

# T-02U UNIVERSAL FOUR-BALL TESTING MACHINE

FOR TESTING  
OF LUBRICANTS  
AND ENGINEERING MATERIALS



**INSTITUTE FOR SUSTAINABLE TECHNOLOGIES**  
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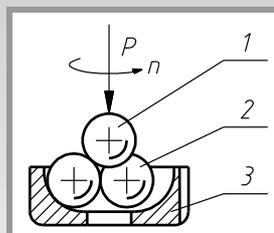
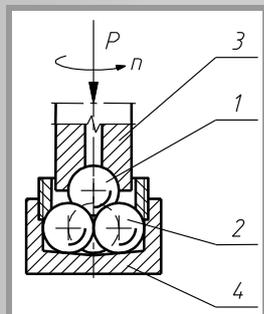
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## CHARACTERISTIC OF T-02U TESTING MACHINE

T-02U Universal Four-Ball Testing Machine is intended for determination of extreme pressure (EP), antiwear (AW) and antifricition properties of lubricants and engineering materials, as well as determination of the tendency of lubricants and engineering materials to produce surface fatigue failures (pitting). All the tests may be carried out at an elevated temperature.

T-02U Machine makes it possible to determine EP and AW properties in accordance with the standards: **ISO 20623, ASTM D 2783, D 2596, D 4172, D 2266, IP 239, PN-76/C-04147**. Pitting tests are carried out according to **IP 300** standard.



During testing of EP, AW properties, and friction coefficient the tribosystem (figure on the left) consists of the three stationary balls (2) fixed in the ball pot (4) and pressed at the required load  $P$  against the top ball (1). The top ball is fixed in the ball chuck (3) and rotates at the defined speed  $n$ . The ball pot (4) is equipped with a heater.

During pitting tests the tribosystem (figure on the right) consists of the three bottom balls (2), free to rotate in the special race (3) and pressed at the required load  $P$  against the top ball (1). The top ball is fixed in the ball chuck and rotates at the defined speed  $n$ . The holder of the race (3) is equipped with a heater.

In case of testing of engineering materials instead of the top ball (1) it is possible to mount a cone-shaped specimen made of the tested material.

T-02U Four-Ball Testing Machine is equipped with a control-measuring system which consists of a set of measuring transducers, digital measuring amplifier, PC and special software for measurements and data acquisition.

During the tests the following quantities are measured: friction torque, applied load, lubricant temperature, vibration level of the tribosystem, rotational speed, and time. The measured values are displayed on the monitor screen and saved on the computer disk. The motor of the tribotester is automatically stopped when the preset time elapses, the preset friction torque is reached, or the preset vibration level is exceeded due to occurrence of a pit on one of the test specimens. After test completion one can print a report presenting curves of changes in the particular quantities versus time.

A unique feature of T-02U Machine is a possibility of automatic, continuous increasing of the load during the run, which is necessary to carry out research under conditions of scuffing, according to a test method developed at ITeE-PIB. What is more, before the run the load can be applied without any effort - it is enough just to press the button and the weight will slide along the loading lever increasing the load in this way. This prevents the operator from carrying heavy weights.

## TECHNICAL SPECIFICATIONS

– type of movement	sliding or rolling
– contact geometry	non-conformal (point): four-ball or cone-balls
– test material	lubricants, engineering materials
– initial tribosystem temperature	up to 180°C
– nominal ball diameter	12.7 mm (1/2")
– rotational speed	from 300 to 1800 rpm
– applied load	from 0 do 7850 N
– speed of load increase	409 N/s
– tribotester dimensions (W x H x D)	1700 x 1700 x 620 mm
– tribotester weight	210 kg
– power supply; max. power consumption	230 V / 50 Hz; 2.1 kW

