

Annex to declaration of accreditation (scope of accreditation)
 Normative document: EN ISO/IEC 17025:2017
 Registration number: **K 050**

of **Tradinco Instrumenten en Apparaten B.V.**
Tradinco Calibration Laboratory (TCL)

This annex is valid from: **06-05-2020** to **01-05-2021**

Replaces annex dated: **31-01-2018**

Location(s) where activities are performed under accreditation

Head Office

Radonstraat 250
 2718 TB
 Zoetermeer
 The Netherlands

Location	Abbreviation/ location code
Radonstraat 250 2718 TB Zoetermeer The Netherlands	ZOE

HCS code	Measured quantity, Range	Frequency	CMC ¹	Remarks	Location
LF 0 0	DC/LF Quantities				
LF 1 1	Direct voltage				ZOE
	10 mV to 100 mV		$5.5 \cdot 10^{-5} \cdot U$	Measuring	
	100 mV to 1 V		$2.0 \cdot 10^{-5} \cdot U$		
	1 V to 1000 V		$1.5 \cdot 10^{-5} \cdot U$		
	1 mV to 10 mV		$3.5 \cdot 10^{-3} \cdot U$	Generating	
	10 mV to 100 mV		$3.5 \cdot 10^{-4} \cdot U$		
	100 mV to 330 mV		$1.0 \cdot 10^{-4} \cdot U$		

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".

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

J.A.W.M. de Haas

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HCS code	Measured quantity, Range	Frequency	CMC ¹	Remarks	Location
	330 mV to 1020 V		$9.0 \cdot 10^{-5} \cdot U$		
LF 2 1	Direct current				ZOE
	100 μ A to 10 mA		$1.5 \cdot 10^{-4} \cdot I$	Measuring	
	10 mA to 100 mA		$1.8 \cdot 10^{-4} \cdot I$		
	100 mA to 1 A		$3.5 \cdot 10^{-4} \cdot I$		
	100 μ A to 300 μ A		$6.0 \cdot 10^{-4} \cdot I$	Generating	
	300 μ A to 1 mA		$3.0 \cdot 10^{-4} \cdot I$		
	1 mA to 3.3 mA		$1.7 \cdot 10^{-4} \cdot I$		
	3.3 mA to 330 mA		$2.0 \cdot 10^{-4} \cdot I$		
	330 mA to 2.2 A		$4.1 \cdot 10^{-4} \cdot I$		
	2.2 A to 11 A		$6.7 \cdot 10^{-4} \cdot I$		
LF 3 1	Alternating voltage				ZOE
	100 mV to 100 V	40 Hz to 1 kHz	$3.0 \cdot 10^{-4} \cdot U$	Measuring	
	100 mV to 100 V	1 kHz to 100 kHz	$1.7 \cdot 10^{-3} \cdot U$		
	100 V to 500 V	40 Hz to 10 kHz	$5.0 \cdot 10^{-4} \cdot U$		
	500 V to 1000 V	40 Hz to 10 kHz	$1.6 \cdot 10^{-3} \cdot U$		
	33 mV to 330 mV	10 Hz to 45 Hz	$2.2 \cdot 10^{-3} \cdot U + 51 \mu$ V	Generating	
		45 Hz to 10 kHz	$6.0 \cdot 10^{-4} \cdot U + 30 \mu$ V		
		10 kHz to 20 kHz	$9.0 \cdot 10^{-4} \cdot U + 22 \mu$ V		
		20 kHz to 50 kHz	$1.5 \cdot 10^{-3} \cdot U + 41 \mu$ V		
		50 kHz to 100 kHz	$2.1 \cdot 10^{-3} \cdot U + 0.15$ mV		

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		100 kHz to 500 kHz	$6.1 \cdot 10^{-3} \cdot U + 0.29 \text{ mV}$		
	330 mV to 3.3 V	10 Hz to 45 Hz	$1.3 \cdot 10^{-3} \cdot U + 0.34 \text{ mV}$		
		45 Hz to 10 kHz	$3.0 \cdot 10^{-4} \cdot U + 0.17 \text{ mV}$		
		10 kHz to 20 kHz	$7.0 \cdot 10^{-4} \cdot U + 0.07 \text{ mV}$		
		20 kHz to 50 kHz	$1.3 \cdot 10^{-3} \cdot U + 0.29 \text{ mV}$		
		50 kHz to 100 kHz	$2.1 \cdot 10^{-3} \cdot U + 1.5 \text{ mV}$		
		100 kHz to 500 kHz	$4.4 \cdot 10^{-3} \cdot U + 2.9 \text{ mV}$		
	3.3 V to 33 V	10 Hz to 45 Hz	$1.3 \cdot 10^{-3} \cdot U + 3.4 \text{ mV}$		
		45 Hz to 10 kHz	$4.0 \cdot 10^{-4} \cdot U + 1.5 \text{ mV}$		
		10 kHz to 20 kHz	$7.0 \cdot 10^{-4} \cdot U + 2.4 \text{ mV}$		
		20 kHz to 50 kHz	$1.7 \cdot 10^{-3} \cdot U + 4.6 \text{ mV}$		
		50 kHz to 100 kHz	$2.1 \cdot 10^{-3} \cdot U + 16 \text{ mV}$		
	33 V to 330 V	45 Hz to 1 kHz	$5.0 \cdot 10^{-4} \cdot U + 15 \text{ mV}$		
		1 kHz to 10 kHz	$7.0 \cdot 10^{-4} \cdot U + 15 \text{ mV}$		
		10 kHz to 20 kHz	$8.0 \cdot 10^{-4} \cdot U + 33 \text{ mV}$		
	330 V to 1020 V	45 Hz to 1 kHz	$4.0 \cdot 10^{-4} \cdot U + 0.17 \text{ V}$		
		1 kHz to 10 kHz	$1.8 \cdot 10^{-3} \cdot U + 0.46 \text{ V}$		
LF 4 1	Alternating current				ZOE
	100 μ A to 100 mA	40 Hz to 5 kHz	$1.7 \cdot 10^{-3} \cdot I$	Measuring	
	100 mA to 1 A	40 Hz to 1 kHz	$3.0 \cdot 10^{-3} \cdot I$		
	29 μ A to 0.33 mA	10 Hz to 20 Hz	$2.1 \cdot 10^{-3} \cdot I + 0.17 \text{ } \mu\text{A}$	Generating	
		20 Hz to 45 Hz	$1.0 \cdot 10^{-3} \cdot I + 0.17 \text{ } \mu\text{A}$		
		45 Hz to 1 kHz	$1.1 \cdot 10^{-3} \cdot I + 0.22 \text{ } \mu\text{A}$		
		1 kHz to 5 kHz	$3.5 \cdot 10^{-3} \cdot I + 0.14 \text{ } \mu\text{A}$		
		5 kHz to 10 kHz	$1.1 \cdot 10^{-2} \cdot I + 0.16 \text{ } \mu\text{A}$		
	0.33 mA to 3.3 mA	10 Hz to 20 Hz	$1.8 \cdot 10^{-3} \cdot I + 0.27 \text{ } \mu\text{A}$		

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		20 Hz to 45 Hz	$8.0 \cdot 10^{-4} \cdot I + 0.91 \mu\text{A}$		
		45 Hz to 1 kHz	$9.0 \cdot 10^{-4} \cdot I + 0.47 \mu\text{A}$		
		1 kHz to 5 kHz	$1.8 \cdot 10^{-3} \cdot I + 0.41 \mu\text{A}$		
		5 kHz to 10 kHz	$5.2 \cdot 10^{-3} \cdot I + 0.82 \mu\text{A}$		
	3.3 mA to 33 mA	10 Hz to 20 Hz	$1.7 \cdot 10^{-3} \cdot I + 6.1 \mu\text{A}$		
		20 Hz to 45 Hz	$9.0 \cdot 10^{-4} \cdot I + 4.7 \mu\text{A}$		
		45 Hz to 1 kHz	$8.0 \cdot 10^{-4} \cdot I + 4.1 \mu\text{A}$		
		1 kHz to 5 kHz	$1.8 \cdot 10^{-3} \cdot I + 3.6 \mu\text{A}$		
		5 kHz to 10 kHz	$5.2 \cdot 10^{-3} \cdot I + 5.2 \mu\text{A}$		
	33 mA to 330 mA	10 Hz to 20 Hz	$1.7 \cdot 10^{-3} \cdot I + 61 \mu\text{A}$		
		20 Hz to 45 Hz	$9.0 \cdot 10^{-4} \cdot I + 47 \mu\text{A}$		
		45 Hz to 1 kHz	$8.0 \cdot 10^{-4} \cdot I + 41 \mu\text{A}$		
		1 kHz to 5 kHz	$1.8 \cdot 10^{-3} \cdot I + 36 \mu\text{A}$		
		5 kHz to 10 kHz	$5.2 \cdot 10^{-3} \cdot I + 52 \mu\text{A}$		
	330 mA to 2.2 A	10 Hz to 45 Hz	$1.7 \cdot 10^{-3} \cdot I + 0.63 \text{ mA}$		
		45 Hz to 1 kHz	$8.0 \cdot 10^{-4} \cdot I + 0.65 \text{ mA}$		
		1 kHz to 5 kHz	$6.5 \cdot 10^{-3} \cdot I + 0.41 \text{ mA}$		
	2.2 A to 11 A	45 Hz to 65 Hz	$4.0 \cdot 10^{-4} \cdot I + 4.1 \text{ mA}$		
		65 Hz to 500 Hz	$8.0 \cdot 10^{-4} \cdot I + 3.8 \text{ mA}$		
		500 Hz to 1 kHz	$2.8 \cdot 10^{-3} \cdot I + 7.4 \text{ mA}$		
LF 6 2	DC Resistance				ZOE
	1 Ω to 10 Ω		$7.0 \cdot 10^{-5} \cdot R$	4-wire measuring	
	10 Ω to 1 k Ω		$4.0 \cdot 10^{-5} \cdot R$	4-wire	
	1 k Ω to 100 k Ω		$3.0 \cdot 10^{-5} \cdot R$	4-wire	
	100 k Ω to 1 M Ω		$4.0 \cdot 10^{-5} \cdot R$	4-wire	
	1 M Ω to 10 M Ω		$8.5 \cdot 10^{-5} \cdot R$	4-wire	
	10 M Ω to 100 M Ω		$8.5 \cdot 10^{-4} \cdot R$	4-wire	

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	100 MΩ to 1 GΩ		$8.5 \cdot 10^{-3} \cdot R$	2-wire	
	1 Ω to 11 Ω		$5.5 \cdot 10^{-3} \cdot R$	4-wire generating	
	11 Ω to 33 Ω		$9.5 \cdot 10^{-4} \cdot R$	4-wire	
	33 Ω to 110 Ω		$4.0 \cdot 10^{-4} \cdot R$	4-wire	
	110 Ω to 110 kΩ		$3.0 \cdot 10^{-4} \cdot R$	4-wire	
	110 kΩ to 3.3 MΩ		$3.0 \cdot 10^{-4} \cdot R$	2-wire	
	3.3 MΩ to 11 MΩ		$7.0 \cdot 10^{-4} \cdot R$	2-wire	
	11 MΩ to 33 MΩ		$1.0 \cdot 10^{-3} \cdot R$	2-wire	
	33 MΩ to 330 MΩ		$4.6 \cdot 10^{-3} \cdot R$	2-wire	
TF 0 0	Time and frequency				
TF 2 1	Frequency				ZOE
	0.01 Hz to 225 MHz		$10 \cdot 10^{-6} \cdot f$	Measuring	
	1 Hz to 300 Hz		$2.5 \cdot 10^{-5} \cdot f + 1 \text{ mHz}$	Generating	
	300 Hz to 2 MHz		$2.5 \cdot 10^{-5} \cdot f$		

HCS code	Measured quantity, Instrument, Measure	Range	CMC ¹	Remarks	Location
TE 9 0	Simulators/ Display Units				
TE 9 1	Resistance thermometer			Electrical Calibration	ZOE
	-200 °C to 0 °C		0.05 °C	Generating and Measuring	
	0 °C to 630 °C		0.10 °C		

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	630 °C to 800 °C		0.30 °C		
TE 9 2	Thermocouples			Electrical Calibration	ZOE
	Type B	600 °C to 800 °C	0.51 °C	Generating and Measuring	
		800 °C to 1000 °C	0.40 °C		
		1000 °C to 1550 °C	0.34 °C		
		1550 °C to 1820 °C	0.34 °C		
	Type C	0 °C to 150 °C	0.30 °C		
		150 °C to 650 °C	0.26 °C		
		650 °C to 1000 °C	0.29 °C		
		1000 °C to 1800 °C	0.49 °C		
		1800 °C to 2316 °C	0.92 °C		
	Type E	-250 °C to -100 °C	0.49 °C		
		-100 °C to -25 °C	0.15 °C		
		-25 °C to 350 °C	0.13 °C		
		350 °C to 650 °C	0.16 °C		
		650 °C to 1000 °C	0.20 °C		
	Type J	-210 °C to -100 °C	0.26 °C		
		-100 °C to -30 °C	0.15 °C		
		-30 °C to 150 °C	0.13 °C		
		150 °C to 760 °C	0.17 °C		
		760 °C to 1200 °C	0.22 °C		
	Type K	-200 °C to -100 °C	0.32 °C		
		-100 °C to -25 °C	0.17 °C		
		-25 °C to 120 °C	0.15 °C		
		120 °C to 1000 °C	0.26 °C		
		1000 °C to 1372 °C	0.38 °C		

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	Type L	-200 °C to -100 °C	0.33 °C		
		-100 °C to 800 °C	0.24 °C		
		800 °C to 900 °C	0.17 °C		
	Type N	-200 °C to -100 °C	0.41 °C		
		-100 °C to -25 °C	0.22 °C		
		-25 °C to 120 °C	0.19 °C		
		120 ° to 410 °C	0.17 °C		
		410 °C to 1300 °C	0.28 °C		
	Type R	0 °C to 250 °C	0.63 °C		
		250 °C to 400 °C	0.38 °C		
		400 °C to 1000 °C	0.35 °C		
		1000 °C to 1767 °C	0.43 °C		
	Type S	0 °C to 250 °C	0.56 °C		
		250 °C to 1000 °C	0.39 °C		
		1000 °C to 1400 °C	0.37 °C		
		1400 °C to 1767 °C	0.45 °C		
	Type T	-250 °C to -150 °C	0.64 °C		
		-150 °C to 0 °C	0.23 °C		
		0 °C to 120 °C	0.15 °C		
		120 °C to 400 °C	0.14 °C		
	Type U	-200 °C to 0 °C	0.50 °C		
		0 °C to 600 °C	0.25 °C		
TE 13 1	Self-indicating thermometers				
	Dry Block Calibrators	-50 °C to 650 °C	0.1 °C	<i>See remark at bottom of the scope</i>	ZOE

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HCS code	Measured quantity, Instrument, Measure	Range	CMC ¹	Remarks	Location
PV 0 0	Pressure and vacuum				
PV 1 1	Absolute gas pressure	1 kPa to 3.5 kPa	$6 \text{ Pa} + 1.0 \cdot 10^{-4} \cdot p$	Gas	ZOE
		3.5 kPa to 67 kPa	$45 \cdot 10^{-6} \cdot p$ (not smaller than 2 Pa)		
		67 kPa to 7 MPa	$35 \cdot 10^{-6} \cdot p$ (not smaller than 3 Pa)	Gas	
		7 MPa to 40 MPa	$7.0 \cdot 10^{-5} \cdot p + 3 \cdot 10^{-5} \cdot p_{amb} + 6.0 \text{ Pa}$		
PV 1 2	Over atmospheric gas pressure	20 Pa to 1.4 kPa	$2.5 \cdot 10^{-4} \cdot p_e$ (not smaller than 0.15 Pa)		ZOE
		1.4 kPa to 7 MPa	$35 \cdot 10^{-6} \cdot p_e$ (not smaller than 0.35 Pa)		
		7 MPa to 40 MPa	$7.0 \cdot 10^{-5} \cdot p_e$	Oil	
PV 2 1	Absolute liquid pressure	350 kPa to 1.5 MPa	$1.1 \cdot 10^{-4} \cdot p + 6.0 \text{ Pa}$		ZOE
		1.5 MPa to 80 MPa	$7.0 \cdot 10^{-5} \cdot p + 3 \cdot 10^{-5} \cdot p_{amb} + 6.0 \text{ Pa}$		
		80 MPa to 100 MPa	$1.2 \cdot 10^{-4} \cdot p + 6.0 \text{ Pa}$		
		100 MPa to 250 MPa	$2.0 \cdot 10^{-4} \cdot p + 6.0 \text{ Pa}$		
PV 2 2	Over atmospheric liquid pressure	260 kPa to 1.5 MPa	$1.1 \cdot 10^{-4} \cdot p_e$	Oil	ZOE
		1.5 MPa to 80 MPa	$70 \cdot 10^{-6} \cdot p_e$ (not smaller than 150 Pa)		
		80 MPa to 100 MPa	$1.2 \cdot 10^{-4} \cdot p_e$		
		100 MPa to 250 MPa	$2.0 \cdot 10^{-4} \cdot p_e$		

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HCS code	Measured quantity, Instrument, Measure	Range	CMC ¹	Remarks	Location
PV 3 1	Under atmospheric pressure	-100 kPa to -4 kPa	$1.0 \cdot 10^{-4} \cdot p_e $	Gas <i>See remark at bottom of the scope</i>	ZOE

Remarks:

The calibrations are carried out at an ambient temperature of 20 °C (nominal).

$p_e = p - p_{amb}$; p_e is the gauge pressure, p_{amb} is the ambient pressure.

This annex is applicable to calibrations carried out in the own laboratory.

PV 3 1: Under atmospheric pressure is measure from ambient air pressure in the negative direction, therefor -100 kPa can only be achieved when the barometric pressure is at least 101 KPa absolute.

TE 13 1: The CMC value excludes the characteristic influence of the Dry Block Calibrators.