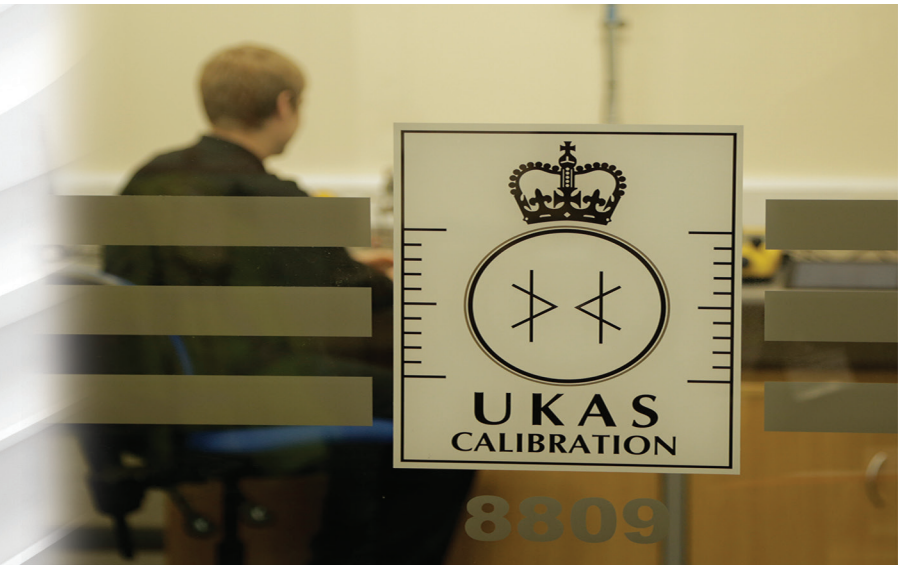
ABB MEASUREMENT & ANALYTICS | PRODUCT GUIDE | PG/SMD140–EN REV. B

UKAS calibration laboratory 8809

Temperature, pressure and electrical signals calibration guide



Measurement made easy

UKAS calibration laboratory 8809 temperature, pressure and electrical signals calibration guide

1 Introduction

Life often involves adherence by someone to voluntary or mandatory standards (for example, those related to food safety and labelling or health and safety at work and in the home, weights / measures and trading standards). The implementation of many of these standards can impact on our everyday life, such as those related to the structural integrity of building materials, reliability of health care and management systems.

The quality of data from any industrial process is only as good as the device used to collect it. Depending on what's being measured, the slightest deviation in performance can have a major impact in areas including product quality, energy consumption, efficiency and even safety. If every process is only as good as the devices used to measure it, then every one of those devices must be as accurate as possible. The ISO17025 standard has been created to help ensure consistency in the way that equipment, including measurement instruments, is tested and calibrated in order that its accuracy can be relied upon by end users. In the UK, all accreditations for testing and calibration are managed by the United Kingdom Accreditation Service (UKAS), that operates in accordance with ISO17011:2004, a global standard governing the general requirements for accreditation bodies. Any organization that is accredited by UKAS is part of the International Laboratory Accreditation Cooperation (ILAC). The arrangement facilitates the international acceptance of test and calibration data and the elimination of technical barriers to trade.

As a manufacturer of measurement equipment for multiple industrial end users, we are dedicated to helping you maintain the highest level of accuracy from your assets. ABB's UKAS Laboratory 8809 can support you with the calibration of temperature, pressure and electrical signal (volts, current and resistance) devices to ensure measurement traceability and compliance to any relevant standards.

Benefits of ABB calibration services

Our instrumentcalibration services can help you to get the best levels of performance from your flowmeter throughout its lifetime, resulting in:

Improved process optimization
— reduced raw material cost, increased process speed and accurate measurement data

Improved process availability
— reducing unscheduled maintenance helps maximize the uptime of your plant or process

Continued regulatory compliance
— our services provide you with independent calibrations and third party signed certificates for your records

Enhanced safety
— having your flowmeter calibrated at regular intervals and authenticated with the relevant certification can help enhance your process safety and minimize your risk of exposure in the event of an accident

Accurate custody transfer
— together with independent calibration, improved accuracy provides added peace of mind in custody transfer applications

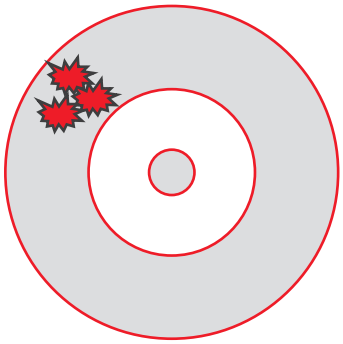
When you deal with ABB for flow calibration, you can be sure that all work is conducted by highly trained ABB service technicians, backed up with extended product warranties.

Uncertainty

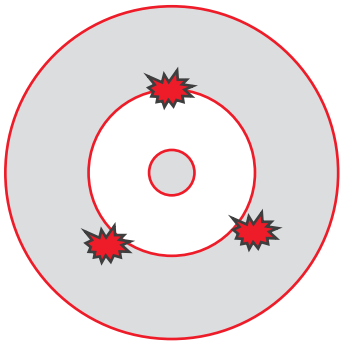
The uncertainty of a measurement tells us something about its quality. Uncertainty of measurement is the doubt that exists about the result of any measurement. For every measurement, even the most careful, there is always a margin of doubt.
We need to ask "how big is the doubt"?
It is important not to confuse 'error' and 'uncertainty'

Error	= the difference between the measured value and the true value
Uncertainty	= the quantification of the doubt of the measurement result

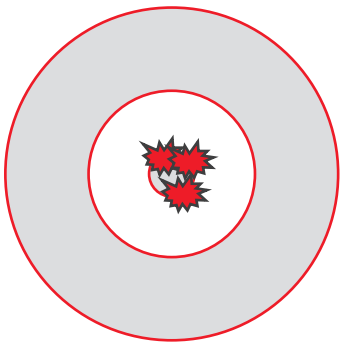
Uncertainty of measurement is important to making a good quality measurement and understanding the result.



Good precision – poor accuracy



Poor precision – good accuracy



Good precision – good accuracy

Fig. 1: Precision and accuracy

Calibration suite

We provide a range of calibrations for workshop service contracts for a wide range of different flow technologies from all manufacturers. Our facilities can be used to calibrate the following types of flowmeters using the medium of water; although ABB does have the facility of calibrating flowmeters on gas compositions, if required.

Accreditation schedule

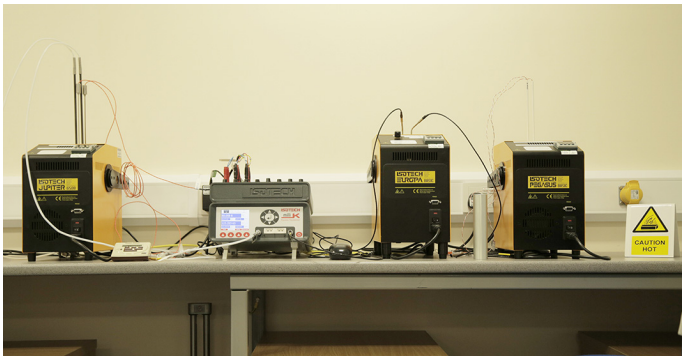
Temperature:	–35 to 1200°C Ice point 0°C
Voltage:	±50 V (measure) ±12 V (generate)
Noble metal thermocouples types R and S:	0 to 1768°C
Base metal thermocouples types K, T and J:	–200 to 1370°C
PT100:	–200 to 850°C
Current:	±100 mA (measure) ±25 mA (generate)
Pressure:	–0.85 to 20 bar
Resistance:	0 to 4000Ω (measure) 1 to 4000Ω (generate)

Temperature

To calibrate your temperature asset, we use industry-recognized, best-in-class measuring equipment comprising high precision electronic thermometer, dry block thermal baths and reference standards appropriate to the chosen calibration range.

Schedule

Measured quantity instrument or gauge	Range (°C)	Calibration and Measurement Capability (CMC) expressed as an expanded uncertainty (k = 2) in °C
Resistance thermometers	Ice point (0)	0.040
	–35 to 0	0.070
	0 to 140	0.080
	140 to 250	0.24
	250 to 450	0.46
	450 to 650	0.53
Thermocouples	Ice point (0)	0.40
	–35 to 140	0.40
	140 to 250	0.50
	250 to 450	0.70
	450 to 650	0.8
	650 to 1100	2.0 to 2.6
	1100 to 1200	3.1
Temperature indicators and recorders with sensors	Ice point (0)	0.040
	–35 to 0	0.070
	0 to 140	0.080
	140 to 250	0.24
	250 to 450	0.46
	450 to 650	0.53
	650 to 1100	2.0 to 2.6
	1100 to 1200	3.0



Ordering information

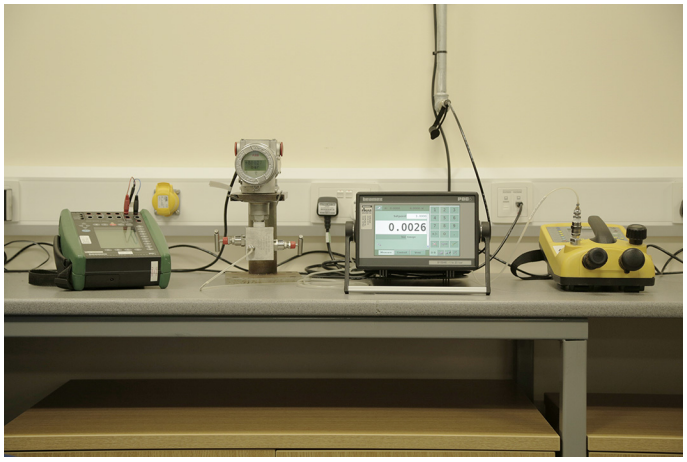
UKAS temperature calibration SMD140-T	XX	X	XX
Device type			
Resistance thermometers	11		
Thermocouple	12		
Temperature indicators and recorders with thermometers	13		
Temperature indicators and recorders with thermocouple	14		
Calibration range			
Ice point 0 °C (32 °F)		A	
–35 to 140 °C (–31 to 284 °F)		B	
–35 to 660 °C (–31 to 1220 °F		C	
0 to 140 °C (32 to 284 °F)		D	
0 to 660 °C (32 to 1220 °F)		E	
0 to 1100 °C (32 to 2012 °F)		F	
0 to 1200 °C (32 to 2192 °F)		G	
Ambient to 140 °C (284 °F)		H	
Ambient to 660 °C (1220 °F)		J	
Ambient to 1100 °C (2012 °F)		K	
Ambient to 1200 °C (2192 °F)		L	
Special – customer to specify		Z	
Number of calibration points			
1 (ice point only)			01
5 (standard)			05
6			06
7			07
8			08
9			09
10			10
Special – customer to specify			99

Pressure

We use a best-in-class programmable multi-point controller to calibrate pressure devices.

Schedule

Measured quantity instrument or gauge	Range	Calibration and Measurement Capability (CMC) expressed as an expanded uncertainty (k = 2)
Gas pressure (gauge) Calibration of pressure indicating instruments and gauges	–85 to 0 kPa	0.18 kPa
	0 to 400 kPa	0.19 kPa
	400 kPa to 1.2 MPa	0.29 kPa
	1.2 to 2 MPa	0.33 kPa



Ordering information

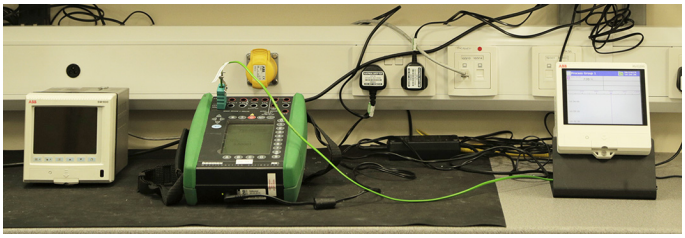
UKAS temperature calibration SMD140-P	XX	X	XX
Device type			
Gas pressure (gauge only)	21		
Pressure indicating instrument and gauges	22		
Calibration range			
–85 to 0 kPa (–0.85 to 0 bar / –12.3 to 0 psi)		A	
–85 to 400 kPa (–0.85 to 4 bar / –12.3 to 58 psi)		B	
–0.085 to 2 MPa (–0.85 to 20 bar / –12.3 to 290 psi)		C	
0 to 100 kPa (0 to 1 bar / 0 to 14.5 psi)		D	
0 to 400 kPa (0 to 4 bar / 0 to 58 psi)		E	
0 to 2 MPa (0 to 20 bar / 0 to 290 psi)		F	
Number of calibration points			
5 (standard)			05
6			06
7			07
8			08
9			09
10			10
Special – customer to specify			99

Electrical signals

Electrical signal calibrations are performed using a best-in-class multi-calibrator to give users confidence in the performance of their equipment.

Schedule

Measured quantity instrument or gauge	Range	Calibration and Measurement Capability (CMC) expressed as an expanded uncertainty (k = 2) in °C
DC voltage		
Measurement	0 to 100 mV 100 mV to 50 V	0.027 mV 4.2 mV
Generation	0 to 100 mV 100 mV to 12 V	0.013 mV 1.4 mV
DC current		
Measurement	0 to 100 mA	0.013 mA
Generation	0 to 25 mA	0.0058 mA
DC resistance		
Measurement	1 to 400 Ω 400 to 4 kΩ	0.035 Ω 0.55 Ω
Generation	1 to 400 Ω 400 to 4 kΩ	0.037 Ω 0.35 Ω
Electrical calibration of temperature indicators, controllers and recorders for the following sensors:		
Noble metal thermocouples types R and S (with cold junction compensation)	0 to 1768 °C	1.0 °C
Base metal thermocouples types K, T and J (with cold junction compensation)	–200 to 0 °C 0 to 1370 °C	0.56 °C 0.23 °C
Pt100	–200 to 850 °C	0.092 °C



Ordering information

UKAS signal calibration	SMD140-S	X	XX	X	XX
Signal type					
Input		A			
Output		B			
Input and output		Y			
Device type					
Multimeter			31		
Multifunctional calibrator			32		
Recorder			33		
Controller			34		
Voltmeter			35		
Amperemeter			36		
Decade box (4kΩ)			37		
Indicator			39		
Number of channels					
1				A	
2				B	
3				C	
4				D	
5				E	
6				F	
Special – customer to specify				Z	
N/A				Y	
Number of calibration points					
5 (standard)					05
6					06
7					07
8					08
9					09
10					10
Special – customer to specify					99

Notes

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