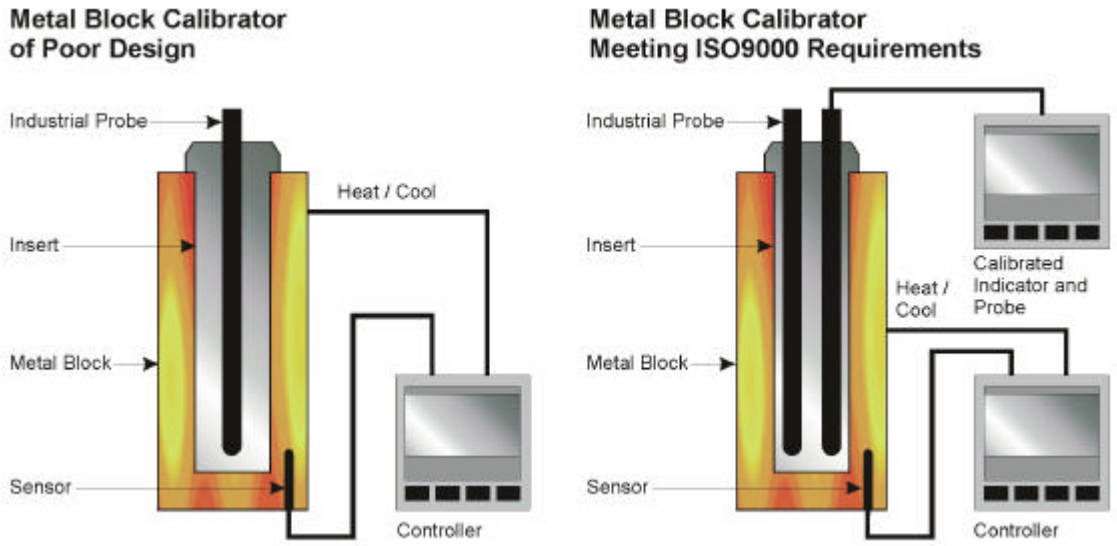
Isothermal Technology: Dry Blocks – *Support Information*

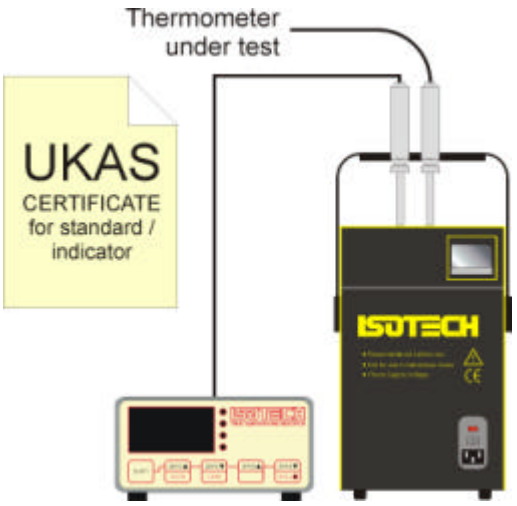
Dry Block Controllers and SITE Models

It is now ten years since Isotech introduced the SITE (S) Models of Dry Blocks. These models, ideal for field use, include in addition to the temperature controller a digital readout (indicator) to which a reference probe can be connected. This probe and indicator can then be calibrated forming a complete traceable calibration system.

Relying on the controller to indicate the block temperature with a high degree of accuracy is not ideal – and for wide temperature ranges and removable calibration volumes the errors can become very large, see diagram.



Isotech were first to introduce this SITE model concept; other manufacturers with one noticeable exception have now caught up. Of course an external indicator with greater precision can be used for smaller uncertainties. Be wary of uncertainty claims made elsewhere which show performance figures for the external indicator and probe *only* – the stability and temperature uniformity of the calibration bath need to be taken into account. Check a particular supplier has the benefit of an accredited lab *and* accreditation for Dry Block Calibration!



The new Isotech Databook 3 introduces the PLUS models with properly engineered blocks to give good uniformity and new instrumentation offering outstanding temperature stability and repeatability. These new instruments include features specifically designed for Isotech Dry Blocks by Eurotherm Controls. The instrument family that the Isotech controllers and indicators derive from benefit from the skills of a US and UK design team with investment of £3.2M and 58 man years of design effort. Simple controllers from companies lacking core skills and budget cannot match this level of investment and customisation.

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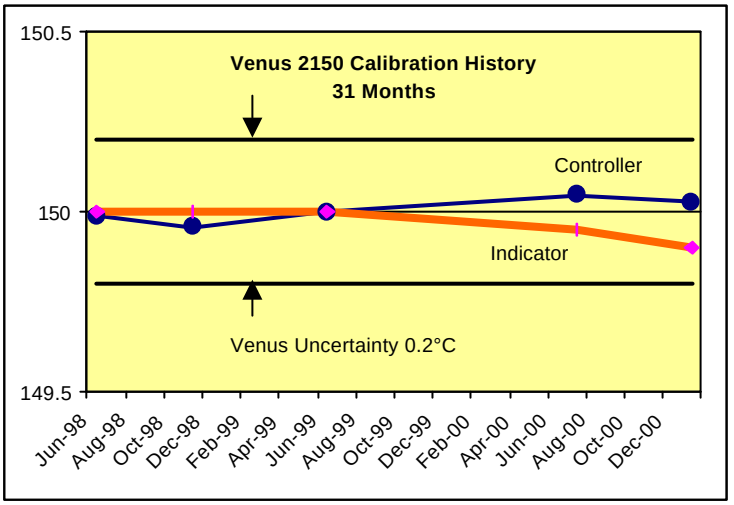
Extremely good long-term stability is achieved by performing automatic zero & scale calibration between each measurement operation. This method practically eliminates the need for field recalibration by minimising drift, (although it is still good practice to periodically check instrument calibration). Thermocouple warm-up drift is significantly reduced through the use of Eurotherm's patented, 'Instant Accuracy' dual sensor cold junction measurement method.
The following features combine to further enhance the high precision measurement and extremely stable temperature control performance for which Eurotherm is well known;

- Refined proven Eurotherm PID control algorithm with 'cutback'
- High input sample rates
- High precision polynomial sensor linearisation
- Digital noise filtering
- Non-linear 'Plant' modelling
- Power feed forward line voltage compensation

Eurotherm Controls specify "calibration accuracy" and comment, *"this describes the guaranteed worst-case instrument measurement accuracy as supplied by Eurotherm. This figure not only includes the instruments basic measurement uncertainty but also all Eurotherm's manufacturing calibration uncertainties and these contribute most significantly to the total uncertainty figure.*

The instruments have been designed to achieve very low time related drift. Eurotherm have invested many man months developing proprietary measurement and A/D techniques designed to minimise measurement noise and eliminate time related drift effects and have good evidence to suggest that we lead the market in this area."



Once Isotech has calibrated the Instruments, along with the reference probe, then the relevant criteria is this "time related drift", this is best demonstrated from actual lab measurements. The chart above shows the calibration history of a Venus 150 model over a 31-month period. In all that time is has not been necessary to alter the indicators calibration!

Web Links

Isotech http://www.isotech.co.uk/industrial
Eurotherm http://www.eurotherm.co.uk
Guidelines on the Calibration of Temperature Block Calibrators **EA-10/13**
http://www.european-accreditation.org/