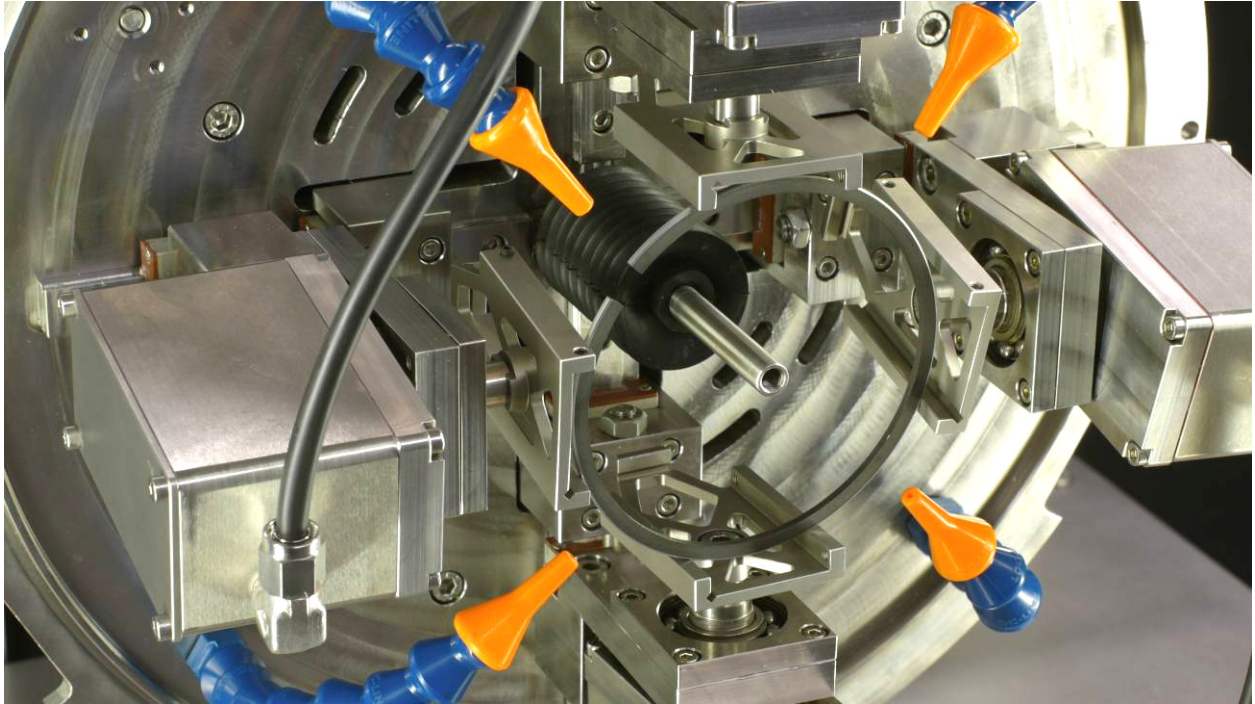


Product Information DS4-PISTON SIMULATOR



Make your engine greener

Optimization of fuel consumption by friction reduction additives

Reduction of wear and better performance by optimization of materials

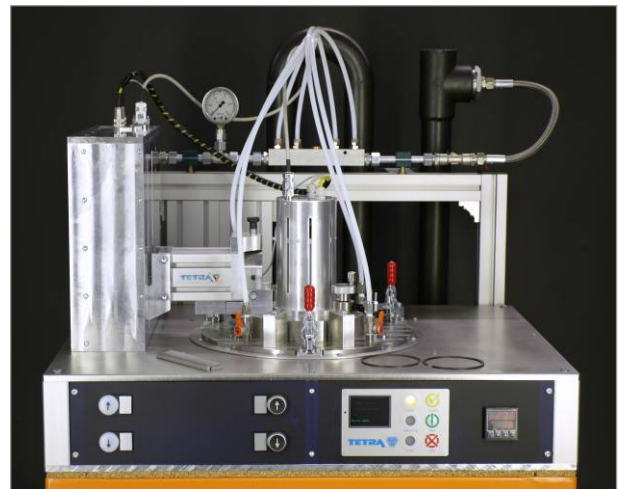
www.tetra-ilmenau.de

 PRECISION
Mechatronics



Best simulation of rings sliding over liners

- Choose your own materials or compare with production piston rings and liner
- Study modifications to materials and lubrication



Realistic Contacts and Multiple Experiments

The innovative concept of the DS4 Piston Simulator lies in the self-aligning holders for the piston rings and cylinder liner segments. A realistic contact situation is created without effort.

By the use of a multi station design, it is possible to test 4 specimens simultaneously. This saves time by generating statistically valid results in one experiment and under identical conditions.

Another advantage is the possibility to compare different materials in the same experiment.

The design is flexible to changes in specimen geometry, according to the customers' requirements. It is possible to create a ball-on-flat contact, a line-on-flat contact, even a flat-on-flat contact, extending the capacity of the tester to general reciprocating experiments.

For lubricant testing, standard test pieces, similar to combustion engine components, are available from TETRA.

DS4 stands for:

Drives:

- superior motion system for rotation or oscillation
- high resolution positioning

Sensors:

- highest precision
- low noise
- optimized sensor ranges

Stations:

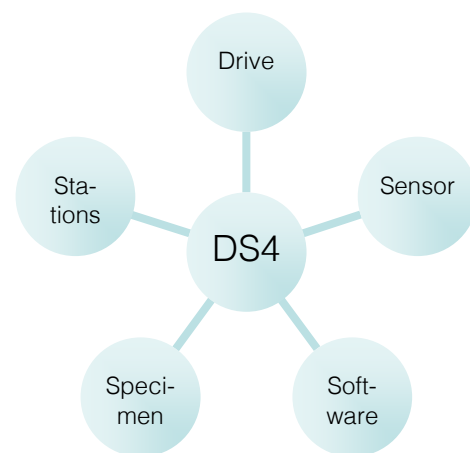
- up to 4 tests and/or characterization tools
- sequential and parallel operation

Sample Holder:

- rapid and efficient sample exchange systems for balls, pins cylinders, pads and discs

Software:

- Modular experiment build up and data visualisation
- LabView® interfaces for customised data treatment



Benefits

Self alignment

They key to a good piston ring cylinder liner simulation is proper alignment of the piston ring in the curvature of the liner. This is achieved by clamping a complete ring on the same diameter as the

cylinder ID, and compressing cylinder liner segments against this ring with a self aligned and self correcting design. This allows precise measurement of the friction force on each liner separately.

Only the best is good enough

The DS4 range is developed around the best sensors and drives available in their class. Good data depends first and foremost on the quality of sen-

sors and drives, so no costs are spared to provide the user with the best possible precision, performance and repeatability.

Time is money

Using the DS4-Piston simulator's 4 stations, you save time and create more and better data. Sample holders and software are developed with

user friendliness and efficient testing in mind. Contrary to single contact tribometers, we generate statistical data in one test run.

Applications

- Piston ring cylinder liner contact
- Engine lubrication
- Fuel additives
- Reciprocating components
- Fretting simulations
- Bio materials

Software for experiments and data analysis

The easiest way to perform an experiment:
TETRA Piston Simulator GUI

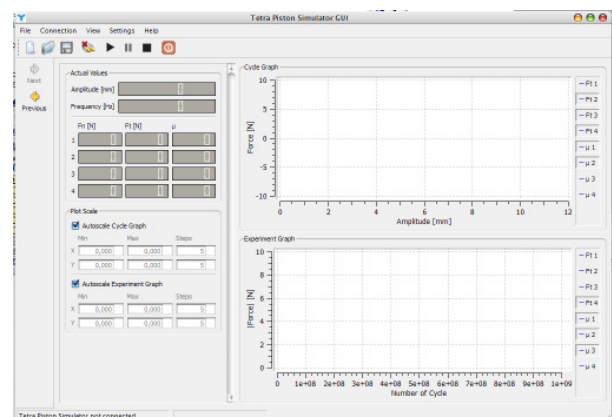
The software system allows setting up standard experiments step by step with options like :

- user defined warning- and stop limits
- free scalable immediate data and historic graphs
- stroke and frequency sequences programmed in a batch table

Load can be changed stepless during the experiment progress and is constantly measured.

Experiments results are stored in two different files: one for raw data and one for an experiment overview of 1000 points.

Also available: LabVIEW® DLL to program your own experiments or on line data analysis



Technical Parameters

2D-Force Measurement	
Normal force	100N resolution 24mN
Tangential force	±20N 4,8mN
Direct Drive	
Stroke length	Up to 10mm
Peak force	262N
Frequency	0,1 to 50Hz
Real time data acquisition	All force and position signals synchronized; Sample rate 1kHz
Experiment Software	On separate PC via TCP/IP interface
Oil circuit flow rate	3,5l/min
Oil Heater	8kW, 150°C
Power supply	3- phase AC, 16A per phase
Control	Integrated Compact PC EtherCAT® field bus system

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