



DL1000

DURABILITY & LUBRICITY TEST SYSTEM

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The DL1000 provides accurate, reliable measurement of the durability and lubricity of hydrophilic coatings on catheters and guidewires. Engineered with robust components and controls, the bench-top DL1000 maximizes productivity and provides flexible, easy to use features for lab and production applications.



ACCURATE, RELIABLE RESULTS

The DL1000 minimizes test system and test operation variability to provide data that accurately reflects the performance of your device.

- **Innovative horizontal force system** – measures the surface qualities of the coating, rather than changes in device geometry
- **Robust design** – stays in calibration and provides unmatched repeatability
- **Precision motion** - Sealed ball-screw stage for low maintenance and long life (~10 million cycles)

EASE OF USE

The DL1000 was designed for simple, intuitive use by operators, technicians and engineers.

- **Tool-less operation** – for easy and effective calibration and fixture change-out
- **Convenient interface** – PC-based controls and touch-screen interface with optional keyboard and mouse for technician and engineer functions
- **Teach function** – for recipe-specified stage positions
- **Ruled reference** – for manual gripper height adjustment
- **Three access levels** – to accommodate both production and R&D settings

SAVES TIME

The DL1000 was engineered to maximize manufacturing floor productivity and lab efficiency.

- **Advanced software controls** – rapid set-up and simple data export for offline data analysis
- **Fast calibration** – easy and effective tool-less pull force load cell and gripper load cell calibration in less than 10 minutes
- **Stable and predictable calibration** – system maintains calibration, reducing downtime
- **Low maintenance** – robust, production-worthy design and components ensure high system uptime and minimal maintenance

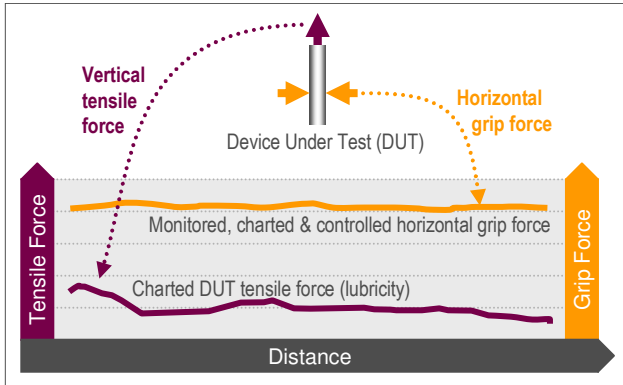
FLEXIBLE OPERATION

The DL1000 provides the flexibility you need to address a broad range of testing requirements.

- **Intuitive software** – provides maximum flexibility for R&D settings, as well as consistent, routine testing in production applications
- **Customizable and interchangeable** - gripper pad cassettes allow testing ODs up to 13mm
- **Removable base plate** - allows for custom applications, including long parts, heated baths and torturous path fixturing
- **Corrosive solution compatible** – stainless steel construction supports use with saline and other corrosive solutions

HORIZONTAL FORCE SYSTEM

The DL1000 offers an industry first closed loop control horizontal force system. This innovative system actively regulates, records and maintains a constant gripper force, even when the diameter of the part changes.



Traditional test systems using springs, clamps, or weights cannot maintain constant horizontal force as they are not closed-loop. These systems require hardware changes to adjust horizontal force. The DL1000's software controlled horizontal force system accommodates device variability, resulting in a more accurate measurement of the surface qualities of the coating, rather than changes in geometry.

CALIBRATION

Calibration is a critical component of any test system. The DL1000 was designed to provide a long calibration interval, and fast, effective calibration.

- High quality commercial load cells
- Complete calibration in under 10 minutes, including both pull force load cell and gripper load cell calibration
- Calibration kit with NIST traceable weight set

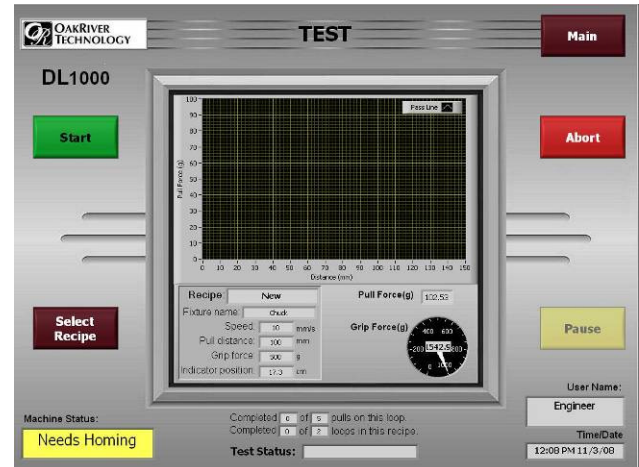
SOFTWARE

The DL1000 offers a powerful, yet easy to use FDA CFR 21 Part 11 compliant software environment. Its touch screen interface and intuitive structure allow users to quickly and confidently take advantage of the system's flexibility, with prompts to guide the user. The system's main screen provides easy access to system functions.



Test

- Easy to control test operations, highly configurable to your use scenario
- Full control of system settings, allowing push, pull, push/pull, tortuous path and other protocols
- Comprehensive, auto-generated test reporting with pass/fail notification

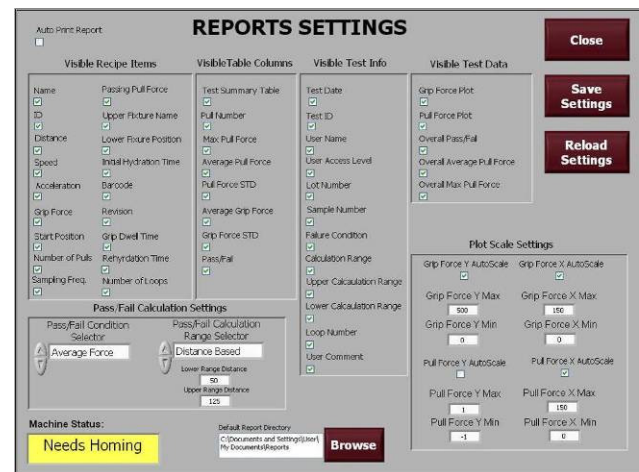


Alarms

- Detailed alarms and error messages
- On screen prompts and detailed machine status guide user in troubleshooting and diagnostics

Reports & Data

- Configurable, automated reporting capability, from pass/fail to comprehensive results
- Full report archiving, with network interface capability for enterprise-wide data storage
- Single screen access to historical reports, with the ability to create, view, print and save reports
- Raw data stored in Excel compatible files (.CSV)



Recipes

- Easy recipe development with teach functions
- Highly configurable recipe control enables specific test protocols and multiple sequences
- Comprehensive recipe management system with revision control

Calibration

- Software driven calibration with on screen prompts enable calibration in under 10 minutes
- Configurable calibration requirement interval with automatic notification and history tracking

Maintenance

- Control of all I/O from single screen for use in training, manual operation and troubleshooting
- Built-in maintenance schedule and full step-by-step guide for standard maintenance activities

Users

- Fully configurable user management system accommodates multiple users and access levels

ACCESSORIES

The DL1000 includes the following accessories:

Single-End Pin Vise Set



- 0.000 - 0.055" (0.00 - 1.4mm)
- 0.025 - 0.075" (0.6 - 1.9mm)
- 0.045 - 0.125" (1.1 - 3.2mm)
- 0.110 - 0.187" (2.8 - 4.8mm)

Hand-Tightened Chuck



- Tool-less operation
- 0.063 - 0.5" (1.5 - 12.7mm)

Alligator Clip



- 5/16" Jaw opening

Pull Force Load Cell



- 2.2lb (1kg) Capacity

Gripper Pad Cassettes



- 0.5" Silicone rubber
- Accommodates ODs up to 13mm

2L Pyrex Beaker



- Griffin, low form

Calibration Kit - Weights and Fixturing



- 1kg +/- 0.0001kg
- 500g +/- 0.07g
- 200g +/- 0.04g
- 50g +/- 0.01g

SPECIFICATIONS

Process Capabilities	
Max. part length	<ul style="list-style-type: none"> 550mm (21.6") Bottom plate can be removed to extend up to 1500mm (59")
Max. pull length	<ul style="list-style-type: none"> 330mm (13")
Max. part diameter	<ul style="list-style-type: none"> 12.7mm (0.5")
Max. stage travel	<ul style="list-style-type: none"> 330mm (13")
Min. part diameter	<ul style="list-style-type: none"> 0.23mm (.009")
Gripper pad cassettes	<ul style="list-style-type: none"> Interchangeable and customizable
Gripper pad material	<ul style="list-style-type: none"> 60 Durometer silicone rubber
Max. distance between open grippers	<ul style="list-style-type: none"> 40mm (1.6") with standard cassette
Min. distance between open grippers	<ul style="list-style-type: none"> 28mm (1.1") with standard cassette

Operation	
Loading ergonomics	<ul style="list-style-type: none"> Adjustable by recipe
HMI	<ul style="list-style-type: none"> 15" Touch-screen monitor for all production functions Optional keyboard and mouse Compatible with barcode scanner
Monitor height	<ul style="list-style-type: none"> 8.5" off of table to center of screen

Motion Control	
Pull speed range	<ul style="list-style-type: none"> 0.1cm/s - 5cm/s
Position repeatability	<ul style="list-style-type: none"> +/- 0.02mm
Pull force capacity	<ul style="list-style-type: none"> 1000g (standard) 250g and 2000g (optional)
Pull force accuracy	<ul style="list-style-type: none"> 0.1%FS ($\pm 1g$; max pull force capacity: 1000g - standard) 0.16%FS ($\pm 0.4g$; max pull force capacity: 250g - optional) 0.1%FS ($\pm 2g$; max pull force capacity: 2000g - optional)
Grip force range	<ul style="list-style-type: none"> 100 - 1000g
Grip force accuracy	<ul style="list-style-type: none"> 0.2%FS ($\pm 2g$)
Grip force stability	<ul style="list-style-type: none"> 0.5%FS ($\pm 5g$)
Gripper height adjustment	<ul style="list-style-type: none"> Manual with ruled reference in millimeters and inches

Safety	
E-Stops	<ul style="list-style-type: none"> 1 (front panel)
Electrical enclosure	<ul style="list-style-type: none"> Main power disconnect & padlock functionality

Calibration	
Components	<ul style="list-style-type: none"> Pull force load cell, grip force load cell and applied grip force controller
Calibration kit	<ul style="list-style-type: none"> Included; weights traceable to NIST certification

Data Logging	
Compliance	<ul style="list-style-type: none"> CFR 21 Part 11
Grip force monitoring	<ul style="list-style-type: none"> Actively regulated and recorded
Max. data acquisition rate	<ul style="list-style-type: none"> 125Hz
SQL database	<ul style="list-style-type: none"> Test data & reports, access codes & logins, test recipes, errors & alarms
Hard disk space	<ul style="list-style-type: none"> 40GB

Electrical/Pneumatics	
Certification	<ul style="list-style-type: none"> CE
Voltage	<ul style="list-style-type: none"> 120VAC
Frequency	<ul style="list-style-type: none"> 60Hz
Phases	<ul style="list-style-type: none"> 1
Wires	<ul style="list-style-type: none"> 3
Full-load current	<ul style="list-style-type: none"> 4 Amps
Largest load	<ul style="list-style-type: none"> 1.9 Amps
Short circuit	<ul style="list-style-type: none"> 5000 Amps
Electrical enclosure design	<ul style="list-style-type: none"> NEMA 12
Air pressure	<ul style="list-style-type: none"> 90 psi

Dimensions	
Height	<ul style="list-style-type: none"> 94cm (37")
Width	<ul style="list-style-type: none"> 46cm (18")
Depth	<ul style="list-style-type: none"> 56cm (22")
Working height	<ul style="list-style-type: none"> 94cm (37")
Working width	<ul style="list-style-type: none"> 92cm (36")
Working depth	<ul style="list-style-type: none"> 97cm (38") (rear-mounted electrical enclosure door swing)
Reservoir diameter	<ul style="list-style-type: none"> 13cm (5.2")
Reservoir height	<ul style="list-style-type: none"> 19cm (7.6")
Reservoir volume	<ul style="list-style-type: none"> 2L
Weight	<ul style="list-style-type: none"> 150lbs

Materials/Construction	
Process-exposed materials	<ul style="list-style-type: none"> 316 Stainless steel, silicone rubber
Test media compatibility	<ul style="list-style-type: none"> DI water and saline (PBS)
Debris generation resistance	<ul style="list-style-type: none"> Stainless steel and hard-coat anodized aluminum parts; sealed bearings (no lubrication required)

Controls	
Computer	<ul style="list-style-type: none"> Industrial PC - 6Hz 512Mb RAM, 40Gb hard drive
Ethernet ports	<ul style="list-style-type: none"> 1
USB ports	<ul style="list-style-type: none"> 3
I/O module	<ul style="list-style-type: none"> 6212 DAQ
Software platform	<ul style="list-style-type: none"> NI LabView
Software access	<ul style="list-style-type: none"> 3 Levels: Operator, Technician, Engineer

OAKRIVER MEDICAL DEVICE COATING

OakRiver Technology offers a growing portfolio of innovative medical device coating equipment. Our products are built on a foundation of medical device industry experience and unmatched equipment engineering and design capabilities.

Proven Industry Experience

With nearly a decade of experience in the design and manufacture of custom equipment for the leaders in the medical device industry, OakRiver understands the challenges and requirements for medical device coating equipment.

- Broad, established relationships with leading medical device manufacturing companies
- Proven partnership with SurModics, a leader in surface modification technologies
- ISO 9001 and ISO13485 certification

Professional Engineering and Design

As an equipment engineering and design firm, our engineers, technicians and staff utilize design controls incorporated into ISO certified processes to assure OakRiver systems provide robust, reliable operation for years to come.

- Proven experience designing and building high precision products for demanding applications
- Holistic design approach encompassing performance, reliability, operation and maintainability
- Comprehensive, professional documentation set supports qualification, operation and maintenance
- Powerful software controls providing ease of use, stability and flexibility
- Thorough performance, reliability and qualification testing, including CE marking

Product Portfolio

OakRiver Technology's portfolio of medical device coating products includes:

- DC100 Medical Device Dip-Coating System
- DL1000 Durability and Lubricity Test System
- SC1000, HC1000 Specialty Coating Systems

Additional products are currently under development, contact OakRiver for more information.

FOR MORE INFORMATION

To learn more about medical device coating products from OakRiver Technology, or our process automation and manufacturing services, please contact OakRiver today:

- Tel.: 651-770-8710
- Email: Info@OakRiverTechnology.com
- Web: www.OakRiverTechnology.com

