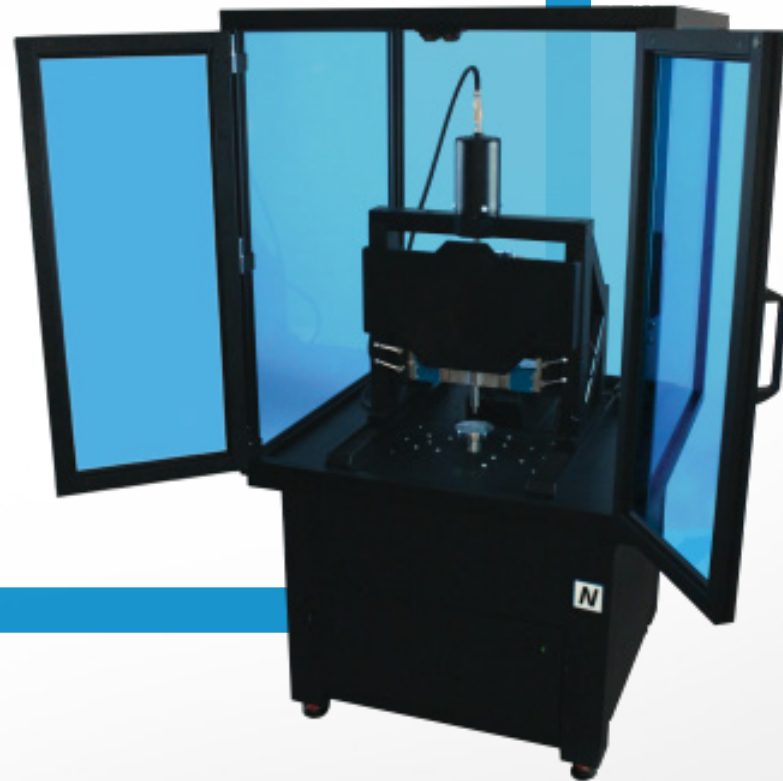


NANOVEA T2000

***THE HIGH LOAD
PNEUMATIC TRIBOMETER***





ULTIMATE TESTING

*Designed with advanced pneumatic technology,
the **NANOVEA T2000** provides controlled vertical loading up to 2000 N.*

For highly accurate and repeatable wear, scratch & friction testing.

***ADVANCED PNEUMATIC
LOADING TECHNOLOGY***

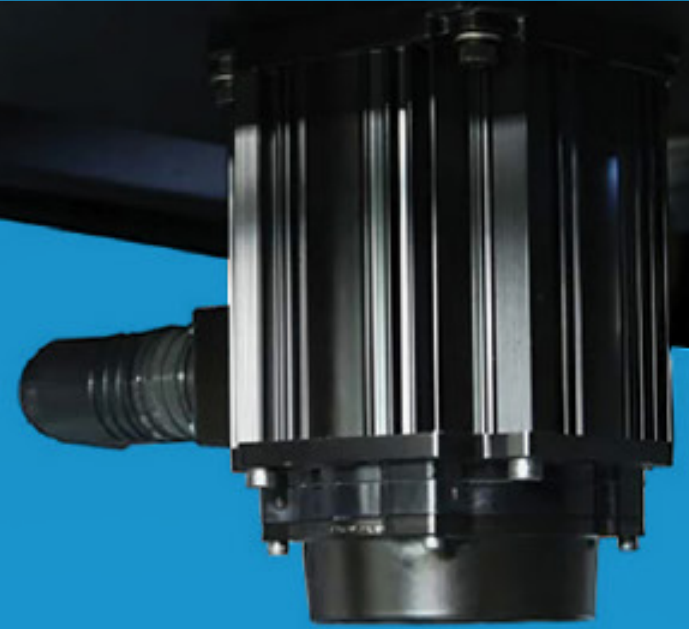
***REAL-LIFE SIMULATIONS OF
INDUSTRIAL VIBRATIONS***

***DIRECT FRICTION MEASUREMENT FROM
INDEPENDENT LOAD CELL SENSORS***

***FULL WEAR TRACK PROFILING AND
VISUAL IMAGING INTEGRATION***

SUPERIOR MOTOR TECHNOLOGY

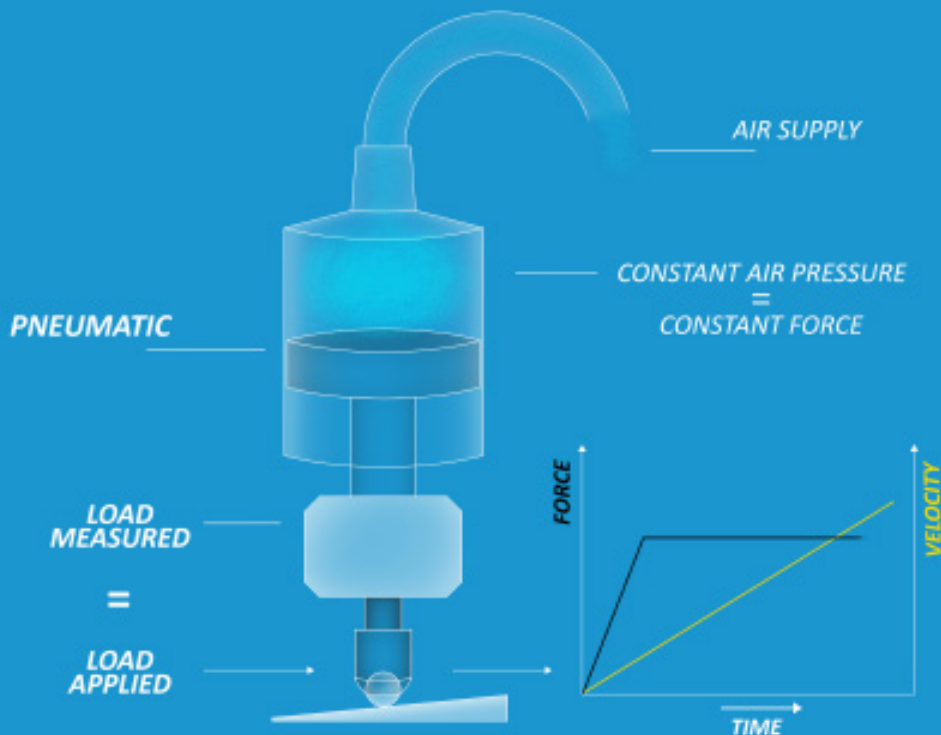
- ***WIDEST SPEED RANGE***
- ***UNMATCHED SPEED CONTROL***
w/ 20 bit internal speed encoder
- ***ULTIMATE POSITIONING PRECISION***
w/ 16 bit external position **>0.006°**
- ***STUDY OF QUASI STATIC COF*** **0.01 to 0.1 rpm**
- ***POWERFUL MAX INTERMITTENT TORQUE*** **up to 14.7 Nm**
- ***INSTANTANEOUS SPEED CHANGE*** **0 to 1000 rpm in 0.23 s**



ADVANCED PNEUMATIC LOADING TECHNOLOGY

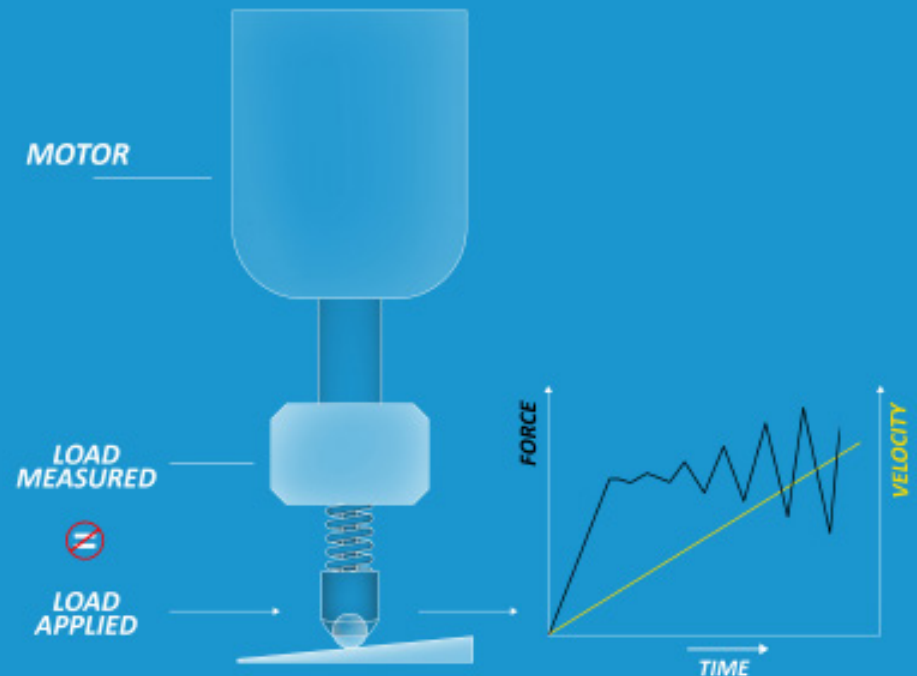
- ▶ Accurate Load Measurement (no spring in-between load cell and surface)
- ▶ Superiority of air medium as a natural fast damper
- ▶ Unmatched normal load stability (for fast speed & rough surfaces)
- ▶ Speeds of up to 15000 rpm

ADVANCED PNEUMATIC



N NANOVEA

PASSIVE SERVO MOTOR



OTHERS

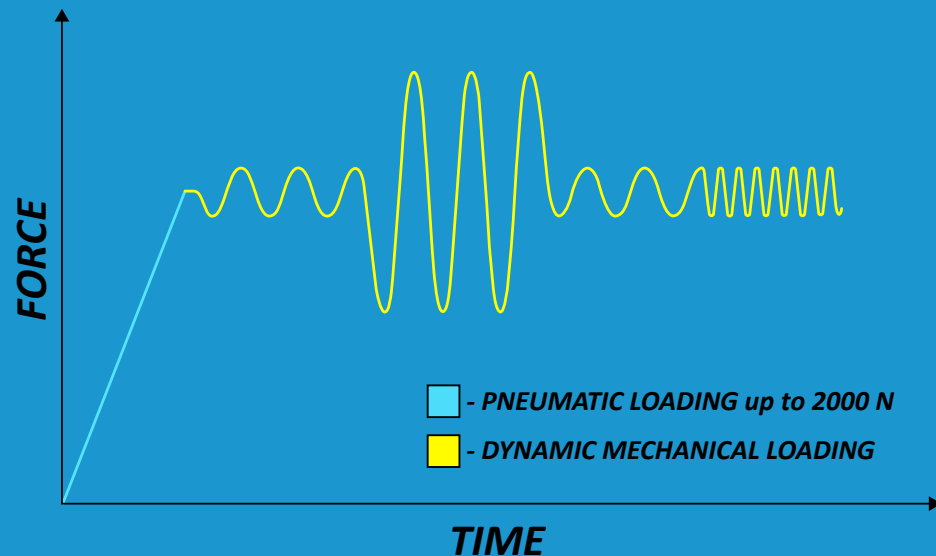
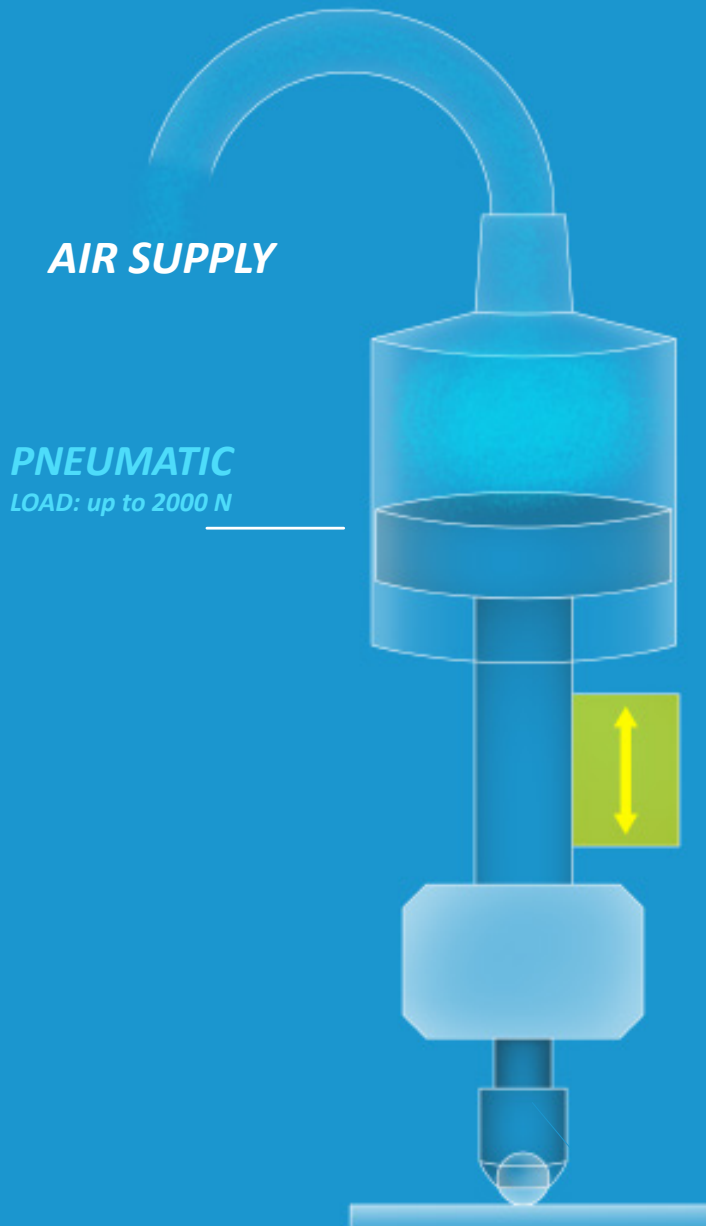
HIGH-SPEED FATIGUE WEAR

DYNAMIC MECHANICAL LOADING

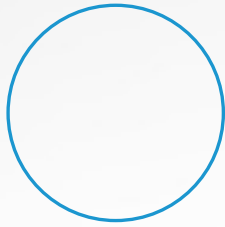
First instrument to simulate real-life fatigue effects on wear from industrial vibrations

OSCILLATION LOAD: 0.2 to 20 N

FREQUENCIES: up to 150 Hz



TESTING MODULES



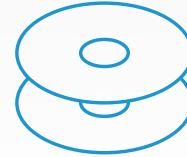
ROTATIONAL



LINEAR



BLOCK-ON-RING



RING-ON-RING



SCRATCH

ROTATIONAL

MAX ROTATIONAL SPEED	5000 15000 rpm
MIN ROTATIONAL SPEED	0.01 0.05 rpm
SPEED ACCELERATION (0 to 1000 rpm)	0.23 0.45 s
MOUNTING AREA (Disk Size)	100 mm Dia.
OPTIONAL MODE	Reciprocating Arc, Spiral

LINEAR

MAX STROKE RANGE	25 mm
MAX FREQUENCY (up to 5 mm stroke)	60 Hz
MOUNTING AREA	62 x 76 mm

SCRATCH

MAX SCRATCH LENGTH	50 mm
SCRATCH SPEED	0.002-10 mm/s
LOADING RATE	1-200 N/min

ROTATIONAL MODULE



PROPERTIES ANALYZED

Coefficient of Friction **Static & Dynamic**
Wear Analysis
Stribeck Curve
Lubricity
Reciprocating Arc
Spiral Test
Friction vs Load / Speed / Time *& more*

ENVIRONMENTAL MODULES

High Temp
up to 1000°C



Low Temp
down to -150°C



Lubrication
up to 150°C



Humidity
10 - 90%/Td

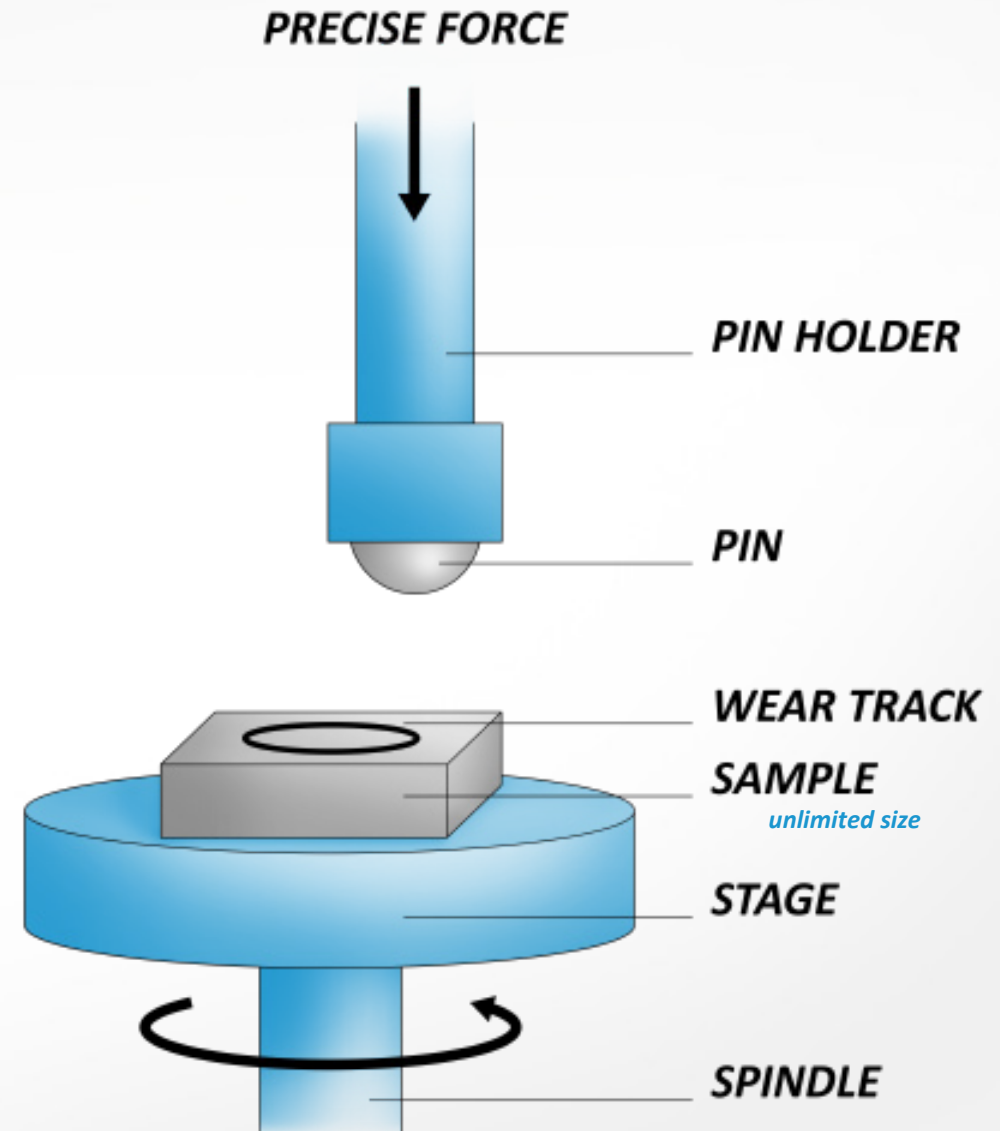


Gas
inert



STANDARDS

ASTM G99 ♦ ASTM G132
DIN 50324



LINEAR MODULE

PROPERTIES ANALYZED

Coefficient of Friction **Dynamic**

Wear Analysis

Lubricity

Friction vs Load / Speed / Time & more

ENVIRONMENTAL MODULES

High Temp
up to 900°C



Low Temp
down to -150°C



Lubrication
up to 150°C



Corrosion
up to 40 N



Humidity
10 - 90%/Td



Gas
inert



STANDARDS

ASTM G132 ♦ ASTM G133

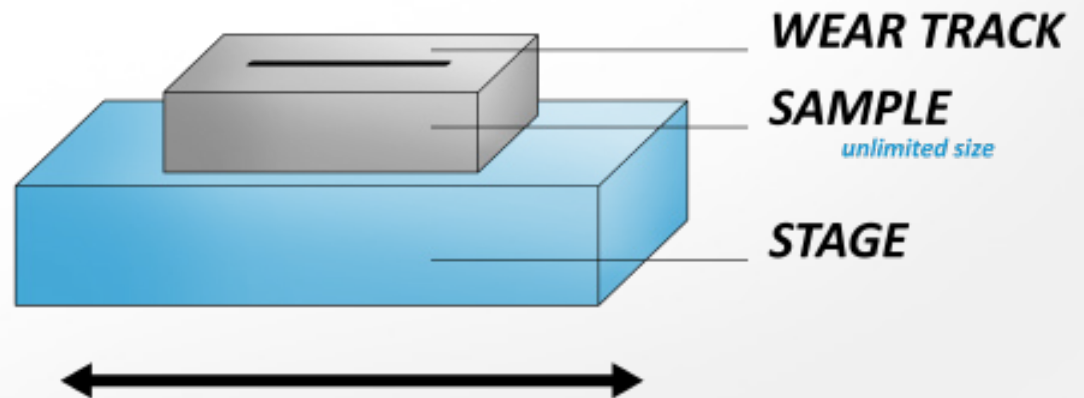
ASTM G171 ♦ ASTM F732

PRECISE FORCE



PIN HOLDER

PIN



WEAR TRACK

SAMPLE

unlimited size

STAGE

BLOCK-ON-RING MODULE



PROPERTIES ANALYZED

Coefficient of Friction **Dynamic**

Wear Analysis

Lubricity

Friction vs Load / Speed / Time & more

ENVIRONMENTAL MODULES

Lubrication



Humidity

10 - 90%/Td

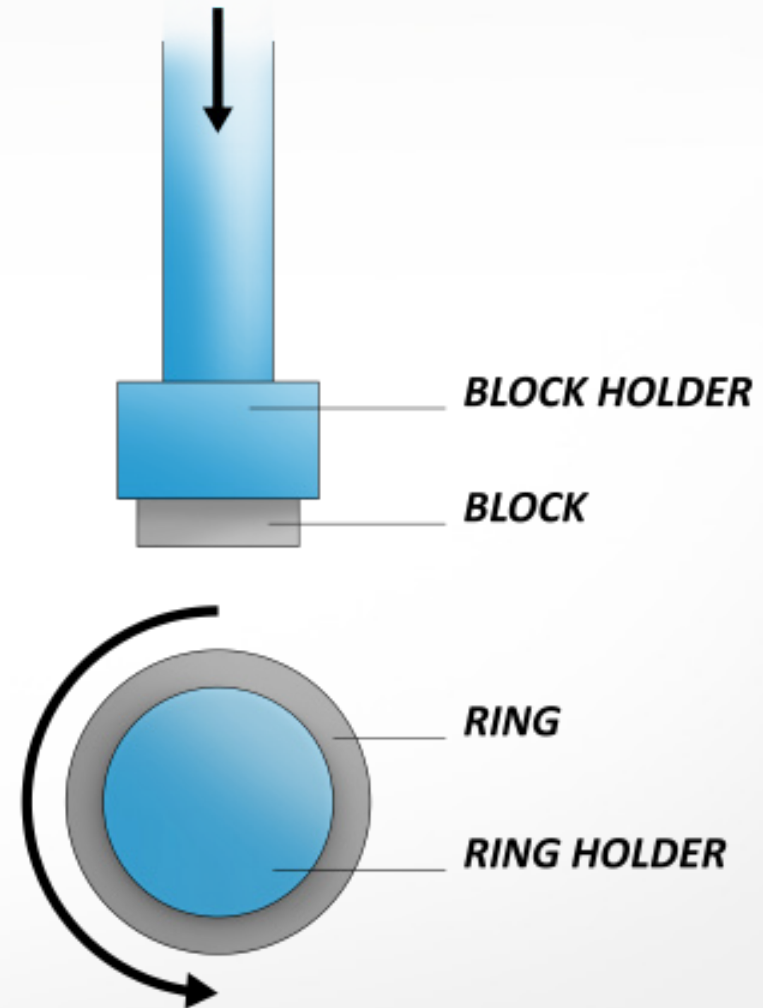


Gas

inert



PRECISE FORCE



STANDARDS

ASTM G77

RING-ON-RING MODULE



PROPERTIES ANALYZED

Coefficient of Friction **Dynamic**

Wear Analysis

Lubricity **Custom**

Friction vs Load / Speed / Time & more

ENVIRONMENTAL MODULES

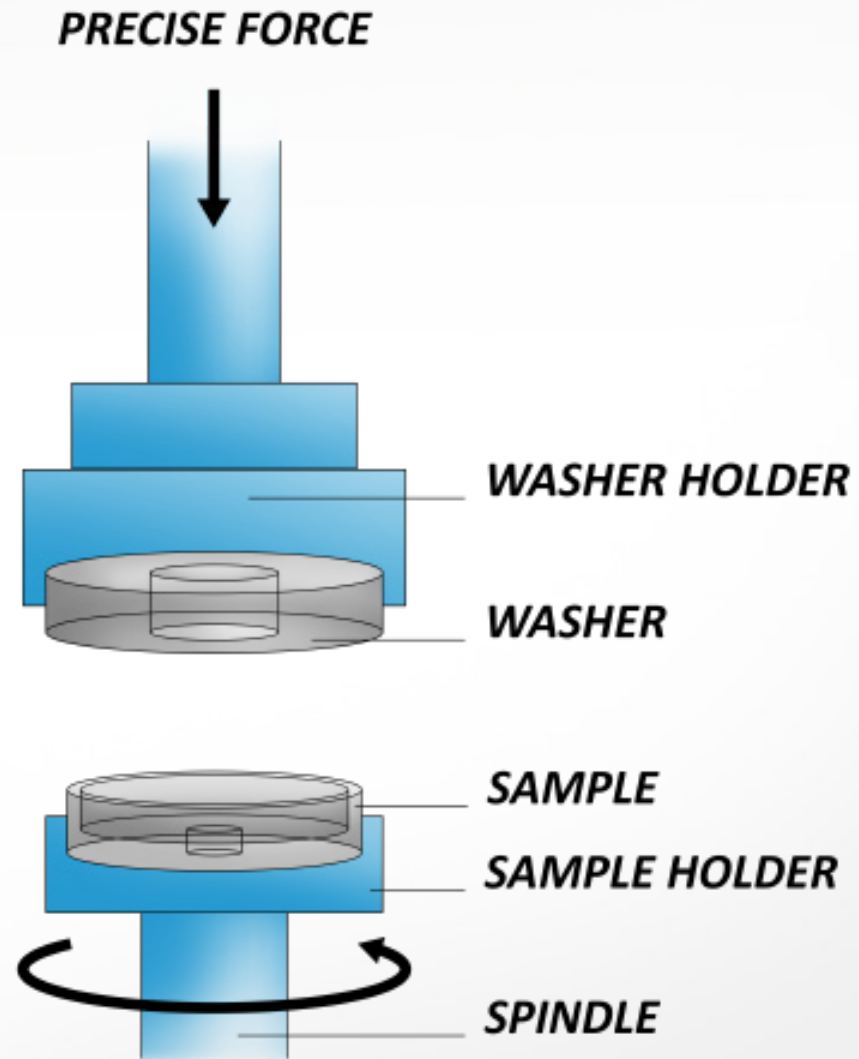
High Temp



Humidity
10 - 90%/Td



Gas
inert



STANDARDS

ASTM D3702


SCRATCH TESTING





PROPERTIES ANALYZED


Cohesive & Adhesive Failure / Strength
Scratch Hardness
Surface Cracking / Marring
Scratch Depth
Acoustic Emissions
Full-Length Visualization of Scratches


ENVIRONMENTAL MODULES

High Temp
up to 1000°C 

Low Temp
down to -150°C 

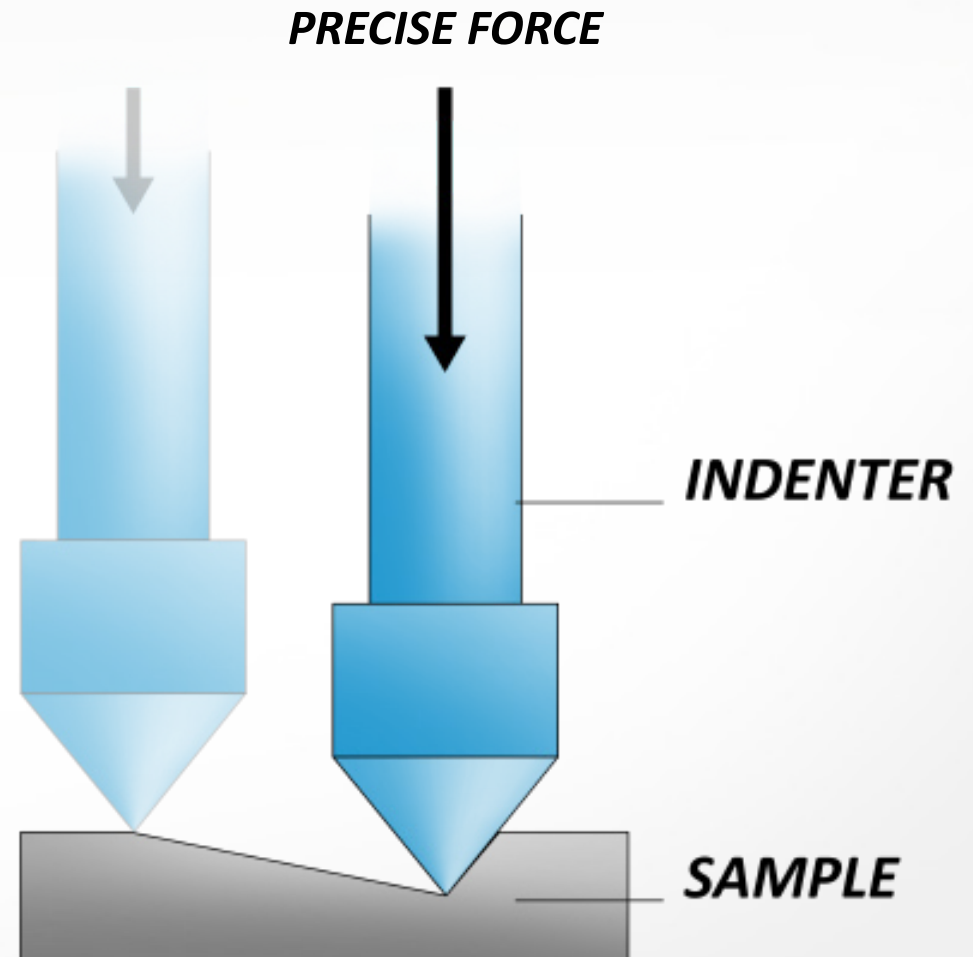
Lubrication
up to 150°C 

Humidity
10-90%/Td 

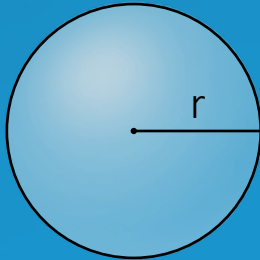
Gas
inert 

STANDARDS

ASTM C1624
ASTM D7027 ♦ ASTM G171
ISO 20502 ♦ ISO 1518
DIN EN 1071 ♦ DVM-0058-PA



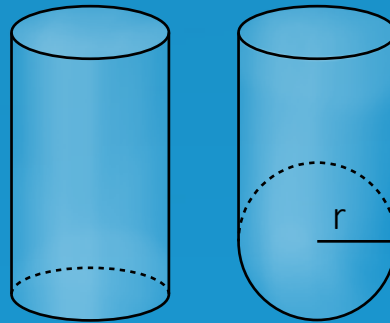
AVAILABLE PIN GEOMETRIES



BALL

3 mm, 6 mm, 10 mm, 25 mm

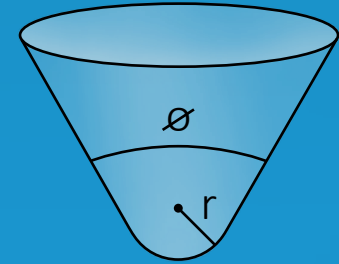
** any material + custom sizes upon request*



CYLINDER

3 mm, 6 mm, 10 mm, 25 mm

** any material + custom sizes upon request*



CONICO-SPHERICAL

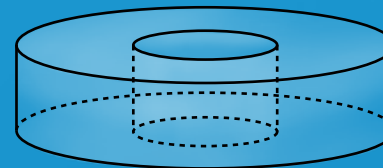
200 mm, 500 mm, 800 mm

** custom indenters upon request*



BLOCK

for Block-on-Ring



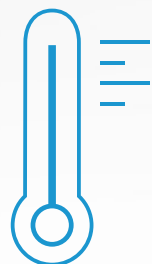
RING

*for Block-on-Ring
or Ring-on-Flat*

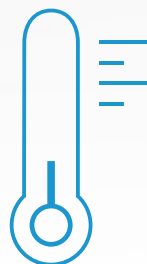
ENVIRONMENTAL MODULES



CORROSION



HIGH TEMP



LOW TEMP



LIQUID



HUMIDITY & GAS

HIGH TEMPERATURE

MOUNTING AREA	78 mm ²
BALL & SAMPLE MAX TEMP for rotational	1000°C
BALL & SAMPLE MAX TEMP* for linear	900°C

LOW TEMPERATURE

AIR COOLING MODULE TEMP	-10°C to RT
CRYOGENIC MODULE TEMP with liquid nitrogen	-150°C

LIQUID

LINEAR MOUNTING AREA	80 x 45 x 25 mm
ROTATIONAL MOUNTING AREA DIA.	78 x 25 100 x 30 mm
LIQUID HEATING	RT to 150°C
HUMIDITY CONTROL	10 - 90%/Td
DROP BY DROP	Available

* higher temp upon request

CORROSION

COMPATIBLE TESTING MODULES:

LINEAR (MAX OF 40 N)

PROPERTIES ANALYZED

Tribocorrosion Behavior - Wear at Open Circuit Potential - Potentiodynamic Polarization
Wear at Anodic/Cathodic Potential - Electrochemical Impedance Spectroscopy Analysis



HIGH TEMP

COMPATIBLE TESTING MODULES:

ROTATIONAL - LINEAR - SCRATCH - RING-ON-RING

PROPERTIES ANALYZED

Temperature Wear & Friction Data



LOW TEMP

COMPATIBLE TESTING MODULES:

ROTATIONAL - LINEAR - SCRATCH

PROPERTIES ANALYZED

Temperature Wear & Friction Data



LIQUID

COMPATIBLE TESTING MODULES:

ROTATIONAL - LINEAR - SCRATCH - RING-ON-RING

PROPERTIES ANALYZED

Wear Rates - Friction vs Speed - Stribeck Curve



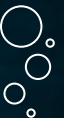
HUMIDITY & GASES

COMPATIBLE TESTING MODULES:

ROTATIONAL - LINEAR - SCRATCH - BLOCK-ON-RING (CUSTOM) - RING-ON-RING (CUSTOM)

PROPERTIES ANALYZED

Friction & Wear vs % Humidity



VISUAL & MEASURING ADD-ONS

2D + 3D OPTICAL PROFILER

Either a standard or a high-speed optical sensor can be installed to measure a full wear track in 3D and obtain an accurate wear rate calculation. The high-speed sensor can measure a wear track in seconds.

*The **Chromatic Light** technology used in our profilometer line is ideal for tribology applications because it works on any type of material and is the best optical technology for rough high angular surfaces. The profiler, which has a wide measurement capability, can also be used for roughness and many other surface topography studies.*

VIDEO ZOOM IMAGING

A 2 MP camera can be installed as a visual analysis tool that can capture the surface features created during wear & friction testing. It is also considered to be essential for full-length imaging of scratch tests which allows a user to determine critical failures along the scratch.

DEPTH ENCODER

An extremely fast and high precision encoder (10 nm) tracks the height change on the surface during the test. This data can be used to calculate wear rates. It also gives information on rate of wear change during tribology mechanisms.



SPECIFICATIONS

of the T2000 Tribometer

MAX TESTING LOAD	2000 N
LOAD RESOLUTION	0.12 mN
LOAD NOISE FLOOR	20 mN
FATIGUE LOADING	0.2 to 20 N
FRICTIONAL FORCE MAX RESOLUTION	±1000 N 6 µN
MAX TORQUE	up to 14.7 Nm
ENCODERS for SPEED POSITION	21 bit 16 bit
X MOTORIZED TRAVEL	250 mm
Y MOTORIZED TRAVEL <i>(optional)</i>	100 mm
DEPTH SENSOR RANGE RESOLUTION	100 mm 10 nm
INSTRUMENT DIMENSION	101 x 101 x 188 cm (Stand-Alone)
WEIGHT	202 kg

Specifications subject to change, please contact us for the latest.



NANOVEA **T2000**

THE HIGH LOAD PNEUMATIC
TRIBOMETER

For pricing information, please contact
SALES@NANOVEA.COM

ALSO AVAILABLE:

NANOVEA T100
The Compact Pneumatic Tribometer



NANOVEA.COM