

Tergotometer

Background: Detergent Testing

The detergent industry is highly competitive with re-formulation an ongoing, continuous activity driven by the demand for exemplary performance, coupled with the need to reduce the environmental impact of routine cleaning. Enhanced performance at lower wash temperatures and the use of more environmentally friendly ingredients are key trends. Preserving the integrity, finish and quality of delicate fabrics and items is also essential.

To support formulation, for QC and for sensitive comparative performance testing, detergent manufacturers require relevant, reproducible, cost-efficient tests that can easily be applied in the laboratory. Ultimately, the performance and impact of detergents are assessed under real-life conditions using a domestic appliance, but this can be time-consuming, costly and has several other limitations, with respect to routine use within a laboratory.



Understanding Test Requirements

Laundry Detergents

Containing a range of functional ingredients including surfactants, buffers, chelating agents, enzymes, polymers, fragrances and optical brighteners, laundry detergents are complex formulations.

Consumers are sensitive to both performance and price so understanding the relative benefit of incorporating what can be expensive ingredients is crucial in product development, whilst exemplary QC is essential for long term market advantage.

When assessing laundry detergent product performance, there are several factors to consider:

- Stain removal effectiveness
- Prevention of re-deposition
- Maintenance of whiteness
- Maintenance of colour
- Inhibition of dye transfer

Dishwashing Detergents

The market for dishwashing powders, liquids, gels and tablets is equally competitive and formulations are just as complex, drawing on a range of ingredients with similar functionality, including complexing agents, surfactants, bleaching components, enzymes and wetting agents.

However, the focus of testing is slightly different with soil removal, the avoidance of re-deposition and the resulting finish (clarity and shine) the key characteristics assessed.

Establishing a Testing Strategy

Test methods need to be practical, reliable, reproducible and sufficiently differentiating to detect superior performance and/or any failure to meet a specification.

Use of a full-scale domestic appliance to test a detergent has important limitations, including laboratory space requirements, noise and energy consumption, and low analytical throughput. There are limited opportunities to closely control test conditions and the potential for 'carryover' of soil or detergent from one test to another is a recognised issue.

Test Equipment

The tergotometer is a simple, but representative solution that directly addresses these limitations. Consisting of a number of miniature washing stations in a single benchtop instrument, the tergotometer delivers reproducible testing under closely controlled conditions, at much higher analytical throughput than can be achieved with a standard domestic appliance.

Test Conditions & Materials

Laundry samples with closely defined stains, pre-applied to a suitable substrate are commercially available in a range of fabrics, sizes and volumes, for many different stain types. Using such samples to standardise test conditions with respect to soil can significantly improve the repeatability of testing.

Stain samples for dishwasher detergents testing are equally accessible, typically 'baked-on' to melamine tiles (mimicking the effect of porcelain), as well as glass and stainless steel.

Beyond the issue of soil, there are several test conditions that can impact the test results including:

- Detergent concentration
- Temperature
- Water hardness, pH, bleach etc
- Washing and rinsing times
- Washing action
- The load

Analytical Assessment

Quantitative Analysis

Instruments for direct quantitative analysis include the colorimeter, whose relatively simple and robust construction make it ideal for QC applications. A spectrophotometer is more suited to high precision QC and research and development applications.

A product or surfactant can be considered successful when both criteria – stain removal and whiteness – have been met.

Similar methods can be applied to the testing of light duty detergents, as used in domestic dishwashers, using a suitable accessory.

Manual Analysis

Once processed, laundry samples can be analysed manually (by eye) by comparison with a greyscale. Whiteness or yellowness indices can also be employed.

Tergotometer: TRG 800i

Practical, reliable and reproducible detergent performance testing

Providing a simple solution for repeatable, sensitive laundry and dishwasher detergent testing, Copley's TRG 800i offers rapid and reliable testing for formulation, QC and comparative performance testing applications.

Consisting of several miniature washing stations in a single benchtop instrument, the TRG 800i boosts analytical throughput by up to 8 times when compared with a standard domestic appliance, whilst at the same time ensuring reproducible detergent testing under closely controlled conditions.

Agitation is provided by a series of up to eight stirrers, each located in an individual vessel to produce a scaled down version of a larger machine. User control and monitoring of agitator speed, direction and vessel temperature is via the unit's intuitive touchscreen interface.



Boosts testing throughput by up to 8 times compared with conventional domestic appliances



Smaller quantities of test materials, water and detergents are required per test compared to standard domestic appliances



Precision control of test parameters for accurate and reproducible detergent testing



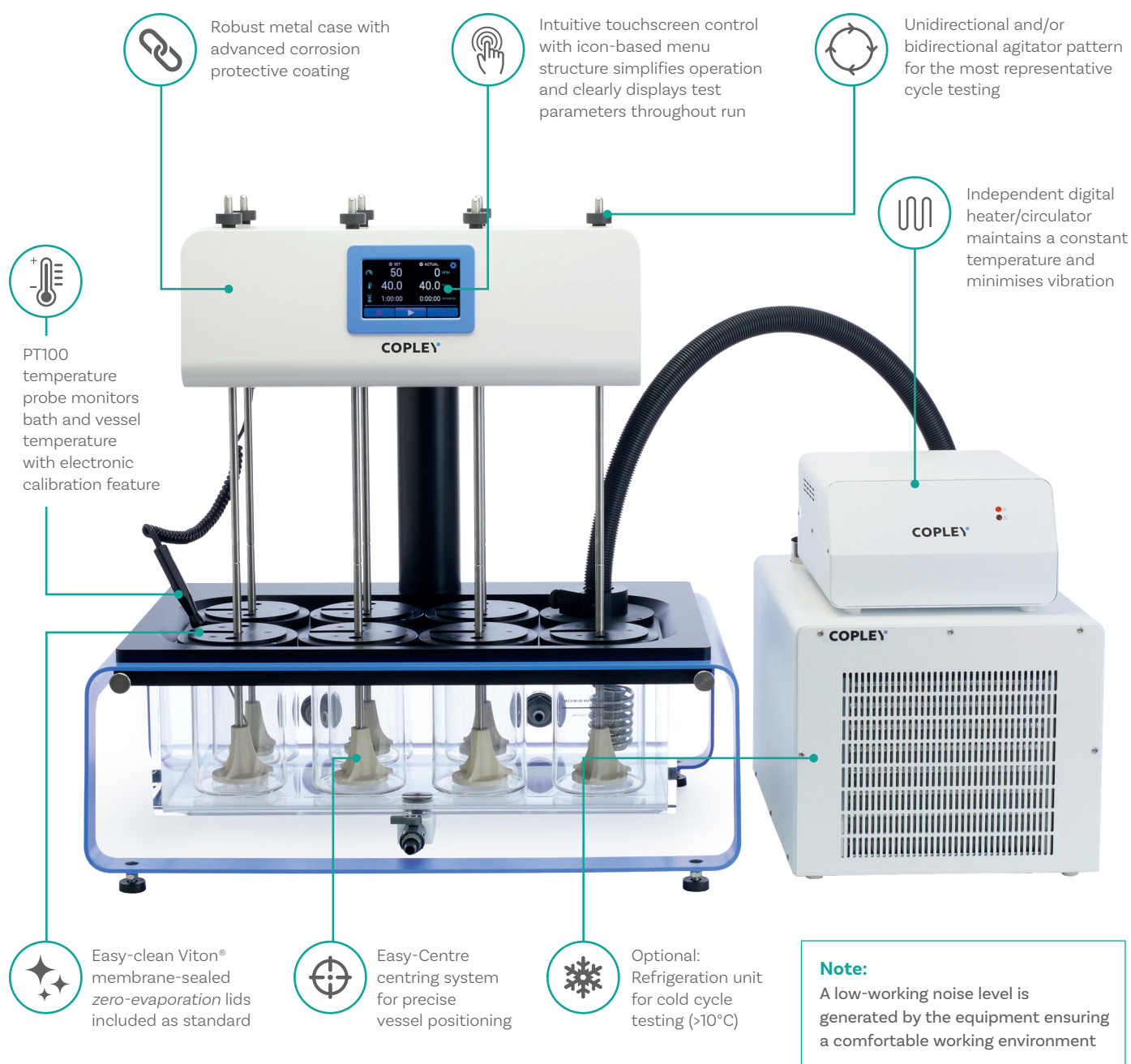
Space-saving benchtop system saves precious laboratory space



Lower energy consumption compared with standard domestic appliances



TRG 800i Highlights



Applications

A versatile, laboratory-scale washing simulator, the TRG 800i is ideal for:

- Evaluating the effectiveness of soap detergents etc.
- Assessing washability and colour fastness of fabrics and other materials
- Optimising washing conditions for detergents (e.g. temperature and water hardness)
- Routine screening for dirt removal
- Assessing brightening, softening and foaming

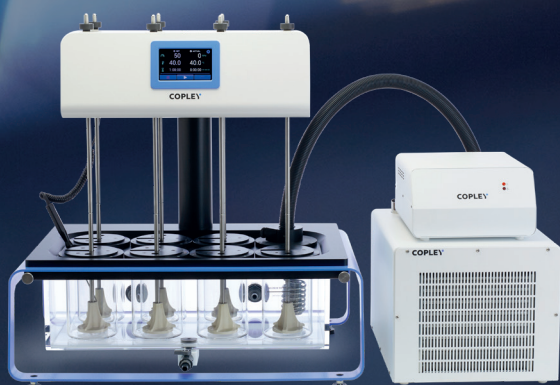
TRG 800i: Touchscreen User Interface



Key Features:

- **Intuitive menu structure** enables users to locate features quickly and easily
- **Easy-set** user-configurable **test parameters**:
Speed (revolutions per minute)
Temperature (°C)
Test duration (HH:MM:SS)
- Status of '**Actual**' v '**Set**' test **parameters clearly displayed** throughout testing
- **Test progress bar** provides clear and constant indication of run status
- Resistive touchscreen interface can be **operated with gloves on**
- Hygienic **wipe-clean** screen
- **Passcode-protected** temperature calibration
- High productivity - **easy system set-up** and **operation** minimises training burden

- A** Setting a test parameter
- B** Setting reverse parameters
- C** Set v Actual test parameters (before test run)
- D** Set v Actual test parameters (during test run, with test progress bar)
- E** Settings menu
- F** Passcode-protected temperature calibration process
- G** Temperature calibration
- H** Report output settings menu
- I** Motor speed (RPM) verification



Reporting

Extensive data output options are available as standard, including direct reporting to a printer or PC.

Reported parameters

- **Speed (revolutions per minute)**

Set
Average
Maximum
Minimum



RS 232

- **Temperature (°C)**

Set
Average
Maximum
Minimum



USB A

- **Test Duration (HH:MM:SS)**

Set
Actual



USB B

- **Calibration Data**

Calibration date
Temperature calibrated at (°C)

TRG 800i: Technical Specifications		
User Interface	Resistive touchscreen	
Test Stations	8 (or 7 when optional Refrigeration Unit used)	
Test Station Sample Capacity	Dishwasher Detergent Up to 48 pre-stained samples	Laundry Detergent Up to 96 pre-stained samples
Agitator Speed Range	20 - 220 rpm	
Agitator Directional Pattern	Unidirectional Bidirectional (10 - 99 revolutions in either direction)	
Heater Temperature Range	Ambient - 70°C (10°C - 70°C with optional Refrigeration Unit)	
Heater	Independent external digital heater/circulator	
Vessel Size	1000 mL	
Test Run Time	Up to 99 hours, 59 minutes, 59 seconds	
Alarm(s)	End of testing (audible)	
Data Output	RS 232 USB A (for connection with a USB printer) USB B (for connection with a PC)	
Unit Dimensions	Main unit: 728 x 490 x 772 mm (w x d x h) Heater: 260 x 330 x 150 mm (w x d x h) Refrigeration Unit: 350 x 470 x 300 mm (w x d x h)	

Temperature Calibration



Single-point electronic temperature calibration.

Calibration of the TRGi Series temperature probe is simple, through the use of an electronic calibration key and passcode-protected calibration menu designed to guide users through the process without fuss.

The latest temperature probe calibration information is stored and available to print/export when convenient to the user.

TRG 800i

Cat. No.	Description
6431	Tergotometer Model TRG 800i
6432	Refrigeration Unit (Ambient to 10 degrees C) -230V/50hz
6432-110/60	Refrigeration Unit (Ambient to 10 degrees C) -110V/60Hz
1209	Electronic Temperature Calibration Key

Refrigeration Unit

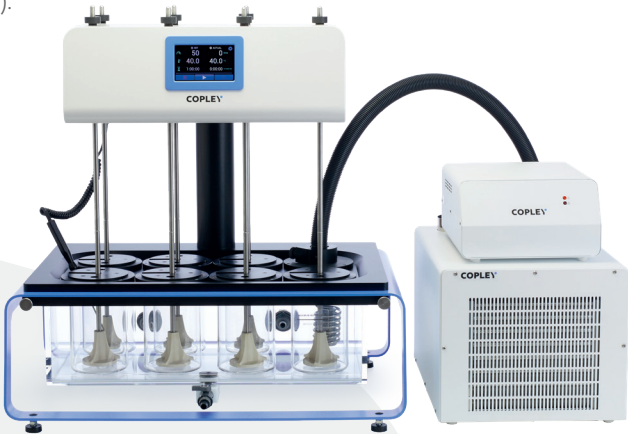
To support the testing of detergents designed to work at cooler temperatures, Copley offers an optional refrigeration unit (ambient down to 10 degrees C).

TRG 800i

Cat. No.	Description
6432	Refrigeration Unit (Ambient to 10 degrees C) -230V/50hz
6432-110/60	Refrigeration Unit (Ambient to 10 degrees C) -110V/60Hz

Note:

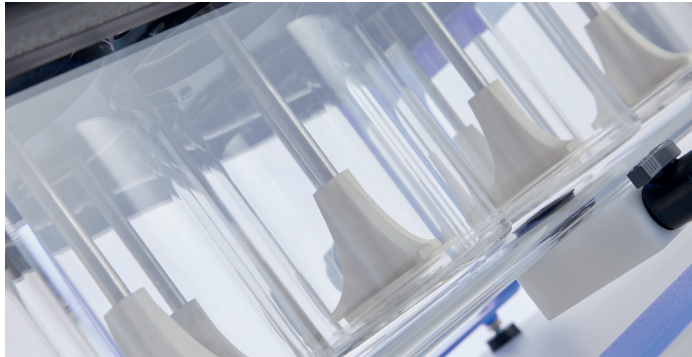
Use of the refrigeration unit reduces the number of usable test stations to seven.



Laundry Detergent Testing

The TRG 800i is supplied with resin paddles as standard. Accepting up to 12, 5 cm x 5 cm or 6, 8 cm x 8 cm swatches, the TRG 800i can test between 48 or 96 individual textile swatches simultaneously (42 or 84 where refrigeration unit used).

A wide range of standardised pre-soiled test fabrics of suitable dimensions are available from the Center for Testmaterials B.V. (www.cftbv.nl).

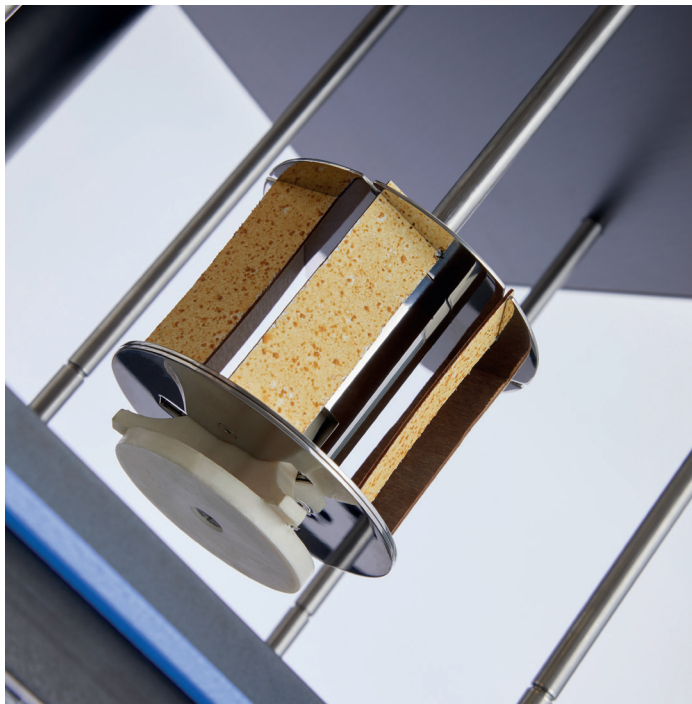


Dishwasher Detergent Testing

Dishwasher detergents can be tested using a special accessory affixed to the conventional agitator in each tergotometer vessel.

Each accessory holds up to six pre-stained sample tiles (7.5cm x 2.5cm) mounted at an angle close to the side of the test vessel and held in position by a suitable O-ring. A total of 48 samples can be processed simultaneously (42 where the refrigeration unit is used).

Pre-stained tiles are available from the Center for Testmaterials B.V. (www.cftbv.nl) to customer selection (e.g. crème brûlée, egg yolk, shepherd's pie, spaghetti bolognese).



Dishwasher Accessories

Cat. No.	Description
6408	Dishwasher Slide Accessory for Tergotometer
6409	Pack of 10 O-Rings (spare)
6410	Pack of 60 Glass Slides (spare)

TRG 800i Accessories & Spares

Cat. No.	Description
6404	Set of 8 Stainless Steel Paddles (option)
6404A	Set of 8 SS Paddles with holes for fabric attachment (option)
6405	Vessel, Glass, Flat Bottomed, 1000 mL with "Easy-Centre"
6406	Vessel, Stainless Steel, 1000 mL with "Easy-Centre" (option)
6437	Stainless Steel Bath for TRG 800i (optional)

