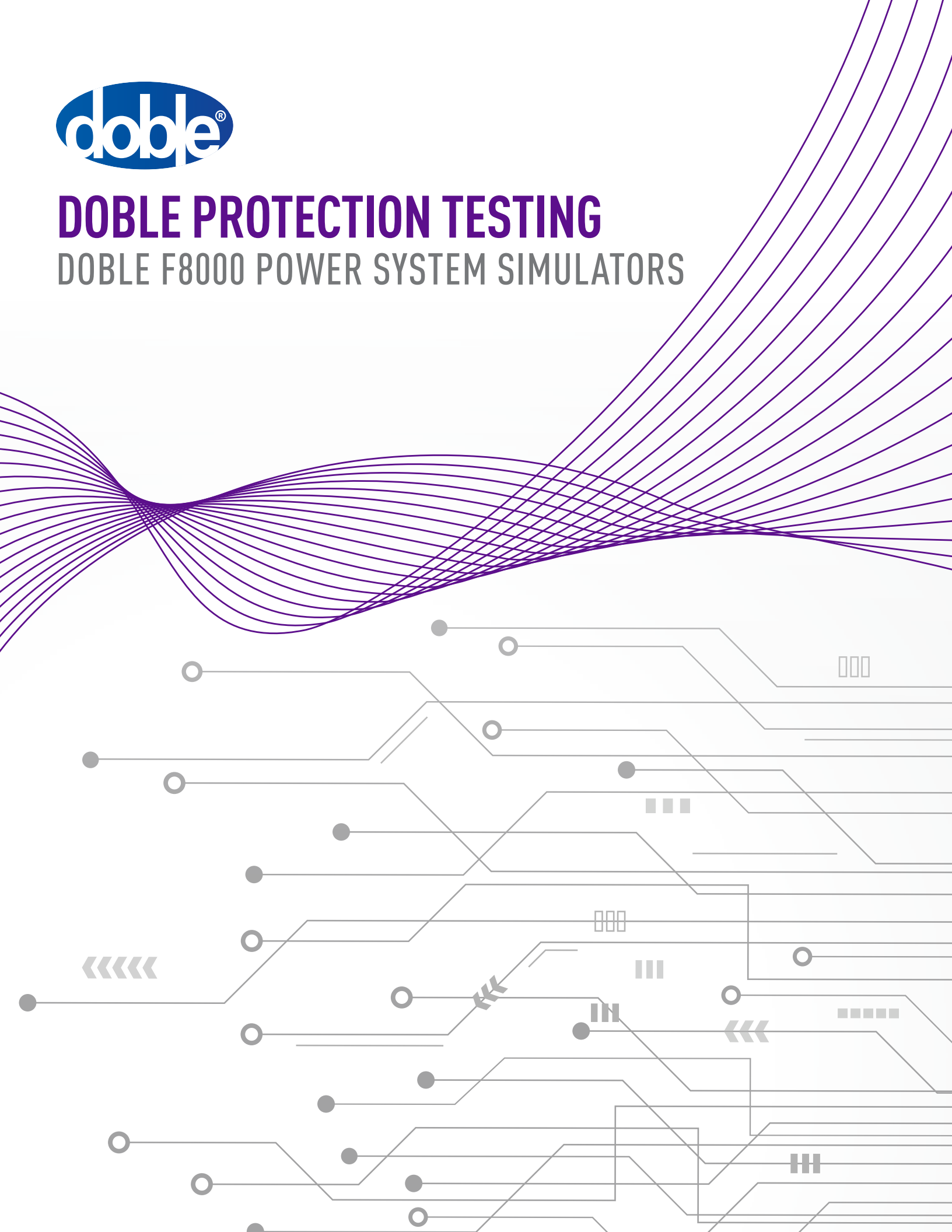




DOBLE PROTECTION TESTING

DOBLE F8000 POWER SYSTEM SIMULATORS





Moving Forward in a World of Change

Protection system performance testing has entered the digital realm. Investments in protection system automation are increasing as Intelligent Electronic Device (IED) functionality continues to expand and the benefits of IEC 61850 materialize around the globe.

Using a variety of test systems and software to accommodate the multifaceted work of testing relays and IEDs invites errors, complicates troubleshooting, and produces data and results that are difficult to track.

Maintaining installed protection systems while advancing with newer technologies does not have to be complicated or disruptive to your workforce. Moving forward capably with clarity and consistency is possible. The key is equipping your team from a platform of modular protection test instruments that scale to your requirements, integrate seamlessly into your practices and remain compatible with your operations and infrastructures as they evolve.



A Complete and Integrated Protection Testing Platform

Doble F8000-series Power System Simulators have numerous configurations that provide a range of possible solutions to your specific test requirements. The F8000 platform lets you choose the capabilities and functionality that make sense for the protection applications you test.

Each F8000 instrument configuration can perform analog and digital tests and will work seamlessly with existing Protection Suite™ and Doble RTST™ test procedures. Features include:

- Chassis and module configurations for a range of test applications.
- Innovative analog ports with color-programmable LED light rings that give visual recognition of sources and logic.
- Embedded time protocol and network synchronization functions.
- Easy pairing and networking with other F8000 instruments.
- Power and logic I/O modularity combined with options for testing IEC 61850 standard-based protection schemes.
- Rugged protective bumpers for field use or mounting brackets for installing in 19" racks.

With a modular platform and state-of-the-art digital componentry, F8000-series Power System Simulators provide modern performance in versatile designs that scale to meet the demands of any conventional or digital test scenario.



F8000 Modules: Configurations to Fit Your Needs

The F8000 hardware platform offers modules for voltage, current and logic I/O that are combined into standard instrument configurations that cover a range of protection testing requirements.

A unique feature of F8000 modules is programmable analog ports with innovative LED light rings. The engineer or test technician can assign color combinations to the LED light rings in Protection Suite and RTS software for visual recognition of sources and logic applied to F8000-series Power System Simulators.

HIGH VA CURRENT MODULE

The HVA Current Module provides two 25 A sources at 150 VA each. When both sources are connected in parallel, 50 A at 300 VA continuous power is produced. Transient mode extends power and range up to 90 A at 300 VA for 30 seconds. DC output is 50 A. The LED light rings indicate the placements of test lead connections for current sources and will alert if source issues are detected.



HIGH VA VOLTAGE MODULE

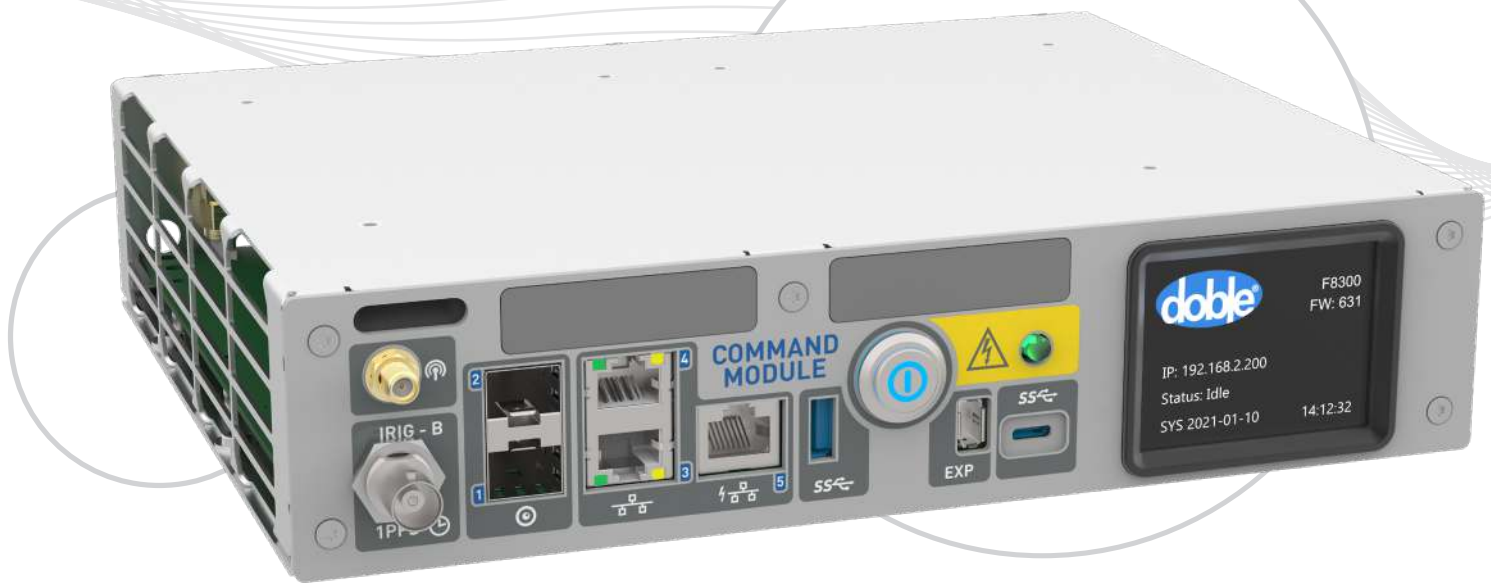
The HVA Voltage Module provides two 150 V sources at 150 VA or one 300 V source at 300 VA with both channels connected in parallel. The available Convertible Mode option converts outputs of the HVA Voltage Module into high-VA/low-range current sources. The LED light rings indicate the placements of test lead connections for voltage sources and will alert if source issues are detected.



LOW-DENSITY LOGIC I/O MODULE

The Low-Density Logic I/O Module provides four pairs of programmable input/output ports with LED light rings that indicate port assignments and changes in monitored voltage, current and contact states. An optional DC Meter upgrade is available for testing transducers and Class 2 meters.





Command Module

The Command Module is embedded with each F8000-series chassis and controls all instrument operations from Protection Suite and RTS software. Communication and synchronization functions are hosted, and instrument status information is displayed. Connections to other F8000-series instruments are supported and IEC 61850 standard-based protection scheme testing options are available.

COMMUNICATIONS

- 3 x Ethernet ports (10/100/1000 Mbps each)
- 1 x 40 W Power over Ethernet (PoE) port
- 2 x SFP (copper & fiber) ports (1 Gbps each)
- 2 x USB 3.0 ports (types A & C)

TIMING

- Phase voltage line synchronization
- Simple Network Time Protocol (SNTP)

TIME SYNCHRONIZATION

- IRIG-B modulated & unmodulated
- IEEE 1588 / IEC 61850-9-3 Precision Time Protocol (PTP)
- GPS at 1 PPS

IEC 61850

- Sampled Values - IEC 61869-9 & IEC 61850-9-2LE (publishing)
- GOOSE (publishing & subscribing)

BATTERY SIMULATOR

Each F8000-series chassis includes a battery simulator with a power range of 6 to 300 V at 90 W.

Choose Your Test Instrument: Doble F8000-series Power System Simulators

With dimensions and different combinations of modules to fit your needs, pick the F8000 chassis and module configuration that is right for you.

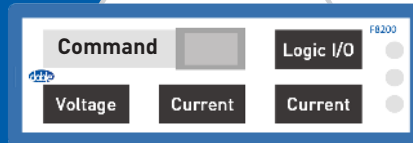


F8200 FOUR-MODULE TEST SET

The F8200 model Power System Simulator is available in four standard configurations and includes a Command Module and a Battery Simulator. This compact instrument is perfect for testing single-phase conventional schemes, digital protection systems and more!

F8200 Configuration 1

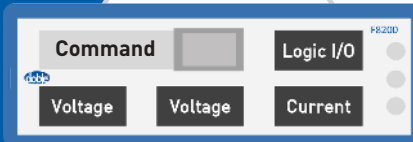
- 1 x LD Logic I/O
- 1 x HVA Voltage
- 2 x HVA Current



- Modern replacement of F2253
- Use for single-phase electromechanical or microprocessor relay testing

F8200 Configuration 2

- 1 x LD Logic I/O
- 2 x HVA Voltage
- 1 x HVA Current



- Allows testing of 3-phase directional voltage

F8200 Configuration 3

- 4 x LD Logic I/O



- For testing digital substations
- Hybrid digital-analog scheme testing

F8200 Configuration 4

- 1 x LD Logic I/O
- 3 x HVA Current



- For single or multi-phase testing
- Parallel amplifiers to inject single high-current for single-phase tests



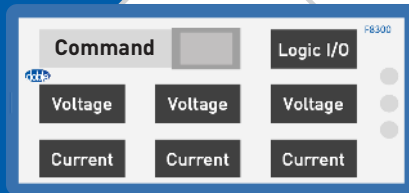


F8300 SEVEN-MODULE TEST SET

The F8300 model Power System Simulator is available in five standard configurations and includes a Command Module and a Battery Simulator. This do-it-all, expanded instrument is ideal for three-phase and digital protection testing applications.

F8300 Configuration 1

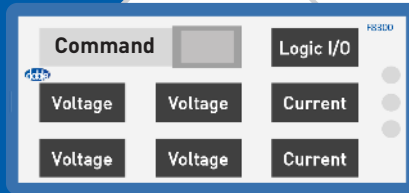
1 x LD Logic I/O
3 x HVA Voltage
3 x HVA Current



- Provides 3 phases of 300 V L-N & 6 currents
- Ideal for differential testing

F8300 Configuration 2

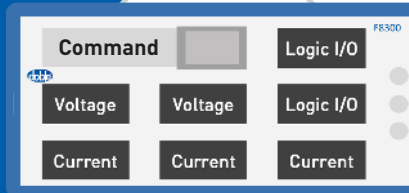
1 x LD Logic I/O
4 x HVA Voltage
2 x HVA Current



- Provides 4 phases of 150 V L-N
- Ideal for testing at generation stations

F8300 Configuration 3

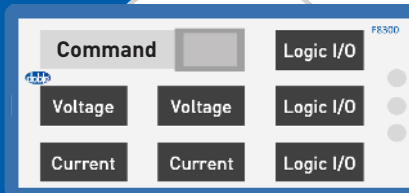
2 x LD Logic I/O
2 x HVA Voltage
3 x HVA Current



- Provides 4 phases of 150 V L-N
- Ideal for transmission testing
- 8 programmable logic I/O
- 6 currents for transformer differential
- Offers robust scheme testing

F8300 Configuration 4

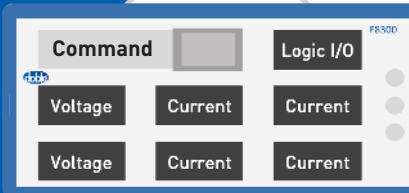
3 x LD Logic I/O
2 x HVA Voltage
2 x HVA Current



- Provides 12 logic I/O
- 4 voltages at 150 V
- 4 currents
- Ph-Ph transformer protection testing

F8300 Configuration 5

1 x LD Logic I/O
2 x HVA Voltage
4 x HVA Current



- 4 phases at 150 V for testing transmission protection
- Transformer differential testing

Enhanced Automation to Extend Your F8000 Investments

The F8000-series of instruments is fully-compatible with current and future versions of Doble protection testing software solutions. Technicians can use their existing test plans without any additional training and take advantage of the latest enhancements in Protection Suite and Doble RTS software. The combination of the F8000 platform and Doble protection testing software enables power and utility companies to seamlessly integrate and efficiently manage all digital and analog protection testing.

PROTECTION SUITE

- Includes an expansive collection of industry-proven test macros plus straightforward methods for assembling and editing test plans.
- Supports relay testers of all skill and experience levels with intuitive test creation, increased automation and highly-adaptive test techniques.
- Supports all F-series instrument configurations for any test situation—from relay calibrations to commissioning modern communication-assisted trip schemes to testing IEDs over networks based on IEC 61850 standards.

DOBLE RTS

- Robust database features standardize elements of relay testing programs and powerful automation tools increase efficiency and reduce complexity.
- Comes with an extensive relay test plan database offering more than 600 pre-written test routines; enables quick test plan modifications and sharing.
- Captures and stores important maintenance information for CTs/VTs, DC control circuitry, communication systems and more, along with consolidated reporting of history and results.

61850 Test

- Processes multiple SCL files (ICD, IID, CID, SED, and SCD) for analyzing IEC 61850 substation configurations.
- Creates fault conditions to verify IED logic for proper control scheme coordination.
- Helps with planning testing scenarios in a laboratory or offline environment and uses saved configuration files for efficiency in the field.

DOBLE POWERBASE™

- Highly configurable central test and asset database system for protection data and records management with robust work tracking and extensive reporting features.
- Interfaces to Doble RTS and Protection Suite plus numerous third-party software products.
- Tracks any power system component and simplifies compliance audit readiness.

Visit www.doble.com/F8000 to select an F8000-series instrument configured for your specific protection testing requirements.

EXPERIENCE, KNOWLEDGE, INSIGHT YOU CAN COUNT ON.



F8000 Patents Pending

CONTACT DOBLE TODAY.

Doble Engineering Company

Worldwide Headquarters | 123 Felton Street, Marlborough, MA 01752 USA | +1 617 926 4900

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