Calibration System for Thermometers

Secondary reference system for calibration thermometers by direct comparison

The system can be used to calibrate electronic and glass thermometers. A liquid thermostatic bath creates a homogenous temperature field. Within this field thermometers are compared to a reference thermometer. A platinum resistance thermometer is used as a reference.

The best solution for calibration of your temperature probes

Design based on experience from ISO / IEC 17025 accredited laboratory

Complete calibration system including calibration software and database

Very easy to use & labor-saving automatic calibration with IMS4 CalibLab

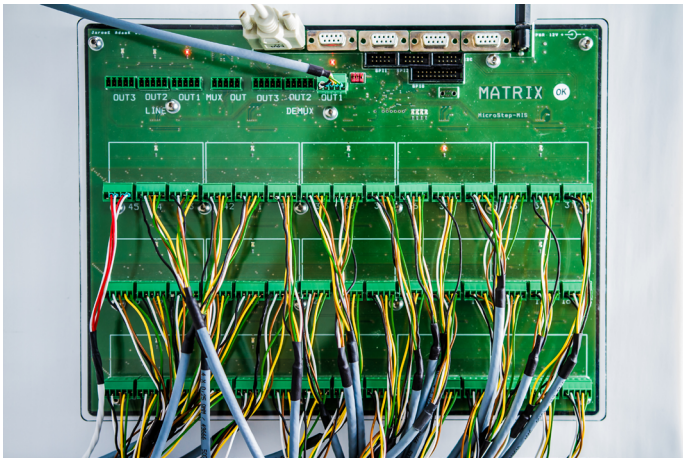
On-line calculation of measurement uncertainty

We customize the solution per your needs and budget

We automate the calibration process where possible. The software controls the bath temperature and takes readings from the reference thermometer.

Resistance thermometers; PT-100s or thermistors can be calibrated automatically. Multiple thermometers connect to a multimeter via channel switch – Matrix. The system can handle up to 45 resistance thermometers at a time. Actual maximum number of sensors depends on their size and the size of the bath.

Liquid-in-glass thermometers can be calibrated too - the reading is taken manually by operator and entered.



Matrix with 45 resistance thermometers

Reference thermometer

Heat transfer liquid

The bath is filled with liquid, which maintains its key physical qualities over a wide temperature range. Due to fire safety, the liquid must be operated well below flash point. The liquid must maintain kinematic viscosity low enough even at the lowest temperature. Higher kinematic viscosity causes higher temperature non-homogeneity in the bath. The baths come in two sizes. To decide, which one fits your needs, consider the parameters displayed in the table at the end of this product sheet. For range from -40 °C to +60 °C there are two options; silicone oil or PFPE fluid. The silicone oil is cheaper. However, the thermometers remain greasy after calibration. The PFPE fluid is not greasy, but high priced. The extended range from -90 °C to +60 °C cannot be covered by one liquid.

Reference thermometer

The reference thermometer is a precise platinum resistance thermometer. It comes with ITS-90 coefficients, which must be used to calculate temperature from its resistance. The calibration software performs this calculation. The resistance is measured by a precise multimeter, or a dedicated readout. The readout is more expensive than multimeter, but it can do also the ITS90 calculation. This is the option, if you don't wish to use the calibration software.

Calibration software IMS4 CalibLab

The software guides the user through the calibration setup in several steps. The software can read serial numbers from certain (digital) sensor types. Preconfigured sensor types include specific calculation of uncertainty, corrections and other formulas. Graphic user interface (GUI) allows the user to configure a new type of sensor. A list of setpoints can be edited, saved or loaded. The fully automated calibration process follows the setpoint list, sets the bath temperature and scans the readings from all thermometers. The system evaluates the readings for stability, calculates mean values and uncertainty.

After the process goes through all setpoints, the results are stored in a database. You can generate certificates for all thermometers by one click. The certificate is generated from a template. You can freely edit the template to fit your needs. The database of calibrations holds the history of calibrations from whole calibration laboratory at one place. You can browse it by quantity, year, sensor type, serial number etc. Looking for calibration history of a certain instrument is a brief. The built-in database browser allows on-line tabular and graphical view of multiple certificates. The software supports export to .csv, .odt, .xml and .pdf formats. Whole database can be backed-up or restored by simple click of a button. There is also provision of automatic periodic back-up.

Automatization

Reading of the instrument values and data processing is fully automatic. Thanks to this fact, it is possible to read more values and minimize the measurement uncertainty. The measurement process does not require any attention after setup. The end of the calibration process or possible error is announced by a sound signal. The progress of the calibration process may be controlled remotely via a computer network.

Third-party sensors integrated in our systems

IMS4 CalibLab enable calibration of almost any sensor on the market automatically, quickly, and reliably. It support multiple calibration bath and chambers.

Features of IMS4 CalibLab

- Support for calibration of temperature, pressure, relative humidity and other quantities
- Graphical user interface
- Multiple step wizard for easy setup of calibration
- Automated instrument serial readout (if supported by instrument)
- Simultaneous calibration of multiple instruments
- User defined sensor types
- Automated calibration controller
- User defined calibration process (setpoint list)
- Support of saving / loading of setpoint list
- On-line graphing of read values, chart zooming
- On-line calculation of statistics and uncertainty
- On-line display of elapsed time and time estimate until the end
- Display of preliminary results during calibration
- Possibility to stop, pause or restart the calibration process
- Detection of sensor fault, automatic kick-out or wait until the problem is solved
- Indication of errors, sound alarm
- Generation of calibration certificates from template document
- Database of calibrations, filtering, graphing, export to .csv, .pdf, .odt, .xml
- Database backup / restore from file, automatic backup scheduler

Calibration software IMS4 CalibLab

Technical specification

Resistance readout parameters

Resistance range	60 Ω to 150 Ω at least
Resistance measurement	4-wire
Measuring current	1 mA
Calibration	accredited
Calibration uncertainty (k = 2)	0.002 mΩ or better
Communication interface	RS-232

Reference thermometer parameters

Output rate (seconds)	10 to 300 selectable
Serial outputs	RS-232, RS-422 and RS-485
Analogue outputs	0 - 10 V (4 - 20 mA option)
Relay outputs	1 fault and 2 threshold relays (option)
Temperature range	-200 °C to 300 °C
Nominal resistance at 0 °C	100 Ω ±0.1 Ω
Temperature coefficient	0.0039250 Ω/Ω/°C
Calibration	accredited
Calibration uncertainty (*k* = 2)	0.018 °C or better over (-38 to +200) °C
Dimensions	according to bath depth

Thermostatic liquid baths

Parameter	Small bath	Big bath	Ultra-cool Big bath
Rate of temperature change	fast	slow	slow
Liquid volume	7 l	22 l	22 l
Usable diameter	100 mm	147 mm	147 mm
Usable depth	270 mm	500 mm	500 mm
Temperature range	-40 °C to 130 °C	-40 °C to 130°C	-90 °C to 130°C
Heating time (+20 °C to +100 °C) **Heating time (-90 °C to +20 °C)**	37 min -	49 min -	- 65 min
Cooling time (+20 °C to -40 °C) **Cooling time (+20 °C to -90 °C)**	64 min -	121 min -	- 240 min
Homogeneity	better than 0.007 °C @ 130°C	better than 0.007 °C @ 130°C	better than 0.007 °C @ -90 °C
Stability	better than 0.002 °C @ -40 °C	better than 0.002 °C @ -40 °C	better than 0.005 °C @ -90 °C
External dimensions	480 x 1080 x 470 mm	600 x 1240 x 550 mm	600 x 1240 x 550 mm
Weight	85 kg	100 kg	135 kg
Communication interface	RS-232	RS-232	