

INDEPENDENT PROTECTION, AUTOMATION, AND CONTROL TESTING

HARDWARE-IN-THE-LOOP TESTING

The Real-Time Digital Simulator (RTDS®) enables real-time interaction with protection, control, and automation systems under evaluation. This hardware-in-the-loop environment identifies weaknesses and performance issues in equipment, relay settings, and models before deployment, helping prevent potential misoperations in the power system.

Testing with an RTDS system enhances protection and control application performance by providing a repeatable, accurate platform for validation under real-world operating conditions. RTDS testing supports prototype development, system verification, and commissioning of new digital protection, control, and measurement systems.

WHY DANOVO ENERGY SOLUTIONS?

We provide vendor-neutral, independent testing and expert guidance across all stages of project validation, from test plan development through setup, execution, and analysis.

Our specialists bring experience from utility, manufacturing, and consulting environments, enabling an efficient, automated, and highly repeatable testing process.

Testing can be performed at our two state-of-the-art RTDS laboratories or on-site using customer systems. We also support utilities and OEMs in the design, specification, and commissioning of their own RTDS laboratories.

TYPICAL RTDS TEST APPLICATIONS

System and integration

- IEC 61850 interoperability and conformance testing
- Phasor measurement unit (PMU), phasor data concentrator (PDC), and communications system testing
- Renewable generation impact testing for protection systems

Protection and control

- End-to-end protection scheme testing
- Remedial action scheme (RAS) and system integrity protection scheme (SIPS) testing
- Microgrid protection and control validation

RTDS LAB CAPABILITIES

Our RTDS laboratories support both transmission and distribution applications, including:



Real-time simulation of distribution grids and IBR-rich power systems



Verification of digital substations and edge-intelligent AMI systems



Hardware-in-the-loop (HIL) and model-in-the-loop (MIL) validation



Integration testing of advanced sensors and field devices



Training and technical support for protection engineers and utility personnel



PICTURED:
RTDS® simulator

ADVANCED AUTOMATION AND TESTING PROCESS

We have extensive experience supporting utilities and manufacturers and have refined our testing automation framework to reduce turnaround time while increasing precision and reproducibility. Our focus is efficient, high-value testing that accelerates deployment readiness for complex protection, control, and automation systems.

CONTACT US:

919.334.3000



[DANOVOENERGY.COM](https://www.danovoenergy.com)



[INFO@DANOVOENERGY.COM](mailto:info@danovoenergy.com)



[HTTPS://WWW.LINKEDIN.COM/COMPANY/DANOVOENERGY/](https://www.linkedin.com/company/danovoenergy/)

KEY RTDS LABORATORY FOCUS AREAS AND CAPABILITIES

Functional Area	Example Capabilities
Monitoring, protection, and controls	RAS verification, virtual protection and control environments, and low-voltage and IBR system testing
Automation and substation systems	IEC 61850 verification, digital substation validation, sampled measurements, and SCADA data extraction
AMI/edge intelligence	AMI 2.0 testing, head-end interface verification, and prepayment and analytics validation
Data, analytics, and visualization	IED and sensor data analysis, event and fault location, and system behavior analytics
Training and development	Protection settings, relay coordination, and custom RTDS model development

LAB VERIFICATION AND FUTURE-READY TESTING

Our dedicated edge technology laboratory provides an environment for testing **next-generation AMI meters and intelligent protection devices**. RTDS simulation enables seamless integration and analytics validation before deployment, supporting reliable, future-ready automation.

PROJECT EXAMPLE 1

Impact of inverter-based resources (IBRs) on the protection system

Scope

- Model high-fidelity IBR controls and the affected power system in RSCAD.
- Conduct HIL testing to evaluate IBR impacts on protection schemes.
- Develop prototype mitigation strategies and technical reports.

Benefits of HIL testing for protection scheme verification

- Identify protection vulnerabilities before field deployment.
- Support resilient integration of inverter-based generation.



PICTURED: Impact of IBRs on the protection system

PROJECT EXAMPLE 2

Digital substation verification using RTDS HIL testing

Scope

- Simulate contingencies and communications failures, including clock, switch, and merging unit failures.
- Validate IEC 61850 system performance and redundancy.

Benefits of HIL testing for protection scheme verification

- Shift site acceptance test activities into a controlled laboratory environment.
- Train engineers and operators on substation automation systems.



PICTURED: HIL test setup for a project

Let's discuss your testing and validation requirements and define the right approach for your protection, control, and automation systems. Whether testing is performed in our RTDS laboratories or on-site using your systems, we can help validate performance, identify issues before deployment, and reduce commissioning risk.

Quanta Technology, LLC

(d/b/a Danovo Energy Solutions)
4020 Westchase Blvd., Suite 200
Raleigh, North Carolina 27607

©09/2026, Danovo Energy Solutions

Document number: DES-FL-24-V3-09-26

Quanta Technology, LLC (d/b/a Danovo Energy Solutions) has used reasonable efforts to ensure the accuracy and completeness of the technical data presented in this document. Danovo Energy Solutions makes no warranty or representation for its contents, including technical and/or business considerations, risk, impacts, intended or unintended consequences, or outcomes that may determine the value or use of this document. Specific technical data can be provided upon request. Danovo Energy Solutions reserves the right to modify the technology and data contained herein at any time.

CONTACT US:

919.334.3000



[DANOVOENERGY.COM](https://www.danovoenergy.com)



[INFO@DANOVOENERGY.COM](mailto:info@danovoenergy.com)



[HTTPS://WWW.LINKEDIN.COM/COMPANY/DANOVOENERGY/](https://www.linkedin.com/company/danovoenergy/)