



**The easiest and most powerful  
solution for running tests**



Automotive, aerospace, civil structures,  
composite materials, biomechanical  
prosthesis, dental implants, bio-materials

# Simultaneous control of 4 actuators

## Servo-actuators

Pneumatic

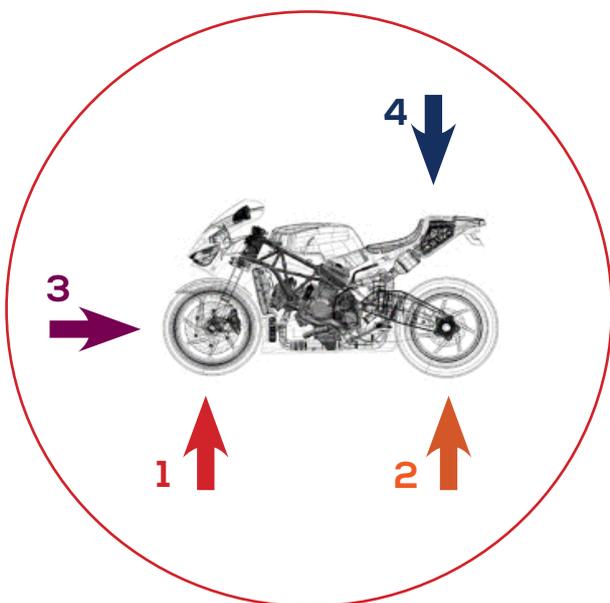
Hydraulic

Linear Electrodynamic

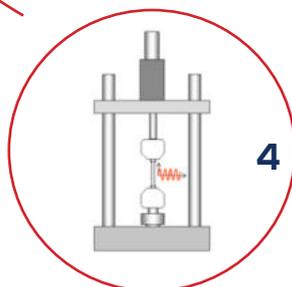
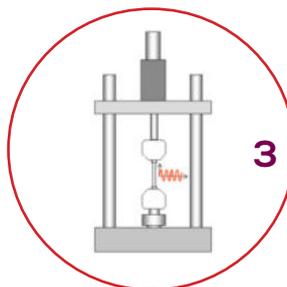
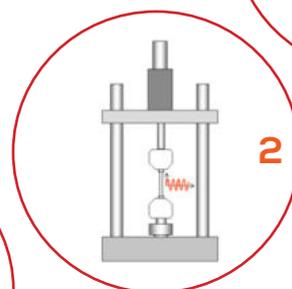
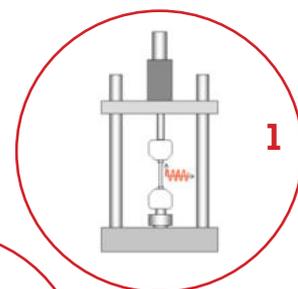
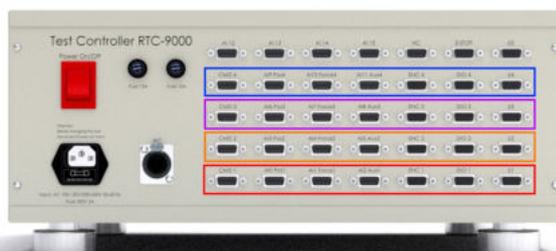
Brushless and Torque



A powerful and affordable solution for your test laboratory



Up to 4 actuators synchronised and simultaneous on the same sample



Up to 4 independent actuators on 4 different test samples

### RTC 9000 Performance

The whole system is equipped with an FPGA board with very high-speed control electronics required to acquire the signals coming from the sensors and to close the PID control loop which is performed at a frequency of 1000 Hz. The system is also provided with an integrated Real Time Processor which generates various wave forms to be performed by the connected actuator or motor.

Controller model	Number of axes	Type of actuators	Type of sensor	Type of test
<b>RTC 9001</b>	<b>1</b> Not expandable	Pneumatic	Industrial sensors with supply voltage 24V and output in the range $\pm 10V$ , incremental Encoders. The 24V supply voltage is provided by the controller	Static, dynamic and fatigue tests Voltage Compression Torsion Pressure
<b>RTC 9000-1*</b>	<b>1</b> Expandable	Hydraulic	Amplified load cells with output signal $\pm 10V$	
		Linear electric - Voice Coil	Load cells $\pm 2mV/V$ with amplifier $\pm 10V$	
		Linear electric	Displacement sensors with output signal $\pm 10V$	
<b>RTC 9000-2*</b>	<b>2</b> Expandable	Linear electric with ball screw	Magnetostrictive displacement sensors with output signal range 0-10V	
		Rotary electric brushless or Torque	LVDT displacement sensors with output signal range 0-10V	
<b>RTC 9000-4*</b>	<b>4</b> Expandable	Rotary electric with gear reduction	Pressure sensor with output signal range 0-10V	
			Linear potentiometers (voltage reduction board at $\pm 5$ or $\pm 10$ required)	
			Full Wheatstone Bridge with amplifier $\pm 10V$	
			A quarter Wheatstone bridge strain gauge with bridge-completion board with $\pm 10V$ amplifier	

\*The number of active axes is depending on the software license

Specification	RTC 9001	RTC 9000-1	RTC 9000-2	RTC 9000-4
Real Time Controller	Yes			
Force channel +/- 10V, 16 bit	1	1	2	4
Displacement channel +/- 10V, 16 bit	1	1	2	4
Auxiliary channel +/- 10V, 16 bit	1	1	2	4
Incremental Encoder (TTL 5V, A and B phase)	1	1	2	4
Control procedures	For each active axis, the closing of the control loop may be in: Force, Displacement, Auxiliary and Encoder			
PID command number (output voltage +/-10V)	1	1	2	4
PID control loop frequency	1000 Hz (10 kHz available on request)			
Safety limits (can be set by operator via software)	Included (a group of safety limits per each channel)			
Panel emergency button	Included			
Remote emergency control	Included			
No. 4 extra reading channels +/- 10V, 16 bit	Hardware ready only for reading and recording. Activation of channels with optional licence			
PC connection	Ethernet cable RJ45			



## Control Interface

The software RTC allows you to perform static, almost static, cyclical and fatigue tests very easily and efficiently. The software is provided together with the RTC 9000 controller, both produced by LiTeM.

For specific applications or requirements, there are also different Tools that can be purchased separately.

You can set the test mode with a simple click on the mouse:

- displacement control
- force control
- AUX channel control
- control with Encoder

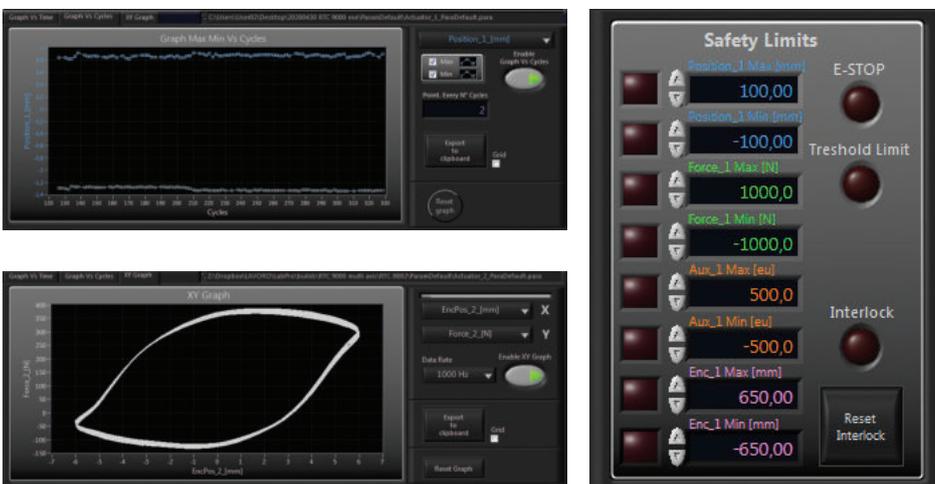
Easy and safe test configuration, with full display of graphs and parameters in a single screen with overlapping layers, and data recording in various modalities and with various export tools - these are the successful features of the RTC 9000 control software. Even the least practical user can run



Display of all test parameters in a single clear and intuitive screen.

Safety parameters can be set from the main test screen and are always visible on the display in order to avoid accidents or damage to the system.

You can also see the Real Time Graphs over time with a simple click of your mouse:



- Sine wave
- Displacement load
- Position vs. cycles
- Load vs. cycles

## Software Technical specifications

Software features	SS 9000
Interface developed with Labview	Yes
Runs static, semi-static, dynamic and cyclical tests	Yes
Control procedures: Force, Displacement, Auxiliary sensor and Encoder	Yes
Control mode can be changed without interrupting the test	Yes
Standard command signals: in ramp maintaining the load, sine wave, triangular wave, square wave with duty cycle.	Yes
Multi-axis controllers, setting the displacement between the different wave forms and the actuators which can be set by the operator	Yes
PID output voltage selectable by the operator	Yes
PID gain coefficients which can be modified without interrupting the test	Yes
Automatic amplitude control for fatigue tests	Yes
Real time display of the number of cycles performed during fatigue tests	Yes
Safety limits settable for: displacement, force, auxiliary channel and encoder	Yes
Real time graphs available for: displacement, force, auxiliary channel and encoder	Yes
XY graph with X and Y selection by the operator, example: force vs displacement	Yes
Maximum - Minimum graph vs cycles per fatigue test displayable in real time	Yes
Digital gauges: displacement, force, auxiliary channel and encoder	Yes
Do null offset for: displacement, force, auxiliary channel and encoder	Yes
Manual continuous recording with sampling rate settable on 10Hz, 100Hz, 500Hz and 1000Hz	Yes
Automatic continuous recording vs. Cycles, example: record for 5s every 100 cycles	Yes
Automatic continuous recording vs. blocks defined with editor profile tool, example: recording 5s every 100 blocks	Yes
Automatic recording of Maximum and Minimum values vs cycles.	Yes
Data recording and exportation in text format ready for Notepad, Excel, Libre Office and Open Office	Yes
Sensor setting window including: sensitivity, unit of measurement, absolute tare, sign, PID sign	Yes
Saving and importing of set up parameters of sensors	Yes
Saving and importing of test parameters	Yes
<b>Software Tools</b>	
Tool Scope Standard	Opzional
Scope Pro	Opzional
Sheker - VIBRA 9	Opzional
Time Counting	Opzional
Editor Profile	Opzional

### RTC 9001 Single axis



The **RTC 9001** controller is the entry-level model in our RTC controller family. It is non-expandable, and can control only one axis.

The control modes are identical to those of the multi-axis model:

- » Displacement control test
- » Force control test
- » Control test with aux 1 channel (analogue auxiliary channel +/- 10V, 16 bit)
- » Test with Encoder channel control

It ships with the single-axis version of the controller software.

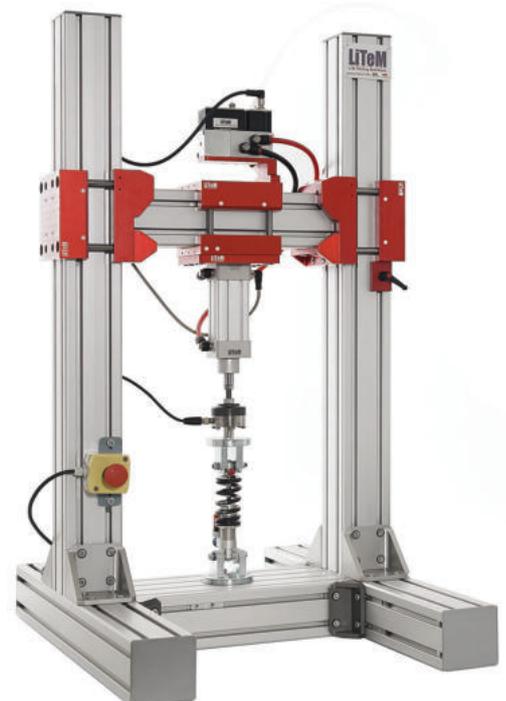
### Versatility

The single-axis non-expandable version of the RTC 9001 controller is used for static, dynamic and cyclical tests on different types of actuators:

- » Pneumatic actuators
- » Electromechanical actuators
- » Electrodynamic actuators
- » Hydraulic actuators
- » Brushless motors for torsional tests

### Flexibility

The RTC 9001 controller is used for stand-alone systems, such as ELDY and PRIMA, and for modular and user-customised systems.



## RTC 9000 - Multi-axis controller

**RTC 9000** is a Real Time control system for multi-axis static, cyclical and fatigue tests.

The **RTC 9000-1**, **RTC 9000-2** and **RTC 9000-4** multi-axis models are available according to the number of active channels. The system can be extended at any time by simply purchasing the activation licence for the required number of axes without any further hardware implementation.



The unit ships with the standard **SS 9000 software**, with a control window for each active axis



The multi-axis RTC 9000 is the ideal solution for research centres, universities and test labs investing in R&D, as well as quality control departments, where the continuous development activity requires multiple, complex tests on different samples.

The flexibility of the system allows the user to simultaneously perform static, dynamic and cyclical tests on different axes and with different types of actuators connected.



The strong point of the RTC 9000 control system is its user interface: simple, intuitive and easy to understand even by inexperienced users; this reduces times and costs for the installation and activation of the test system.

**LiTeM** provides training courses for operators during the installation phase at the customer's premises (costs are indicated in the purchase contract), or free of charge at the company's premises or remotely using on-line platforms. In addition, tutorial videos on the RTC 9000 system are available for all customers.



### Real Time RTC Controller Order codes

Code	Description
<b>RTC 9001</b>	Multi-axis real time expandable controller, with no. 1 active axis. Position control, force, AUX 1 and Encoder; test function in ramp, sine-wave, triangle-wave and square-wave mode.
<b>RTC 9000-1</b>	Multi-axis real time expandable controller, with no. 1 active axis. Position control, force, AUX 1 and Encoder; test function in ramp, sine-wave, triangle-wave and square-wave mode.
<b>RTC 9000-2</b>	Multi-axis real time expandable controller, with no. 2 active axes. Position control, force, AUX and Encoder; test function in ramp, sine-wave, triangle-wave and square-wave mode. Tests with independent, in-phase, counter-phase and simultaneous axes.
<b>RTC 9000-4</b>	Multi-axis real time expandable controller, with no. 4 active axes. Position control, force, AUX and Encoder; test function in ramp, sine-wave, triangle-wave and square-wave mode. Tests with independent, in-phase, counter-phase and simultaneous axes.
All RTC 9001/RTC 9000-X models include DELL MiniTower PC or similar, monitor 27", mouse and keyboard, software RTC 9000 already installed, LAN connection cable, external emergency button, power supply cable.	

Code	Description
<b>RTC 9000-AX1</b>	<b>Activation of 1 axis for RTC 9000 series controller</b>
<b>RTC 9000-AX2</b>	<b>Attivation of 2 axes for RTC 9000 series controller</b> cost referred to single axis
<b>RTC 9000-AX3</b>	<b>Attivation of 3 axes for RTC 9000 series controller</b> cost referred to single axis

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