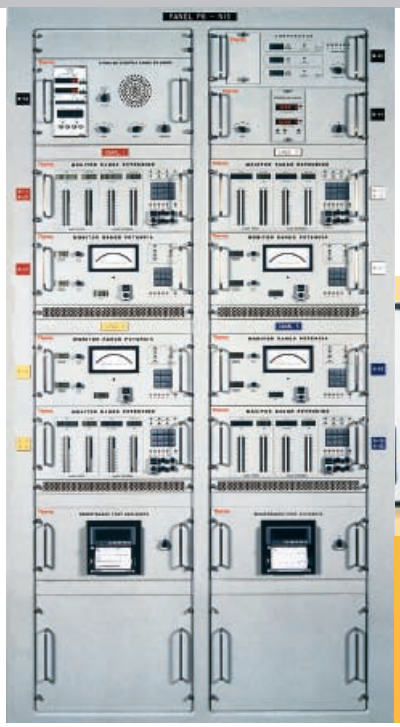
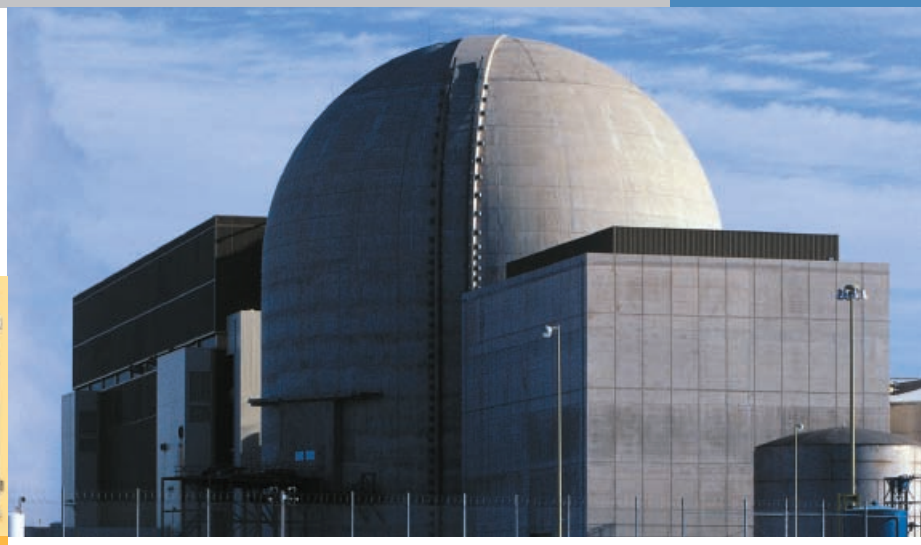
Product Specifications

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.

Neutron Flux Monitoring Systems

Reliable Power Level Monitoring and Control for Nuclear Power Plants





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

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.

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	**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

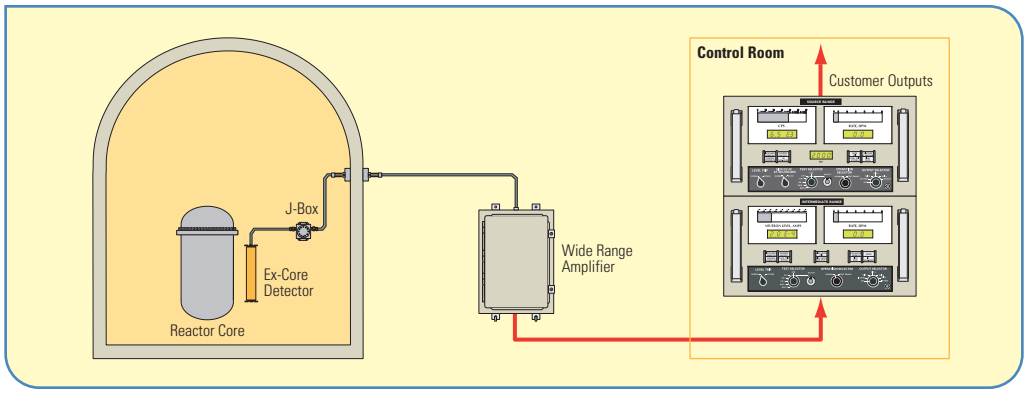
The Neutron Flux Monitoring Channel is designed to operate under normal service conditions and to operate through a design basis event (DBE)

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



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