The "NEW" Reversing Thermometer & Pressure Meters from SiS

These instruments are the **second** generation of electronic reversing thermometers and pressure meters. They are designated RTM 4002X, RPM 2000X, RPM 6000X and RPM 10000X; where X stands for e**x**tended.

Pressure meter accuracy indicators (suffixes "H" and "S") are no longer used as **all** the extended instruments are manufactured to the "S" quality standard.

THE MECHANICS

1. The Main Housing

The construction of the main housing is a composite of boro-silicate glass and high strength titanium. The connection of the glass to the titanium has been completely re-designed. The new construction is not only reinforced for compressive and tensile forces but, most importantly, for shear loading. The junction of the glass and the titanium is now fully shrouded by the metal thus protecting the seal from direct damage.

The battery stopper has become an integral part of the main housing. Formerly it was O-ring sealed inside a titanium tube which was part of the main housing. The new technique reduces the number of seals in the system by one.

2. Sealing

The sensor head is sealed by a double o-ring seal which is reinforced by the use of double back-up rings. The battery housing seal has been up-graded from a single to a double O-ring.

3. Battery Contacts and Housing

The power-feed through and battery contact pressure functions have been separated.

The power feed-through is now a replaceable, O-ring sealed part and battery contact pressure is maintained by a spring, also replaceable, in the bottom of the housing. Both items are coated to inhibit corrosion.

The change to a single-piece battery (see The Electronics below) means that the insulating cover is no longer necessary.

THE ELECTRONICS

1. Battery

Changing the battery power source from two Lithium Manganese type 1/3 DL to one Lithium Thionyl Chloride type 1/2 AA typically increases operational life to 5,000 samples with 3,000 in the worst case.

2. Sampling Size

The original instruments were "single shot" instruments. The value stored was the last acquired in sample or continuous mode. The new instruments acquire a burst of **sixteen** measurements.

3. Sample Processing

Computer control has been introduced.

The mean value of the burst and the standard deviation of the individual measurements are calculated by an 8-bit RISC controller and the results appear alternately on the LCD.

As an aid to data quality analysis, the measurements within the burst can be stepped through on demand.

4. Resolution and Accuracy

The **thermometer** now reads out to 0.0001 °C from -2.0000 °C to 9.9999 °C and 0.001 °C between 10.000 °C to 40.000 °C - a factor of ten improvement in resolution across the whole range. The calibration data are expressed by a third order polynomial with a fitting accuracy of better than 0.0001 °C.

Instrument accuracy is thus limited to that of the primary standards used for calibration, i. e. the uncertainty of the triple point of water, the melting point of gallium and the interpolation of the standard platinum thermometer, Pt 10. These uncertainties are less than 3 mK over the whole range and less than 1 mK at 0 °C (+/- 3 °C) and 29 °C (+/- 2 °C).

The **pressure meters** now read out to 0.1 dbar and have an accuracy of 0.1% of the range. They have two new features. The first is an automatic null balance capability. Every time a meter is switched to sample mode, it measures the air pressure and sets this as the null reference value. In effect, this reduces the drift of the actual pressure sensor. Offset drift of the sensor is the main source of total drift, drift of scale is some orders of magnitude less than this.

The other new feature is the display of the offset in dbar. This appears as a seventeenth reading to the sequence showing the measurements which form the sample burst. This provides control of the offset and hence the drift of the instrument. Although the drift is compensated for by the controller, it is an indication of what is going on with the sensor element and, should it exceed pre-determined limits, can be used as a sign that it is time to return the instrument for servicing.

5. Self Diagnosis

Power on (battery insertion) is followed by a self diagnosis procedure culminating in status messages. These can help to keep the instrument operational, or explain a malfunction.

AND FINALLY -

Documentation is much more comprehensive. The user manual has been expanded to encompass information on **use**, **service, maintenance** and availability of **spares** and **tools**.

SiS Sensoren Instrumente Systeme GmbH
Mühlenkoppel 12
D-24222 Schwentinental, Germany
Tel: +49-431-79972-0
Fax: +49-431-79972-11
Email: info@sis-germany.com
WWW: http://www.sis-germany.com