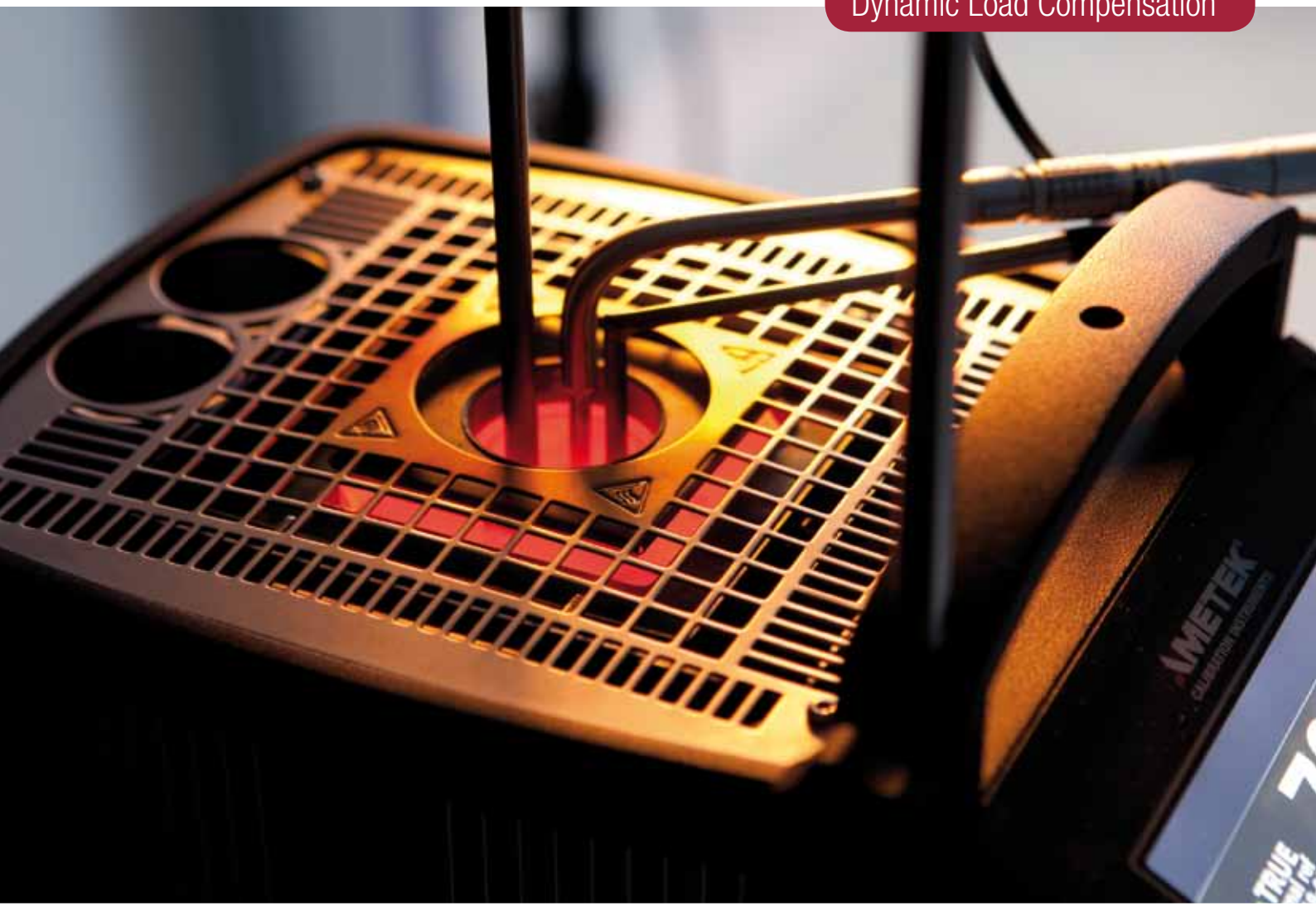
DLC

Dynamic Load Compensation



Temperature Calibration Excellence

- **Calibrate multiple, odd sized or large sensors without compromising accuracy**
- **Fast, improved and documented uncertainty budget calculations**
- **Accuracy improved by a factor 3 compared to a normal dry-block calibration**

AMETEK®

TEST & CALIBRATION INSTRUMENTS

JOFRA™

The new RTC calibrators are the only dry-blocks that effectively compensate for the heat dissipation caused by sensor loading. This is achieved by applying the innovative and patent pending Dynamic Load Compensation. In short the DLC system provides you with the following benefits:

- Calibrate multiple or large sensors without worrying about heat loss errors
- Fast, simplified and documented uncertainty budget calculations
- Reduced uncertainty by up to a factor of 6
- Accuracy improved by a factor 3 compared to a normal dry-block calibration
- No need for detailed information on sensor (UUT) design

Significant improved accuracy

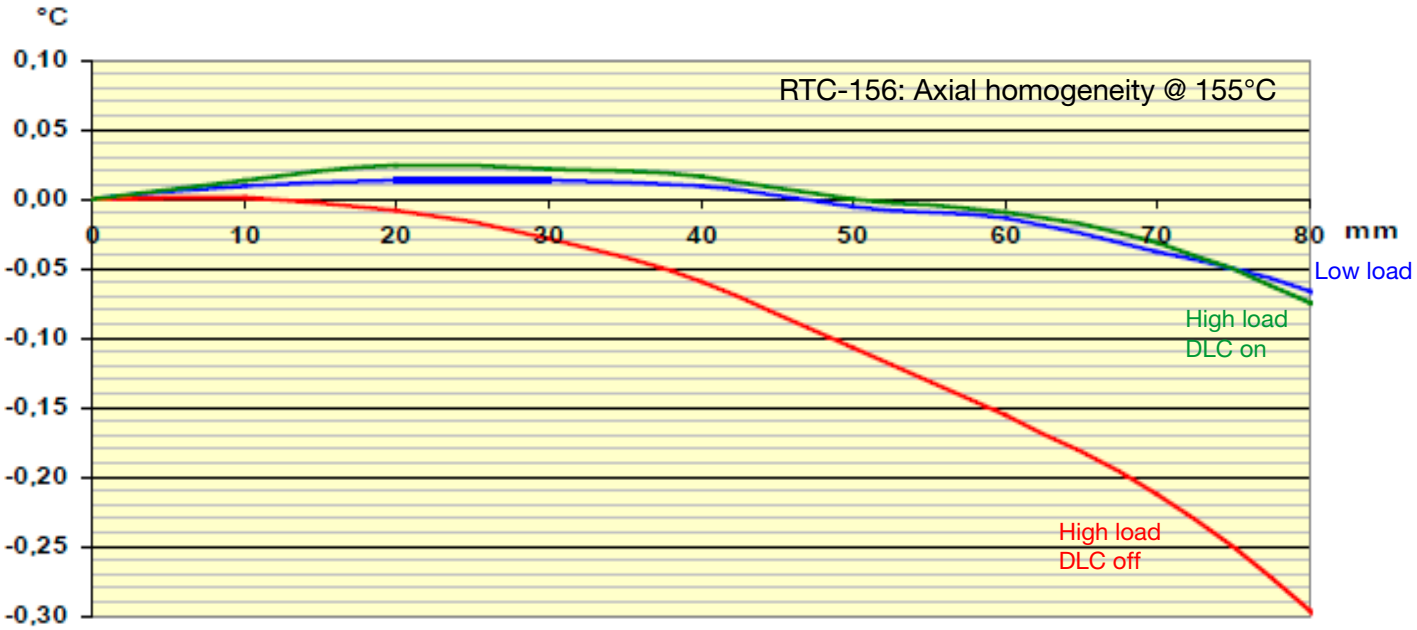
The DLC system gives significant improvement in the calibration accuracy. Axial homogeneity in the calibration well is important, as the typical thermo-sensitive element of a sensor can vary from 5mm to 60mm. The actual temperature in the well will inherently deviate from the ideal temperature as a function of the proximity to the bottom of the well.

How the DLC improves the axial homogeneity is illustrated by:

1. Reference case with the calibrator practically unloaded (*blue line*).

2. Calilbrator loaded with a Ø 10mm sensor without DLC functionality (*red line*). In this case the heavy load causes a distinct non-linear axial gradient that increases with the proximity to the top of the well. The maximum deviation is 0,160°C.

3. Same sensor load, but with the DLC active (*green line*). The performance is practically identical to the reference case (1) and the maximum deviation from the ideal is 0,025°C.



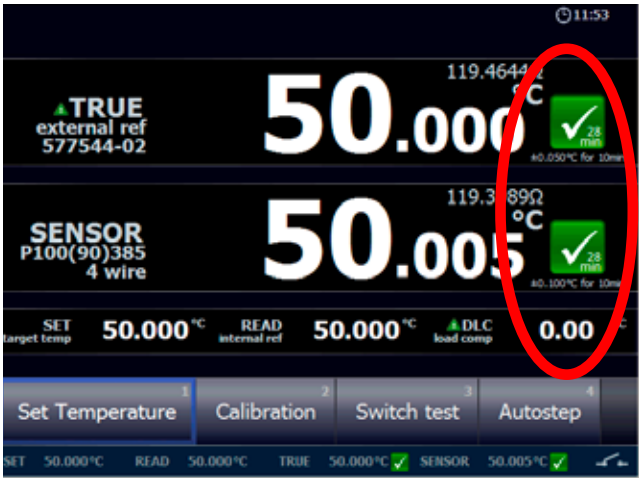
Reference bath calibration is generally regarded as having optimal accuracy. However comparative measurements on a Ø 10mm sensor have shown a maximum deviation of 0,008°C @ 155°C. Compared with a reference bath calibration the calibration result has improved with a factor 3 compared to conventional dry-blocks.

Dynamic Load Compensation is therefore a major step in providing dry-block performance similar to baths, while keeping the inherent advantages of dry-block technology such as;

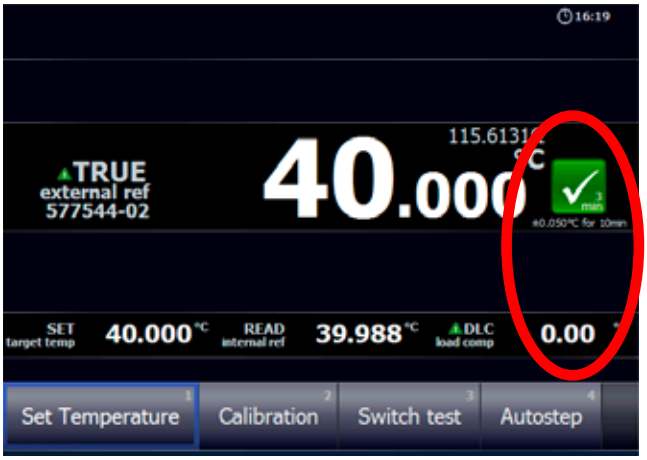
- ease of use
- portability and
- speed

Easy to use and document - by applying the green-zero rule

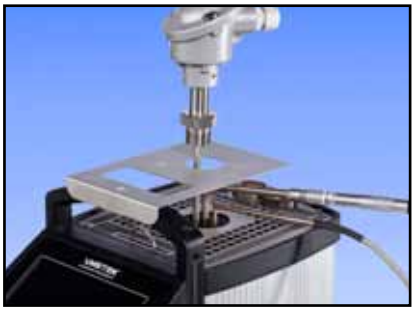
The DLC function in the RTC calibrators provides automatic documentation by indicating when the temperature has stabilized and can be read with optimal precision. The best calibration result is obtained by using the Green-Zero rule as shown on the picture.

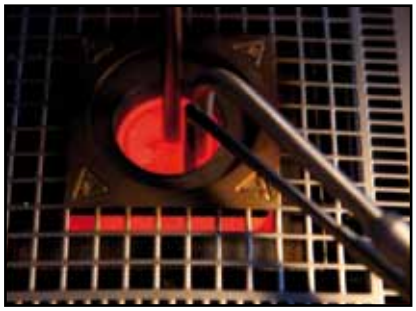


Best dry-block calibration is obtained using the green-zero rule.



The green-zero rule as shown on the C type of the RTC calibrator series.





For more information please see our series of RTC calibrators or the DLC technical note at **www.jofra.com**

Calibrators with DLC

RTC-156
Temperature range from -30 to 155°C (-22 to 311°F)
General purpose light-weight and high performance dry-block.

RTC-157
Temperature range from -45 to 155°C (-49 to 311°F)
General purpose light-weight and high performance dry-block, with superior low temperature performance.

RTC-158
Temperature range from -22 to 155°C (-8 to 311°F)
Combined liquid bath and large diameter insert, designed for calibration of odd sizes and shapes of sensors or calibrating multiple sensors at once.

RTC-250
Temperature range from 28 to 250°C (82 to 482°F)
Combined liquid bath and large diameter insert, designed for calibration of odd sizes and shapes of sensors or calibrating multiple sensors at once.

RTC-700
Temperature range from 33 to 700°C (91 to 1292°F)
A unique combination of speed and accuracy at very high temperatures, based upon our new patent pending heating block.

AMETEK Calibration Instruments
is one of the world's leading manufacturers and developers of calibration instruments for temperature, pressure and process signals as well as for temperature sensors both from a commercial and a technological point of view.

JOFRA Temperature Instruments
Portable precision thermometers. Dry-block and liquid bath calibrators: 5 series, with more than 25 models and temperature ranges from -90° to 1205°C / -130° to 2200°F. All featuring speed, portability, accuracy and advanced documenting functions with JOFRACAL calibration software.

JOFRA Pressure Instruments
Convenient electronic systems ranging from -25 mbar to 1000 bar (0.4 to 15,000 psi) - multiple choices of pressure ranges, pumps and accuracies, fully temperature-compensated for problem-free and accurate field use.

JOFRA Signal Instruments
Process signal measurement and simulation for easy control loop calibration and measurement tasks - from handheld field instruments to laboratory reference level bench top instruments.

JOFRA / JF Marine Instruments
A complete range of calibration equipment for temperature, pressure and signal, approved for marine use.

FP Temperature Sensors
A complete range of temperature sensors for industrial and marine use.

M&G Pressure Testers
Pneumatic floating-ball or hydraulic piston dead weight testers with accuracies to 0.015% of reading.

M&G Pumps
Pressure generators from small pneumatic "bicycle" style pumps to hydraulic pumps generating up to 1,000 bar (15,000 psi).

...because calibration is a matter of confidence

Pub code AS-DLC issue 1011