

## DOBLE OFF-LINE TESTING & ASSESSMENT

# M7100™

## High-Voltage Asset Analyzer

### THE MOST-COMPREHENSIVE, FASTEST SOLUTION FOR TESTING WITH BUILT-IN SAFETY

The Doble M7100 High-Voltage (HV) Asset Analyzer is your complete solution for high and low voltage testing. The only test set featuring two dual-function high-voltage leads for source and measurement delivers the fastest, complete set of measurements. Compared to a single-lead system, this patented design dramatically improves technician safety by reducing ladder trips by as much as two-thirds and simplifying lead placement.

The M7100 automates multiple tests, previously performed by several pieces of equipment, cutting down testing time from seven hours to one and a half hours. Reduced testing time means technicians can safely perform more commissioning, scheduled maintenance and diagnostic activities.

#### FEATURES

- Patented dual-function high-voltage lead design allows you to switch between source and measurement—both capabilities are within each HV lead
- Built-in low voltage/high current multi-frequency source
- True 4-Terminal measurements
- Easy setup using either a color or number to indicate the connection
- Only dual high-voltage lead test set in the industry
- Standard two-year warranty and three-year calibration interval based upon accuracy and reliability in the field

#### BENEFITS

##### FAST AND EFFICIENT

- Finish testing in a third of the time
- Replace a truck full of instruments and cables

##### COMPREHENSIVE

- Maximize your outages and limit safety risk

##### EASY AND SAFE

- Greatly reduce the number of ladder trips technicians are exposed to per job
- A dual-lead system eliminates most steps needed for connection, reducing errors during lead placement—where most mistakes occur—and instilling confidence in testing
- Enhanced safety with special safety switch design and emergency stop switch



## Doble Asset Management Software and Database

Extend the value of the test result data from the M7100 High-Voltage Asset Analyzer with additional tools to proactively manage the lifecycle of your assets. Combine the M7100 with other Doble software solutions to collect, store and analyze data from high-voltage testing. Provide field staff with secure universal controllers—laptops or tablets built specifically for field applications—to quickly evaluate apparatus test results.



## Doble Test Assistant Software (DTA)

Pair the M7100 with Doble Test Assistant Software (DTA) for automated control and testing of the instrument. This single platform provides built-in templates for all configurations and types of HV assets including transformers, breakers, cables, instrument transformers, surge arresters, rotating machines and more.

## DTAWeb

DTAWeb database software stores and organizes test result data from the M7100 and other Doble test equipment. Upload and download data to a remote Doble-hosted database and eliminate the need to maintain a server and manage database installation and upgrades. Harness the power of the dobleDATABASE, which includes millions of aggregated asset test results, to understand how your assets are performing compared to others in the industry.



## DUCe for Apparatus Testing

Doble Universal Controller enterprise (DUCe) for Apparatus Testing automates multiple manual steps in traditional testing workflows, provides effective cybersecurity controls to protect your substation assets and offers a selection of versatile and rugged controllers. Automatically updates the database to avoid trapping data on laptops.



SUPPORTED STANDARDS	
IEEE	C57.152 C57.13 C57.13.6 C57.19.01 286
IEC	60076-1 60137 61850-9-2-Ed.2 B
IEC/TR	60894
NETA	2011 Maintenance 7.2.2 2007 Acceptance 7.19.2

TEST CAPABILITIES
Power Factor/Tan Delta
Variable Frequency Power Factor/Tan Delta
Demagnetization Feature
3 Phase Turns Ratio
10 kV Turns Ratio
Short Circuit Impedance Leakage Reactance (1Ø, 3Ø)
3 Phase Winding DC Resistance
3 Phase 10kV (Single Phase) Exciting Current and Loss
FUTURE ENHANCEMENTS
OLTC Dynamic Resistance Measurement (DRM)
Capacitor Bank

INCLUDED ACCESSORIES	
SYSTEM CABLES	
Type	Quantity
High Voltage Cables	2
Low Voltage Cables (Red, Blue, Yellow, Black)	4
Measurement Cables (Red, Blue, Yellow)	3
Ground Lead (Copper)	1
OLTC Control Cable	1
USB Cable	1
Ethernet Cable	1
AC Power Cord	1
External Temperature & Humidity Module w/Cable	1
External LED Strobe Lamp w/Cable	1
8' (2.4M) Integrated Safety Switch/Cable	1
65' (19.8M) Integrated Safety Switch/Cable	1
Doble Bushing Tap Adapters	4
Hot Collar Straps	7
5 ft Copper Jumpers	5
OPTIONAL ACCESSORIES	
M7 Truck	
MFL Liquid Insulation Test Cell	
Type C Resonator (Up to 12 kV)	
Doble Universal Controller (DUC)	



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Specifications are subject to change without notice.  
 Doble is an ISO 9001 & ISO/IEC 17025 & 17034 Certified Company.  
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## High-Voltage Asset Analyzer

### M7100™ TECHNICAL SPECIFICATIONS

POWER SUPPLY	
AC Input	90...264 VAC Single Phase, 47...63 Hz, Portable Generator or Inverter Compatible
AC Power Consumption	4 kW, 20 A max
GFI/RCBO Compatibility	Class A & B
MECHANICAL FUNCTIONALITY/PERFORMANCE	
Size	32.75" x 21" x 16.5"
Weight	175 lbs
Shipping Container	Integrated
Shipping Weight of Cables, Accessories	Cable kit only - 124 lbs. Including case - 185 lbs
DIAGNOSTIC & CALIBRATION FUNCTIONALITY	
Diagnostic Capabilities	Integrated server for remote diagnostics
Source & Measurement Validation	Integrated diagnostic tests for all measurement circuits
HIGH VOLTAGE OUTPUT	
AC	
Voltage Range	0.250...12 kV RMS
AC Frequency Range	15...500 Hz
AC Current Range Maximum	300 mA
Accuracy (Voltage)	0.5%
LOW VOLTAGE OUTPUT	
Voltage Range	AC: 25...250 V RMS DC: 1...175 V
AC Frequency Range	1 Hz...1000 Hz
AC Current Maximum	25 A RMS
DC Current Maximum	35 A
Accuracy	0.1%
ELECTRICAL I/O SPECIFICATIONS	
OLTC	OLTC control by clip connections
Temperature & Humidity Module	External Integrated Temp & Humidity Module Interface
Control Connection	USB 2.0 Ethernet - PC

ENVIRONMENTAL & DURABILITY SPECIFICATIONS	
Operating Temperature	-20°C to +50°C
Storage Temperature	-40°C to +70°C
Relative Humidity	5% to 95% (non-condensating)
Altitude	Operational < 10,000 ft above sea level
Dry Heat	IEC 60068-2-2
Cold	IEC 60068-2-1
Damp Heat	IEC 60068-2-30
Shock	IEC 60068-2-27: 15g/11ms, half-sinusoid, each axis
Transport Shock	ASTM D999.75
Vibration	IEC 60068-2-6: 10...150 Hz, acceleration 2g continuous (20 m/s <sup>2</sup> ); 10 cycles per axis
Drop Test	IEC 60068-2-31
Safety	EN 61010-1:2001 (2nd Edition)
Safety Switches	IP66 (A4EG-C000041) IP65 (A4EG-BE2R041, A4EG-BM2B041) IP66 (A4EG-C000041) EN 60947-5-1, UL 508, CSA C22.2 No.14, GB 14048.5, EN60947-5-1
EMC Emissions	FCC 47 CFR Part 15 Class A Emissions requirements (USA) EN 55011:1998/A1:1999/A2:2002 Group 1 Class A ISM Emissions requirements (Europe) AS/NZS CISPR 11:2004 Class A ISM Emissions requirements (Australia)
EMC Immunity	EN 61326:1997/A1:1998/A2:2001/A3:2003 IEC 61000-4-2/3/4/5/6/11 Electrostatic Discharge

## M7100™ TECHNICAL SPECIFICATIONS

### MEASUREMENT ACCURACIES (HV LEADS, LV LEADS, M LEADS)

#### AC HV INSULATION TESTS/EXCITATION/DOBLE TTR

f: 45-65Hz, accuracy parameters assume 0.1mA-1A measured at 10kVAC

Power Factor/ Tan Delta/QF	Range	0-100%
	Accuracy	± 0.04% PF
Voltage	Range	250V-12kV
	Accuracy	0.5% ± 5V
Current	Range	100µA-5A
	Accuracy	0.25%
Watts	Range	1 mW-3.6kW
	Accuracy	0.5%
Capacitance	Range	5 pF-1µF
	Accuracy	0.5% ± 1pF
Inductance	Range	10mH-1MH
	Accuracy	0.5%

#### AC Variable Frequency Power Factor/Tan Delta

f: 15-400Hz, accuracy parameters assume 0.1mA - 0.3mA measured at 4kVAC ≥ 40Hz, 3.5kVAC < 40Hz

Power Factor/ Tan Delta/QF	Range	0-100%
	Accuracy	0.04%
Current	Range	100µA-5A
	Accuracy	0.25%
Watts	Range	0.01µW-3.6kW
	Accuracy	0.5%
Capacitance	Range	100pF-50nF
	Accuracy	0.5% ±1pF

#### AC Low Voltage Turns Ratio

f: 45-65Hz, accuracy parameters assume driving voltage measured at 250VAC

Turns Ratio	Range	1:1 - 50,000:1
	Accuracy	0.25%
Voltage	Range	5mV-250V
	Accuracy	0.25% ± 0.1 mV
Phase Angle	Range	+180° to -180°
	Accuracy	0.25°

#### AC Leakage Reactance

f: 45-65Hz

Voltage	Range	5-250V
	Accuracy	0.25%
Resistance & Reactance	Range	0.1-700Ω
	Accuracy	1% of reading ±10mΩ
Current	Range	10µA-20A
	Accuracy	0.25%
Watts	Range	0.01µW-3.6kW
	Accuracy	0.5%
Inductance	Range	1mH-10H
	Accuracy	0.5% ±10µH

#### DC Winding Resistance

Current	Range	35A
	Accuracy	0.25%
Voltage	Range	5mV-175V
	Accuracy	0.25%
Resistance	Range	0.5mΩ-10Ω
	Accuracy	0.5% ± .05 mΩ

### INCLUDED ACCESSORIES

#### SYSTEM CABLES

Type	Quantity
High Voltage Cables 65' (19.8M)	2
Low Voltage Cables (Red, Blue, Yellow, Black) 65' (19.8M)	4
Measurement Cables (Red, Blue, Yellow) 65' (19.8M)	3
Ground Lead (Copper)	1
OLTC Control Cable	1
USB Cable	1
Ethernet Cable	1
AC Power Cord (20A AC)	1
External Temperature & Humidity Module w/Cable	1
External LED Strobe Lamp w/Cable	1
8' (2.4M) Integrated Safety Switch/Cable	1
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Doble Bushing Tap Adapters	4
Hot Collar Straps	7
5 ft Copper Jumpers	5

#### OPTIONAL ACCESSORIES

M7 Truck
MFL Liquid Insulation Test Cell
Type C Resonator (Up to 12 kV)
Doble Universal Controller (DUC)

#### TEST CAPABILITIES

Power Factor/Tan Delta
Variable Frequency Power Factor/Tan Delta
Demagnetization Feature
3 Phase Turns Ratio
10 kV Turns Ratio
Leakage Reactance 1Ø and 3Ø equivalent
3 Phase Winding DC Resistance
3 Phase 10kV (Single Phase) Exciting Current and Loss

#### FUTURE ENHANCEMENTS

OLTC Dynamic Resistance Measurement (DRM)
Capacitor Bank



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