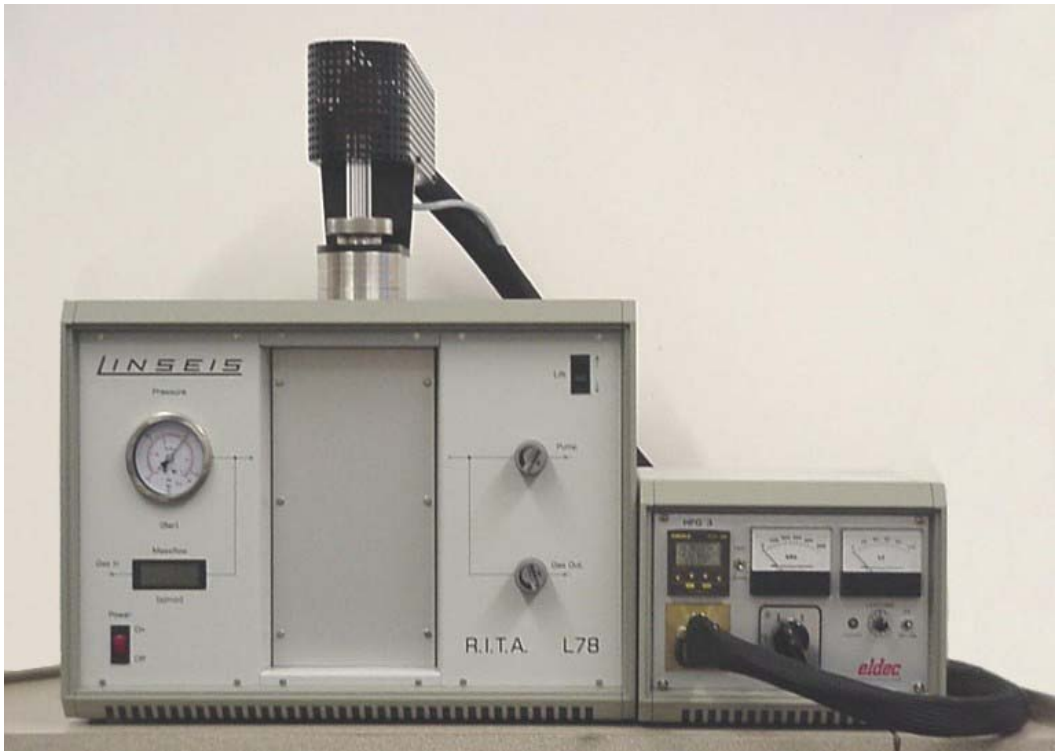
L78 RITA-Dilatometer (Rapid Inductive Thermal Anlaysis)



For the first time LINSEIS company will introduce at ACHEMA'2003 in Frankfurt a new version of the RITA-Dilatometer L78. This further development is a table top version of it's original development, that used a floor mount cabinet. That means, the space requirement in the laboratory is a lot less.

The technical data of this ultra fast dilatometer of up to 100K/sec heat up and cool down speeds are unreached through other systems. Within 20 – 30 seconds a sample can be heated controlled from RT up to 1000°C and can be cooled down to RT again. The very high cooling speed of 100K/sec is controlled through a controlled valve gas system using nitrogen gas. Highest cooling speeds can be controlled up to about 300°C. The especially developed control circuit for this dilatometer uses data acquisition rates of up to 1000 values per second. The heating element is an induction furnace, where the induction coils were especially designed to fit the used measuring / sample system.

The newly developed technology for this RITA-Dilatometer was developed in cooperation with the Technical University Dresden / Germany. Also there was a further cooperation with Fraunhofer Gesellschaft Dresden for the development of special materials used. This was necessary, when a susceptor was developed which is used for the heat up of non-metal samples. The susceptor which is metallic accepts the energy of the inductive heater and transmits it to the non-metallic materials, for example ceramics. The results that can be obtained are equal or better than the results that you can get with resistance furnaces. Especially the biggest advantage of the super fast cycle times is still available.

L78 RITA-Dilatometer (Rapid Inductive Thermal Anlaysis)

Another advantage of using the induction heating method is, that only the sample is heated and no big furnace around the sample has to carry a large thermal load. As only the sample heats up protection tube out of quartz can be used up to highest temperatures (1500°C eventually 2000°C).

When using quartz as protection tube very rare and clean atmospheres can be used (especially oxygen free). This is not possible when using normal high temperature materials like Al2O3, as this material is not as good vacuum tight as quartz. Also most other high temperature furnaces around 2000°C are using graphite as heating element, that automatically gives a reducing atmosphere.

Not so with the RITA principle that can give measurements under air or oxidicing atmospheres up to 2000°C.

Another advantage of the system is that temperature ranges from liquid nitrogen temperatures (-150°C up to temperatures of +1000°C or 1500°C) can be measured in 1 run with 1 furnace. Normally 2 furnaces have to be used for this type of temperatures ranges.

As you can see, the RITA technology which is also available for thermal balance applications has many advantages which makes it interesting for many applications.

- *very large temperature range (-150°C up to +2000°C) can be realized with one measurement*
- *high vacuum and very clean atmospheres are possible*
- *very fast heat up speed of up to 100K/sec*
- *controllable cool down speeds up to 100K/sec*
- *fast cycle times giving a lot more measurements per day*
- *control circuit with data acquisition sampling rates of 1000 samples/second*
- *possibility to measure either with LVDT expansion principle, or with laser expansion measurement princple*

L78 RITA-Dilatometer (Rapid Inductive Thermal Anlaysis)

Technical specifications R.I.T.A.

Linearity of transducer (±2.5mm):		±0.1% Full scale
Reproducibility:		±0.5%
Accuracy:		±2%, typical ±1% at sample-length of 10..20mm
Zero adjustment (by motor):		0..30mm
Range:		±50...2500µm
Output voltage of amplifier :		±1.0V Full scale
Temperature drift of amplifier:		±0.1µm/K
Temperature drift of transducer and mounting:		±0.5µm/K
Sample holder:		Fused silica
Sample size: (hollow sample)	Inner diameter: Outer diameter: Length:	5mm 6...7mm 10mm
Temperature range:		RT...1000°C
Thermocouple:		Type-K (NiCr/Ni), welded to sample
Heating:		Inductive
Frequency range Generator:		150..400kHz
Heating/Cooling rate:		0.1..99.9K/s 0.1..99.9K/min
Dwell time:		0...3000s 0..3000min
Acquisition rate:		max. 1000 readings/s
Power requirements:		230VAC, 16A, 50..60Hz
Power consumption Generator:		3.5kVA
Cooling water:		2l/min, 5 Bar
Sample/Cooling gas:		Inert gas, 10l/min max. at 1 Bar max.