

# Triboster

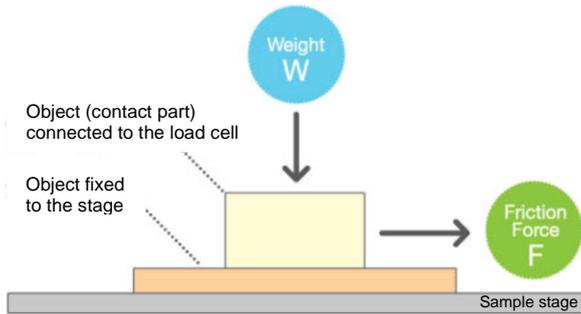
Automatic Friction Abrasion Analyzer



## Principle

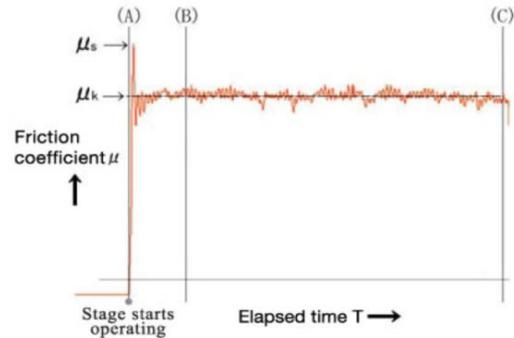
### Coefficient of Friction (COF)

The value of the COF  $\mu$  is defined by the relationship between the required force  $F$  to slide an object and the weight  $W$  perpendicular to the surface the object is resting on. The COF is calculated by the equation  $\mu = F/W$ .

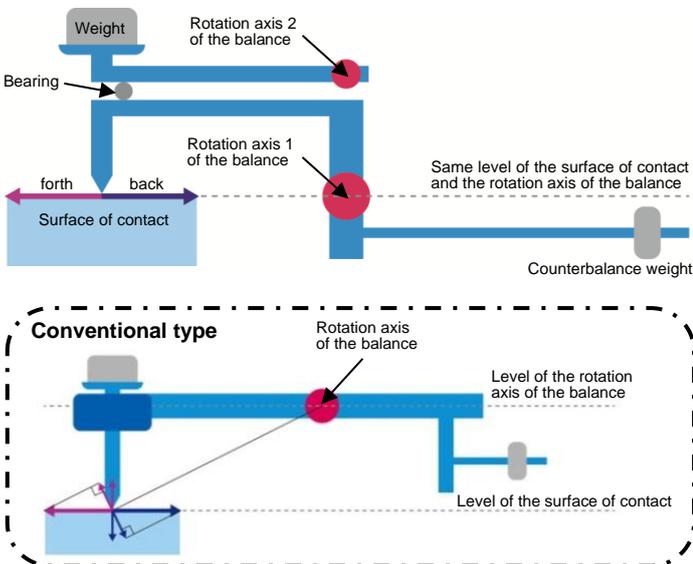


### Analysis Method

The graph below indicates the COF versus time. The static COF  $\mu_s$  is determined in the initial phase between the point (A) and (B), the kinetic COF  $\mu_k$  is determined by the average of the values between the points (B) and (C).



## Our new concept of the biaxial balance's innovative design



### Advantage One: Biaxial Balance

Isolating inertia effects and external forces from the load cell

One part of the biaxial balance acts as a supporting arm for the weight and the other part acts as transducing arm for the friction force to the load cell. Both parts carry out their functions individually, properly isolating inertia effects and external forces from the load cell.

### Advantage Two: Crank Shaped Balance

Highly reliable data not affected by the direction of movement

Due to the leveled surface of contact and the rotation axis of the balance the weight perpendicular to the surface of contact is the same in both directions back and forth, and the friction force transduced to the load cell is the same despite different directions.

## Automatic Friction Abrasion Analyzer, Triboster TSf-503

The Triboster TSf-503 is designed for computer-controlled analysis of the static and kinetic coefficients of friction (COF). The TSf-503 features the unique patented crank-shaped biaxial balance technology for precise and reliable measurements.

Different loads, speeds, contact parts, measuring methods, and options allow customers to set up the instruments to meet their needs.

The linear reciprocating sample stage can be used for all kinds of samples with different shapes because sample holders are specially designed according to the sample. The stage's stroke can be set from 1 to 80mm and the speed from 0.1 to 100mm/sec.

The TSf-503 features seven measuring methods, a complete set of six weights, and a built-in temperature sensor.

The device is available in two versions: the standard normal load range from 100 to 1000g, and the optional range from 200 to 2000g



## Applications

Objects	Examples of evaluation
Lubrication oil	The friction, wear-resistance, and longevity of oil-lubricated metallic surfaces / The temperature-dependence of the friction
Cosmetics	The longevity and peel resistance of manicures / The smoothness of hair before and after treatment with hairdressing / The friction of surfaces from production machines to improve powders' flow properties and prevent powder adhesion.
Powders	The functionality and effectiveness of powder lubricants
Papers	The durability of and damage to papers or the surfaces of printing media during the printing process / The friction between paper sheets against each other and between paper sheets and each part of the printer's paper feed mechanism for its optimization
Rubbers, plastics	The friction and wear of tires against road surfaces / The stick-slip-effect between wiper blades and wet windshields / Functionality and persistence of rubbers for table tennis rackets / The durability and functionality of the rubber surface of paper-feed or pick-up rollers
Textiles	The smoothness of textiles depending on the weave pattern / The efficiency of softening and smoothening agents on textiles / The slippage of different kinds of fabrics on each other / The slippage of stockings on insoles
Paints, Coatings	The strength of plating layers and coated surface against scratching, continuous rubbing, sliding, etc. / The friction and wear of coated surfaces against each other
Medical	The friction of materials from artificial joints, valves of artificial hearts, and implants / The friction of catheters submerged in water and the durability of the catheter's coatings.
Automobile	The extensibility of car polish or wax on the car body and their effectiveness after drying / Sliding characteristics between clothing fabrics and seat belts and car seat materials

## Featured Functions

- Biaxial balance technology:**  
This technology minimizes the effects of inertia and other external forces on the load cell during the measurements, ensuring exact and reliable results.
- Two-way measurements:**  
Measurements of coefficients of friction in both ways of the stage travel.
- Automatic counterpart lift-up function:**  
The counterpart lifts automatically after every measurement of the coefficient of friction in one way of the stage travel to avoid contact with the sample when the stage returns.
- Continuous static friction measurement:**  
The stage's stop-and-go movement allows for measurements of up to 50 data of coefficients of static friction in one stroke.
- Standard repetition measurement:**  
The device repeatedly measures friction coefficients on the same measuring area in up to 12 cycles.
- Repetition-dependent measurements:**  
The device repeatedly measures friction coefficients on the same measuring area in 100 to 10.000 cycles.
- Multi-sample measurements:**  
Measurements of friction coefficients for different samples or areas for one test piece allow easy comparison.
- Load-dependent measurements:**  
Measurements of coefficients of friction depending on different normal loads.
- Speed-dependent measurements:**  
Measurements of coefficients of friction depending on different speeds.
- Time-interval dependent measurements:**  
The software analyzes the influence of adhesion to the coefficients of friction depending on up to four different contact times in one way, combining the counterpart lift-up function and the stage's stop-and-go movement.

## Measuring Methods and Functions

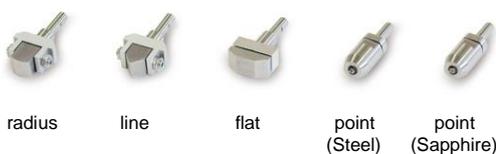
◎ Standard ○ Option --- Not available

	TSf-503
Biaxial balance technology	◎
Automatic contact part lift-up function	◎
One-way measurement (forward motion)	◎
Two-way measurement (reciprocating motion)	◎
Standard repetition measurement	◎
Multi-sample measurement	◎
Repetition dependent measurement	◎
Load dependent measurement	◎
Speed-dependent measurement	◎
Continuous static friction measurement	◎
Time interval-dependent measurement	◎
Temperature control	○

## Specifications

TSf-503	
Measuring mode	Linear reciprocating
Display resolution	Coefficient of friction: 0.0001
Friction force range	Standard: 0 to 1.000gf (9.8N), Optional: 0 to 2.000gf (19.6N)
Normal load range	Standard: 100 to 1.000g (in steps of 50g), Optional: 200 to 2.000g (in steps of 100g)
Stage travel distance	1 to 80mm (in steps of 1mm)
Stage travel speed	0.1 to 100mm/sec
Stage travel cycles	Max. 10.000 cycles
Max. sample size	180(W)×100(D)×30(H)mm
Stage size	180(W)×100(D)mm
Measuring temperature	Standard: Ambient Optional: Jacket stage: +10 to +60°C Heater stage: Ambient to +180°C
Instrument dimensions	310(W)×600(D)×420(H)mm
Instrument weight	29kg
Power supply	AC100 to 240V, 50/60Hz
Environmental condition	Temperature: +15 to +35 °C, Humidity: 30 to 80 %RH (non-condensing) Positioned away from sources of vibration and electrical noise

## Optional Accessories



radius line flat point (Steel) point (Sapphire)

### Contact parts geometries

Standard contact part geometry for all models:  
Point contact ( $\phi$ 3 mm steel ball)



### ASTM sled

Sled (contact part) of standardized size  
compliant with ASTM D1894 standard



2000g 1000g 500g 400g 200g 100g

### Optional weight set (2kg)

Factory option for the TSf-503.  
For retrofitting, the device must be shipped  
back to the manufacturer for modification.



### Pencil holder

A holder to use pencils as contact parts



### Heater-type stage system

Package of a heater-type stage for solid  
samples and temperature controller 202E  
Temperature range: Ambient to +180 °C



### Jacket-type stage

A jacket-type stage for solid samples  
A refrigerated/heated circulator is required  
Temperature range: +10 to +60 °C

For detailed information, please get in touch with our sales partner or us directly at +81-48-483-2629 or [overseas-sales@face-kyowa.co.jp](mailto:overseas-sales@face-kyowa.co.jp).

The specifications and designs are subject to change without notice.

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