1980s. Since then, more than 130 reactors in 11 countries have chosen our neutron flux monitoring systems because of their high reliability, low maintenance costs, high immunity to electromagnetic interference, ease of installation, and ease of testing.

Features

- Source Range Neutron Flux Monitoring Systems
- Intermediate (Wide) Range Neutron Flux Monitoring Systems
- Power Range Neutron Flux Monitoring Systems
- Qualified for Safety Grade Class 1E and US NRC RG 1.97 Post-Accident Monitoring Applications
- 10CFR50 Appendix R Remote Shutdown Monitoring Systems
- Audible Count Rate and Scaler-Timer Drawers
- Shutdown Margin Monitors (for boron dilution detection)
- Cabinets
- 40 year life under normal full-power operating conditions
- 10CFR50 Appendix B Quality Assurance Program

Thermo Scientific Neutron Flux Monitoring Systems

General Specifications — Source Range

| | |
|--------------|---|
| Sensitivity | 20 cps/nv (thermal) |
| Flux Range | 10^{-2} nv to 10^4 nv |
| Output Range | 0.1 cps to 10^6 cps |
| Linearity | ±2% (percent of equivalent linear full scale) |

General Specifications — Intermediate (Wide) Range

| | |
|--------------|---|
| Sensitivity | 1 V/decade |
| Flux Range | 1 nv to 10^{10} nv |
| Output Range | 10^{-8} to 200% |
| Linearity | ±1% (percent of equivalent linear full scale) |

General Specifications — Power Range

| | |
|--------------|---|
| Output Range | 0 to 200% |
| Linearity | ±1% (percent of equivalent linear full scale) |

Mechanical Specifications

| Mechanical Specifications | Dimensions | Weight |
|---|---|---------------|
| SR/IR Detector Housing | 152 cm (60 in) x 14.3 cm (5.625 in) O.D. | 36 kg (80 lb) |
| PR Detector Housing | As required | |
| Cables | Up to 305 m (1,000 ft) | |
| Amplifier | 61 cm (24 in) x 51 cm (20 in) x 25 cm (10 in) | 23 kg (50 lb) |
| Wall Mount Isolator | 51 cm (20 in) x 41 cm (16 in) x 23 cm (9 in) | 27 kg (60 lb) |
| Wall Mount Signal Processor | 61 cm (24 in) x 51 cm (20 in) x 25 cm (10 in) | 23 kg (50 lb) |
| Cabinets | As required | |
| Rack Mount Signal Processors | As required | |
| Audible Count Rate Drawer | 18 cm (7 in) x 48 cm (19 in) x 30 cm (12 in) | 10 kg (21 lb) |
| Audible Count Rate Drawer with Scaler-Timer | 36 cm (14 in) x 48 cm (19 in) x 30 cm (12 in) | 14 kg (30 lb) |
| Shutdown Margin Monitor | 18 cm (7 in) x 48 cm (19 in) x 28 cm (11 in) | 5 kg (10 lb) |

Temperature Specifications

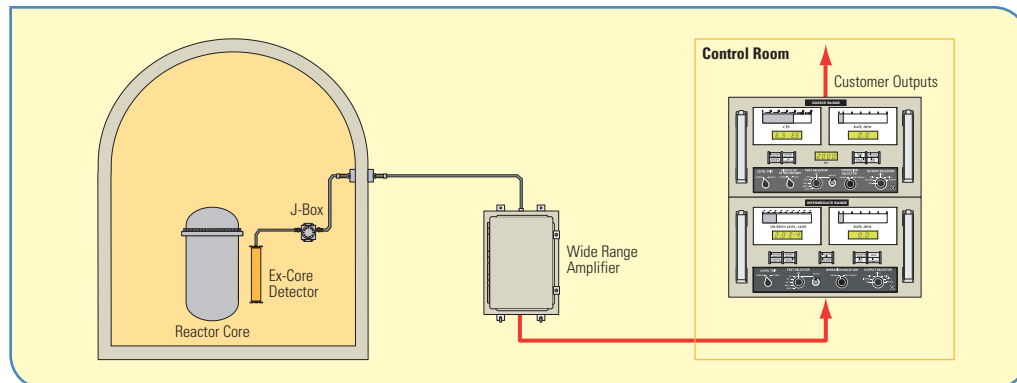
The Neutron Flux Monitoring Channel is designed to operate under normal service conditions and to operate through a design basis event (DBE)

| | |
|------------------|--|
| Detector | Normal: 0°C to +93°C (+32°F to +200°F); 10% to 100% RH DBE: LOCA profile |
| Amplifier | Normal: +5°C to +60°C (+41°F to +140°F); 10% to 95% RH DBE: +5°C to +60°C (+41°F to +140°F); 10% to 100% RH |
| Signal Processor | Normal: +5°C to +60°C (+41°F to +140°F); 10% to 95% RH DBE: Normal |

Electrical Specifications

| | |
|--------------------|--|
| Power Requirements | 120 VAC ±10%, 60 Hz, 1.0 A/unit; 220 VAC ±10%, 50 Hz, 0.5 A/unit |
|--------------------|--|

Typical Ex-Core Neutron Flux Monitoring System Channel



© 2009 Thermo Fisher Scientific Inc. All rights reserved. Results may vary under different operating conditions. Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details. Literature Code PI.3011.0109

| | | |
|---|---|--|
| Americas +1 (800) 488-4399 +1 (858) 452-9250 fax | China +86 (0) 21 6865 4588 +86 (0) 21 6445 1101 fax | India +91 (20) 6626 7000 +91 (20) 6626 7001 fax |
| Australasia +61 (0) 8 8208-8200 +61 (0) 8 8234-3772 fax | Europe +49 (0) 9131 998207 +49 (0) 9131 998230 fax | South Africa +27 (0) 11-609-3101 +27 (0) 11-609-3120 fax |

www.thermo.com/nuclear

Thermo
SCIENTIFIC