framatome

TELEPERM XS Test Equipment

Maintenance and Parameterization Tool

Modular maintenance and test machine for safety I&C pre-processing functions

Challenge

Safety I&C systems of nuclear power plants perform critical functions that monitor and control reactor process systems. Power plant operators are required to periodically survey and continuously validate the correct operation of these safety I&C systems. Surveillance activities are performed during periods of reactor on-line or off-line operation, in accordance with requirements of nuclear testing procedures.

Efficient surveillance and maintenance activities to validate correct safety I&C system operation provide justification for safely continuing plant operation. Using customized maintenance equipment based on the latest, high-performing technology will support the safe and long-term operation of the power plant.

Solution

Maintenance solutions from Framatome have supported customers' efficient commissioning and periodic testing activities of safety I&C systems for more than 60 years. Framatome's maintenance and parameterization tool (MPAT) is based on a modular data acquisition (DAQ) system, employing robust, scalable and high-performing equipment. The MPAT tool delivers customized tester solutions which fulfill a large spectrum of customer needs.
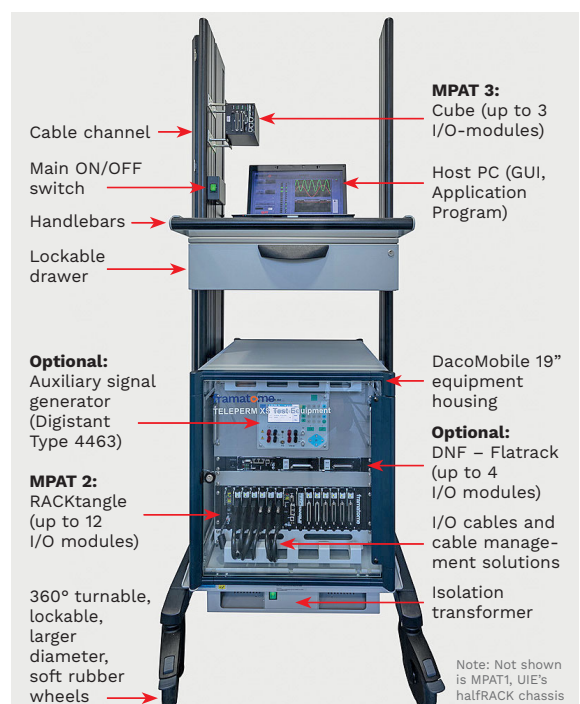
Framatome's MPAT tester offers customers a precise, highly customizable and state-of-the-art maintenance device. MPAT reduces test complexity and effort, providing the needed features for efficient maintenance activities on-site including:

- Customized Graphical User Interface (GUI) and user functionality
- Adaptable test scripts providing a high degree of confidence and quality with mechanisms ensuring correct data processing
- Continuous tester monitoring and configuration monitoring
- Signal type as well as signal count adaption according to the I&C system needs
- Cable management and cabling abilities
- Physical security and cybersecurity
- Mobility and ease of use in plant environments.

Customer benefits

- A highly adaptable tester solution that is scalable so customers get the precise level of capabilities needed
- Parameterization tasks of TELEPERM XS (TXS) modules (SBC1, SCV2, SCR1, SPAM1 and SWR1) via serial data interface. This interface is realized with a high degree of confidence which reduces licensing risk
- Adaptable and customizable software also in the application program and user defined graphical user interface (GUI)
- Advanced diagnostic features that improve testing efficiency while reducing its complexity, resulting in less downtime
- Less test equipment means less system maintenance which reduces operational costs
- Enhanced data integrity due to the use of multiple, diverse mechanisms for data exchange
- Supplier confidence with long-term product support

Cable channel

Main ON/OFF switch

Handlebars

Lockable drawer

Optional: Auxiliary signal generator (Digistant Type 4463)

MPAT 2: RACKtangle (up to 12 I/O modules)

360° turnable, lockable, larger diameter, soft rubber wheels

MPAT 3: Cube (up to 3 I/O-modules)

Host PC (GUI, Application Program)

DacoMobile 19" equipment housing

Optional: DNF – Flatrack (up to 4 I/O modules)

I/O cables and cable management solutions

Isolation transformer

Note: Not shown is MPAT1, UIE's halfRACK chassis

MPAT - Powered by **Cube** and **RACKtangle** from United Electronic Industries (UEIDAQ)

Your performance
is **our** everyday **commitment**

Technical information

MPAT specifications*:

- External power supply voltages in the range of: 24 VDC/110 VAC @ 60 Hz/240 VAC @ 50 Hz
- Power consumption: <200 W
- 130,000 hrs ≤ MTBF ≤ 540,000 hrs (module type specific)
- Supports the following types of signal exchange:
  - Analog current input/output, in the range of: 0 to 24 mA
  - Analog voltage input in the range of: -10 to +32 V
  - Analog voltage output in the range of: ±13,5 V
  - Analog resistance measurement simulator for Resistive Temperature Device (RTD) type: Pt100
  - Analog pulse input measurement, in the range of: 0,1 Hz up to 1 MHz
  - Binary voltage input/output, in the range of: 0 to 24 VDC
  - Serial communication, supporting: I^2C (as used in TXS signal conditioning modules) and RS-232 protocols

Software:

- TXS-MPAT-SW 4.0.0

Tester operational conditions:

Normal I&C room environmental conditions of:

- Temperature in the range of: +15 to +35 °C
- Humidity in the range of: +20 to +80 % Rh (non-condensing)
- Operational shock and vibration: 30 g (acc. IEC 60068-2-27) and 5 g (between 10 – 500 Hz) (acc. 60068-2-6)

Tester requirements:

Host computer could be integrated into mobile test trolley with:

- Linux Operating System (SLE-15), and
- User developed application program and GUI (in either: Python or LabVIEW Professional 2020 (for Linux))

Note: Final system specifications may vary depending on configuration

References

South America
- Brazil
  Nuclear Power Plant – Periodic Test Computer

Western Europe
- Switzerland
  Nuclear Power Plant – Test and parameterization tool
- United Kingdom
  Nuclear Power Plant – Periodic Test Computer
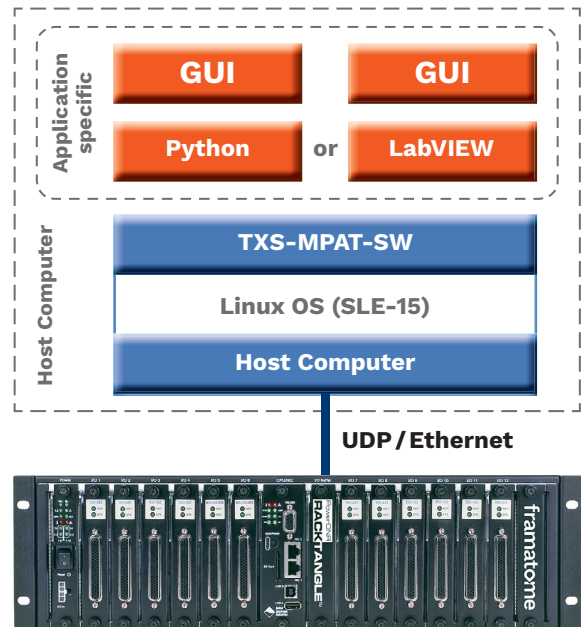
* MPAT V01 qualified for use connected to one DAQ-system of the type: MPAT1, MPAT2 or MPAT3.

Key figures

Signal count (I/O-signals) scalable and adaptable according to I&C system specifications. Supported signal types include:

- Analog current input/output (range: 0 to 24 mA; input tol. = ±12 µA, output tol. = ±11 µA)
- Analog voltage input (range: ±10 V tol. = ±4 µV and range: -2 V to +32 V; tol. = ±1.47 mV)
- Analog voltage output (range: ±13,5 V tol. = ±2,3 mV)
- Analog resistance (RTD simulation) output (range: Pt 100 RTD; tol. 0,385 Ω)
- Serial communication supporting RS-232 and I^2C protocol as implemented in TELEPERM XS signal conditioning modules
- Binary input/output signals: standard 0 to 24 V
- Supports response time measurements, up to a precision of 2 ms (input-to-output module)

(Further signal types and specifications are available upon request.)

Host computer technical specifications adaptable to provide an efficient test experience (i.e. processing speed, memory, graphical display)

Employs modern data integrity and equipment monitoring features ensuring safe operation.
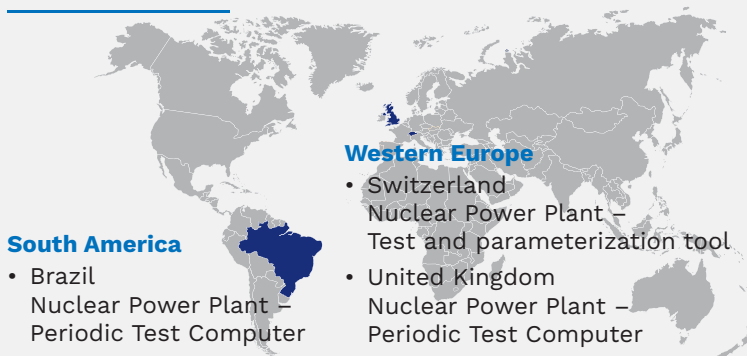
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