

Annex to declaration of accreditation (scope of accreditation)
 Normative document: EN ISO/IEC 17025:2017
 Registration number: **K 013**

of **Fluke Nederland B.V.**
Standaard Laboratorium

This annex is valid from: **20-07-2023** to **01-10-2027**

Replaces annex dated: **22-06-2022**

Location(s) where activities are performed under accreditation

Head Office

Brainport Industries Campus (BIC) 1
 5657 BX
 Eindhoven
 The Netherlands

Location	Abbreviation/ location code
Brainport Industries Campus (BIC) 1 5657 BX Eindhoven The Netherlands	BIC
On-site at the customer	OS

HCS code	Measured quantity, Range	Frequency	CMC ¹	Remarks	Location
LF 0 0	DC/LF Quantities				
LF 1 0	DC Voltage			measuring and generating	BIC
	10 V		$5 \cdot 10^{-7} \cdot U$	zenerreferences	
	1 V and 1.018 V		$2.3 \cdot 10^{-6} \cdot U$	zenerreferences	
	0 μ V to 10 μ V		0.3 μ V		
	10 μ V to 200 mV		$3 \cdot 10^{-6} \cdot U + 0.2 \mu$ V		
	200 mV to 1 V		$3 \cdot 10^{-6} \cdot U$		
	1 V to 2 V		$2 \cdot 10^{-6} \cdot U$		
	2 V to 10 V		$1 \cdot 10^{-6} \cdot U$		

This annex has been approved by the Board of the Dutch Accreditation Council, on its behalf,

J.A.W.M. de Haas

¹ Calibration and Measurement Capability (CMC): Demonstrated measurement uncertainty, with coverage probability of 95%, in a given measurement point or measurement range. Measurement uncertainty, U , is calculated according to EA-4/02 "Evaluation of the Uncertainty of Measurement in Calibration".

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	10 V to 1000 V		$2 \cdot 10^{-6} \cdot U$		
	1000 V to 1100 V		$4 \cdot 10^{-6} \cdot U$		
LF 2 0	DC Current			measuring and generating	BIC
	1 μ A to 10 μ A		$3 \cdot 10^{-5} \cdot I$		
	10 μ A to 20 A		$2 \cdot 10^{-5} \cdot I$		
LF 3 0	AC Voltage			measuring and generating	BIC
	100 mV to 220 mV	10 Hz to 20 Hz	$3 \cdot 10^{-4} \cdot U$		
		20 Hz to 40 Hz	$5 \cdot 10^{-5} \cdot U$		
		40 Hz to 20 kHz	$5 \cdot 10^{-5} \cdot U$		
		20 kHz to 50 kHz	$5 \cdot 10^{-5} \cdot U$		
		50 kHz to 100 kHz	$6 \cdot 10^{-5} \cdot U$		
		100 kHz to 200 kHz	$2 \cdot 10^{-4} \cdot U$		
		200 kHz to 500 kHz	$4 \cdot 10^{-4} \cdot U$		
		500 kHz to 1 MHz	$7 \cdot 10^{-4} \cdot U$		
	220 mV to 2.2 V	10 Hz to 20 Hz	$5 \cdot 10^{-5} \cdot U$		
		20 Hz to 40 Hz	$5 \cdot 10^{-5} \cdot U$		
		40 Hz to 20 kHz	$5 \cdot 10^{-5} \cdot U$		
		20 kHz to 50 kHz	$4 \cdot 10^{-5} \cdot U$		
		50 kHz to 100 kHz	$5 \cdot 10^{-5} \cdot U$		
		100 kHz to 200 kHz	$2 \cdot 10^{-4} \cdot U$		
		200 kHz to 500 kHz	$4 \cdot 10^{-4} \cdot U$		
		500 kHz to 1 MHz	$7 \cdot 10^{-4} \cdot U$		
	2.2 V to 22 V	10 Hz to 20 Hz	$5 \cdot 10^{-5} \cdot U$		
		20 Hz to 40 Hz	$4 \cdot 10^{-5} \cdot U$		
		40 Hz to 20 kHz	$4 \cdot 10^{-5} \cdot U$		
		20 kHz to 50 kHz	$4 \cdot 10^{-5} \cdot U$		
		50 kHz to 100 kHz	$5 \cdot 10^{-5} \cdot U$		

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	2.2 V to 22 V	100 kHz to 200 kHz	$2 \cdot 10^{-4} \cdot U$		
		200 kHz to 500 kHz	$4 \cdot 10^{-4} \cdot U$		
		500 kHz to 1 MHz	$8 \cdot 10^{-4} \cdot U$		
	22 V to 220 V	10 Hz to 20 Hz	$6 \cdot 10^{-5} \cdot U$		
		20 Hz to 40 Hz	$5 \cdot 10^{-5} \cdot U$		
		40 Hz to 20 kHz	$5 \cdot 10^{-5} \cdot U$		
		20 kHz to 50 kHz	$5 \cdot 10^{-5} \cdot U$		
		50 kHz to 100 kHz	$2 \cdot 10^{-4} \cdot U$		
	220 V to 1000 V	10 Hz to 20 Hz	$5 \cdot 10^{-5} \cdot U$		
		20 Hz to 40 Hz	$5 \cdot 10^{-5} \cdot U$		
		40 Hz to 20 kHz	$5 \cdot 10^{-5} \cdot U$		
		20 kHz to 50 kHz	$7 \cdot 10^{-5} \cdot U$		
		50 kHz to 100 kHz	$4 \cdot 10^{-4} \cdot U$		
LF 3 3	Pulse Amplitude				BIC
	1 mV to 25 mV	10 Hz to 10 kHz	$5 \cdot 10^{-3} \cdot U$	measuring	
	25 mV to 110 mV	10 Hz to 10 kHz	$2.6 \cdot 10^{-4} \cdot U$		
	110 mV to 2.2 V	10 Hz to 10 kHz	$2.6 \cdot 10^{-4} \cdot U$		
	2.2 V to 11 V	10 Hz to 10 kHz	$2.6 \cdot 10^{-4} \cdot U$		
	11 V to 130 V	10 Hz to 10 kHz	$2.6 \cdot 10^{-4} \cdot U$		
	6 mV to 25 mV	10 Hz to 10 kHz	$1 \cdot 10^{-2} \cdot U$	generating	
	25 mV to 110 mV	10 Hz to 10 kHz	$5 \cdot 10^{-3} \cdot U$		
	110 mV to 2.2 V	10 Hz to 10 kHz	$5 \cdot 10^{-3} \cdot U$		
	2.2 V to 11 V	10 Hz to 10 kHz	$5 \cdot 10^{-3} \cdot U$		
	11 V to 130 V	10 Hz to 10 kHz	$5 \cdot 10^{-3} \cdot U$		

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HCS code	Measured quantity, Range	Frequency	CMC ¹	Remarks	Location
LF 3 4	AC/DC Transfer			measuring and generating	BIC
	0.5 V to 50 V	40 Hz to 1 kHz	$5.6 \cdot 10^{-5} \cdot U$		
		1 kHz to 20 kHz	$5.1 \cdot 10^{-5} \cdot U$		
		20 kHz to 100 kHz	$6.1 \cdot 10^{-5} \cdot U$		
		100 kHz to 500 kHz	$2.5 \cdot 10^{-4} \cdot U$		
	0.5 V to 10 V	500 kHz to 1 MHz	$4.2 \cdot 10^{-4} \cdot U$		
	50 V to 100 V	40 Hz to 1 kHz	$4.5 \cdot 10^{-5} \cdot U$		
		1 kHz to 20 kHz	$4.5 \cdot 10^{-5} \cdot U$		
		20 kHz to 50 kHz	$5.1 \cdot 10^{-5} \cdot U$		
		50 kHz to 100 kHz	$5.6 \cdot 10^{-5} \cdot U$		
	100 V to 500 V	40 Hz to 1 kHz	$6.2 \cdot 10^{-5} \cdot U$		
		1 kHz to 20 kHz	$5.8 \cdot 10^{-5} \cdot U$		
		20 kHz to 50 kHz	$9.2 \cdot 10^{-5} \cdot U$		
		50 kHz to 100 kHz	$2.4 \cdot 10^{-4} \cdot U$		
	500 V to 1000 V	40 Hz to 20 kHz	$6.4 \cdot 10^{-5} \cdot U$		
		20 kHz to 50 kHz	$9.6 \cdot 10^{-5} \cdot U$		
		50 kHz to 100 kHz	$2.4 \cdot 10^{-4} \cdot U$		
LF 4 0	AC Current			measuring and generating	BIC
	100 μ A to 1 mA	10 Hz to 1 kHz	$3.2 \cdot 10^{-4} \cdot I$		
		1 kHz to 5 kHz	$2.6 \cdot 10^{-4} \cdot I$		
		5 kHz to 10 kHz	$6.5 \cdot 10^{-4} \cdot I$		
		10 kHz to 20 kHz	$1.2 \cdot 10^{-3} \cdot I$	measuring only	
	1 mA to 10 mA	10 Hz to 1 kHz	$2.3 \cdot 10^{-4} \cdot I$		
		1 kHz to 5 kHz	$1.7 \cdot 10^{-4} \cdot I$		
		5 kHz to 10 kHz	$4.3 \cdot 10^{-4} \cdot I$		
		10 kHz to 20 kHz	$6.7 \cdot 10^{-4} \cdot I$	measuring only	

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	10 mA to 1 A	10 Hz to 1 kHz	$2.4 \cdot 10^{-4} \cdot I$		
		1 kHz to 5 kHz	$2.1 \cdot 10^{-4} \cdot I$		
		5 kHz to 10 kHz	$4.9 \cdot 10^{-4} \cdot I$		
		10 kHz to 20 kHz	$8.2 \cdot 10^{-4} \cdot I$	measuring only	
	1 A to 5 A	10 Hz to 1 kHz	$2.4 \cdot 10^{-4} \cdot I$		
		1 kHz to 5 kHz	$2.8 \cdot 10^{-4} \cdot I$		
		5 kHz to 10 kHz	$7.4 \cdot 10^{-4} \cdot I$		
		10 kHz to 20 kHz	$1.4 \cdot 10^{-3} \cdot I$	measuring only	
	5 A to 20 A	10 Hz to 1 kHz	$3.3 \cdot 10^{-4} \cdot I$		
		1 kHz to 5 kHz	$3.8 \cdot 10^{-4} \cdot I$		
		5 kHz to 10 kHz	$7.8 \cdot 10^{-4} \cdot I$		
		10 kHz to 20 kHz	$1.4 \cdot 10^{-3} \cdot I$	measuring only	
LF 6 2	DC Resistance			measuring and generating	BIC
	1 mΩ		$3 \cdot 10^{-5} \cdot R$		
	10 mΩ		$2 \cdot 10^{-5} \cdot R$		
	100 mΩ		$1 \cdot 10^{-5} \cdot R$		
	1 Ω		$3 \cdot 10^{-6} \cdot R$		
	10 Ω		$3 \cdot 10^{-6} \cdot R$		
	100 Ω		$3 \cdot 10^{-6} \cdot R$		
	1 kΩ		$3 \cdot 10^{-6} \cdot R$		
	10 kΩ		$2 \cdot 10^{-6} \cdot R$		
	100 kΩ		$3 \cdot 10^{-6} \cdot R$		
	1 MΩ		$3 \cdot 10^{-6} \cdot R$		
	10 MΩ		$5 \cdot 10^{-6} \cdot R$		
	100 MΩ		$2 \cdot 10^{-5} \cdot R$		
	1 GΩ		$6 \cdot 10^{-4} \cdot R$		
	1 mΩ to 10 mΩ		$9 \cdot 10^{-5} \cdot R$		

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	10 mΩ to 100 mΩ		$3 \cdot 10^{-5} \cdot R$		
	100 mΩ to 1 Ω		$2 \cdot 10^{-5} \cdot R$		
	1 Ω to 10 MΩ		$5 \cdot 10^{-6} \cdot R$		
	10 MΩ to 100 MΩ		$2 \cdot 10^{-5} \cdot R$		
	100 MΩ to 1 GΩ		$6 \cdot 10^{-4} \cdot R$		
LF 6 5	LF Capacitance			measuring and generating	BIC
	10 pF	1 kHz to 10 kHz	$2 \cdot 10^{-5} \cdot C$		
	100 pF	1 kHz to 10 kHz	$2 \cdot 10^{-5} \cdot C$		
	1000 pF	1 kHz to 10 kHz	$2 \cdot 10^{-5} \cdot C$		
	1 pF to 50 pF	1 kHz to 10 kHz	$2 \cdot 10^{-4} \cdot C$		
	50 pF to 100 pF	1 kHz to 10 kHz	$4 \cdot 10^{-5} \cdot C$		
	100 pF to 1 nF	1 kHz to 5 kHz	$2 \cdot 10^{-5} \cdot C$		
	1 nF to 1 μF	1 kHz	$2 \cdot 10^{-4} \cdot C$		
	1 μF to 10 μF	100 Hz	$3 \cdot 10^{-4} \cdot C$		
	200 μF to 500 μF	DCV	$1.2 \cdot 10^{-3} \cdot C$		
	500 μF to 110 mF	DCV	$1 \cdot 10^{-3} \cdot C$		
RF 0 0	High Frequency Quantities				
RF 1 0	CW Flatness				BIC
	5 mV _{pp} to 200 mV _{pp}	50 kHz to 1100 MHz	$3.5 \cdot 10^{-2}$ related to 50 kHz/50 Ω	measuring	
	200 mV _{pp} to 6 V _{pp}	50 kHz to 1100 MHz	$3.5 \cdot 10^{-2}$ related to 50 kHz/50 Ω	measuring	
	5 mV _{pp} to 20 mV _{pp}	50 kHz to 1100 MHz	$11 \cdot 10^{-2}$ related to 50 kHz/50 Ω	generating VSWR scope ≤ 1.3	
	20 mV _{pp} to 6 V _{pp}	50 kHz to 1100 MHz	$10 \cdot 10^{-2}$ related to 50 kHz/50 Ω	generating VSWR scope ≤ 1.3	

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HCS code	Measured quantity, Range	Frequency	CMC ¹	Remarks	Location
TF 0 0	Time and frequency				
TF 2 1	Frequency			measuring and generating	BIC
	10 MHz		$6 \cdot 10^{-11} \cdot f$		
	10 mHz to 1 MHz		$1 \cdot 10^{-10} \cdot f + T_e$	1)	
	1 MHz to 300 MHz		$1 \cdot 10^{-10} \cdot f$		
	300 MHz to 1.1 GHz		$6 \cdot 10^{-9} \cdot f$	2)	
TF 2 2	Time Interval				BIC
	1 μ s to 10 s		$5 \cdot 10^{-10} \cdot t + T.E.$	3) measuring only	
	10 s to 10 ⁵ s		$5 \cdot 10^{-10} \cdot t + 10$ ns	measuring only	
TF 2 3	Phase Angle				BIC
	0 ° to 180 °	10 Hz to 50 Hz	0.05 °	at equal input voltages 100 mV < U _i < 300 V generate up to 120 V	
		50 Hz to 1 kHz	0.08 °		
		1 kHz to 5 kHz	0.18 °		
		5 kHz to 10 kHz	0.35 °		
		10 kHz to 30 kHz	0.75 °		
		50 Hz	0.10 °	unequal input voltages 100 mV < U _i < 300 V ratio 1:100	
		50 Hz to 1 kHz	0.25 °		
		1 kHz to 5 kHz	0.40 °		
		5 kHz to 10 kHz	1.0 °		
		10 kHz to 30 kHz	1.8 °		
TF 2 4	Rise time				BIC
	70 ps to 1000 ps	pulse repeat ≤ 1 MHz	20 ps	180 mV _{pp} to 300 mV _{pp} in 50 Ω measuring only	

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HCS code	Measured quantity, Instrument, Measure	Range	CMC ²	Remarks	Location
PV 0 0	Pressure				
PV 1 1	Absolute pressure	10 kPa to 60 kPa	12 Pa	nitrogen, measuring and generating	BIC
		60 kPa to 700 kPa	$3.1 \cdot 10^{-5} \cdot p + 10 \text{ Pa}$		
		700 kPa to 10 MPa	$4.2 \cdot 10^{-5} \cdot p + 95 \text{ Pa}$		
PV 1 2	Gauge pressure	0 kPa to 15 kPa	$2.5 \cdot 10^{-5} \cdot p_e + 0.7 \text{ Pa}$	nitrogen, measuring and generating	BIC
		15 kPa to 700 kPa	$3.5 \cdot 10^{-5} \cdot p_e + 10.3 \text{ Pa}$		
		700 kPa to 10 MPa	$4.2 \cdot 10^{-5} \cdot p_e + 95 \text{ Pa}$		
PV 3 1	Negative Gauge pressure	-90 kPa to -15 kPa	$3.5 \cdot 10^{-5} \cdot p_e + 6.1 \text{ Pa}$	nitrogen, measuring and generating	BIC
		-15 kPa to 0 kPa	$3.5 \cdot 10^{-5} \cdot p_e + 0.7 \text{ Pa}$		
TQ 0 0	Torque	0.45 to 5.6 Nm	$2 \cdot 10^{-2} \cdot M + 0.069 \text{ Nm}$	Setting Torque Tools (wrenches and drivers)	BIC
		5.6 to 41 Nm	$1.5 \cdot 10^{-2} \cdot M + 0.53 \text{ Nm}$		
		41 to 113 Nm	$7 \cdot 10^{-3} \cdot M + 0.86 \text{ Nm}$		
		113 to 339 Nm	$6 \cdot 10^{-3} \cdot M + 1.06 \text{ Nm}$		

² Calibration and Measurement Capability (CMC): Demonstrated measurement uncertainty, with coverage probability of 95%, in a given measurement point or measurement range. Measurement uncertainty, U , is calculated according to EA-4/02 "Evaluation of the Uncertainty of Measurement in Calibration".

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TE 0 0	Temperature, Humidity, Thermophysical properties				
TE 1 0	Resistance thermometers	5 °C to 15 °C	0.11 °C	measurements in climate chamber	BIC
		15 °C to 24 °C	0.045 °C	measurements in climate chamber	BIC
		24 °C to 65 °C	0.045 °C to 0.17 °C	measurements in climate chamber	BIC
		0.01 °C	0.0059 °C	triple point of water	BIC
		29.7646 °C	0.0068 °C	fixed point gallium	BIC
		419.527 °C	0.010 °C	fixed point zinc	BIC
		660.323 °C	0.014 °C	fixed point aluminium	BIC
		-95 °C to -80 °C	0.025 °C		BIC
		-80 °C to 125 °C	0.085 °C		OS
		-80 °C to 248 °C	0.014 °C		BIC
		248 °C to 500 °C	0.021 °C		BIC
		500 °C to 660 °C	0.053 °C		BIC
TE 1 3	Thermistors	0 °C to 100 °C	0.014 °C		BIC
TE 3 0	Thermocouples	0 °C to 26 °C	0.022 °C	thermocouple Type-E	BIC
		-30 °C to 200 °C	0.16 °C		OS
		-95 °C to 660 °C	0.10 °C		BIC
		660 °C to 1000 °C	0.80 °C		BIC
		35 °C to 500 °C	0.5 °C to 1.8 °C	surface thermometers and surface calibrators	BIC

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TE 4 0	Self-indicating thermometers				
TE 4 1	Temperature sensors with display unit (digital system thermometer or dataloggers)	5 °C to 15 °C	0.11 °C	measurements in climate chamber	BIC
		15 °C to 24 °C	0.045 °C	measurements in climate chamber	BIC
		24 °C to 65 °C	0.045 °C to 0.17 °C	measurements in climate chamber	BIC
		0.01 °C	0.0059 °C	triple point of water	BIC
		29.7646 °C	0.0068 °C	fixed point gallium	BIC
		419.527 °C	0.010 °C	fixed point zinc	BIC
		660.323 °C	0.014 °C	fixed point aluminium	BIC
		-95 °C to -80 °C	0.025 °C		BIC
		-80 °C to 125 °C	0.085 °C		OS
		-80 °C to 248 °C	0.014 °C		BIC
		248 °C to 500 °C	0.021 °C		BIC
		500 °C to 660 °C	0.053 °C		BIC
	660 °C to 1000 °C	0.80 °C		BIC	
TE 6 2	Radiation thermometers (infrared)	-35 °C to -15 °C	0.22 °C	pyrometers	BIC
		-15 °C to 120 °C	0.19 °C	pyrometers	
		120 °C to 500 °C	0.19 to 0.47 °C	pyrometers	
		500 °C to 550 °C	0.51 °C	pyrometers	
		550 °C to 1000 °C	3.5 °C	pyrometers	

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		-10 °C to 50 °C	0.22 °C	Thermal Imagers, spot calibration only	BIC
		50 °C to 550 °C	0.22 °C to 0.70 °C	Thermal Imagers, spot calibration only	
		550 °C to 1000 °C	3.5 °C	Thermal Imagers, spot calibration only	
		-35 °C to -15 °C	0.35 °C	black body sources	BIC
		-15 °C to 120 °C	0.19 °C	black body sources	
		120 °C to 500 °C	0.19 °C to 0.47 °C	black body sources	
TE 9 0	Simulators/ indicators				
TE 9 1	For the purpose of resistance thermometers	-200 °C to 850 °C	0.006 °C to 0.009 °C	measuring and generating 4) based on Pt100	BIC + OS
TE 9 2	For the purpose of thermocouples	0 °C to 26 °C	0.025 °C	measuring and generating 5) thermocouple type E	BIC
		-250 °C to -200 °C	0.38 °C	measuring and generating 5)	BIC + OS
		-200 °C to -100 °C	0.25 °C	measuring and generating 5)	BIC + OS
		-100 °C to -25 °C	0.14 °C	measuring and generating 5)	BIC + OS
		-25 °C to 120 °C	0.12 °C	measuring and generating 5)	BIC + OS
		120 °C to 1000 °C	0.19 °C	measuring and generating 5)	BIC + OS
		1000 °C to 1372 °C	0.30 °C	measuring and generating 5)	BIC + OS
		1372 °C to 1767 °C	0.34 °C	measuring and generating 5)	BIC + OS

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TE 13 0	Other temperature enclosures				
TE 13 1	Dry block calibrator	-95 °C to 140 °C	0.033 °C		BIC
		140 °C to 660 °C	0.033 °C to 0.053 °C		BIC
		660 °C to 1000 °C	0.56 °C		BIC
		1000 °C to 1200 °C	2.2 °C		BIC
TE 13 2	Thermostat baths	-80 °C to 500 °C	0.025 °C		BIC
RH 0 0	Humidity				
RH 1 3	Relative Humidity sensors	10 %rh to 70 %rh	0.37 %rh	15 °C to 50 °C	BIC
		70 %rh to 95 %rh	0.46 %rh	15 °C to 50 °C	

Remarks:

- Calibrations inside the pressure laboratory are carried out at an ambient temperature of nominal (20 ± 2) °C, with a relative humidity of nominal (45 ± 20) %rh.
- Calibrations inside the electrical laboratory are carried out at an ambient temperature of nominal (23 ± 1) °C, with a relative humidity of nominal (45 ± 10) %rh.
- Temperature calibrations are carried out at an ambient temperature of nominal (23 ± 3) °C, with a relative humidity of nominal (45 ± 20) %rh.
- The calibrations outside the electrical laboratory are carried out at an ambient temperature of nominal (23 ± 3) °C, with a relative humidity of nominal (45 ± 20) %rh.
- Calibration on customer location are carried out at an ambient temperature of nominal (23 ± 5) °C, with a relative humidity of nominal (45 ± 20) %rh.

- 1) T_e = Trigger error for sine wave signals = $(4/f) \cdot 10^{-5} \cdot f$ (f = measured frequency).
- 2) Generate at $T_a = (23 \pm 3)$ °C.
- 3) T.E. = trigger error related to number of 10 MHz pulses counting during start/stop.
- 4) Resistance thermometers based on a Pt100. For others e.g. thermistors which actually measure resistance, see calibration measurement capabilities for DC/LF quantities.
- 5) Thermocouple measurement with or without internal reference junction compensation, actually measuring temperature dependent voltage. See calibration measurement capabilities for DC/LF quantities. Uncertainty depends on thermocouple type.