

Triboster

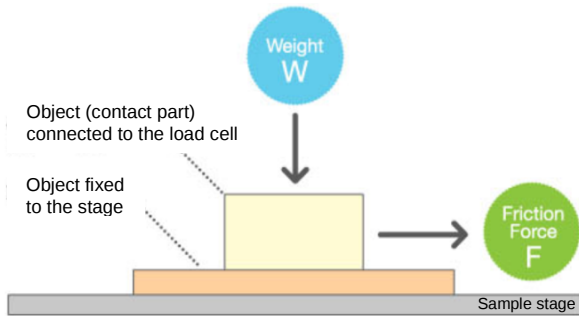
Automatic Friction Abrasion Analyzer



Principle

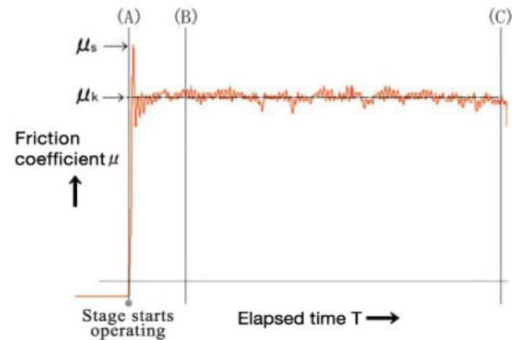
Coefficient of Friction (COF)

The value of the COF μ 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 $\mu = F/W$.

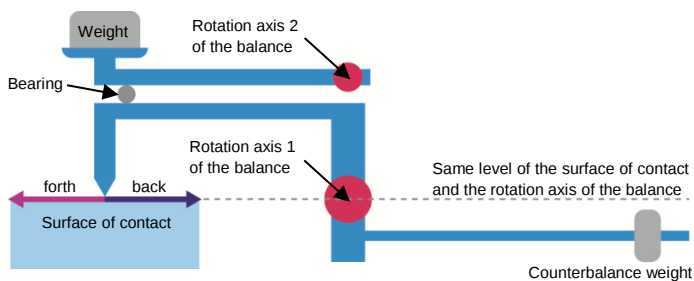


Analysis Method

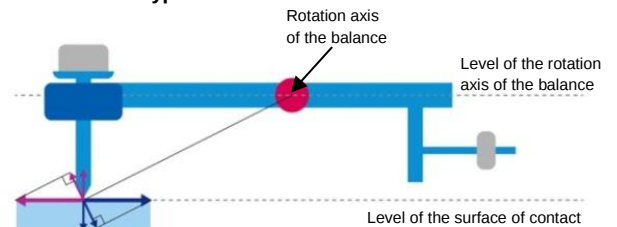
The graph below indicates the COF versus time. The static COF μ_s is determined in the initial phase between the point (A) and (B), the kinetic COF μ_k is determined by the average of the values between the points (B) and (C).



New concept of the balance design



Conventional type



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 Analyzers, Triboster TSf-series

The Triboster TSf-series is designed for computer-controlled analysis of the static and kinetic coefficients of friction (COF). Each model feature the crank shaped biaxial balance technology for precise and reliable measurements. Different loads, speeds, contact parts and measuring methods, as well as options allow customers to set up the instruments to meet their needs.

TSf-503/TSf-303

These versatile models feature the linear reciprocating movement. The stage's stroke can be set from 1 to 80mm and the speed from 0.1 to 100mm/sec.

The TSf-503 features 7 measuring methods, a full set of 6 weights and a built-in temperature sensor.

The TSf-303 features 1 measuring method (standard repetition measurement) and 2 different weights. A temperature sensor is available as an option.



TSf-503 with laptop PC

TSf-503D

Analysis of friction properties by 4 measuring methods with constant rotation speed of the $\phi 150$ mm stage in two directions. Designed for friction tests such as pin-on-disk and ball-on-disk. Speed range: 1 to 600rpm Cycle range: 1 to 999,999



TSf-503R

Analysis of friction properties by 4 measuring methods with constant rotation speed of the cylindrical sample in two directions. Sample holders are customized to customer-specific requirements. Speed range: 1 to 600rpm Cycle range: 1 to 999,999



Applications

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

Featured Functions

- Biaxial balance technology:**
Minimizes the effects of inertia and other external forces to the load cell during the measurements, ensuring exact and reliable results.
- Two-way measurements:**
Measuring the coefficients of friction in both ways of the stage travel.
- Automatic contact part lift-off function:**
Measuring the coefficients of friction in one way of the stage travel, the contact part is lifted automatically after one stroke to avoid contact with the sample when the stage returns.
- Continuous static friction measurement:**
Measuring up to 50 data of coefficients of static friction in one stroke by stop-and-go movement of the stage.
- Standard repetition measurement:**
Measuring the coefficients of friction repeatedly on the same measuring area in up to 12 cycles.
- Repetition dependent measurements:**
Measuring the coefficients of friction repeatedly on the same measuring area in 100 to 10.000 cycles.
- Multi sample measurements:**
Measuring the coefficients of friction for different samples or different areas for one sample for easy comparison.
- Load dependent measurements:**
Measuring the coefficients of friction depending on different normal loads.
- Speed dependent measurements:**
Measuring the coefficients of friction depending on different speeds.
- Time-interval dependent measurements:**
Analyzing the influence of adhesion to the coefficients of friction depending on up to 4 different contact times in one way, by use of the contact part lift-off function and the stop and go movement of the stage.

Measuring Methods and Functions

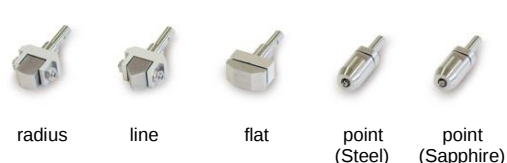
☉ standard ○ option

	TSf-503	TSf-303	TSf-503D	TSf-503R
Biaxial balance technology	☉	☉	☉	☉
Automatic contact part lift-off function	☉	☉	☉	☉
One-way measurement (forward motion)	☉	☉	clockwise and counterclockwise	
Two-way measurement (reciprocating motion)	☉	☉	---	
Standard repetition measurement	☉	☉	---	---
Continuous rotation 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	TSf-303	TSf-503D	TSf-503R
Measuring mode	Linear reciprocating		Rotating	
Display resolution	Coefficient of friction: 0.0001			
Friction force range	Standard: 0 to 1.000gf (9.8N), Option: 0 to 2.000gf (19.6N)			
Normal load range	Standard: 100 to 1.000g (in steps of 50g), Option: 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		—	
Rotation speed	—		1 to 600rpm	
Stage travel cycles	Max. 10.000 cycles	1 to 12 cycles	Max. 999.999 cycles	
Max. sample size	180(W)×100(D)×30(H)mm		150(Dia.)×10(H)mm	10 to 100(Dia.)×300(L)mm
Stage size	180(W)×100(D)mm		150(Dia.)mm	—
Measuring temperature	Standard: Ambient Optional: Jacket stage: +10 to +60°C Heater stage: Ambient to +180°C		Ambient only	
Instrument dimensions	310(W)×600(D)×420(H)mm			425(W)×600(D)×420(H)mm
Weight	About 29kg		About 32kg	About 29kg
Power supply	AC100–240V, 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



Contact parts geometries

Standard contact part geometry for all models:
Point contact (φ3mm steel ball)



ASTM sled

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



Standard weight set (1kg)

Standard accessory for: TSf-503/503D/503R
1.000g weight and one additional weight at
choice for: TSf-303



Pencil holder

A holder to use pencils as contact parts



Heater type stage system

Package of heater type stage for solid samples
and temperature controller 202E
Temperature range: Ambient to +180°C
(Available for TSf-503/303 only)



Jacket type stage

Jacket type stage for solid samples
Refrigerated/heated circulator is required
Temperature range: +10 to +60°C
(Available for TSf-503/303 only)

For detailed information please contact our sales partner or us directly at +81-48-483-2629 or at overseas-sales@face-kyowa.co.jp.

The specifications and designs are subject to change without notice.

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