

Product Overview



Doble Engineering has been serving the electric power industry by providing unsurpassed diagnostic instruments, consulting services and knowledge for 85 years. We help our clients consistently achieve demanding goals for minimized risk and maximum performance of electric power systems.

Diagnostic Instruments

Our decades of unsurpassed cumulative knowledge and field testing experience have enabled us to develop diagnostic test instruments which accurately assess electrical apparatus condition. Engineered to perform consistently despite rough handling in transport and under adverse conditions, Doble instruments are legendary for reliability in the field.

Expert Consulting Services

Companies are increasingly looking to out-source for expertise when facing answers to their tough problems. Doble's expert consulting group leverages the resources of our extensive Knowledge Library and experienced team of engineers, in order to deliver the highest level of consulting services and knowledge-based solutions.

Laboratory Services

At Doble, we are committed to advancing the knowledge of material sciences. We have laboratory services for material sciences and high voltage testing, staffed by industry-acclaimed scientists and apparatus engineers.

Premiere Conferences and Events

Doble's Client Conferences in North America, Europe, Latin America, South Africa and Asia-Pacific are the industry's premiere events on apparatus maintenance and asset management. These annual conferences are the venues for exchanging the latest industry information, and for advancing the reliable and cost-effective delivery of electric power. In addition, Doble offers regional seminars worldwide throughout the year, on topics of importance to the industry.

Doble is certified ISO 9001:2000

Product Support & Services Agreements

Doble has engineering support offices located around the world, enabling us to offer real-time assistance around the clock to our clients. Clients tell us that their relationships with Doble Client Service Engineers are one of the most valuable aspects of working with Doble. Our engineers work in close partnership with our clients, to analyze test data and handle service issues, providing a wealth of knowledge and expertise.

The Doble Knowledge Library

Doble maintains the industry's most extensive resource library of apparatus test results and knowledge. Since Doble does not manufacture or market utility assets such as transformers, circuit breakers, insulators and bushings, we have always been in a position to act as the "honest broker" of information related to the performance of these system components.

The Doble library contains over 25 million apparatus test results, on over 250,000 types of apparatus. This volume of knowledge is statistically significant, allowing clients to make informed decisions based on comparison of their test data to a very large sample database.

TOGETHER WE POWER THE WORLD



Doble's M series diagnostic instruments and the "Doble Test" are the industry standard throughout the world

Doble's M4000 Diagnostic Test System

Doble established its world class reputation through the development of our M series instruments. These analytical instruments and test methods measure the quality and condition of electrical insulation. The M series instruments and the "Doble Test" are the industry standard throughout the world.

M4100 Automated Insulation Analyzer



This 10-kV Portable Automated Insulation Analyzer uses patented, state of the art technology to accurately evaluate the insulation quality of substation high voltage power apparatus even under conditions of high electrostatic and electromagnetic interference.

M4110 Leakage Reactance Module



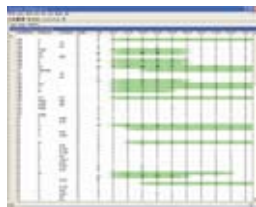
Detect winding movement – use the M4110 to perform short circuit impedance tests on transformers – a vital tool in diagnosing winding deformation.

Type C Resonating Inductor



The Type C Resonating Inductor is an adjustable reactor, designed to extend the charging current range of the M4100 to test larger apparatus.

Doble Test Assistant (DTA)[®] Software



This comprehensive software package enhances productivity and enables maintenance engineers to make informed decisions on apparatus insulation condition in the field. DTA utilizes a Doble-developed expert system based on decades of analysis of field

test results.

M2H-MCM Insulation Analyzer



The M2H-MCM offers the same measurement accuracy and most of the functionality of the M4000 in a semi automated package. The M2H-MCM produces stable test results and fast test times. It offers a graphical user interface automated measurements, data management and various interfaces to external storage devices and printer.

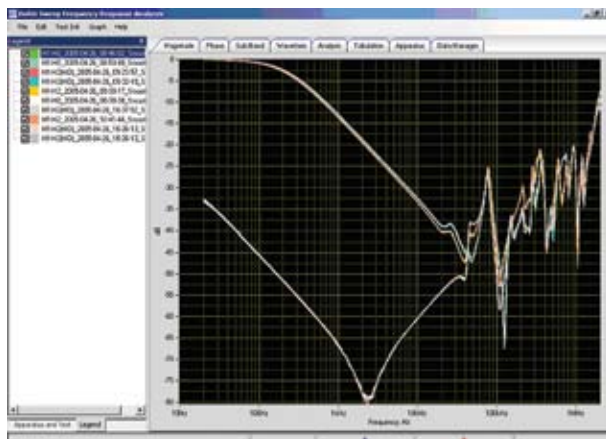
The M5000 series for Sweep Frequency Response Analysis (SFRA)

Doble's M5000 Series uses Sweep Frequency Response Analysis (SFRA) for detecting mechanical failure or movement of windings due to short circuits, mechanical stresses or transportation. Use it to ensure transformer performance, reduce maintenance cost, and increase the service life of transformers. The SFRA technique determines whether transformer repair is necessary without costly de-tanking.

M5400



The M5400 detects mechanical failure or movement of windings due to short circuits, mechanical stresses or transportation. Use it to ensure transformer performance, reduce maintenance cost, and increase the service life of transformers. Requires user-supplied PC.



M5300



This Sweep Frequency Response Analyzer comes with a built-in PC.

The M5300 detects mechanical failure or movement of windings due to short circuits, mechanical stresses or transportation. Use it to ensure transformer performance, reduce maintenance cost, and increase the service life of transformers.

Doble F Series Protection Diagnostics Instruments are compact, rugged and field portable, and are used by test engineers worldwide to diagnose and calibrate electromechanical as well as numerical protection schemes.

F6000 Family of Power System Simulators

The F6000 Family of Power System Simulators, Software and auxiliary products are known for their accuracy, ruggedness and high output. These state-of-the-art lightweight products will provide an excellent suite of hardware and software to meet all your testing and simulation needs.

The F6000 line of products provide automated three phase testing and evaluation of electromechanical and numerical relays and protection schemes.

These products are designed to provide fully automated steady-state, dynamic and transient testing capability in the field as well as in a laboratory environment.

The Doble F6150 Power System Simulator is also certified by KEMA as being compliant with IEC 61850 communications protocol.

F6010 Controller



The F6010 Controller provides stand-alone control functions for F6150 Sources via the Ethernet or Serial port of the F6150 Instrument.

F6860 IEC 61850 GSE Configurator

The F6860 option allows testing of protection schemes that use IEC 61850-compliant IEDs (intelligent electronic devices) with ease through an user friendly interface.

F6080 Field Calibration Module



The F6080 Field Calibration Module is the most effective way to keep the F6150 protection test instrument properly calibrated. Using the F6080 will increase your confidence in the accuracy of your protection, meter and transducer testing.

F2250 Single-phase Power System Simulator



The F2250 series provide versatile, high power manual or fully automated protection testing. Units can be used individually for simple single phase testing or combined for sophisticated three phase protection schemes.

F6150 Three-phase Power System Simulator

F6150



- the total test solution for protection schemes

The F6150 is the foundation of Doble's F6000 product line. With this instrument, users can evaluate protection relays and schemes in their environment, using simulated power system conditions and events. The F6150 is the only

instrument with the high power, flexibility and sophisticated software needed to run full simulation tests on your relays and protection schemes.

The options below may be used in conjunction with the F6150 Power System Simulator:

F6050 Universal Time Synchronizer



Doble's F6050 Universal Time Synchronizer extends the benefits of GPS Synchronized End-to-End Testing to your entire power system – regardless of location – eliminating the need for costly staged fault testing. The F6050 does not require a permanent access to open sky.

F6300 High Power Current Amplifier



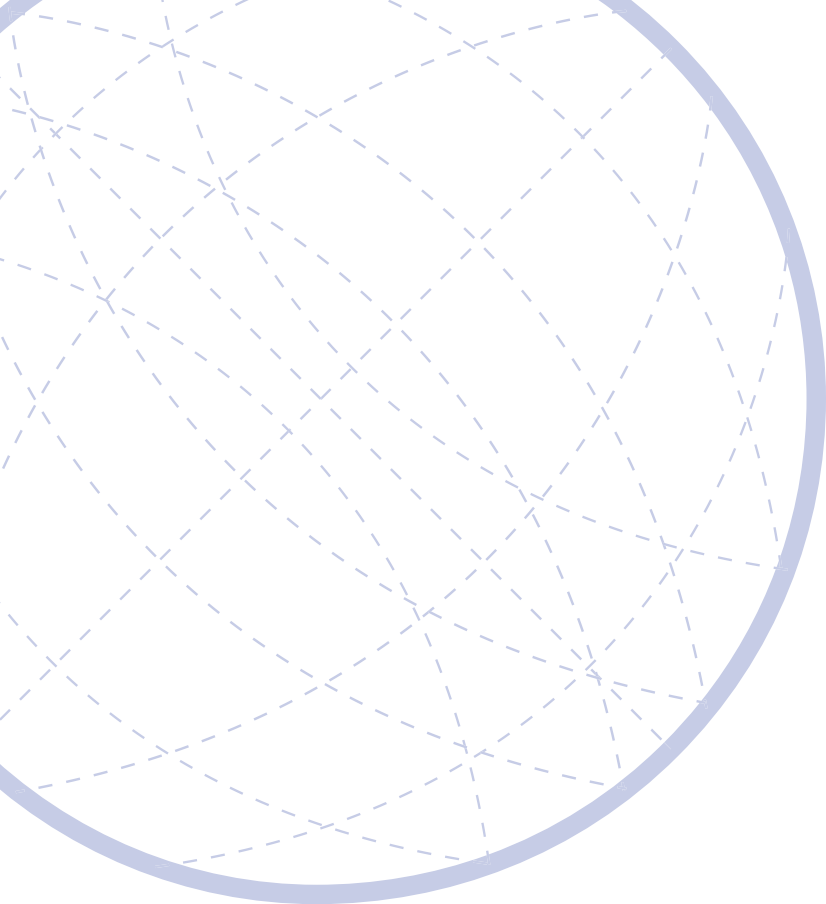
The F6300 provides more power - bringing your realistic protection scheme testing power to the next level. The powerful combination of the F6150 and the F6300 can evaluate the performance of protection schemes for practically all power system events.

ProTest™ and F6 Test™ Automation Software Systems



These software programs enable fully automated control of Doble test instruments for simplified, accurate testing of protection schemes. The software eliminates manual errors to improve productivity. Relational database architecture

stores protection settings, test methods and test history.



TOGETHER WE POWER THE WORLD



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Doble is certified ISO 9001:2000
Doble is an ESCO Technologies Company

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Doble is the world leader in the application of expert systems for on-line diagnostics of electrical apparatus, based on decades of field testing experience.

Intelligent Diagnostic Devices (IDD)TM



A family of small stand-alone devices installed on specific apparatus which continuously monitor the apparatus condition using an expert diagnostic system. IDD provides operators and maintenance engineers with an early warning of the need for preventive maintenance or corrective actions.

IDD Models include:

IDD – for Bushings and CTs

IDD – for Moisture in Transformers

IDD – for Dissolved Gas in Oil Analysis (DGA)

DOMINO[®] Family of Moisture Sensors

The DOMINO family consists of both permanent mount and portable instruments. Doble's Moisture-in-Oil permanent mount sensors measure moisture in oil in terms of ppm and relative saturation (RS) as well as temperature.

These sensors provide an extremely reliable measurement of the water content of electrical insulating liquids and other types of oils.

DOMINO instruments measure the water content continuously. The measuring technology is based on the change of capacitance of a thin polymer film. The determination of moisture in insulating liquids is an essential part of any comprehensive maintenance or diagnostic program.

The portable instruments which comprise the USS systems not only measure moisture-in-oil but also have the ability to measure the moisture in gas (dewpoint) including nonarced SF₆ gas.

DOMINO instruments are rugged and field-portable. Even the permanent mount sensors can be easily moved if so desired.

DOMINO[®] Permanent Mount Sensors



Available in a variety of models, the DOMINO continuously measures moisture content and temperature of electrical insulating liquids such as transformer oils. DOMINO provides results in parts per million (ppm), temperature and relative saturation with accuracy consistent with traditional laboratory titration methods.

DOMINO[®] USS – Ultimate Sampling System



DOMINO USS is a portable combination system, consisting of either a moisture-in-oil sensor or a moisture-in-gas (dewpoint) sensor or both, mounted in a handy carrying case, it provides a fast, convenient way to take high-quality samples

AIA Acoustic Insulation Analyzer



The Doble TransiNor AIA gives users a unique opportunity to detect, locate and identify most common defects in Gas-Insulated Substations (GIS) such as particles and partial discharges without disturbing normal service operation. The AIA has a unique sensitivity that enables you to classify whether a flaw is harmful or not.

APDA - Acoustic Partial Discharge Analyzer



Use the Doble TransiNor APDA for condition monitoring of medium voltage cable terminations and cable joints. The APDA detects defects in cable accessories before they breakdown, and allows you to check cable accessories without disturbing normal service operation. Users obtain an optimum economic condition-based maintenance and renewal program and get quality assurance of new terminations during commissioning.

IPM – Insulator Pollution Monitor



The Doble TransiNor IPM is designed to perform continuous on-line monitoring of external pollution effects on high-voltage insulators and other insulator housings, such as surge arresters and bushings. This complete system is designed to monitor the level of pollution to indicate when washing is recommended to avoid flashovers and serious disturbances to the power supply.

LCM II – Leakage Current Monitor



The Doble TransiNor LCM II is a unique, portable instrument for leakage current measurements. It provides in-service measurements of the resistive component of the continuous leakage current of gapless metal oxide surge arresters (MOSA's).

Doble's circuit breaker test systems provide dynamic testing of circuit breakers with high accuracy, unaffected by electrostatic and electromagnetic interference present in substations.



TDR9000 - Circuit Breaker Test Instrument



The modular design of the TDR9000 enables maintenance engineers to configure the instrument to test all classes of circuit breakers – from simple to very complex. The TDR9000 measures

grading capacitors, insertion and grading resistors value, motion and contact timing – all in a single, field-portable and rugged instrument. The TDR9000 is used with Doble's TRX software to control the instrument and organize circuit breaker test plans and test types by user. Requires user-supplied PC.

TDR900 Circuit Breaker Test Instrument



The TDR900 provides efficient and accurate performance measurements to test all types of circuit breakers. It performs timing functions for up to 4 breaks per phase with motion measurements. The TDR900 allows simple to complex testing of circuit breakers using a single, rugged, field-portable instrument. The TDR900 is used with T-Doble software to control the instrument and organize circuit breaker test plans and test types by user. Requires user-supplied PC.

TDR100 Circuit Breaker Test System



The TDR100 Circuit Breaker Test System is a simple and effective way to assess the condition of circuit breakers and switching devices. Its design and simplicity of operation allows you to test all types of circuit breakers quickly and easily. PC not required for operation.

DFA100 Dielectric Fault Analyzer



Doble's DFA100 is specifically designed to detect faults in grounded SF₆ gas-insulated systems, such as Gas-Insulated Substations (GIS) and SF₆ filled dead tank breakers. Use this handheld, battery powered instrument to identify and locate partial discharge, particles and mechanical defects.