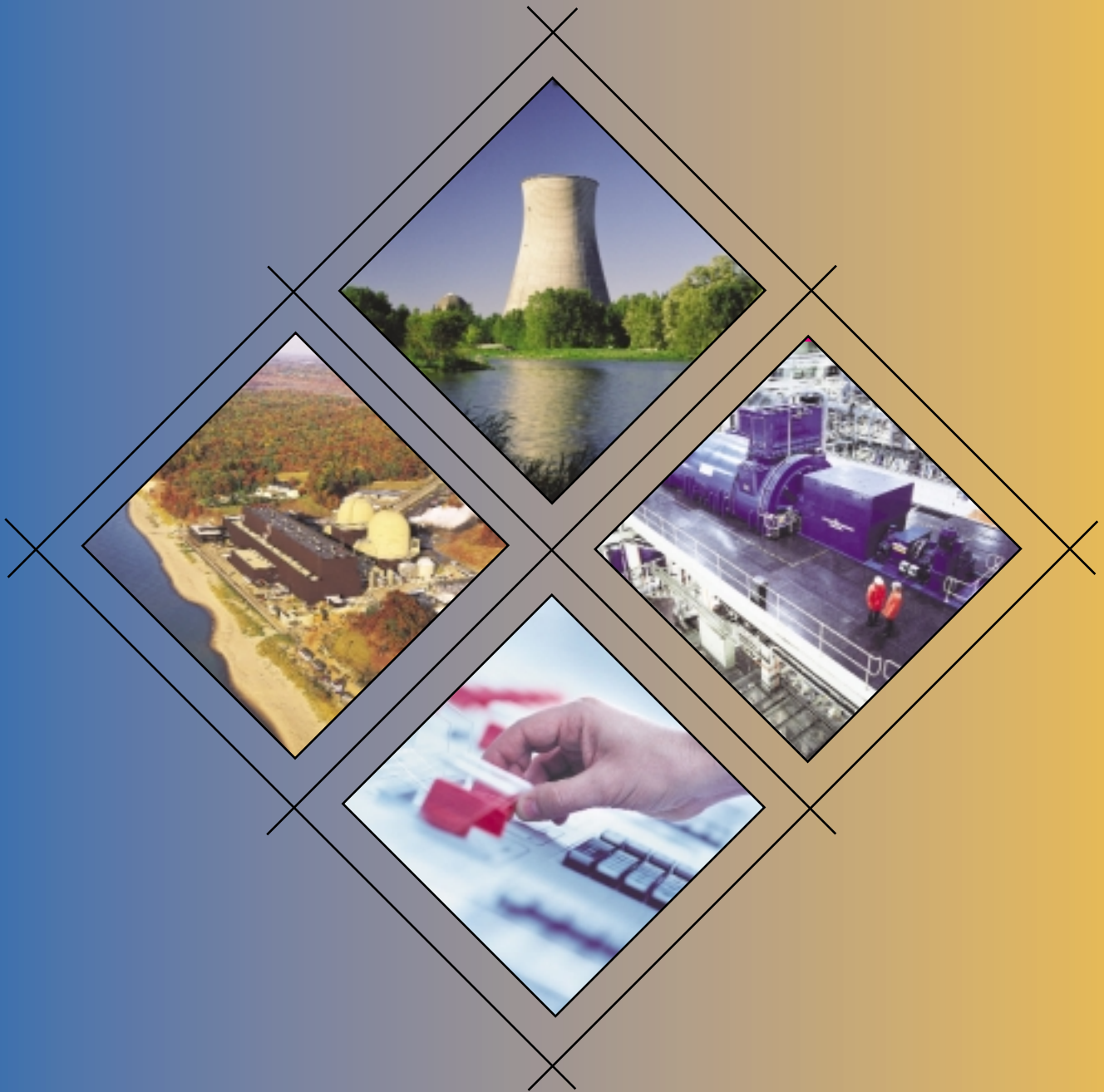


 **Weed Instrument**  
Nuclear



**EXCELLENCE in Solutions – Products – Service**

## **W**eed Instrument – A World leader in Nuclear Qualified Instrumentation

Weed Instrument has been supplying nuclear qualified temperature and pressure measurement instrumentation and fiber optic networking equipment for more than three decades.

Today, over 80% of all North American reactors rely exclusively on Weed Instrument temperature sensors for critical reactor coolant monitoring. Our nuclear qualified pressure transmitters are used for safety related measurements at over 20% of US nuclear power

became the exclusive US supplier of, the Invensys (Foxboro) N-I/A Series nuclear qualified pressure transmitters. The N-I/A Series combines the advantages of digital electronics with the reliability and performance of ion-implanted, micro-machined silicon pressure sensor technology.

We have continued to invest in our nuclear engineering, manufacturing and quality infrastructure, and we are now acknowledged to be one of the world's leading suppliers of



plants. Weed Instrument products have been qualified for use in all of the leading reactor technologies, including PWR, BWR, CANDU (PHWR), and APWR.

We are also proud to be team members of the Generation III and III+ reactor technology platforms, including the System 80+ and AP600.

In 1989 we acquired the manufacturing rights for the Foxboro N-E10 Series nuclear qualified pressure transmitters. In 1993, we purchased Camille Bauer, Inc (Tobar/Westinghouse-Veritrak), a major US based manufacturer of pressure transmitters for the nuclear power industry. More recently, we seismically qualified, and

temperature and pressure measurement instrumentation and fiber optic networking equipment to the nuclear power industry.

### **Weed Instrument Nuclear Quality Program**

Our Quality Program was established to meet the stringent needs of the nuclear industry. In addition to being ISO 9001:2000 registered we are compliant with 10CFR50 Appendix B, 10CFR21, ANSI N45.2, ASME NQA-1, ASME NCA3800 and CSA Can3-Z299.1.



**Nuclear Qualified / Safety Related / Class 1E Products**

Weed Instrument nuclear qualified products have earned a reputation for providing exceptional reliability, excellent performance and consistent quality. Our temperature and pressure product lines include a complete selection of sensors, thermowells and transmitters qualified to IEEE-344 (seismic) and IEEE-323 (environmental) standards.

Weed Instrument nuclear qualified temperature and pressure measurement

products feature a variety of performance and accident specification profiles to meet the application requirements of virtually every reactor type. We offer products suited for mild environments to pressure transmitters and temperature sensors designed for highest performance under the most severe of environments.

Other nuclear qualified products include fiber optic networking equipment, offering significant application advantages over copper based data transmission. Long Distances, Fault

Tolerance, Self Healing, High Reliability, Multidrop Communications, Harsh Environments, Electrical Noise, and many other communication problems, common to the nuclear power industry, are easily overcome with the simple, rugged and easy to install technology of Weed Instrument fiber optic products. Most of our fiber products can be used in almost any network configuration, independent of topology, and are compatible with virtually every type of fiber optic cable.



## Nuclear Qualified Temperature Sensors



Weed Instrument is the world's largest supplier of nuclear qualified RTDs and thermocouple temperature sensors. Qualifications are to IEEE and NUREG standards. These sensors can withstand 20G's, 300 Megarads T.I.D., LOCA and are available in many standard or custom configurations, such as thermowell mounted, strap-on, direct immersion, fast time response, and atmospheric styles.

Many optional features are available, such as a unique, qualified quick disconnect connector that allows for reduced installation and maintenance times.

Our temperature sensors for nuclear applications include:

- General use Models 601 & 611 RTDs for direct immersion
- General use Thermocouples for direct immersion
- General use Models 602, 612, & 615 Spring Loaded RTDs for thermowell mounting
- General use Spring Loaded Thermocouples for thermowell mounting
- Wide Range Model N9001 RTD for thermowell mounting
- Surface mount Model N9002 RTD for strap on mounting
- Surface mount Model N9013 Thermocouple for strap on mounting
- Fast response Model N9004 RTD for thermowell mounting
- Atmospheric Model N9017 RTD for wall mounting
- Atmospheric Model N9018 Thermocouple for wall mounting
- Fast response Model N9019 RTD for direct immersion
- Flexible Model N9339 RTD for use in CANDU plants
- Rigid Model N9356 RTD for use in CANDU plants

## Nuclear Qualified Temperature Transmitters



Weed Instrument temperature transmitters are qualified to IEEE-344 and can be used with either RTDs or thermocouples. They are capable of withstanding up to 40 years of background radiation of 10 Kilorads T.I.D.

The N7000 series transmitter is fully field configurable, making it adaptable to virtually any application. Top entry test jacks provide easy access for direct current measurement without disturbing the loop wiring. Each transmitter has a gasketed aluminum case, which is moisture resistant and provides a high degree of RFI protection. For especially harsh environments, an explosion proof/corrosion resistant NEMA 4X certified housing is also available.

Our transmitters for nuclear applications include:

- Model N7000 RTD and Thermocouple Transmitter
- Model N4000R-99 RTD Transmitter

## Nuclear Qualified Thermowells



We provide a variety of thermowells in virtually any style or material. While our standard thermowells are manufactured in stainless steel, other materials such as Monel, Inconel, and Hastelloy are regularly produced.

For ASME SECTION III compliant thermowells, we source bar stock materials from a Certificate holder and then manufacture the wells under our NQA-1 and NCA 3800 quality program.

The thermowell styles offered by Weed Instrument include standard and heavy duty in socket wells, threaded wells and flanged wells. Standard bore sizes are 0.260 inches and 0.386 inches. Metric versions are also available.

For applications requiring fast response, we supply a variety of taper tip thermowells.

## Nuclear Qualified Pressure Transmitters



Weed Instrument supplies one of the world's broadest ranges of pressure transmitters for nuclear qualified applications. Most of the instruments are qualified to IEEE-323/344 and versions are offered for virtually every installation and reactor technology - from inside containment/harsh environment to applications requiring only seismic qualification or commercial grade.

Models are available for the measurement of gauge, absolute or differential pressure and output signals include 4-20 mA, 10-50mA, HART, FOUNDATION Fieldbus, Profibus, and FoxCom.

Weed Instrument pressure transmitters for nuclear applications include:

- Model N-E11 and N-E13 Series for Harsh Environment Inside Containment
- Model DTN2000 for Harsh Environment Outside Containment
- Model N-I/A Seismic
- Model I/A for Commercial Grade

## Nuclear Qualified Analog Fiber Optic Data Links and Contact Closures



Our nuclear qualified analog fiber optic data link is designed to convert a 0-10VDC signal into a fiber optic signal for transmission, via a fiber optic cable, up to 10,000 ft (3,000 m). Once received, the fiber optic signal is then converted back into a direct proportional analog 0-10VDC signal via a receiver unit. No field adjustments are required. Simply apply power, connect the two units with fiber optic cable and supply the input signal to the transmitter. The analog fiber optic data link has been qualified to meet the seismic requirements of IEEE 344-1987 and mild environment requirements of IEEE 323-1974/1983.

The Weed Instrument fiber optic contact closures can be used to transmit contact closure data up to 16,000 ft (5,000 m) with 200 $\mu$ m cable. The DIN-Rail mount enclosures enable easy installation on industry standard hardware. The FOT-CC transmitter provides a closed contact signal to the FOR-CC receiver, which activates a single pole, double throw relay.

## Custom Products/Services



As a solutions company, Weed Instrument provides more than just catalog products. Decades of nuclear applications engineering provide the perspective and experience necessary to prototype, qualify, build and deliver special design quality temperature, pressure and fiber optic networking products.

Our Nuclear Engineering team simulates actual application environments, performs environmental testing and evaluates electrical loads. Experience has taught us which technologies and product characteristics provide the most effective solutions to our nuclear customers' measurement problems.

Weed Instrument services include:

- Commercial Grade Dedication
- Environmental Qualification
- Seismic Qualification
- Reverse Engineering

So, if you are confronted with instrumentation issues related to obsolescence and/or plant life extension, simply contact Weed Instrument.

## Commercial Grade Temperature Transmitters



We offer a full selection of economical, head mount and DIN-rail temperature transmitters. Available certifications include FM, CSA, ATEX and GL (ship building approval). Features include:

- 0.08% accuracy
- Full input/output isolation
- Custom input/linearization capability
- Configurable via a PC or HART Communicator
- T/C Inputs: B, C, D, R, S, E, J, K, L, N, T, U
- RTD inputs: Pt100, Pt500, Pt1000, Ni100, Ni500, Ni1000
- mV Inputs: -10 to 75mV/Ohm  
Inputs: 10 to 2000 ohms
- Outputs: 2-wire, 4-20mA or 20-4mA with optional HART signal superimposed

## Commercial Grade/Non-Safety Balance-of-Plant (BOP) Temperature Sensors



Weed Instrument provides one of the world's largest selections of catalog RTDs and thermocouples. Our RTDs can be found globally in thousands of industrial, process and OEM applications, wherever performance, reliability and economy are key considerations. We offer temperature sensors for every high temperature application in a power plant, such as: air intake/return; pump intake/discharge; pump seals; chiller outlet. We also manufacture a wide choice of Magnesium Oxide (MgO) insulated

thermocouples, in all thermocouple element types, for various process and laboratory applications.

All our RTDs and thermocouples can be supplied with your choice of element materials, values, accuracies and element leadwire configurations, together with a variety of sheath materials, lengths and diameters. All Weed Instrument temperature measurement assemblies can be pre-configured with one of our economical, integral head mounted smart or analog temperature transmitters.

- RTDs: -320 °F to 900 °F (-200 °C to 480 °C)
  - Strain Free, Wire Wound Elements
  - Thin Film Elements
  - Surface Mount Sensors
- Thermocouples: -320 °F to 2300 °F (-200 °C to 1260 °C)
  - Base Metal Types: J, K, T, E, N
  - Noble Metal Types: R, S, B
  - Other Types: M
- Custom Designs

## Other Weed Instrument Products

### Fiber Optic Networking for Bus Systems and Serial Data Interfaces

In critical applications, with high requirements for data availability, fiber optic is becoming the data transmission technology of choice. The advantages of fiber optic data transmission over copper systems include:

- Maximum resistance to interference, even in applications with extreme levels of electromagnetic interference
- High grade electrical isolation between stations
- Long transmission distances with extremely high data rates
- Number of stations not limited by electrical properties of the communication interface employed

This results in a significant gain in performance and immunity to interference for the data communication infrastructure, without having to allow for complex surge protection measures, shielding and equipotential bonding concepts.



Weed Instrument fiber optic communication modules provide complete physical layer network solutions for both open standard networks and the communication/control networks of most of the major global PLC and control system suppliers. Our standard data interface options include:

- Ethernet, Profibus, Modbus, Modbus Plus, ControlNet, DeviceNet, Data Highway Plus, DH-485, Genius, Remote I/O, RS232/484, Reliance R-Net

- Analog: 4-20mA, 0-10V

Recently, we have successfully qualified and supplied fiber optic data transmission products for several major nuclear power projects. As a result, the significant advantages of fiber optic data transmission are now available to the nuclear power industry.



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