



## DELTI-Vac REV

### DIGITAL VACUUM STABILITY TESTER

DELTI-Vac REV is a revolution system for All-in-One stability testing of energetic materials. It is designed with respect to excellent precision, safety and versatility which is required in QC or R&D applications.

DELTI-Vac Revolution is unique by its unexceptional multifunctionality.

#### APPLICATION

Vacuum stability testing (VST) is widely used for reliable risk and safety management of single based (NC) or double based (NC/NG) gun powders, rocket fuels and other propellants, pyrotechnic mixtures, explosives, hazardous chemicals, energetic polymers, binders and others. An integral part of this monitoring is also testing of substances compatibility. Vacuum conditions provide the highest sensitivity for evolved gas quantification but testing conditions can be widely extended.

Stability and compatibility monitoring is deeply incorporated in the quality and safety management of production, transportation and warehousing. All kinds of ammunition require safety inspections during their lifecycle. The latest accidents of automotive parts containing energetic materials triggered VST implementation into R&D and QC of civilian production. These new applications require significantly better performance.

#### PRINCIPLE

The unstable behaviour of explosives and other hazardous materials is associated with the liberation of decomposition products which are continuously monitored as a volume of evolved gas. VST methods were standardized and testing conditions are united to provide globally comparable results. The result of the VST is the absolute volume of evolved gas. Additionally, DELTI-Vac provides also time dependence of pressure (vacuum) and gas liberation rate.

#### COMPLIANCE

##### VST standards

STANAG 4556, 4147, 4022/4, 4023, 4230, 4284, 4566,  
MIL-STD-650

##### Other stability testing standards

MIL-STD-286C, STANAG 4178, AOP-48



Energetic Materials  
Stability & Compatibility  
Heating Blocks



www.deltima.eu  
Simunkova 1610/23  
182 00 Praha 8  
Czech Republic (EU)



## DELTI-Vac REV

### DIGITAL VACUUM STABILITY TESTER

DELTI-Vac REV is a revolution system for All-in-One stability testing of energetic materials. It is designed with respect to excellent precision, safety and versatility which is required in QC or R&D applications.

DELTI-Vac Revolution is unique by its unexceptional multifunctionality.

#### HEATING BLOCK SPECIFICATIONS

No. of holes for test tubes	12
Hole diameter / depth	35 / 270 mm
Limit for test tube set diameter	59.5 mm
Block temperature limit	200 / 250 °C
Block temperature resolution	0.1
Tube temperature stability	±0.025 °C
Mains supply	110/220 V - 50-60 Hz
Power rating	2350 W
Dimensions - WxDxH	36x37.5x47.5 cm

#### INTERFACE SPECIFICATIONS

LCD user interface	4.3" touch screen
Pressure sensor connectors	12
Data storage	SD & USB (opt.)
LED light indicators	2
External sensor ports	3
CAN bus ports	2
USB port for PC connection	1
LAN port	1 (optional)
External Heating Lock	1 (optional)

#### DAQ SPECIFICATIONS

Pressure signal channels	12
Voltage input	0 - 10 V
Voltage DAQ resolution	600 nV
Volume resolution (25 ml tubes)	0.01 ml
Test tube assembly volume stability	±0.01 ml
Ambient temperature resolution	0.1 °C
Ambient pressure and humidity	Optional
Sampling rate (adjustable)	1 sample/min
Precision of calibrated vacuum sensors	0.15% RSD

#### TESTING STANDARDS

<b>Vacuum Stability Testing</b>
True sample density
Abel test
Methyl violet test
Bergmann-Junk test
Red fumes test
Dutch weight loss test
Ageing procedures

#### DELTI-Vac can be alternatively used as / for

- vacuum drying chamber / humidity and VOC content
- monitoring of sample weight during heat treatment
- volume of combustion gases and their water content
- alternative ageing procedures
- detection of runaway tendencies
- oxygen resistance of polymers
- induction period / explosion temperature
- large scale DTA



Energetic Materials  
Stability & Compatibility  
Heating Blocks



www.deltima.eu  
Simunkova 1610/23  
182 00 Praha 8  
Czech Republic (EU)





## DELTI-Vac REV DIGITAL VACUUM STABILITY TESTER

DELTI-Vac REV is a revolution system for All-in-One stability testing of energetic materials. It is designed with respect to excellent precision, safety and versatility which is required in QC or R&D applications.

DELTI-Vac Revolution is unique by its unexceptional multifunctionality.

### DESCRIPTION

Apparatus **DELTI-Vac REV** is a compact apparatus with inbuilt

- aluminium heating block with 6 heating elements
- precise temperature controller with independent sensor
- overheating protection with independent sensor
- microprocessor based controlling unit
- 12 channel DAQ unit with RJ45 connector interface
- 4.3" colour LCD touch screen interface
- SD card & USB slots
- ports for external environmental sensors and external heating lock
- CAN bus connectors for external units (tube lift, block chiller)

**DELTI-Vac REV allows operation with heat conductive oil.**

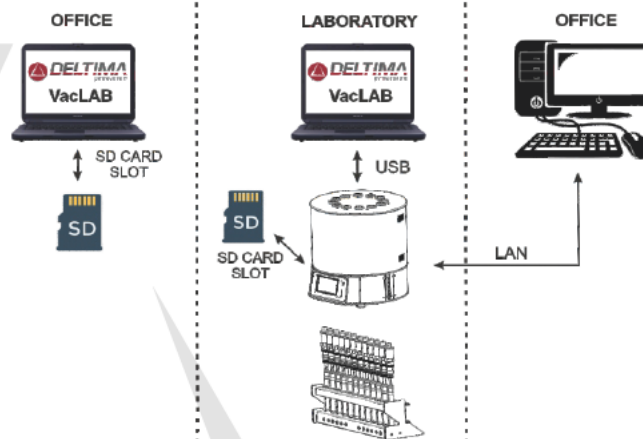
The **DELTI-Vac REV** is a standalone device operated by means of instruction on SD card. Additionally, it can be connected to the computer. The larger screen of PC is beneficial for experiment configuration, real-time data evaluation and final data processing but the PC is not necessary for device operation.

DELTIMA Precision provides a variety of test tubes for the highest variability of application and safety. Using stainless steel tubes allows testing in overpressure of air, inert or oxygen.

### ADVANTAGEOUS FEATURES

- A standalone device with a touchscreen interface
- Alternative PC based operation
- Clustering of several units for higher performance
- Precise test tube temperature controlling
- Independent overheating protection (temperature limiting)
- High-resolution vacuum data acquisition
- Additional stainless steel heat protection head plate
- Active air cooling of inner sandwich structure with aerogel insulation
- External sensors for ambient temperature, pressure and humidity
- Connecting of external units (block chiller, tube lift)
- Remote firmware updates for smart support and customization
- Wide range of accessories for testing
- Large holes for conversion inserts or oil bath mode
- Ultimate variability of applications

### MODES OF OPERATION



The unique interface of **VacLAB** software supports **clustering of multiple units**. Connecting of more devices to one PC via USB creates **cluster** which appears as a **single device** with ultimate variability of testing temperature and time for each of the connected unit. There is no software limit for the number of connected blocks.

**A cluster of multiple devices substitutes the outdated concept of controlling unit with connected heating blocks or a master block with connected slave blocks.**



Energetic Materials  
Stability & Compatibility  
Heating Blocks



www.deltima.eu  
Simunkova 1610/23  
182 00 Praha 8  
Czech Republic (EU)

Precise solution for smart people