Digital Nuclear Instrumentation System

Westinghouse

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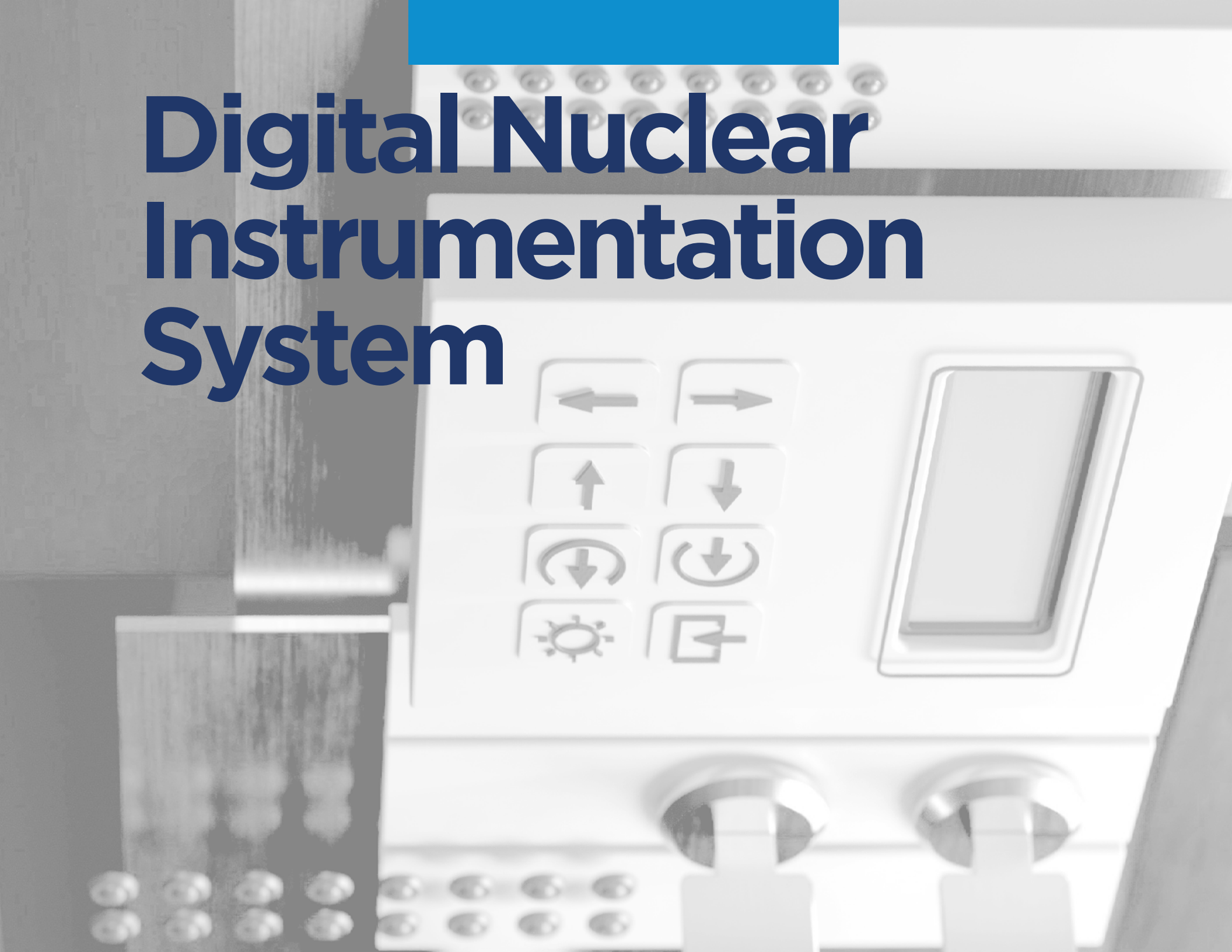


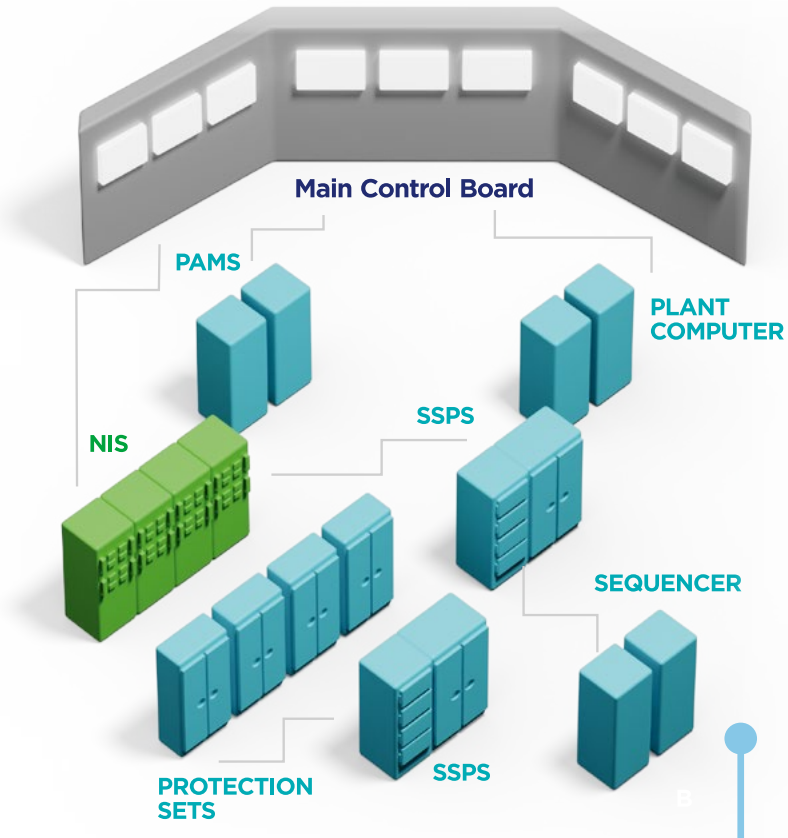
Digital Nuclear Instrumentation System

Background

Many Nuclear Instrumentation Systems (NIS) in today's global nuclear fleet are original to plant construction and based on antiquated technology. These legacy systems are increasingly costly to maintain and nearing end of their service lives.

Digital NIS offers a drawer-for-drawer replacement, enabling operators to upgrade seamlessly to modern digital technology. This solution delivers enhanced performance, lower operating costs, and minimal disruption with no large-scale plant modifications required.

Standard Westinghouse Gen II Safety System Architecture Scope of Digital NIS Upgrade



Digital NIS Upgrade

Developed in partnership with Mirion and powered by the proTK™ platform, the Digital Nuclear Instrumentation System Upgrade delivers a reliable, modern solution for neutron flux monitoring in nuclear facilities.

By transitioning from analog to digital technology, operators gain:

- Enhanced measurement accuracy
- Modular system architecture
- Extended operational life

This upgrade supports long-term plant operations, reduces maintenance demands, and aligns with current regulatory standards-- delivering measurable value to nuclear power plant operators.

Benefits

Seamless Integration

- Drawer-for-Drawer Replacement
  - > Installs in existing locations
  - > Minimal impacts on plant operations

Enhanced Performance

- Improved accuracy, repeatability, and reliability
- Continuous self-diagnostics and functional monitoring
- Integrated test functions

Built-in Safety and Reliability Features

- Built-in redundancy and diversity
- Reduced Trip Risk
  - > Eliminates analog bistable calibration
  - > Enables ion current calibration without taking channel out of service

Expanded Capabilities

- Integration with auxiliary functions
- Optional datalinks for plant computer interface
- Flexible User interface options

Project Scope

A typical Digital NIS upgrade includes the following scope that can be tailored to meet site specific requirements.

- Digital NIS Drawers
- Required Installation equipment
  - > Mounting Hardware
  - > Interface Cables
- Documentation Package
  - > Installation Drawings
  - > User's Manuals for new Digital NIS Drawers
  - > EQ Summary Report
- Licensing Topical Report (LTR)
- Licensing Support for 50.59 under NEI 96-07, Appendix D or ISG-06 for License Amendment Report (LAR)

Drop-In Upgrade for NIS

Applicable Codes & Standards

Environmental

- IEC/IEEE 60780-323:2016
- RG 1.89, Rev 2

Seismic

- IEEE 344-2013
- IEEE/IEC 60980-344:2020
- RG 1.100, Rev 4

EMC/RFI

- RG 1.180, Rev. 1
- EPRI TR-102323, Rev. 4
- IEC 62003:2009
- IEC 61000-6-2:2009
- IEC 61000-6-4:2018

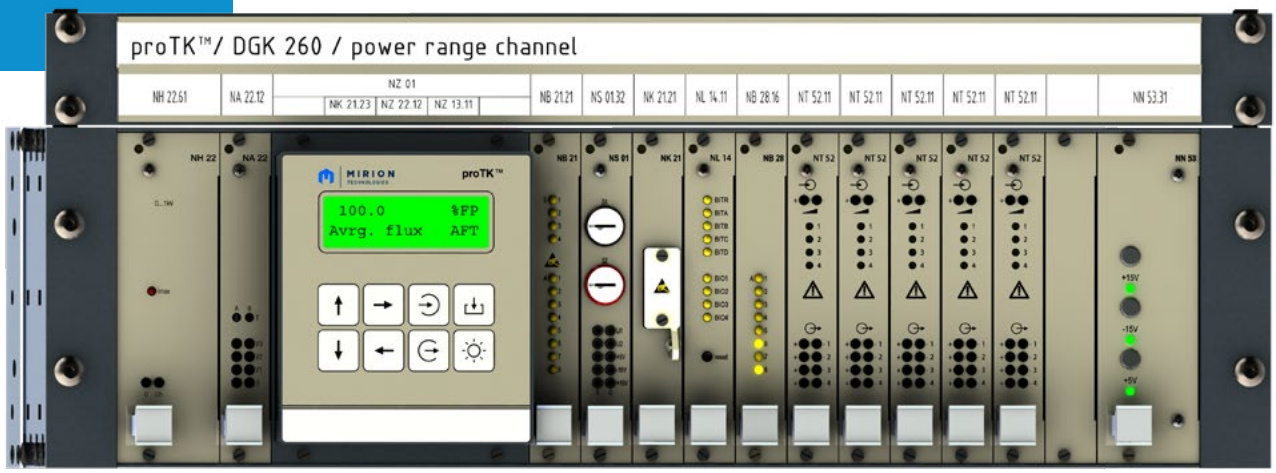
Industry Standards

- IEC 60880: 2006
- IEC 61513: 2011
- IEEE 603-1991
- IEEE 7.4.3.2: 2016
- IEEE 379-2000
- IEEE 384-1992

Value Added Services

The following services are also available to support Digital NIS customers as part of upgrade projects.

- **Installation Support Services**
- **Enhanced Licensing Support**



Digital Replacement NIS Drawers

Smart, Seamless Modernization
The Westinghouse Digital NIS Upgrade is designed for drop-in installation, using existing cabinet locations and mounting points. This minimizes disruption to plant operations, training, and procedures—preserving the original theory of operation.

Reliable Digital Performance
Digital NIS drawers deliver superior accuracy, repeatability, and reliability through adaptive signal filtering, dynamic time constants built-in self-diagnostics, functional monitoring, and redundancy.

Reduced Operational Burden
Digital technology eliminates or reduces manual tasks common with analog systems, such as:

- Technical specification surveillances
- Daily calorimetric calibrations
- Gain potentiometer replacements

Self-testing features simplify surveillance testing via front-panel HMI, reducing outage critical path risk. Digital setpoints remove the need for bistable calibrations, and ion current calibration can be performed without taking channels offline—helping lower plant trip risk.

Meets Existing Functionality. Provides Enhanced Features.

Flexible Interface Options

Digital NIS drawers are designed to integrate seamlessly with existing downstream systems, including the 7300 Process Protection System and Solid-State Protection System (SSPS). They also support future digital Reactor Protection System (RPS) upgrades, without requiring changes to the NIS.

Optional data links enable connectivity with other plant systems, such as the Plant Process Computer (PPC), with both read-only and read/write capabilities available. These interface options allow customization to meet specific site requirements.

Key Benefits

- **Works with existing Systems (7300, SSPS, Relay Protection System)**
- **Compatible with Future Digital Upgrades**
- **Datalinks enable enhanced NIS function on PPC**
- **Potential elimination of auxiliary comparator and flux deviation NIS functions**

Proven NIS Platform

The Digital NIS is built upon the Mirion Technologies proTK™ platform, a trusted neutron flux monitoring system qualified for related use.

- Introduced in 1988, and recently upgraded and recertified, the proTK™ platform has been deployed in over 400 safety systems worldwide, accumulating more than 4000 years of operating experience.
- Custom designed and manufactured by Mirion Technologies for the nuclear industry, the proTK™ platform delivers proven reliability and performance across a wide range of neutron flux monitoring applications

More than 4000 years of total operating experience

proTK™ is a trademark of Mirion Technologies

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https://westinghousenuclear.com/operating-plants/instrumentation-controls-systems/

MIRION TECHNOLOGIES

Protect What's Next™

Advancing Radiation Safety.

The ex-core Nuclear Instrumentation Systems (NIS) drawers for Westinghouse nuclear power plants, developed in a strategic partnership between Westinghouse and Mirion Technologies, are based on the high-performance proTK™ platform from Mirion Technologies.