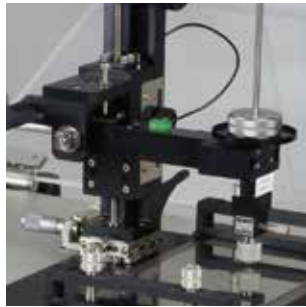


**HEIDON**



# Tribogear

General Catalogue 2019

TRIBOGEAR Series

# Future vision

**With our mind continuously seeking for user satisfaction over 60 years**

Deepen the knowledge regarding frictional wear greatly  
and be reliable to the customer.

We would like to introduce our company products in the  
world by applying the existing techniques and know-how,  
and contribute to the world of tribology.



## **Origin of HEIDON**

The product name "HEIDON" originated from a nickname given to the founder of Shinto Scientific Masahei Nomura during his time as an apprentice.

"Don" was added to the "Hei" in "Masahei" to form "Heidon".

Our HEIDON products continue to embody the principles of the company founder.

INDEX .....	P1
Product Concept .....	P2
Friction and Wear Tester	
Type: 40 .....	P4
Portable Friction Meter	
Muse Type: 94i-II / 37i .....	P5
Tactile Meter	
Type: 33 .....	P6
Both-way Friction and Wear Tester / Friction and Wear Tester	
Type: 30S, Type: 38 .....	P7
Variable Normal Load Friction and Wear Measurement System	
Type: HHS2000S / 3000S .....	P8
Surface Property Tester	
Type: 14FW .....	P10
Continuous Loading Scratching Intensity Tester / Continuous Loading Surface Property Tester	
Type: 18 / 18L, Type: 22 .....	P11
Vacuum Friction and Wear Tester / Static Friction Coefficient Tester	
Type: TriboVac2000, Type: 10 .....	P12
Torque Type Friction and Wear Tester / Wide-range Load Friction and Wear Tester	
Type: 20, Type: 35 .....	P13
Case Study .....	P14
Examples of Tribological Solutions .....	P16
Option	
Data Analyzing Software [TriboSoft] .....	P18
Option	
Option .....	P20

# Business fields of HEIDON TRIBOGEAR Series

“TRIBOGEAR Series” products developed for instrument design, new material development, and tribology closely related to public life can support products development and proposals based on objective data. Accordingly, they can help business to be invigorated.

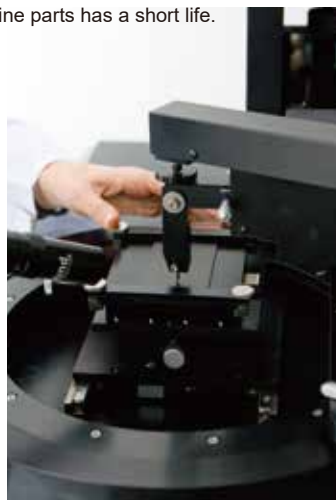


In these days, every industry sector is required to provide more customer satisfaction, higher functionality, and better comfort in the areas of product development, manufacturing process, effectiveness measurements, etc. It is now desired to quantify the level of comfort, including comfortable and uncomfortable feelings people unintentionally have in their daily lives. We provide various types of friction and wear testers in TRIBOGEAR Series, and receive high customer satisfaction in our solutions associated to friction and wear, by providing consulting on measurement-related issues based on many years of experience and offering a full line of products meeting the needs of our customers.

will continue to keep their standing as industry-leading friction and wear testers.

## ■ Automotive Industry

- Measurements of friction between a wiper and glass surface
- Measurements of friction between a cylinder and piston
- Car wax does not spread smoothly.
- Seat belt is slippery.
- Automobile tires are worn off easily.
- Thermal insulator for engine parts has a short life.
- ...and others



## ■ Chemistry

- Evaluation of smoothness (slipperiness) and scratch resistance of films
- Evaluation of smoothness (slipperiness) and scratch resistance of surface treatment (plating, DLC films, etc.)
- Inner clothing clings to outer wear.
- Clothes iron does not smoothly slide on a starched fabric.
- Socks are too slippery.
- ...and others



## Frictional wear testing machine TRIBOGEAR Advantages and Characteristics of TRIBOGEAR

## ■ Electric / Electronic Equipment and Precision Instruments

- Scratch resistance evaluation of lenses
- Scratch resistance evaluation of touch panels
- Friction evaluation of rubber rollers in printers

## ■ Chemicals and Cosmetics

- Evaluation of smooth texture of various creams
- Evaluation of smooth texture of shampoos and conditioners
- Texture evaluation of various cosmetics
- Scratch resistance evaluation of nail enamels

In addition to those in the above industries, we provide various solutions to a wide variety of needs in, for example, the food and beverage industry, construction industry, and sporting goods manufacturers. For more details, refer to examples of application listed in every product page.



# Friction and Wear Tester

## TYPE: 40

### Applications (examples)

- Friction and wear testing on new materials
- Evaluation of various lubricants
- Evaluation of papers, films, and plastics
- Friction, wear, and scratch testing on various coating films



45 years of experience in manufacturing and sales of friction and wear testers.

Through interaction with over 1,000 users of our products, the new right-angle crossing balance arm system, based on the know-how on friction and wear tests, has been introduced. Equipped with a load converter containing a probe integrated into a holder, the tester has been improved for easier operation. With the optional software "TriboSoft", various measurements, from static friction coefficient measurement to both-way wear measurement, can be easily made, analyzed, and maintained.

### Real-time measurement of changes in frictional resistance due to wear

- By repeatedly generating friction in reciprocating motion, the stroke count at which a surface condition has changed and peeling of a film has occurred is determined from an increase or decrease in the frictional resistance.

### Large flip-up acrylic cover and quick and easy sealing function

- Equipped with a large flip-up acrylic cover, which can be used during a test, as a standard component. Optionally, the cover can be used for easy and quick sealing.

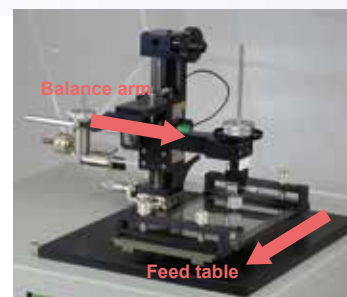
### Standardly-equipped Y-axis stage

- The stage moves with a stroke of 13mm in Y-direction, saving the effort in testing.

### Various measurement jigs

- A wide variety of TRIBOGEAR measurement jigs, including not only point contact measurement jigs (e.g. scratch test pin and ball indenter), but also plane contact jigs (e.g. flat indenter) and line contact jigs (e.g. blade holder) can be used.

The right-angle crossing balance arm, which is designed to cross the feed table at right angles, can measure frictional forces in forward and backward motions with a higher accuracy.



### Key Specifications

	TYPE: 40
Stroke speed	5 to 6000mm/min
Arm	Right-angle crossing balance arm Y-direction stroke: 13mm
Drive system	Rack and pinion AC servo motor
Stroke length	1 to 100mm
Stroke mode	Single mode: Automatically stops upon reaching a preset travel distance Repeat mode: Reciprocating motion with a preset stroke length (up to 99,999,999 times)
Measuring range	0 to 9.8N
Table dimensions	240mm x 120mm
Safety features	Overload safety device High-frequency noise suppression circuit
Dynamic strain amplifier	Zero-point adjustment range: (Manual adjustment) $\pm 0.5\text{mV/V}$ or less (Automatic zeroing) $\pm 0.5\text{mV/V}$ or less Output (non-linear): 0 to $\pm 5\text{V}$ ( $\pm 0.01\%$ FS or less) Zero drift: 0.01% F.S./ $^{\circ}\text{C}$ Gain drift: 0.01% F.S./ $^{\circ}\text{C}$ Low-pass filter: Approx. 500Hz
Operating environment	0 to 50 $^{\circ}\text{C}$ , 85% RH or less (non-condensing)
Power supply	AC100V, 50/60Hz
Overall dimensions	W: 470mm x D: 450mm x H: 475mm (excluding protruding portions)

### Accessories

- Load converter: 1 unit
- Scratch test pin: 1
- $\phi 10\text{mm}$  ball indenter: 1 set
- ASTM flat indenter: 1 set
- Power supply cord: 1
- Parts case: 1
- Tools: 1 set
- Operation manual: 1

# Portable Friction Meter

**TYPE: 37i / 94i- II**

## 3D MUSE TYPE: 37i

Capable of measurements on a wall or ceiling



The world's first

### Applications (examples)

- Wear measurements on floor surface
- Smoothness measurement of chemicals and cosmetics
- Friction measurements on various components (e.g. conveyor, roller, etc.) on a production line
- Friction measurements on papers, films, clothes, etc.
- Other sample measurements that cannot be made with a desk-top tester

HEIDON TRIBOGEAR Muse and 3D Muse are portable meters that allows anyone to easily measure a static friction coefficient. Conventionally, static friction is measured by the gradient method or using a strain gauge; however, these methods may cause decreased on-site work efficiency. The 3D Muse has been developed as the world's first portable friction meter that solves those issues.

## MUSE TYPE: 94i- II

Capable of easy and wider variety of measurements

### Key Specifications

	TYPE: 94i- II	TYPE: 37i
Measuring range	Static friction coefficient: 0.000 to 1.600	Static friction coefficient: 0.000 to 1.300
Display resolution	0.001	
Detector	VCM photo sensor	
Display	7-segment red LED (4 digits)	
Slider	Brass (hard chrome finish) 40g	
Power supply	Alkaline batteries (four AA size cells) or AC adapter	
Dimensions	W: 188mm x D: 62mm x H: 64mm	W: 140mm x D: 56mm x H: 140mm
Accessories	Slider, alkaline batteries, slider holder, carrying case, Phillips-head screwdriver, and O-ring	
Option	AC adapter, PC connection kit, 6-point ball slider, and rubber slider	AC adapter and PC connection kit



The friction meter stores several measured values in its memory and displays the measurement count and average static friction coefficient. The measurement starts by simply placing it on an object to be tested and pressing a switch, eliminating variations of result depending on the operator. Powered by AA size battery cells, the tester makes an measurement quickly and anywhere.



The static friction coefficient between the slider (contact) provided in the main unit and the test sample is displayed. A piece of fabric or film can be attached to the slider.

# Tactile Meter

TYPE: 33



Applications  
(examples)

- Evaluation of comfort in writing/erasing with writing materials (e.g. pens, pencils, erasers) and pressures in use
- Smooth texture of cosmetics and chemicals, and their absorption to skin
- Evaluation of texture of papers
- Other evaluation concerning feeling

With the tactile meter, it is possible to numerically express texture, feeling, and absorption to skin, which have been difficult to quantify. Equipped with three strain gauges, the meter detects resistance in X, Y, and Z directions. It is operated by simply loading a sample on the test sample table and stroke it with your fingertip or a tool. Making a measurement with this meter is very easy. Further, using a handy probe, samples that cannot be loaded on the table can also be measured.



## Key Specifications

TYPE: 33		
Dimensions of test sample table	100mm x 100mm	
Measuring range	0 to 20N (in each axis direction) X, Y, and Z directions	
Dynamic strain amplifier	Zero-point adjustment range:	±0.5V/V (multi-turn potentiometer)
	Analog output	±5V
	Non-linearity	0.01% F.S. ±1 digit
	Zero drift	0.01% F.S./°C ±1 digit
	Sensitivity variation	0.01% F.S./°C ±1 digit
Operating environment	0 to 50°C*, 85% RH or less (non-condensing)	
Power supply	AC100V, 50/60Hz	
Body dimensions	Measurement unit	W: 102mm x D: 150mm x H: 110mm (excluding a fixing plate [W: 200mm x D: 200mm])
	Amplifier unit	W: 160mm x D: 250mm x H: 327mm (excluding protruding portions)

## Accessories

■ Power supply cord: 1 (2P-E, 2 meters) ■ Operation manual: 1

\* Handy probe and dedicated software "TriboTouch" are optional.



# Friction and Wear Tester

## TYPE: 38

High performance and usability at a reasonable price



Applications  
(examples)

- Friction and wear testing on new materials
- Evaluation of various lubricants
- Evaluation of papers, films, and plastics
- Friction, wear, and scratch testing on various coating films

Maintaining the TRIBOGEAR's high measurement performance, the largest possible cost reduction has been achieved with the tester. Its basic features, including touch panel operation and a wide variety of measuring ranges, are as good as those of the upper-end model. Equipped with a load converter containing a probe integrated into a holder, the tester has been improved for easier operation. With the optional software "TriboSoft", various measurements, from static friction coefficient measurement to both-way wear measurement, can be easily made, analyzed, and maintained.

### Key Specifications

	TYPE: 38
Stroke speed	5 to 6000mm/min
Drive motor	AC servo motor
Drive system	Rack and pinion
Stroke length	1 to 100mm
Stroke mode	Single mode: Automatically stops upon reaching a preset travel distance Repeat mode: Reciprocating motion with a preset stroke length (up to 99,999,999 times)
Measuring range	0 to 9.8N
Table dimensions	240mm x 120mm
Safety features	Overload safety device High-frequency noise suppression circuit
Dynamic strain amplifier	Zero-point adjustment range: (Manual adjustment) $\pm 0.5\text{mV/V}$ or less (Automatic zeroing) $\pm 0.5\text{mV/V}$ or less Output (non-linear): 0 to $\pm 5\text{V}$ ( $\pm 0.01\%\text{FS}$ or less) Zero drift: 0.01% F.S./ $^{\circ}\text{C}$ Gain drift: 0.01% F.S./ $^{\circ}\text{C}$ Low-pass filter: Approx. 500Hz
Operating environment	0 to 50 $^{\circ}\text{C}$ , 85% RH or less (non-condensing)
Power supply	AC100V, 50/60Hz
Overall dimensions	W: 630mm x D: 350mm x H: 390mm * Maximum height: 460mm in pick-up motion

### Accessories

- Load converter: 1 unit ■ Scratch test pin: 1 ■ Ball indenter ( $\phi 10\text{mm}$ ): 1 set
- ASTM flat indenter: 1 set ■ Power supply cord: 1 ■ Acrylic cover: 1
- Parts case: 1 ■ Operation manual: 1 ■ Tools: 1 set

# Both-way Friction and Wear Tester

## TYPE: 30S

The simplest both-way wear tester



Applications  
(examples)

- Evaluation of coating film strength
- Evaluation of various types of top coating
- Wear testing on various inks

\* The above photo shows the TYPE:30S with double arms.

This tester is particularly designed for wear testing and evaluation by visual inspection. Its standard functions include functions of stepless speed regulation and automatic stop at a specified count. Displaying a stroke count per minute, easier speed regulation has been realized. In addition, the tester can be customized to a double-to quadruple-arm model, in which multiple tests under the same conditions can be carried out simultaneously.

### Key Specifications

	TYPE: 30S
Stroke speed*	300 to 3000mm/min (at 10mm), 1500 to 15000mm/min (at 50mm)
Drive system	Eccentric cam system, AC induction motor
Speed regulation*	Variable (variable motor rotation, equipped with stroke count indicator)
Stroke length*	10, 20, 30, 40, and 50mm (selectable from 5 levels)
Stroke count	Up to 999,999 (with function of automatic stop at a specified count)
Table dimensions	180mm x 110mm
Operating environment	0 to 50 $^{\circ}\text{C}$ , 85% RH or less (non-condensing)
Power supply	AC100V, 50/60Hz
Overall dimensions	W: 560mm x D: 260mm x H: 430mm

### Accessories

- Combination weights: 1 set ■ Power supply cord: 1 ■ Acrylic cover: 1
- Tools: 1 set ■ Parts case: 1 ■ Operation manual: 1

\* The tester may be produced with different stroke speed and length setting upon request.

# Variable Normal Load Friction and Wear Measurement System

## TYPE: HHS2000S / HHS3000S

Provided with the right-angle crossing balance arm system. New STEP operation mode is available.

### Applications (examples)

- Evaluation of lubricating paint
- Evaluation of hard top coating
- Evaluation of lubricant oil

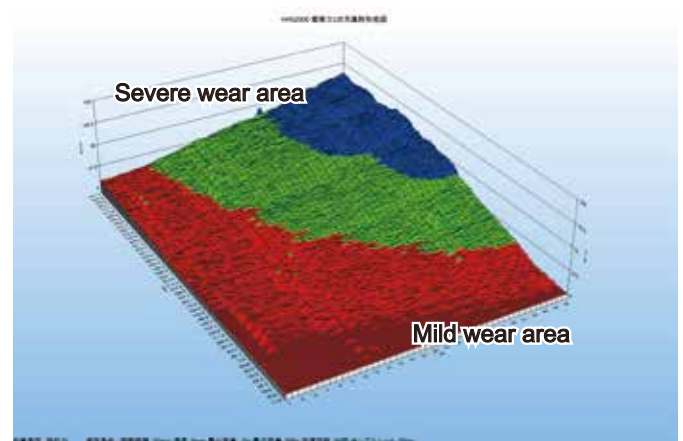


This system is capable of creating a three-dimensional wear mode map representing a relationship among the number of motions causing wear, vertical load, and frictional force/ wear volume in one measurement on the same single test sample. Consequently, a critical load in response to the transition of wear can be determined. The system, therefore, not only does not need multiple test samples but also significantly reduces testing time, eliminating cumbersome data analysis and producing excellent data. Measuring elements in the system include resistance measurements with a load converter as well as wear volume, wear track, and scratch depth measurements with a displacement meter. With the collection of their real-time data, the system makes multi-angled analysis on the physical property of a test sample. Further, using an optional CCD camera "Tribosystem" in combination with the system, more advanced testing, such as a behavioral analysis on wear debris and analysis on the movement of lubricating liquid, can be performed.

The system was developed in collaboration the Horikirikawa Laboratory of Tohoku University.

\* The system shown above is not the type HHS2000S, but the HHS2000.

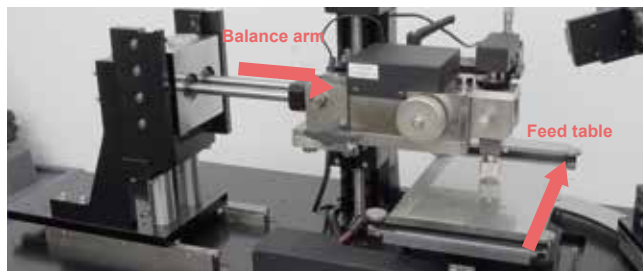
### Example of wear mode map measurement



3D graph representing the frictional force, number of motions causing wear, and vertical load

## Equipped with the new right-angle crossing balance arm system

Completely redesigned for the first time in 18 years, the new right-angle crossing balance arm system has been introduced. The gap between the measurements in forward and backward motions has been narrowed, and the operation of photographing for the purpose of observation has become easier. Movements in Y- and Z-directions are controlled by motors and can be operated with the touch panel.



## Additional STEP operation mode

In addition to the conventional modes of constant load measurement, continuous loading measurement, constant load both-way measurement, and both-way measurement with addition and removal of weight (available in HHS series only), the new STEP operation mode is now available.

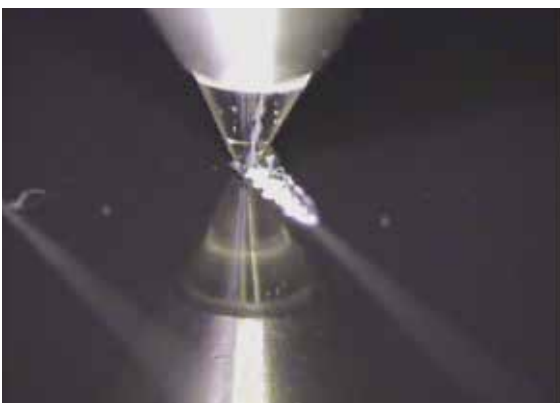
Under the new mode, it is possible to apply a combination of different measurements to a single sample so that the multiple measurements can be performed simultaneously. For example, a static/dynamic friction measurement in the single mode with a constant load, a wear measurement in the repeat mode, and a scratch test in the continuous mode can be completed in one set of operation.

Example of STEP operation screens



Option

## CCD Camera Tribosystem



High-load type system - TYPE: HHS3000S

## Key Specifications

	TYPE: HHS2000S		TYPE: HHS3000S
Stroke speed	0.1 to 50mm/sec		
Drive motor	AC servo motor		
Drive system	Rack and pinion		
Stroke length	Fixed load: 1 to 50mm Variable load / continuous loading: 10 to 50mm		
Vertical load	High-load unit: 10 to 1000g	Low-load unit: 1 to 50g	100 to 10000g
Load converter capacity	19.61N	0.98N	196.1N
Table dimensions	120mm x 200mm		
Measurement mode	Constant load measurement, constant load measurement in reciprocating motion, continuous loading measurement, and continuous loading measurement in reciprocating motion		
STEP measurement mode	Up to 30 steps, maximum recordable recipes: 10		
Safety features	Overload safety device High-frequency noise suppression circuit		
Dynamic strain amplifier	Zero-point adjustment: Digital servo auto-zeroing rest system Output (non-linear): 0±5V (±0.05%FS or less) Sensitivity selection: 0/100/50/25/10%FS SN ratio: 60dB Response frequency characteristic: 2kHz/3dB Filter: 1/10/100/PASS		
Operating environment	0 to 50°C, 85% RH or less (non-condensing)		
Power supply	AC100V, 50/60Hz		
Overall dimensions	W: 710mm x D: 490mm x H: 710mm W: 1000mm x D: 520mm x H: 900mm		

## Accessories

■ Scratch test pin: 2 ■ Ball indenter: 2 sets ■ Vertical gauge: 1 ■ Variable load unit: 1 each  
■ Combination weights: 1 set ■ Power supply cord: 1 ■ Tools: 1 set ■ Parts case: 1  
■ Operation manual: 1 ■ TriboSoft: 1 set ■ TriboWare: 1 set ■ Notebook PC: 1 set



# Surface Property Tester

## TYPE: 14FW

Multiple functions incorporated into one unit, resolving issues in various study subjects

### Applications (examples)

- Friction measurements of rubber rollers
- Smoothness measurement of cosmetics and chemicals
- Slip characteristic testing on flooring materials
- Friction measurements of wires
- Adhesion measurements of various tapes
- Friction, wear, and scratch testing on various coating films



This friction and wear tester supports a wide variety of tests. By presetting the speed of table movement, stroke length, and stroke count, the tester can provide testing under various conditions. As the operation for presetting the values can be completed on the touch panel, you do not need to learn complicated operation procedures. Further, using a variety of attachments that can be replaced with the original attachment to the contact portion, not only the contact mode in the friction and wear testing can be changed, but also scratch intensity and peeling resistance tests can be performed. In addition, with the optional software "TriboSoft", data can be easily maintained and analyzed.

### Supporting various JIS standards

- By replacing the attachment, various tests conforming to JIS K7125, P8147 and K5600 can be performed.

### Real-time measurement of changes in frictional resistance due to wear

- Repeating the friction of the return operation, the number of returns before changes to the surface condition and peeling of the film occurred can be determined from an increase or decrease in the frictional resistance

### Measurement of scratch hardness

- The scratch hardness is expressed based on the size of the scratch made by a conical scratch test pin while a predetermined vertical load is applied it.
- A pencil scratch intensity test can also be performed.

### Measurement of surface stickiness

- The stickiness is expressed in numerical terms, based on the rolling resistance of a stainless steel roll with rotatably supported by a bearing.

### Measurement of peeling resistance

- Adhesion and peeling resistance between duplex board layers can be measured by 180 degree peel and T-peel tests.



### Key Specifications

	TYPE: 14FW	
Stroke speed	5 to 6000mm/min	
Drive motor	AC servo motor	
Drive system	Rack and pinion	
Stroke length	1 to 100mm	
Stroke mode	Single mode: Automatically stops upon reaching a preset travel distance Repeat mode: Reciprocating motion with a preset stroke length (up to 99,999,999 times)	
Measuring range	0 to 0.98N or 0 to 19.61 N	
Table dimensions	240mm x 120mm	
Safety features	Overload safety device High-frequency noise suppression circuit	
Dynamic strain amplifier	Zero-point adjustment:	Digital servo auto-zeroing rest system
	Output (non-linear)	0 to $\pm 5V$ ( $\pm 0.05\%$ FS or less)
	Sensitivity selection:	0/100/50/25/10%FS
	SN ratio:	60dB
	Response frequency characteristic:	2kHz/-3dB
Filter:	1/10/100/PASS	
Operating environment	0 to 50°C*, 85% RH or less (non-condensing)	
Power supply	AC100V, 50/60Hz	
Overall dimensions	W: 630mm x D: 350mm x H: 580mm	

### Accessories

- Load converter: 1 unit
- Scratch test pin: 1
- ASTM flat indenter: 1 set
- $\phi 10$  mm ball indenter: 1 set
- Combination weights: 1 set
- Power supply cord: 1
- Acrylic cover: 1
- Tools: 1 set
- Parts case: 1
- Vertical gauge: 1
- Operation manual: 1

## Continuous Loading Scratching Intensity Tester TYPE: 18 / 18L

Providing a scratch resistance expressed in numerical terms using continuous loading



Applications  
(examples)

- Evaluation of plating adhesion
- Evaluation of coating film strength
- Pencil hardness test
- Scratch resistance evaluation of various films

A conical scratch test pin having a round-chamfered tip (0.005 to 1.0mmR depending on the type) is used. Along with the movement of the movable stage on which a test sample is loaded, the pin is continuously applied with a load from the weights rolling on the arm. The stroke length is 100mm. The load range can be selected from 0 to 50g, 0 to 100g, and 0 to 200g, adjustable by adding and removing some of continuous loading weights. The continuous loading mechanism is based on a mechanical structure, without requiring a cumbersome calibration procedure. The tester can provide the scratch intensity test with a highly reproducible result can at any time. Alternatively, using only a constant load weight, in place of the weights for continuous loading, scratch hardness can also be determined.

### Key Specifications

	TYPE: 18	TYPE: 18L
Stroke speed	600mm/min (1200mm/min in return motion)	
Drive motor	Reversible motor	
Drive system	Rack and pinion	
Stroke length	100mm	
Vertical load	Continuous loading: 0 to 50g, 0 to 100g, and 0 to 200g	
	Constant load: 200g	
Measuring range	—	0 to 9.8N
Table dimensions	200mm x 120mm	
Safety features	—	Overload safety device High-frequency noise suppression circuit
Dynamic strain amplifier	—	Zero-point adjustment: Digital servo auto-zeroing rest system Output (non-linear) 0 to $\pm 5V$ ( $\pm 0.05\%$ FS or less) Sensitivity selection: 0/100/50/25/10%FS SN ratio: 60dB Response frequency characteristic: 2kHz/-3dB Filter: 1/10/100/PASS
Operating environment	0 to 50°C, 85% RH or less (non-condensing)	
Power supply	AC100V, 50/60Hz	
Overall dimensions	W: 535mm x D: 225mm x H: 340mm	

### Accessories

■ Combination weights: 1 set ■ Power supply cord: 1 ■ Acrylic cover: 1  
■ Tools: 1 set ■ Scratch test pin: 1 ■ Parts case: 1 ■ Operation manual: 1

## Continuous Loading Surface Property Tester TYPE: 22

Evaluates adhesion of a film from the scratch resistance in continuous loading.



Applications  
(examples)

- Evaluation of plating adhesion
- Evaluation of coating film strengths
- Scratch resistance evaluation of various films

Using two pulse motors, the movable stage on which a test sample is loaded and a guide for the weights for continuous loading are moved in synchronization with each other. Because the weights travels roll on the arm to which the scratch test pin is attached, the vertical load to the pin can be proportionally increased along with the movement of the test sample. Further, a built-in load converter that detects a resistance force is provided at the test pin attaching portion.

### Key Specifications

	TYPE: 22L	TYPE: 22H
Stroke speed	60 to 600mm/min	
Drive motor	Movable stage: pulse motor	Weights for continuous loading: pulse motor
Drive system	Movable stage: rack and pinion	Weights for continuous loading: ball screw
Stroke length	1 to 50mm	
Stroke mode	SINGLE: Automatically stops upon reaching a preset travel distance	
	REPEAT: Reciprocating motion with a preset stroke length (Up to 9,999 reciprocating strokes can be set.)	
Measuring range	0 to 0.98N (with load converter)	0 to 9.8N (with load converter)
Vertical load	0 to 50g (continuous loading / constant load)	0 to 500g (continuous loading / constant load)
Test sample dimensions	Max. 220mm x 100mm, t8mm	
Safety features	Overload safety device High-frequency noise suppression circuit	
Dynamic strain amplifier	Zero-point adjustment: Output (non-linear) Sensitivity selection: SN ratio: Response frequency characteristic: Filter: The dynamic strain amplifier is built into the main unit.	Digital servo auto-zeroing rest system 0 to $\pm 5V$ ( $\pm 0.05\%$ FS or less) 0/100/50/25/10%FS 60dB (at maximum sensitivity) 2kHz/-3dB 1/10/100/PASS (Hz)
Operating environment	0 to 50°C, 85% RH or less (non-condensing)	
Power supply	AC100V, 50/60Hz	
Overall dimensions	Main unit: W: 650mm x D: 410mm x H: 490mm	
Option	Common to 22L and 22H	

### Accessories

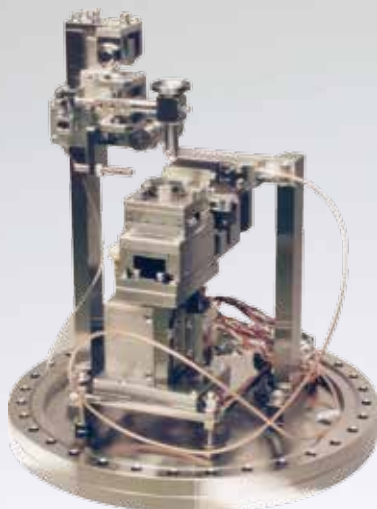
■ Load converter (100gf provided with 22L or 1000gf with 22H): 1 unit ■  $\phi 3$ mm ball indenter: 1 set ■ Scratch test pin: 1 diamond pin (0.05mmR) ■ Vertical gauge (for scratch): 1 ■ Weights for continuous loading: 0 to 50g (provided with 22L) or 0 to 500g (provided with 22H): 1 set ■ Combination weights: 1 set ■ Tools: 1 set ■ Power supply cord: 1 ■ Acrylic cover: 1 ■ Parts case: 1 ■ Operation manual: 1



## Vacuum Friction and Wear Tester

### TYPE: TriboVac2000

Capable of various friction and wear experiments in vacuum



Applications  
(examples)

- Various friction and wear measurements in vacuum
- Evaluation of various lubricant agents for the space industry
- Wear testing on solid lubricants and lubrication films

The TriboVac2000 tester, incorporating the well-reputed TRIBOGEAR friction and wear tester mechanism into a vacuum chamber, is now capable of various kinds of friction and wear testing in vacuum. The tester makes it possible to easily perform product evaluation in vacuum, which has been difficult to do, and is widely applicable to, for example, the space industry and the research and development applications for new materials technology. The loading system utilizes the highly-reputed HEIDON balance method, in which precise lading is possible even from a low load. Optionally, high-speed wear experiments using a rotating table are also possible. Support for specifications involving minute loading amounts can also be provided.

Supports vacuuming up to 10Pa using a turbo-molecular pump. Additionally, the tester with a high vacuum specification can be provided as an option, allowing testing under various conditions to satisfy the needs of users. Please contact us for more information.

#### Key Specifications

	TYPE: TriboVac2000
Vertical load	10 to 1000g
Loading system	Adjustable by adding and removing weights
Fixing system	Sample at upper side: dedicated holder    Sample at lower table side: bolt fixation
Load cell	Capacity: 9.8N, Accuracy: $\pm 0.098\text{N}$
Table	Diameter: 60mm
Vacuum pump	Turbo-molecular pump and rotary pump
Rotation speed	Setting between 1 and 2000rpm is possible
Data analysis	General-purpose frictional force analysis software "TriboSoft"

The above specifications are merely examples, and the tester may be produced with different specifications upon request. Please contact us for further information.

## Static Friction Coefficient Tester

### TYPE: 10



The test sample is installed on the ascending board and flat indenter. The board is equipped with a sensor that monitors the movement of the flat indenter. The ascending board at the horizontal position starts to increasingly tilt when the measurement begins. The sensor detects the motion when the flat indenter begins to slide, and stops the board instantly.

The angle and  $\tan \theta$  at this moment should be read.

#### Key Specifications

	TYPE: 10
Ascending Speed	Average $10^\circ/6 \text{ sec}$ ( $10^\circ/3 \text{ sec}$ in return motion)
Drive motor	Reversible motor
Measuring range	Static friction coefficient: 0 to 1.5 (minimum scale: 0.005) Slide angle: 0 to $56^\circ$ (minimum scale: $0.5^\circ$ )
Test sample size	Ascending board side: Max. 300mm x 120mm Flat indenter side: 75mm x 35mm (contact surface)
Flat indenter	Weight: 150g or 200g (selectable by adjusting the weights)
Operating environment	0 to $50^\circ\text{C}$ , 85% RH or less (non-condensing)
Overall dimensions	Main unit: W: 470mm x D: 290mm x H: 420mm
Option	Flat indenter for JIS P8147

#### Accessories

- Flat indenter: 1 set    ■ Power supply cord: 1    ■ Vinyl cover: 1
- Operation manual: 1

## Torque Type Friction and Wear Tester TYPE: 20

Disk-on-disk and ball-on-disk friction and wear testing



Applications  
(examples)

- Wear testing on coating films
- Wear testing on top coating
- Wear testing on various disks

The torque converter is directly connected to the turntable on which the test sample can be mounted. On the loading side, either the disk for surface contact or the ball indenter for point contact can be installed (selectable). Because both the disk and the ball indenter can be balanced using the self-weight, highly accurate friction and wear testing is possible even with a low load.

An openable cover with an interlock system is provided as a part of the standard equipment, ensuring further safety during the measurement.

\* The tester may be customized to include the load converter installed on the balance arm side.

### Key Specifications

	TYPE:20
Rotation speed	30 to 3000rpm (rotation speed indication, accumulated rotation count indication)
Auto stop function	Automatic stop at a specified count (up to 99,999,999 times) Stop in a specified duration of time (up to 65.535 seconds)
Measuring range	0 to 4000g/cm
Turn table	Φ5 inch
Indenter travel range	From the center to the outer periphery of the turn table
Safety features	Overload safety device High-frequency noise suppression circuit
Dynamic strain amplifier	Zero-point adjustment: Digital servo auto-zeroing rest system Output (non-linear): 0 to ±5V (±0.05%FS or less) Sensitivity selection: 0/100/50/25/10%FS SN ratio: 60dB (maximum sensitivity) Response frequency characteristic: 2kHz/-3dB Filter: 1/10/100/PASS (Hz) Dynamic strain amplifier is built into the main unit.
Operating environment	0 to 50°C, 85% RH or less (non-condensing)
Power supply	AC100V 50/60Hz
Overall dimensions	Main unit: W: 630mm x D: 350mm x H: 435mm

### Accessories

■ Ball indenter (Φ10mm): 1 set ■ Combination weights: 1 set ■ Tools: 1 set  
■ Power supply cord: 1 ■ Parts case: 1 ■ Operation manual: 1

## Wide-Range Load Friction and Wear Tester TYPE: 35

Capable of high-load and wide-range testing - from minimum 20g to maximum 100kg



Applications  
(examples)

- Friction and wear characteristic evaluation of automobile/bearing materials, seal materials, etc.
- Wear and friction characteristic evaluation of lubricant materials
- Wear and friction characteristic evaluation of various kinds of surface treatment

A wide loading range, from 20g to maximum 100kg, has become possible with this wear tester. No other testers are needed to make wear experiments for a wide loading range.

Equipped with a rotary turn table, the tester is capable of wear experiments at low to high speed. In addition, the CCD camera "Tribosystem" for observation of wear phenomena is also provided, so that such phenomena can be safely and accurately comprehended.

### Key Specifications

	TYPE:35
Table dimensions	Φ60mm
Rotation speed	30 to 3000rpm
Accumulated rotation counter	Accumulation up to 999,999 is possible
Auto stop function	Automatic stop at a specified count between 1 and 999,999 times is possible
Loading system	20g to 10kg: Balance arm system + loading weights 10kg to 100kg: Vertical motion loading mechanism + loading weights
Wear volume measurement	Displacement meter system: maximum 5mm
Measuring range	Frictional force: Load cell system, maximum 2000N, 200N, or 20N (replaceable type) Wear torque: Torque meter system, maximum 2000N/cm
Safety features	Openable safety cover (with interlock system)
Data analysis	Notebook PC, general-purpose frictional force analyzing software "Tribosoft" (with A/D converter) Monitoring software dedicated to frictional force, wear volume, and temperature monitoring (with A/D converter)
Option	Heater: maximum heating temperature 300°C In-liquid equipment: Liquid tray Sample temperature monitor: non-contact thermometer Image observation system: CCD Tribosystem

### Accessories

■ Φ10mm ball indenter: 1 set ■ Combination weights: 1 set  
■ Control rack: 1 set ■ Loading ring weights: 1 set ■ Parts case: 1 ■ Tools: 1 set  
■ Power supply cable: 1 set ■ Operation manual: 1

# Case Study

## TRIBOGEAR Series supports world-leading technologies.

TRIBOGEAR Series currently contains as much as 14 types of instrument, including the latest 3D Muse, which are capable of a wide variety of testing, such as friction, wear, scratch, adhesion, and peeling tests. Their technical capabilities are recognized at home and abroad. This section shows some of the cases to which solutions using the TRIBOGEAR products were successfully applied. We are happy to customize the products to fulfill customers' request.

<p><b>Case 1</b></p> <p>Paint manufacturer</p> <p>Both-way Wear Tester</p> <p><b>TYPE: 30S</b> [P13]</p>	<p>Evaluation of paint to be applied to mobile terminals</p> <p>Repeatedly slide a ball indenter or steel wool holder wrapped by a piece of cloth is back and forth while applying a constant load.</p>	<p>The wear characteristic under every different condition was successfully verified, contributing to development of the product with a higher level of wear resistance.</p>
<p><b>Case 2</b></p> <p>Chemical product manufacturer</p> <p>Variable Normal Load Friction and Wear Measurement System</p> <p><b>TYPE: HHS2000</b> [P8]</p>	<p>Evaluation of wear resistance of a hard film</p> <p>Repeatedly slide a diamond scratch test pin back and forth while continuously varying the load to be applied.</p>	<p>With a conventional tester, it was necessary to mount a new test sample for every load, which required a long period of time to complete wear testing with different loads. However, with HHS2000 capable of processing wear test while continuously varying the load, testing for a wide range of different loads can be completed in one cycle. Therefore, significant time and effort were successfully saved during the testing.</p>
<p><b>Case 3</b></p> <p>Cosmetics manufacturer</p> <p>Portable Tactile Meter</p> <p><b>TYPE: 33</b> [P7]</p>	<p>Evaluation of smooth texture of cream and its absorption to skin</p> <p>Put some cream on the test sample table and rub it with an examiner's finger.</p>	<p>Previously, sensory evaluation was the only way to evaluate the smooth texture of cosmetics and chemicals. However, with tactile meter, the touch felt by an examiner who directly rubs the cream with a finger is directly converted to a numerical value. Additionally, by continuously rubbing the cream, absorption to skin could also be evaluated.</p>
<p><b>Case 4</b></p> <p>Chemical product manufacturer</p> <p>Continuous Loading Scratching Intensity Tester</p> <p><b>TYPE: 18</b> [P11]</p>	<p>Evaluation of scratch resistance property of a film coating</p> <p>Scratch the sample surface with the scratch test pin while continuously applying a load. As soon as a scratch is observed, compare the strength of the surface at the point of the scratch.</p>	<p>By performing the testing under every different condition, the surface strength of the coating was evaluated based on the scratch made.</p>
<p><b>Case 5</b></p> <p>Rubber product manufacturer</p> <p>Surface Property Tester</p> <p><b>TYPE: 14</b> [P10]</p>	<p>Friction and wear evolution of a rubber roller</p> <p>Using a roll holder, fix a sheet of paper on the table side and the rubber roller on the attachment side. Then, apply a constant load to evaluate the friction and wear of the roller.</p>	<p>After measuring the friction between a sheet of paper and rubber roller, which is a cause of paper jam, a successful selection of an appropriate rubber material was made. Further, the highly versatile tester TYPE:14 was also utilized in the measurement of the friction between a paper sheet and roller, and other purposes, which were not originally intended.</p>

# Aftercare

1

## Services at the time of purchase

We offer some suggestions about appropriate models that will satisfy customer needs. Based on the type of sample to be tested, we explain what kinds of data can be provided by certain models. In some cases, assistance to data extraction is also given.

2

## Joint development

Upon request, we collaborate with our customer in data extraction and analysis. We have many experiences in collaborating with customers from different industries in friction and wear testing, contributing to formation of concepts of many successful products. We are committed to continuously serving our customers through customer-friendly approach. Our support will be provided based on the expertise in friction and wear testing.

3

## Maintenance

Our products have gained immense trust, including on their quality, from our customers. In addition, we are improving our aftercare services for more speedy response and more thorough problem resolution. Please do not hesitate to contact us if you have any questions or comment on our products and services.

Reliable and economical service

## TRIBOGEAR Maintenance Pack

Extended 5-year warranty (standard 1-year + additional 4-year warranty), 3 sets of inspection and calibration services (in 5 years), and free software upgrade (in 5 years) are included.

We also offer paid on-site calibration and other services. For more information, please contact us.

## Contract testing service

We also offer the contract testing service using our TRIBOGEAR products. Relatively economical flat-fee plans, including the static friction coefficient measurement pack, constant load measurement pack, continuous loading scratch pack, wear measurement pack, are also offered. Please visit our website for more information.

### Advantage of the contract testing service

- No need for initial costs
- No need for operators
- Only the result can be obtained in a short time.
- No need for experiences and knowledge in the field of friction and wear

### Disadvantages of the contract testing service

- Expensive in the case of periodical or high-volume testing
- Difficult to accumulate know-how
- Unable to get the testing done anytime you need

## Examples of Tribological Solutions

### Automobile Industry

#### Relevant models

Car wax does not spread smoothly.	Measurement testing on the effect of wax on the painted surface	Type : 10·14·22·38·40· $\mu$ s
Automobile interior parts are easily scarred.	Friction testing on interior materials	Type : 18·22·HHS
Noises are generated between interior parts and clothes.	Friction testing on interior materials	Type : 14·22·38·40·HHS
Scratch marks on dashboard	Measurement and evaluation and of scratch resistance of the resin exterior surface	Type : 18·22·HHS
A seat belt is slippery	Measurement of the friction between the seat belt and clothes	Type : 14·22·38·40·HHS
Automobile tires are worn off easily.	Wear measurement of the rubber	Type : 14·38·40·HHS
Friction between wipers and glass surface	Wear measurement of the rubber	Type : 14·20·HHS
Noises from door hinges	Wear and adhesiveness testing on various solid lubricants	Type : 14·22·HHS
Distortion of automobile rear- and side-view mirrors	Evaluation of distortion in the mirrors	Type : 25W
Thermal insulator for engine parts has a short life.	Testing on interface adhesion between the engine parts and thermal resistant coatings.	Type : HHS

### Electric/Electronic Equipment and Precision Instruments

Cell phone surface coatings are color-faced or chipped.	Scratch, wear, and adhesive strength testing on the liquid coating materials and plating	Type : 14·22·30·38·40·HHS
Interface adhesion between a plastic card and magnetic material	Durability evaluation of the magnetic card	Type : 18·22·HHS
Wear resistance of printed texts on cell phone keypads	Scratch, wear, and adhesive strength testing on the liquid coating materials and plating	Type : 14·22·30·HHS
Scratches on liquid crystal panel extension sheets	Wear and scratch resistance testing on the film	Type : 18·22·HHS
Scratches on LCD protection films	Measurement of the surface strength of the films	Type : 18·22·HHS
Excellent liquid crystal alignment needs to be achieved.	Wear characteristics testing on the liquid crystal alignment film	Type : 18·22·HHS
Scratches on the surfaces of home electric appliances	Evaluation of scratch resistance of the resin exterior surface	Type : 18·22·HHS
Magnetic card becomes unusable.	Durability evaluation of the magnetic card	Type : 18·22·HHS
A video tape is damaged with scratches.	Wear and scratch resistance testing on the film	Type : 18·22·HHS
A FD is damaged by a liner.	Friction and wear measurements on the FD media and liner	Type : 20
Plating on a watch is chipped.	Scratch, wear, and adhesive strength testing on the liquid coating materials and plating	Type : 18·22·40·HHS
Conveyability of various products on production line equipment	Measurement of the friction of rollers	Type : 14·38·40·HHS· $\mu$ s
Paper jam in a copier	Measurement of the friction between sheets of paper in a paper feed tray	Type : 14·22·HHS
Scratches on surface steel plates of a copier	Strength testing on exterior steel plates	Type : 18·22·HHS
Banknotes are not fed into an ATM.	Measurements of the friction of paper feed rollers and the friction caused by dust or other adhered particles	Type : 14·22·38·40·HHS
Between printer rubber rollers and paper sheet - paper jam	Examination of a cause of paper jam in the copier	Type : 14·38·HHS
Toner particles cannot be removed from a copier drum.	Measurement of the friction of the toner particles	Type : 14
Silk screen does not move smoothly	Adhesive strength testing on the silk-screen printing unit	Type : 14·22·38·40·HHS
A shutter is not smoothly pulled down.	Characteristics testing on the solid lubricating paint on the shutter disc and driving unit	Type : 14·22·38·40·HHS
Scratches on a lens	Wear and adhesiveness testing on the anti-reflection film on the lens	Type : 18·22·HHS
Examination of a cause of the noises generated while winding a film in a camera	Wear and scratch resistance testing on the film	Type : 14·22·38·40·HHS
Scratches on a photo film	Wear and scratch resistance testing on the film	Type : 18·22·HHS
Scratches on the coating of a photo film and coating adhesion	Wear and scratch resistance testing on the film	Type : 18·22·HHS
Scratch resistance property of eye-glass lenses	Wear and adhesiveness testing on the anti-reflection film on the lenses	Type : 18·22·HHS

### Chemicals and Cosmetics

Foundation is sticky.	Texture testing on the foundation	Type : 14·22·33·38·40· $\mu$ s
Need to know the level of smooth texture of foundation.	Texture testing on the foundation	Type : 14·22·33·38·40·HHS
Lip rouge does not spread smoothly	Characteristics testing on the spread and stickiness of the lip rouge, cream, etc.	Type : 14·33·38·40·HHS
Cannot move a lip stick smoothly along the lips.	Characteristics testing on the spread and stickiness of the lip rouge, cream, etc.	Type : 14·22·38·40·HHS
Manufacturing machines are undesirably covered with powder materials during pharmaceutical manufacturing.	Friction measurement during the powder pressing process	Type : 14·38·40·HHS
Nail enamel is partially peeled off.	Testing on the peel-off resistance of the nail enamel	Type : 18·22·HHS
Smooth and silky hair cannot be obtained after using hair conditioner	Evaluation test on the effectiveness of hair conditioner and treatment.	Type : 14·38·40·HHS
Cannot tell the degree of smooth texture of hand cream	Characteristics testing on the spread and stickiness of the lip rouge, cream, etc.	Type : 14·22·33·40· $\mu$ s·HHS
Worn-out level of a toothbrush	Worn-out level testing on the toothbrush	Type : 14·22·38·40·HHS
Hair smoothness	Evaluation test on the effectiveness of hair conditioner and treatment.	Type : 14·22·38·40·HHS
Hair becomes clinging after using hair conditioner	Evaluation test on the effectiveness of hair conditioner and treatment.	Type : 14·22·38·40·HHS

### Textile Products

Inner clothing clings to outer wear.	Evaluation of the degree of clinging of the inner clothing and outer wear	Type : 14·22·38·40·HHS
Texture of a fabric need to be examined.	Surface friction measurement of the fabric	Type : 10·14·33· $\mu$ s
A clothes iron does not smoothly slide on a starched fabric	Measurement of the degree of smooth movement of the iron after starching a fabric	Type : 10·14·33· $\mu$ s
Feel uncomfortable in certain clothes	Evaluation of the degree of clinging of the inner clothing and outer wear	Type : 10·14·33· $\mu$ s
Socks are too slippery.	Quality evaluation testing on raw silk	Type : 10·14·38·40·HHS



## Food and Beverage

### Relevant models

Unpleasant texture of spaghetti (or other noodles)	Measurement of the friction of noodles	Type : 14·38·40·HHS
Cookie dough falls from a production line during a manufacturing process.	Measurement of the friction between the cookie dough and the line surface	Type : 14·38·40· $\mu$ s·HHS
Conveyability of chewing gums	Surface friction test on the chewing gums	Type : 14· $\mu$ s
Conveyability of confectionery product packages	Measurement of the friction of the packages	Type : 10·14·22·38·40·HHS
Large distortion in food containers (for pudding and jelly)	Testing on the stress distribution of molded articles	Type : 25W
Conveyability of tobacco leaves	Measurement of the friction between the leaves	Type : 14·38·40·HHS
Scratches on beer bottles	Measurement of the friction of glass	Type : 18·22·HHS
Beer cans get stuck with one another while they are conveyed.	Measurement of the friction of glass	Type : 10
Conveyability of cans conveyed together	Measurement of the friction of resin coating films	Type : 14·22·38·40·HHS
Low conveyability of cups of instant noodles	Measurement of the friction of outer boxes	Type : 10·14·22·38·40· $\mu$ s
Ununiformity in the finish of molded PET bottles	Distortion testing on transparent plastic containers	Type : 25W

## Construction and Building

Flooring materials are too slippery.	Slip characteristic testing on the flooring materials under dry or wet condition	Type : 14·22·38·40· $\mu$ s·HHS
Slippery bottom of a bathtub	Measurement of the friction of the bottom material	Type : 10·14·22·38·40· $\mu$ s
Slippery concrete	Slip characteristic testing on the concrete	Type : 14·22·38·40·HHS
Scratches on a wall	Measurements of strength and adhesive force of the wallpaper	Type : 18·22·HHS

## Sporting Goods

Skis do not slide smoothly.	Evaluation testing on the wax for skis	Type : 14·22·32·38· $\mu$ s·HHS
Friction of strings of a tennis racket	Measurement of the friction a wire	Type : 14·32·38· $\mu$ s
Smoothness of a fishing line	Measurement of the friction of the fishing gut	Type : 14·32·38· $\mu$ s
Slippery grip	Evaluation of grip feeling of various grips	Type : 14·32·33·38· $\mu$ s
Scratches on a golf ball	Measurement of the friction a wire	Type : 18·22·HHS
Slippery shoe soles	Characteristics testing on the degree of worn out soles	Type : 14·32·38·HHS
Slippery inner surfaces of shoes	Evaluation testing of the inner surfaces of the shoes	Type : 14·32·38·HHS

## Others

Difficulties in jointing molded articles	Testing on the stress distribution of molded articles	Type : 25W
Low comfort in writing with a fountain pen	Measurement and testing of the friction of the ink	Type : 14·22·33·38·40·HHS
Smooth movement of a wire	Measurement of the friction of the wire	Type : 14·22·38·40· $\mu$ s·HHS
Sliding materials are worn out quickly.	Measurement and testing on the effectiveness of the wax on the painted surface	Type : 14·22·30·38·40·HHS
Uneven cling property of plastic wrap	Cling property testing on the plastic wrap	Type : 14·17
Iron rollers for metal rolling are worn out in short time.	Measurement of the friction of the rollers	Type : 14·38·40· $\mu$ s
Cardboard boxes tend to slip off while stacking them.	Friction testing on the cardboard boxes	Type : 10
A thread does not move smoothly while being reeled.	Quality evaluation testing on raw silk	Type : 14·22·38·40·HHS
Abrasive force of an abrasive paper needs to be expressed in numerical terms.	Friction and wear testing on the abrasive paper	Type : 14·38·40·HHS
A grease is not as helpful in sliding as before	Measurement of the friction the grease	Type : 14·22·38·40·HHS
The degree of sliding on a painted surface need to be quantified.	Scratch, wear, and adhesive strength testing on the liquid coating materials and plating	Type : 14·22·38·40·HHS
Peel force for an adhesive tape	Measurements of wallpaper strength and adhesive force	Type : 14·17
A catheter does not move smoothly and stop in a blood vessel.	Measurement of the friction the wire	Type : 14·22·38·40·HHS
Scratches on a motor	Surface strength testing on the anti-reflection film	Type : 18·22·HHS
A rubbing cloth slips on a rubbed object	Evaluation and testing on the rubbing cloth, etc.	Type : 14·22·30·38·40·HHS
Uncomfortable texture of diaper	Friction testing on diapers and sanitary napkins	Type : 14·22·33·38·40·HHS

Simple operations for data analysis and management

## General Purpose Friction and Wear Analyzing Software | TriboSoft



The data from the TRIBOGEAR instruments can be acquired and analyzed through simple operations using a mouse. Not only friction coefficient and resistance are automatically calculated, but also obtained characteristics are graphically compared through overlaying one graph on another. The software also supports friction testing in reciprocating motion, and is capable of isolating a piece of data for every cycle of stroke in real time. Additionally, the latest version has become more user friendly, making it to not only analyze data but also controlling the TRIBOGEAR products.

### ■ Packaged items

Data Analyzing Software, A/D converter (built into the main unit), and USB cable

### ■ Operating environment (OS)

Windows10, Windows8, and Windows7

### ■ Communication port

USB port

### ■ Key Specifications

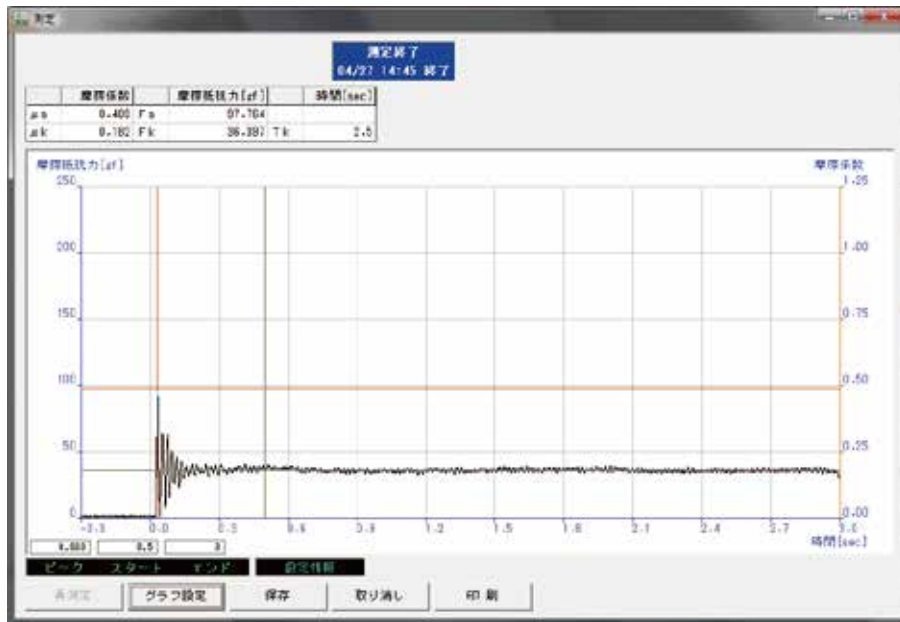
	TriboSoft
Major functions	Constant load measurement, continuous loading measurement, resistance measurement, friction coefficient calculation, automatic static friction coefficient calculation, dynamic friction coefficient calculation, CGS/MKS unit system selection, overlaying graphs, data saving in text format, graph printing, result printing, etc.
Data acquisition performance	Maximum sampling rate: 10KHz Maximum sampling number: 1,000,000 points
System requirement	Windows 10, Windows 8, or Windows 7 (the screen image may be distorted in the case of using the DPI scale function)
A/D converter	Connection: USB 2.0      Effective resolution: 16bit * A built in A/D converter in the main unit will be provided. Accessory: USB cable

### Accessories

■ Installation disk (including driver software) and operation manual

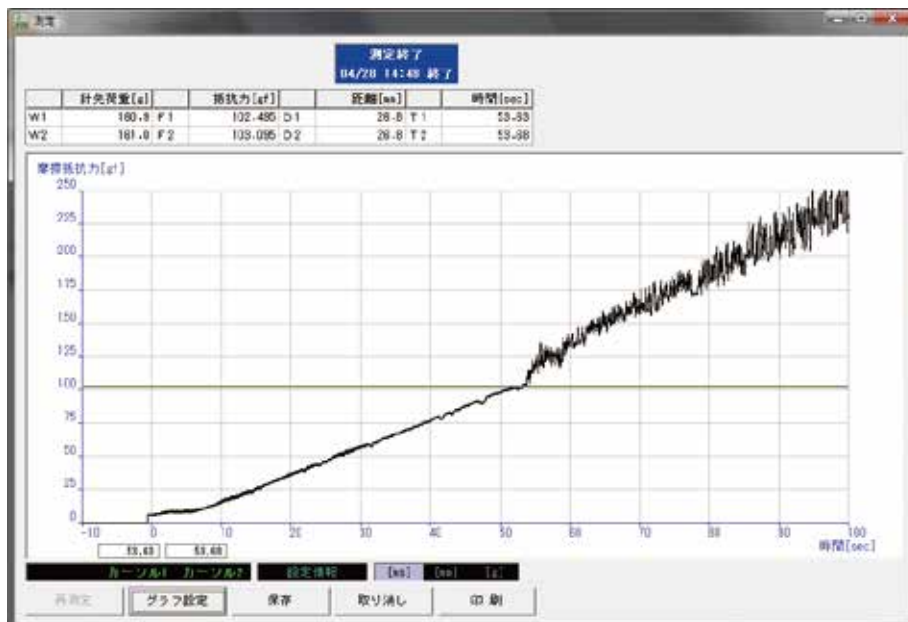
\* The specifications and functions listed above are for TriboSoft ver. 6. For the users of TRIBOGEAR products that cannot accept a built-in A/D converter, TriboSoft ver. 5 designed with a USB connectable external A/D converter is also available. For more details on the specifications, please contact us.

# Measurement Examples



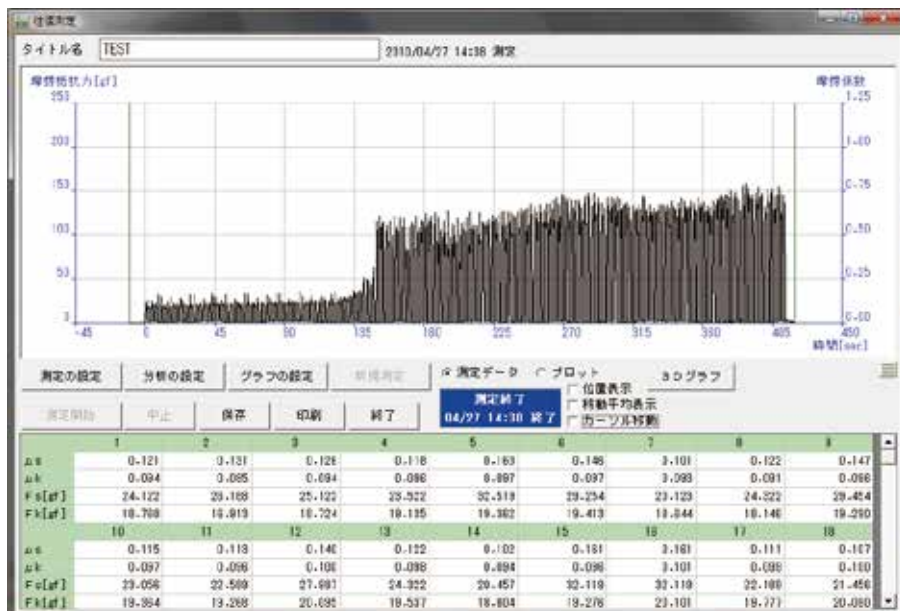
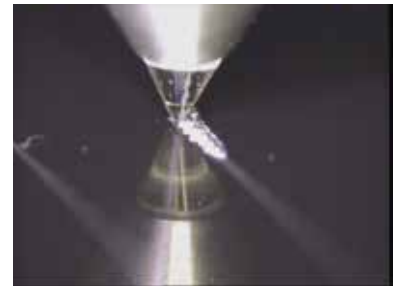
## ■ Constant load measurement (ware data)

The resistive force actin on the load converter is continuously acquired and the alternation of the force is graphically illustrated, so that the static/dynamic frictional resistive force is clarified.



## ■ Continuous loading measurement (scratch test)

The software records the frictional resistive force acting between the test sample surface and scratch test pin during continuous loading, as well as peeling resistance. Further, the vertical load at the moment when the film is peeled off is acquired as adhesiveness



## ■ Both-way measurement (ware data)

By repeatedly generating friction in reciprocating motion, the stroke count at which a surface condition has changed and peeling of a film has occurred is determined from an increase or decrease in the frictional resistance. Further, in the both-way measurement mode, a piece of data for every cycle of stroke can be isolated, and the static/dynamic friction coefficient for the every cycle can also be calculated. By plotting the dynamic friction coefficient for every stroke count, the wear status can be easily clarified.



## ■ ASTM flat indenter



Capable of applying surface pressure to a paired test samples with a sheet-shape test sample wound around the indenter and fixed or a bonded plate-shape test sample.

- Applicable standard: ASTM D 1894
  - Applicable models: 14, 18, 22, 30, 34, 38, 40, and HHS
  - Examples of application: Friction and wear testing using the indenter wrapped by a sheet of paper, film, cloth, etc., and friction and wear test with a plate of metal, resin, glass, etc. attached by bonding
- \* Depending on the models, the gate-shape clip should be removed before use.

## ■ 30mm flat indenter



Capable of applying surface pressure to a paired test samples with a sheet-shape test sample wound around the indenter and fixed or a bonded plate-shape test sample.

- Contact surface: 30 x 30mm
- Applicable models: 14, 18, 22, 30, 34, 38, 40, and HHS
- Examples of application: Friction and wear testing using the indenter wrapped by a sheet of paper, film, cloth, etc., and friction and wear test with a plate of metal, resin, glass, etc. attached by bonding

## ■ Ball indenter (with 4 balls)



Applies point pressure to a flat-plate or sheet test sample using a fixed ball, and slides the ball. The ball indenter is suitable for determining the difference between test samples in relation to the ball.

- Ball (option): Material: alumina, SUJ2, SUS, tungsten carbide  
Size: ø3, 4, 5, 6, 8, 10mm
- Applicable models: 14, 18, 22, 30, 32, 34, 38, 40, and HHS
- Examples of application: Friction and wear testing on various materials, in particular, under high pressure

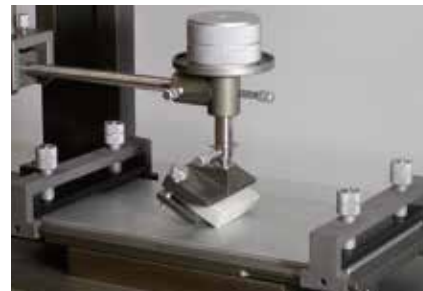
## ■ Roller jig



Slides the fixed cylindrical roller after applying linear pressure. A SUS roller is provided with the jig.

- Applicable models: 14, 18, 22, 30, 34, 38, 40, and HHS
- Examples of application: Friction testing on a cylindrical object. Evaluation of conveying system, such as rubber rollers

## ■ Blade holder



Capable of applying surface pressure to a paired test samples with a sheet-shape test sample wound around the indenter and fixed or a bonded plate-shape test sample.

- Applicable models: 14, 22, 30, 34, 38, 40, and HHS
- Examples of application: Friction and wear testing using the indenter wrapped by a sheet of paper, film, cloth, etc. Alternatively, the sample itself may be directly inserted.

## ■ Sand-contained rubber eraser holder



Securely holds a cylindrical sand-contained rubber eraser, and measures the changes in the friction caused by wear on the test sample surface.

- Applicable models: 14, 18, 22, 30, 32, 34, 38, 40, and HHS
- Examples of application: Scratch resistance evaluation of liquid crystal or plastic housings  
Scratch resistance evaluation of lenses  
Wear evaluation of silk-screen printed or painted surfaces

## ■ Tack roller unit



Evaluates the stickiness of adhesives, floor materials and cosmetics from the rolling resistance of the stainless roller

- Applicable model: 14
- Examples of application: Evaluation of stickiness and adhesion of various tapes

## ■ T-peel unit



Capable of stable T-peel test for peeling resistance and tensile strength measurement.

- Applicable model: 14
- Examples of application: Evaluation of adhesive force of various tapes

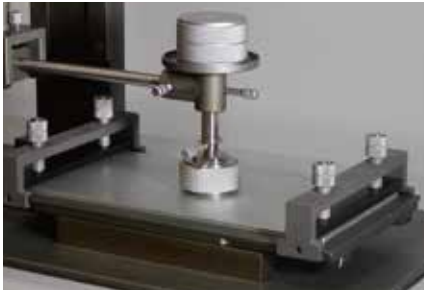
## ■ Peeling clip



Measures adhesion of adhesive tape, demolding property, peeling resistance between duplex board layers, tearing strength, etc.

- Applicable models: 14, 18, 34, and 38
- Examples of application: Evaluation of adhesive force of various tapes  
Evaluation of interface adhesion of coating films

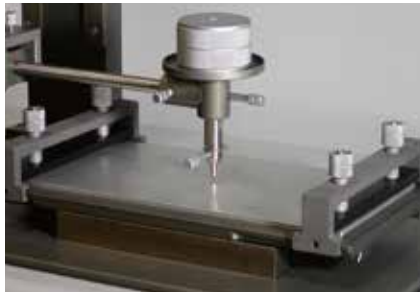
## Steel wool holder



Holds steel wool, gauze, rubber, etc. to measure changes in the friction caused by wear on the test sample surface.  $\phi 12\text{mm}$  and  $\phi 27\text{mm}$  types are available.

- Applicable models: 14, 18, 22, 30, 34, 38, 40, and HHS
- Examples of application: Scratch resistance evaluation of films and plastic  
Scratch resistance evaluation of lenses  
Wear evaluation of silk-screen printed or painted

## Scratch test pin



Evaluates the scratch intensity of various materials and adhesive property of various films, paint films, etc.

- A wide variety of sizes between 0.001 and 1.0mmR are available both with diamond and sapphire pins.
- Applicable models: 14, 18, 22, 30, 34, 38, 40, and HHS
- Examples of application: Strength evaluation of paint and coating films  
For a hard film, such as DLC film, a diamond pin is recommended.

## 45° pencil holder



Measures the scratch intensity of painted surfaces, and evaluates the comfort in writing with pens, pencils, etc. as a resistance value.

- Applicable standards: JISK5600-5-4 (scratch test)
- Applicable models: 14, 18, 22, 30, 34, 38, 40, and HHS
- Examples of application: With the table moving at a constant speed, quantitative evaluation in accordance with JISK5600-5-4 is possible

## Artificial leather holder



A specially designed holder to hold artificial leather.  $\phi 12\text{mm}$  and  $\phi 27\text{mm}$  types are available.

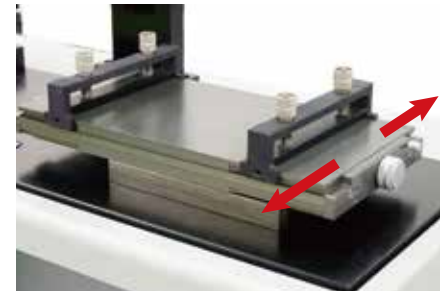
- Applicable models: 14, 18, 22, 30, 34, 38, 40, and HHS
- Examples of application: Evaluation of smart phone screens  
Evaluation of automobile dashboards, handles, etc.  
Friction and wear testing on the objects touched by other people

## Artificial leather sheet



We accept order of the artificial leather sheet from the quantity of 1

## Y-direction fine feeding stage

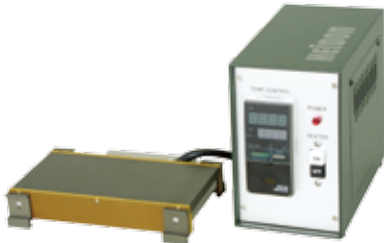


Feeds a fixed test sample to Y-direction so that testing at multiple points of a sample can be performed without complicated process.

- Applicable models: 14, 38, 40

TYPE: OP-YS

## Heater (heating plate)



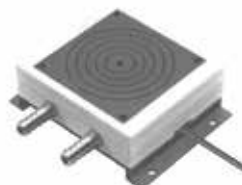
Capable of heating a test sample in the range between  $10^{\circ}\text{C}$  above the room temperature and  $200^{\circ}\text{C}$ . Can be attached to the sliding table of the TRIBOGEAR instruments.

- Applicable models: 14, 18, 22, 30, 34, 38, 40, and HHS

TYPE: HP2000

The high-temperature heater TYPE: HP5000, which can heat a sample up to  $500^{\circ}\text{C}$  is also available.

## Cooler



The cooling device using the Peltier device can cool test samples.

- Applicable models: 14, 18, 22, 30, 34, 38, 40, and HHS

TYPE: PC2000

## Liquid tray



With the liquid tray, friction and wear testing in oil or liquid is possible.

- Applicable models: 14, 18, 22, 30, 34, 38, 40, and HHS

TYPE: LRV



# HEIDON



SCIENCE OF SENSING

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