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CALsys 250 Evaluation Report

An evaluation report of the CALsys 250 Liquid Calibration bath

Manufactured by Tempsens Instruments (II) Pvt Ltd

INTRODUCTION

The CALsys 250 is the latest version of Tempsens makes most popular High Accuracy liquid calibration Bath. It works over the temperature range 50 Deg C to 250 Deg C.

At Tempsens it is our earnest desire to present for our customer's consideration as much useful information as possible and to this end we have spent a substantial amount of time evaluating our products.

The results of the evaluation of Accuracy liquid calibration Bath can be presented in many formats some of which will give an optimistic or indeed a pessimistic view of how the products operate. The performance of the bath will vary depending on liquid type, stirring speed and other outside influences.

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A. Radial Temperature Homogeneity:

What is Radial Temperature Homogeneity and why it is important to measure

Radial uniformity refers to temperature differences between wells of the block or sleeve. This nonuniformity is strongly influenced by the difference between the block and ambient temperature. A larger temperature difference from ambient will result in a larger potential temperature calibration error. Therefore radial in homogeneity should be measured at extremes (relative to ambient temperature) in an instrument's temperature range.

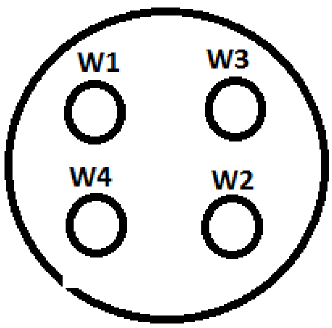
Test method:

The temperature differences between the zones in the individual bores provided for the measurements are measured with one or several suitable thermometers at three different temperature representative of the field of application and covering the extreme temperature which may occur. If there is only one bore no measurement has to be carried out.

For CALsys 250, we consider 50 Deg C, 150 Deg C and 250 Deg C respectively. As example at 50 Deg C two RTD (designed for small steam conduction) were placed in each of the holes. Measurements were recorded and then the probes were interchanged between the two pockets and repeat measurements made. The temperature Difference was calculated to remove the small offsets between the two probes.For calibrators having fewer than four wells, it may be necessary to determine differences by cyclic exchange. The difference between two wells with two thermometers may be determined with the following Formula:

Temperature Difference = [((P1W1 – P1W2) + (P2W1 - P2W2)) / 2}]

Note: P1 = probe 1, W1 = well 1 and so on. P1W1 is read as the value of probe 1 in well 1.



Radial Temperature Homogeneity at CALsys 250

Temp (Deg C)	Sensor	Hole 1	Hole 3
50	RTD Sr.No 438	50.272	50.284
	RTD Sr.No 4391	50.179	50.182
Radial Uniformity : -0.0075			

Temp (Deg C)	Sensor	Hole 1	Hole 3
150	RTD Sr.No 438	150.038	150.075
	RTD Sr.No 4391	149.950	149.799
Radial Uniformity : 0.039			

Temp (Deg C)	Sensor	Hole 1	Hole 3
250	RTD Sr.No 438	250.115	250.297
	RTD Sr.No 4391	250.090	250.999
Radial Uniformity : 0.046			

B. Temperature Stability

Temperature stability is measured with a thermometer and readout with adequate sensitivity and resolution to measure the control fluctuations in the block. A typical time period for stability measurements of a dry-well is about 30 minutes at any specific temperature. Other time periods may be applied depending on how the calibrator is to be used. Temperature stability may vary at different temperatures. The instrument should be characterized over its range, and typically three sets of stability measurements are adequate. Dry-wells that are heated only (that is they utilize no cooling systems to achieve below-ambient temperatures) are measured at their maximum and minimum temperatures and at the midpoint of their ranges. Stability measurements for cold dry-wells are made at their maximum and minimum temperatures as well as near room temperature. Specific temperatures of interest by the user may also be incorporated.

Test Method:

Stability is the measure of the temperature deviations over the measurement period, after temperature control has stabilized. The stability data can be viewed in two ways (see Figure 3). What may be called "peak" stability is often evaluated as plus or minus (±) one-half the difference between of the maximum and minimum values of the data set:

Peak Stability = ± (Tmax – Tmin) / 2.

Temp Set Point	Maximum	Minimum	Peak Stability
50 Deg C	50.182	50.176	0.003
150 Deg C	150.080	150.062	0.009
250 Deg C	250.080	250.101	0.010

C. HEAT UP TIME and COOL DOWN TIME

HEAT UP TIME

50° C to 250°C 31 min

COOL DOWN TIME

250 to 50° C 150 min

Heat up Time	
Temperature (Deg C)	**Time (Min)**
27.8	0
130.6	5
209.0	10
244.8	15
248.5	20
249.6	25
250	31

Cooling Down Time	
Time (Min)	**Temperature (Deg C)**
0	250
10	219
20	192
40	152
60	121
75	107.5
90	93
120	70
150	50