REFERENCES

The dataPartner's product development is based on previous extensive experiences with Research Reactors (RR) I&C system upgrade projects.

RR I&C System innovation projects highlights:

- **LR-0 RR**, Research Centre Řež, CZ
- **VR-1 RR**, Czech Technical University in Prague, CZ
- **TRIGA Mark II RR**, Technical University Vienna, AT
- **LVR-15 RR**, Research Centre Řež, CZ
- **MARIA RR**, NCBJ, Otwock, PL
- **VR-2 RR**, FNSPE, CTU in Prague, CZ
- **JM-1 RR SLOWPOKE-2**, UWI, MONA, Jamaica

Ongoing projects:

- **NPP Temelin**, Diesel generator control system renewal, CEZ, CZ
- **ČEZ**, Pipeline integrity detectors, use of DCPD method, ČEZ (Power plants operator in the Czech Republic), CZ
- **LR-0 RR**, Reactor protection system innovation, Research Centre Řež, CZ
- **VR-1 RR**, Control system for new control rod drives, Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering, CZ
- **LVR-15 RR**, Renovation of the right part of the operator's console, Research Centre Řež, CZ
- **MARIA RR,** Comprehensive I&C renewal (NIS, RPS, HMI, RCS, DAS) for Maria RR in Poland

Evaluations and system designs including implementation are all based on IEC and IAEA safety standards, guidance, and other applicable requirements.

We also provide:

- **Technical consultations** and **feasibility studies**: Our nuclear physics, I&C engineers and computer specialists are ready to provide your facility with assessment of suitable solutions.
- **Statistical evaluation of I&C calibration data** with goal to extend the calibration periods including update of setpoint calculations, Plant Technical Specifications and related design/licensing documentation.
- **Computerized Maintenance Management System** development and implementation.

CONTACT INFORMATION

dataPartner has been providing services in the field of I&C systems for research reactors for more than 25 years. Based on long-term experience and the latest technical knowledge, our specialists have developed the third generation of neutron flux measurement instruments. NIS measurement channels provide neutron flux density measurements and rate of reactor power change (reactor period) for control, protection and safety systems of nuclear reactors.
The refurbishment of the neutron flux instrumentation system or the entire I&C system by dataPartner includes a complete design, support for the regulator's permitting, delivery of the equipment, its installation and adjustment, warranty service and long-term after-sales service.

Contact:

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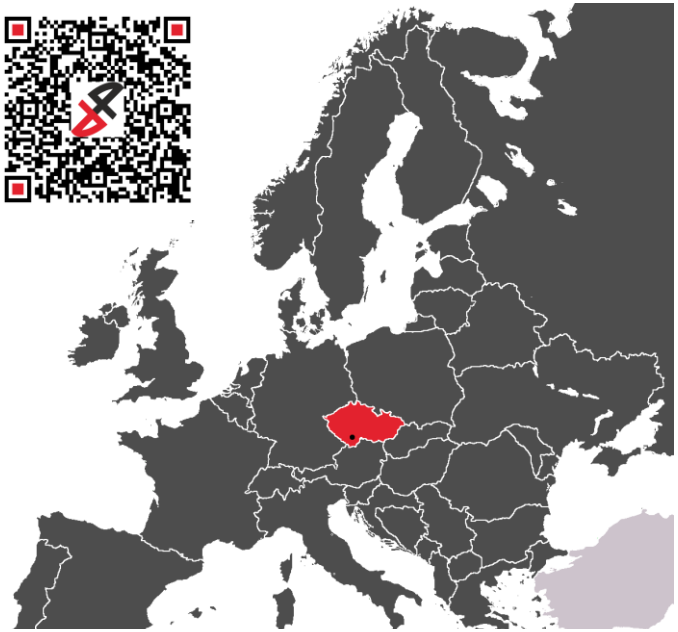
We cooperate with:

- ŠKODA JS Nuclear Machinery, Pilsen, CZ
- CTU in Prague, CZ
- Research Centre Řež, CZ
- ÚJV, Řež, CZ
- TU, Atominstitut Wien, AT

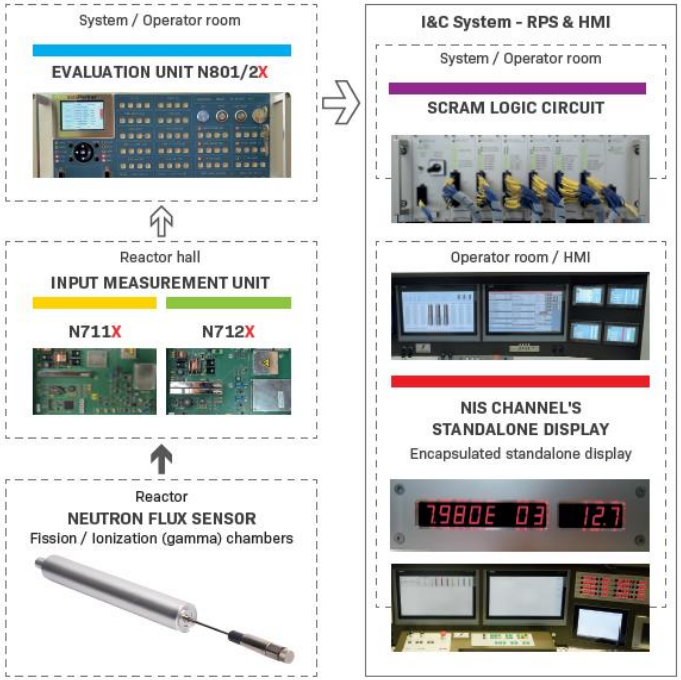


I&C Support for Nuclear Research Reactors

dataPartner®

NEUTRON INSTRUMENTATION

The new Neutron Instrumentation System (NIS) in the projects listed in the project overview is based on the architecture of existing systems and uses mostly in-house developed and manufactured electronic instruments.



Measured signals from the chambers are directly numerically processed to power value and power change rate – period (% per second or period) in Wide-range channels. Power value is converted to common units and can be expressed in % or kW. Actual values are updated every 100 ms and are sent via optical serial line to standalone display and via second optical interface to control system. This deterministic time period of data updating assures fast channel failure diagnostics. The time period length is chosen with respect to demands of safety system time response and measured value stability.

COMPONENTS QUALIFICATION

EMC Qualification

Seismic Qualification

Thermal Ageing

The average degradation-equivalent aging temperature was determined by the Arrhenius method (activation energy of thermal degradation, EA = 0.9 eV). The test simulated that the device is capable of operating under conditions at a given steady temperature for a minimum period of.

See the following table:

Constant temperature (°C)	Simulated operating time (years)
25	15
30	8
35	6,5
40	3,5
45	2
50	1

OTHER NUCLEAR APPLICATIONS

dataPartner continually develops various Nuclear Safety and Control Applications.

Products and services are provided in accordance with nuclear legislation and technical standards:

- Atomic law and implementing regulations
- IEC 61508 - Functional safety of E/E/EP systems
- IEC 61226 - Safety categorization of functions
- IEC 61513 - Design of the overall I&C system
- IEC 62138 - SW category B,C
- IEC 60880 - SW category A
- IEC 60987 - HW for I&C systems

We integrate equipment from proven industry **HW/SW suppliers**: Siemens, Omron, Schneider - Electric, Endress+Hauser, etc.

Research Reactor Reference Project:

TRIGA RR I&C System Refurbishment Project

Complete Renewal of the I&C System for TRIGA RR at TU Wien, TRIGA Centre Atominstitut, Austria

- **Neutron Instrumentation (NI) Channels**
- **SCRAM circuits**
- **Control rods control**
- **Computerized User Interface**
- **Operator control desk**
- **Experimental date recording and storage**