Annex to ISO/IEC 17025 Accreditation
with number: **K 063**

of **D.A.R.E!! Calibrations**

Woerden

Valid from: **27-10-2010** to **1-11-2013** Replaces annex dated: **16-03-2010**

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
LF 0 0	DC/LF Quantities			
LF 1 0	DC Voltage			
	0 - 2 mV		$6 \cdot 10^{-6} \cdot U + 0{,}9\ \mu V$	Generating
	2 – 20 mV		$7 \cdot 10^{-6} \cdot U + 0{,}9\ \mu V$	
	20 mV - 200 mV		$9 \cdot 10^{-6} \cdot U + 1{,}0\ \mu V$	
	200 mV - 2 V		$7 \cdot 10^{-6} \cdot U + 1{,}2\ \mu V$	
	2 V - 20 V		$5 \cdot 10^{-6} \cdot U + 8\ \mu V$	
	20 V - 200 V		$7 \cdot 10^{-6} \cdot U + 0{,}08\ mV$	
	200 V - 1000 V		$9 \cdot 10^{-6} \cdot U + 0{,}6\ mV$	
	0- 200 mV		$7 \cdot 10^{-6} \cdot U + 0{,}8\ \mu V$	Measuring
	200 mV - 2 V		$8 \cdot 10^{-6} \cdot U + 1{,}0\ \mu V$	
	2 V - 20 V		$7 \cdot 10^{-6} \cdot U + 7\ \mu V$	
	20 V - 200 V		$1{,}2 \cdot 10^{-5} \cdot U + 0{,}06\ mV$	
	200 V - 1000 V		$1{,}2 \cdot 10^{-5} \cdot U + 0{,}8\ mV$	
LF 2 0	DC Current			
	0 - 200 µA		$1{,}2 \cdot 10^{-4} \cdot I + 5\ nA$	Generating
	200 µA - 2 mA		$5 \cdot 10^{-5} \cdot I + 12\ nA$	
	2 - 20 mA		$5 \cdot 10^{-5} \cdot I + 0{,}12\ \mu A$	
	20 - 200 mA		$5 \cdot 10^{-5} \cdot I + 1{,}2\ \mu A$	
	200 mA - 2 A		$1{,}2 \cdot 10^{-4} \cdot I + 23\ \mu A$	

This annex has been approved by:

Ir. J.C. van der Poel
Chief Executive

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	0 - 200 µA		$1{,}2\cdot10^{-4}\cdot I$ + 5 nA	Measuring
	200 µA - 2 mA		$1{,}2\cdot10^{-4}\cdot I$ + 0,05 µA	
	2 - 20 mA		$1{,}2\cdot10^{-4}\cdot I$ + 0,5 µA	
	20 - 200 mA		$1{,}2\cdot10^{-4}\cdot I$ + 5 µA	
	200 mA - 2 A		$2{,}4\cdot10^{-4}\cdot I$ + 0,05 µA	
LF 3 0	AC Voltage			
	0 - 2 mV	30 Hz – 3,3 kHz	$1{,}1\cdot10^{-3}\cdot U$ + 6 µV	Generating, 2-wire
		3,3 – 10 kHz	$1{,}8\cdot10^{-3}\cdot U$ + 6 µV	
		10 - 33 kHz	$4\cdot10^{-3}\cdot U$ + 6 µV	
		33 - 100 kHz	$10\cdot10^{-3}\cdot U$ + 6 µV	
	2 mV - 20 mV	30 Hz - 1 kHz	$3{,}2\cdot10^{-4}\cdot U$ + 6 µV	
		1 - 3,3 kHz	$5\cdot10^{-4}\cdot U$ + 6 µV	
		3,3 – 10 kHz	$1{,}3\cdot10^{-3}\cdot U$ + 6 µV	
		10 - 33 kHz	$3{,}5\cdot10^{-3}\cdot U$ + 6 µV	
		33 - 100 kHz	$1{,}2\cdot10^{-2}\cdot U$ + 6 µV	
	20 mV - 200 mV	30 - 330 Hz	$2{,}3\cdot10^{-4}\cdot U$ + 6 µV	
		330 Hz - 1 kHz	$3{,}1\cdot10^{-4}\cdot U$ + 6 µV	
		1 – 3,3 kHz	$6\cdot10^{-4}\cdot U$ + 6 µV	
		3,3 - 10 kHz	$1{,}3\cdot10^{-3}\cdot U$ + 6 µV	
		10 - 33 kHz	$3{,}6\cdot10^{-3}\cdot U$ + 6 µV	
		33 - 100 kHz	$1{,}2\cdot10^{-2}\cdot U$ + 6 µV	
	90 mV - 2V	10 - 32 Hz	$1{,}3\cdot10^{-4}\cdot U$ + 35 µV	Generating, 4-wire
		32 - 330 Hz	$9\cdot10^{-5}\cdot U$ + 25 µV	
		330 Hz – 3,3 kHz	$7\cdot10^{-5}\cdot U$ + 25 µV	
		3,3 - 33 kHz	$9\cdot10^{-5}\cdot U$ + 11 µV	
		33 - 100 kHz	$2{,}2\cdot10^{-4}\cdot U$ + 23 µV	

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
		100 - 330 kHz	$1{,}6\cdot10^{-3}\cdot U$ + 0,12 mV	
		330 kHz - 1 MHz	$1{,}4\cdot10^{-2}\cdot U$ + 0,9 mV	
	2 V - 20 V	30 - 32 Hz	$1{,}3\cdot10^{-4}\cdot U$ + 0,35 mV	
		32 - 330 Hz	$9\cdot10^{-5}\cdot U$ + 0,25 mV	
		330 Hz - 33 kHz	$8\cdot10^{-5}\cdot U$ + 0,12 mV	
		33 - 100 kHz	$2{,}2\cdot10^{-4}\cdot U$ + 0,23 mV	
		100 - 330 kHz	$1{,}6\cdot10^{-3}\cdot U$ + 1,2 mV	
		330 kHz - 1 MHz	$1{,}1\cdot10^{-2}\cdot U$ + 5 mV	
	20 V - 200 V	10 - 32 Hz	$1{,}7\cdot10^{-4}\cdot U$ + 9 mV	
		32 - 330 Hz	$1{,}2\cdot10^{-4}\cdot U$ + 6 mV	
		330 Hz - 10 kHz	$1{,}1\cdot10^{-4}\cdot U$ + 1,2 mV	
		10 - 330 kHz	$1{,}2\cdot10^{-4}\cdot U$ + 2,3 mV	
		330 kHz – 1 MHz	$4\cdot10^{-4}\cdot U$ + 3,5 mV	
	200 V - 1000 V	50 - 330 Hz	$9\cdot10^{-4}\cdot U$ + 50 mV	
		330 Hz- 10 kHz	$7\cdot10^{-4}\cdot U$ + 40 mV	
		10 - 33 kHz	$9\cdot10^{-4}\cdot U$ + 50 mV	
	2 mV - 200 mV	20 - 40 Hz	$3\cdot10^{-4}\cdot U$ + 5 µV	Measuring
		40 Hz - 2 kHz	$2{,}8\cdot10^{-4}\cdot U$ + 5 µV	
		2 - 3 kHz	$2{,}7\cdot10^{-4}\cdot U$ + 7 µV	
		3 - 10 kHz	$2{,}7\cdot10^{-4}\cdot U$ + 5 µV	
		10 - 30 kHz	$5\cdot10^{-4}\cdot U$ + 5 µV	
		30 - 100 kHz	$9\cdot10^{-4}\cdot U$ + 5 µV	
	200 mV - 2 V	20 - 40 Hz	$2{,}1\cdot10^{-4}\cdot U$ + 23 µV	
		40 - 100 Hz	$1{,}9\cdot10^{-4}\cdot U$ + 23 µV	
		100 - 300 Hz	$1{,}7\cdot10^{-4}\cdot U$ + 23 µV	
		300 - 1000 Hz	$1{,}6\cdot10^{-4}\cdot U$ + 23 µV	
		1 - 3 kHz	$1{,}8\cdot10^{-4}\cdot U$ + 23 µV	

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
		3 - 10 kHz	$3 \cdot 10^{-4} \cdot U$ + 0,05 mV	
		10 - 60 kHz	$6 \cdot 10^{-4} \cdot U$ + 0,23 mV	
		60 - 100 kHz	$3,5 \cdot 10^{-4} \cdot U$ + 2,3 mV	
		100 - 300 kHz	$3,7 \cdot 10^{-4} \cdot U$ + 2,3 mV	
		300 kHz - 1 MHz	$1,2 \cdot 10^{-2} \cdot U$ + 23 mV	
	2 V - 20 V	20 - 40 Hz	$2,1 \cdot 10^{-4} \cdot U$ + 0,23 mV	
		40 - 100 Hz	$1,9 \cdot 10^{-4} \cdot U$ + 0,23 mV	
		100 Hz - 3 kHz	$1,6 \cdot 10^{-4} \cdot U$ + 0,23 mV	
		3 - 10 kHz	$3,0 \cdot 10^{-4} \cdot U$ + 0,5 mV	
		10 - 60 kHz	$6 \cdot 10^{-4} \cdot U$ + 2,3 mV	
		60 - 300 kHz	$3,7 \cdot 10^{-3} \cdot U$ + 23 mV	
		300 kHz - 1 MHz	$1,2 \cdot 10^{-2} \cdot U$ + 0,23 V	
	20 V - 200 V	20 - 40 Hz	$2,2 \cdot 10^{-4} \cdot U$ + 2,3 mV	
		40 - 100 Hz	$1,9 \cdot 10^{-4} \cdot U$ + 2,3 mV	
		100 – 300 Hz	$1,7 \cdot 10^{-4} \cdot U$ + 2,3 mV	
		300 Hz – 3 kHz	$1,6 \cdot 10^{-4} \cdot U$ + 2,3 mV	
		3 - 10 kHz	$1,8 \cdot 10^{-4} \cdot U$ + 2,3 mV	
		10 - 30 kHz	$3 \cdot 10^{-4} \cdot U$ + 5 mV	
		30 - 100 kHz	$7 \cdot 10^{-4} \cdot U$ + 23 mV	
	200 V - 1000 V	40 Hz - 3 kHz	$1,7 \cdot 10^{-3} \cdot U$ + 23 mV	
		3 - 10 kHz	$2,8 \cdot 10^{-3} \cdot U$ + 23 mV	
		10 - 30 kHz	$2,8 \cdot 10^{-3} \cdot U$ + 50 mV	
LF 4 0	AC Current			
	10 - 200 µA	10 - 32 Hz	$2,3 \cdot 10^{-4} \cdot I$ + 12 nA	Generating
		32 - 330 Hz	$1,9 \cdot 10^{-3} \cdot I$ + 11 nA	
		330 - 1000 Hz	$6 \cdot 10^{-3} \cdot I$ + 5 nA	

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
	200 µA - 2 mA	10 - 32 Hz	$1{,}6 \cdot 10^{-4} \cdot I + 0{,}11$ µA	
		32 - 330 Hz	$1{,}6 \cdot 10^{-4} \cdot I + 0{,}12$ µA	
		330 - 1000 Hz	$1{,}5 \cdot 10^{-4} \cdot I + 0{,}12$ µA	
		1 - 3,3 kHz	$2{,}6 \cdot 10^{-4} \cdot I + 0{,}12$ µA	
		3,3 - 5 kHz	$2{,}7 \cdot 10^{-4} \cdot I + 0{,}12$ µA	
	2 mA - 20 mA	10 - 32 Hz	$1{,}6 \cdot 10^{-4} \cdot I + 1{,}1$ µA	
		32 - 330 Hz	$1{,}6 \cdot 10^{-4} \cdot I + 1{,}2$ µA	
		330 - 1000 Hz	$1{,}4 \cdot 10^{-4} \cdot I + 1{,}2$ µA	
		1 - 3,3 kHz	$2{,}6 \cdot 10^{-4} \cdot I + 1{,}2$ µA	
		3,3 - 5 kHz	$2{,}7 \cdot 10^{-4} \cdot I + 1{,}2$ µA	
	20 mA - 200 mA	10 - 32 Hz	$1{,}6 \cdot 10^{-4} \cdot I + 11$ µA	
		32 - 330 Hz	$1{,}6 \cdot 10^{-4} \cdot I + 12$ µA	
		330 - 1000 Hz	$1{,}4 \cdot 10^{-4} \cdot I + 12$ µA	
		1 - 3,3 kHz	$2{,}6 \cdot 10^{-4} \cdot I + 12$ µA	
		3,3 - 5 kHz	$2{,}7 \cdot 10^{-4} \cdot I + 12$ µA	
	200 mA - 2 A	10 - 32 Hz	$4 \cdot 10^{-4} \cdot I + 0{,}12$ mA	
		32 - 330 Hz	$6 \cdot 10^{-4} \cdot I + 0{,}12$ mA	
		330 - 1000 Hz	$1{,}5 \cdot 10^{-5} \cdot I + 0{,}10$ mA	
		1 - 3,3 kHz	$5 \cdot 10^{-4} \cdot I + 0{,}09$ mA	
		3,3 - 5 kHz	$8 \cdot 10^{-3} \cdot I + 33$ µA	
	10 µA - 200 µA	50 - 1000 Hz	$3{,}8 \cdot 10^{-4} \cdot I + 23$ nA	Measuring
		1 - 5 kHz	$7 \cdot 10^{-4} \cdot I + 23$ nA	
	200 µA - 2 mA	50 - 300 Hz	$3{,}6 \cdot 10^{-4} \cdot I + 0{,}23$ µA	
		300 - 1000 Hz	$3{,}7 \cdot 10^{-4} \cdot I + 0{,}23$ µA	
		1 - 5 kHz	$7 \cdot 10^{-4} \cdot I + 0{,}23$ µA	

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
	2 mA - 20 mA	50 - 300 Hz	$3{,}6 \cdot 10^{-4} \cdot I + 2{,}3$ µA	
		300 - 1000 Hz	$3{,}8 \cdot 10^{-4} \cdot I + 2{,}3$ µA	
		1 - 5 kHz	$7 \cdot 10^{-4} \cdot I + 2{,}3$ µA	
	20 mA - 200 mA	50 - 1000 Hz	$3{,}6 \cdot 10^{-4} \cdot I + 23$ µA	
		1 - 5 kHz	$7 \cdot 10^{-4} \cdot I + 23$ µA	
	200 mA - 2 A	50 - 1000 Hz	$2{,}3 \cdot 10^{-3} \cdot I + 1{,}2$ mA	
		1 - 5 kHz	$2{,}3 \cdot 10^{-3} \cdot I + 1{,}2$ mA	
LF 6 1	Resistance			
LF 6 2	DC resistance			
	1 Ω		0,2 mΩ	Generating, 4-wire
	10 Ω		0,5 mΩ	
	100 Ω		1,9 mΩ	
	1 kΩ		21 mΩ	
	10 kΩ		0,2 Ω	
	100 kΩ		2,3 Ω	
	1 MΩ		33 Ω	
	10 MΩ		0,7 kΩ	
	100 MΩ		9 kΩ	
	10 Ω		0,24 Ω	Generating, 2-wire
	100 Ω		0,24 Ω	
	1 kΩ		0,35 Ω	
	10 kΩ		0,5 Ω	
	100 kΩ		2,6 Ω	
	1 MΩ		33 Ω	
	10 MΩ		0,7 kΩ	
	100 MΩ		22 kΩ	

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	0 - 20 Ω		$2{,}0\cdot10^{-5}\cdot R$ + 0,12 mΩ	Measuring, 4-wire
	20 - 200 Ω		$1{,}5\cdot10^{-5}\cdot R$ + 0,2 mΩ	
	200 - 2000 Ω		$1{,}2\cdot10^{-5}\cdot R$ + 1,3 mΩ	
	2 - 20 kΩ		$1{,}2\cdot10^{-5}\cdot R$ + 13 mΩ	
	20 - 200 kΩ		$2{,}1\cdot10^{-5}\cdot R$ + 110 mΩ	
	200 kΩ - 2 MΩ		$3{,}1\cdot10^{-5}\cdot R$ + 1,6 Ω	
	2 - 20 MΩ		$3{,}6\cdot10^{-5}\cdot R$ + 100 Ω	Measuring, 2-wire
	20 - 200 MΩ		$1{,}7\cdot10^{-4}\cdot R$ + 10 kΩ	
	200 MΩ - 2 GΩ		$3{,}5\cdot10^{-3}\cdot R$ + 1,1 MΩ	
RF 0 0	High frequency quantities			
RF 2 1	Reflection coefficient			
	Magnitude 0 to 1,0	30 kHz – 1 MHz	$0{,}005+0{,}007\cdot\Gamma+0{,}005\cdot\Gamma^2$	Nom. impedance 50 Ω at nominal -10 dBm RF power
		1 MHz - 2 GHz	$0{,}005+0{,}003\cdot\Gamma+0{,}005\cdot\Gamma^2$	
		2 GHz - 8 GHz	$0{,}02+0{,}004\cdot\Gamma+0{,}02\cdot\Gamma^2$	
		8 GHz – 18 GHz	$0{,}03+0{,}004\cdot\Gamma+0{,}04\cdot\Gamma^2$	
	Phase –180° to + 180°	30 kHz -18 GHz	$u(\theta)=\arcsin\left(\frac{u(\lvert\Gamma\rvert)}{\lvert\Gamma\rvert}\right)$	If the magnitude is less than its uncertainty, the phase uncertainty is 180°
RF 2 11	Impedance			
	LISN Impedance	30 kHz – 30 MHz	0,3 Ω - 1,1 Ω 1,2 ° – 3,8 °	50 Ω // (50 µH + 5 Ω) and 50 Ω // 50 µH
		100 kHz – 150 MHz	0,5 Ω - 0,9 Ω 3,3° – 8 °	50 Ω // (5 µH + 1 Ω) and 50 Ω // 5 µH
	CDN Impedance	150 kHz – 300 MHz	5 Ω – 6 Ω	150 Ω, 0 ° nominal
			2,4 ° – 3,9 °	

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
RF 2 2	Transmission Coefficient			For coaxial 50 Ω devices
	Magnitude 0 to – 40 dB	30 kHz – 1 MHz	0,07 dB	at nom. -10 dBm RF power
		1 MHz - 2 GHz	0,03 dB	
		2 GHz - 8 GHz	0,08 dB	
		8 GHz – 18 GHz	0,10 dB	
	Magn. (–40 to –70)dB	30 kHz – 18 GHz	0,10 dB	at nom. 0 dBm RF power
	Magn. (–70 to –100)dB	30 kHz – 18 GHz	1,0 dB	at nom. +10 dBm RF power
RF 3 0	High Frequency Power			
	Calibration factors of power sensors	30 kHz – 3 MHz	0,10 dB – 0,05 dB	2), 0 dBm nominal
		3 MHz – 300 MHz	0,05 dB	2), 0 dBm nominal
		300 MHz – 4,2 GHz	0,05 dB – 0,07 dB	2), 0 dBm nominal
		10 MHz – 4 GHz	0,07 dB	2), -30 dBm nominal
		4 GHz – 10 GHz	0,07 dB – 0,11 dB	2), -30 dBm nominal
		10 GHz – 18 GHz	0,11 dB	2), -30 dBm nominal
	Linearity of RF power			
	0 to -10 dBm	30 kHz – 4,2 GHz	0,03 dB	
	0 to -20 dBm	30 kHz – 4,2 GHz	0,05 dB	
	0 to -40 dBm	10 MHz – 18 GHz	0,05 dB	
	0 to -50 dBm	10 MHz – 18 GHz	0,07 dB	
	0 to -60 dBm	10 MHz – 18 GHz	0,09 dB	

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RF 3 0	Absolute power			
	-25 dBm to +10 dBm	30 kHz - 300 kHz	0,5 dB - 0,07 dB	3)
	-25 dBm to +10 dBm	300 kHz - 4,2 GHz	0,07 dB	3)
	-60 dBm to -20 dBm	10 MHz - 18 GHz	0,09 dB	3)
	Frequency response of power measuring devices	30 kHz - 18 GHz	0,06 dB	2), at nom. –20 dBm RF power
	Response of CISPR receivers			
	QP and AV	9 kHz - 1 GHz	0,3 dB	3)
	Bandwidth of RBW filters			
	1 Hz to 10 MHz	30 kHz - 2,4 GHz	0,8 + 0,02·BW	
	1 Hz to 10 MHz	10 MHz - 18 GHz	0,08 + 0,02·BW	
RF 5 0	Electrical /magnetic field quantities /EMC			
	Electrical Field Strength 1 – 200 V/m	100 kHz – 30 MHz	0,5 – 0,6 dB	Temcell
		30 MHz – 75 MHz	0,6 – 1,3 dB	
		75 MHz – 200 MHz	1,3 dB	
	Electrical Field Strength 1 – 100 V/m	200 MHz – 4 GHz	1,2 dB	Anechoic Chamber
		4 GHz – 12GHz	1,3 dB	
		12 GHz – 18 GHz	1,3 - 2,4 dB	
		18 GHz – 40 GHz	2,4 dB	

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RF 5 0	Antenna factor			
	ANSI C63.5	30 MHz – 5 GHz	0,8 dB	OATS, Standard Site method
	ANSI C63.5	30 MHz – 1 GHz	0,8 dB	OATS, Reference antenna method
	Quasi Free Space	20 MHz – 100 MHz	0,9 dB	Calibrated in Free Space Environment
		100 MHz – 200 MHz	0,8 dB	
		200 MHz – 5 GHz	0,7 dB	
		1 GHz – 10 GHz	1,4 dB	Calibrated in Full Anechoic Room
		10 GHz – 12 GHz	1,4 dB – 2,1 dB	
		12 GHz – 18 GHz	2,1 dB	
	SAE ARP 958	20 MHz – 100 MHz	0,9 dB	For military or automotive use
		100 MHz – 200 MHz	0,8 dB	
		200 MHz – 5 GHz	0,7 dB	
	Shielding Effectiveness			On Site measurement According to EN50147 and Mil Std 285
	Magnetic Field 100 dB	10 kHz – 30 MHz	± 5 dB	
	Electric Field 120 – 150 dB	10 MHz – 300 MHz	± 5 dB	
	Plane wave 110 – 140 dB	30 MHz – 1 GHz	± 5 dB	
	Plane wave 110 – 140 dB	1 GHz – 18 GHz	± 6 dB	

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
RF 5 0	Normalized Site Attenuation			On Site measurement According to CISPR 16-1-4 using broadband antennae Horizontal and vertical polarization, distance between 3 m and 30 m
	NSA	30 MHz – 1000 MHz	± 1,6 dB	
	Site Voltage Standing Wave Ratio			On Site measurement According to CISPR 16-1-4 using reciprocal method
	S_{VSWR}	1 GHz – 18 GHz	± 2,0 dB	
	Field Uniformity			
	Forward Power	80 MHz – 18 GHz	± 1,3 dB	On Site measurement According to IEC 61000-4-3
	Field Uniformity	80 MHz – 18 GHz	± 1,7 dB	
	Surge generators and coupling/decoupling networks waveform surge voltage			According to EN 61000-4-5, (November 2005), §6.1.2, §6.2.2 and §6.3.1 1,2/50 µs pulse 10/700 µs pulse 0,5/700 µs pulse
	0 V – 550 V		6,7 V + 0,022·*U* 6,7 V + 0,025·*U (on site)*	Coupling/decoupling networks for AC/DC power supply circuits only in combination with appropriate surge generator
	0 V – 1,1 kV		13,4 V + 0,022·*U* 13,4 V + 0,025·*U (on site)*	
	0 V – 2,8 kV		33,5 V + 0,022·*U* 33,5 V + 0,025·*U (on site)*	
	0 V – 5,5 kV		67 V + 0,022·*U* 67 V + 0,025·*U (on site)*	

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
RF 5 0	Waveform surge current			
	Current amplitude			1,2/50 µs pulse 10/700 µs pulse 0,5/700 µs pulse
	0 – 15 A		0,18 + 0,022 * I 0,18 + 0,029 * I *(on site)*	Measurements at coupling/decoupling network input, output; coupling modes line to neutral, line to earth and neutral to earth
	0 – 30 A		0,36 + 0,022 * I 0,36 + 0,029 * I *(on site)*	
	0 – 60 A		0,72 + 0,022 * I 0,72 + 0,029 * I *(on site)*	
	0 – 150 A		1,8 + 0,022 * I 1,8 + 0,029 * I *(on site)*	
	0 – 300 A		3,6 + 0,022 * I 3,6 + 0,029 * I *(on site)*	
	0 – 600 A		7,2 + 0,022 * I 7,2 + 0,029 * I *(on site)*	
	0 – 1500 A		18 + 0,022 * I 18 + 0,029 * I *(on site)*	
	0 – 3000 A		36 + 0,022 * I 36 + 0,029 * I *(on site)*	
	Front time Voltage			
	1,2/50 µs	0,65 – 1,75 µs	0,08 µs	Also applies to On-Site
	10/700 µs 0,5/700 µs	5,5 – 15,5 µs 0,27 – 0,73 µs	0,5 µs 0,027 µs	
	Front time current			
	1,2/50 µs	6,4 – 9,6 µs 1,4 – 3,6 µs	0,18 µs 0,07 µs	line - line line - PE
	10/700 µs 0,5/700 µs	3,5 – 6,5µs 1,0 – 2,2 µs	0,27 µs 0,031 µs	

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
RF 5 0	Rise time Voltage			Also applies to On-Site
	1,2/50 µs	0,55 – 1,45 µs	0,05 µs	
	10/700 µs	3,5 – 9,5 µs	0,27 µs	
	0,5/700 µs	0,22 – 0,58 µs	0,016 µs	
	Rise time current			Also applies to On-Site
	1,2/50 µs	4,5 – 8,3 µs	0,15 µs	line - line
		1,1 – 2,9 µs	0,05 µs	line - PE
	10/700 µs	2,8 – 5,2 µs	0,21 µs	
	0,5/700 µs	0,6 – 1,8 µs	0,024 µs	
	Time to half-value, Voltage			Also applies to On-Site
	1,2/50 µs	35 µs – 65 µs	1,0 µs	
	10/700 µs		14 µs	
	0,5/700 µs		14 µs	
	Time to half-value, Current			Also applies to On-Site
	1,2/50 µs	14 - 26 µs	0,23 µs	line – line
		14 - 36 µs	0,23 µs	line - PE
	10/700 µs	220 - 420 µs	6 µs	
	0,5/700 µs	220 - 420 µs	6 µs	
	Pulse duration time, Voltage			Also applies to On-Site
	1,2/50 µs	35 µs – 65 µs	1,0 µs	
	10/700 µs	490 - 910 µs	14µs	
	0,5/700 µs			

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
	Pulse duration time Current			Also applies to On-Site
	1,2/50 µs	11 - 21 µs	0,23 µs	Current, line to line
		14 - 36 µs	0,23 µs	Current, line to earth
	10/700 µs	210 - 390 µs	6 µs	
	0,5/700 µs	210 - 390 µs	6 µs	
	EFT/burst generators waveform (im)pulse,			According to EN 61000-4-4 (July 2004)
	voltage into 50 ohms			
	0 V – 150V		2,0 V + 0,022·*U* 2,0 V + 0,025·*U*	On Site
	0 – 300 V		4,0 V + 0,022·*U* 4,0 V + 0,025·*U*	On Site
	0 – 600 V		8,0 V + 0,022·*U* 8,0 V + 0,025·*U*	On Site
	0 – 1,5 kV		20 V + 0,022·*U* 20 V + 0,025·*U*	On Site
	0 – 3 kV		37 V + 0,022·*U* 37 V + 0,025·*U*	On Site
	EFT/burst generators Waveform pulse voltage into 1 kΩ			
	0 V – 500 V		6 V + 0,045·*U* 6 V + 0,048·*U*	On Site
	0 V – 1 kV		12 V + 0,045·*U* 12 V + 0,048·*U*	On Site
	0 V – 2 kV		24 V + 0,045·*U* 24 V + 0,048·*U*	On Site
	0 V – 5 kV		60 V + 0,045·*U* 60 V + 0,048·*U*	On Site

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
	Rise time (10%-90%) 3 ns to 7 ns		0,3 ns	Also applies to On-Site
	Pulse duration time (50%-50%) 30 ns to 70 ns		2,0 ns	Also applies to On-Site
	Repetition rate			Also applies to On-Site
	5 µs – 15 µs		0,15 µs	
	150 µs – 600 µs		2,5 µs	
	Burst duration			Also applies to On-Site
	10 ms to 20 ms		0,5µs + 0,0005 * T	
	Burst period			Also applies to On-Site
	200 ms to 400 ms		500 µs	
	ESD simulators wave-form discharge current			According to EN 61000-4-2 (1995) and ISO 10605
	0 A – 10 A		0,18 A + 0,016·*I*	
	0 A – 20 A		0,36 A + 0,016·*I*	
	0 – 50 A		0,91 A + 0,016·*I*	
	rise time (10% - 90%)			
	0,5 ns to 1,2 ns		0,08 ns	
	i(t) @ t = 30 ns			
	1,7 A – 7 A		0,2 A – 0,3 A	
	3,4 A – 14 A		0,4 A – 0,6 A	
	8,5 A – 35 A		1,0 A – 1,4 A	

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
	i(t) @ t = 60 ns			
	0,8 A – 3,5 A		0,2 A – 0,22 A	
	1,7 A – 7 A		0,4 A – 0,5 A	
	4,2 A – 18 A		1,0 A – 1,1 A	
	ESD simulators wave-form discharge current			According to EN 61000-4-2 (2008)
	0 A – 10 A		0,18 A + 0,016·*I*	
	0 A – 20 A		0,45 A + 0,016·*I*	
	0 – 50 A		0,91 A + 0,016·*I*	
	rise time (10% - 90%)			
	0,5 ns to 1,2 ns		0,08 ns	
	i(t) @ t = 30 ns			
	1,7 A – 7 A		0,2 A – 0,3 A	
	3,4 A – 14 A		0,5 A – 0,7 A	
	8,5 A – 35 A		1,0 A – 1,4 A	
	i(t) @ t = 60 ns			
	0,8 A – 3,5 A		0,2 A – 0,22 A	
	1,7 A – 7 A		0,5 A – 0,6 A	
	4,2 A – 18 A		1,0 A – 1,1 A	

Annex to ISO/IEC 17025 Accreditation
with number: **K 063**

of **D.A.R.E!! Calibrations**

Woerden

Valid from: **27-10-2010** to **1-11-2013** Replaces annex dated: **16-03-2010**

HCS code	Measured quantity, Instrument, Measure	Range	CMC *	Remarks
TF 0 0	TIME AND FREQUENCY			
TF 2 1	Frequency			
	10 MHz - 2,7 GHz		$(8 \cdot 10^{-10} / \tau + 1{,}8 \cdot 10^{-10}) \cdot f$	Measuring, 10 ms ≤ τ ≤ 400s
	10 MHz – 10 Hz		$3 \cdot 10^{-5} \cdot f$	Generating
	10 Hz – 100 kHz		$(1 \cdot 10^{-5} / \tau) \cdot f$	Generating, 10 ms ≤ τ ≤ 400s
	100 kHz – 2,16 GHz		$(1 \cdot 10^{-9} / \tau + 1{,}8 \cdot 10^{-10}) \cdot f$	Generating, 10 ms ≤ τ ≤ 400s
TF 2 2	Time interval			
	0,5 ns – 10 µs		$(1 \cdot 10^{-9} / \tau + 1{,}8 \cdot 10^{-10}) \cdot t$	Generating
	10 µs – 100 ms		$(1 \cdot 10^{-5} / \tau) \cdot t$	
	100 ms – 1000 s		$3 \cdot 10^{-5} \cdot t$	

Remarks:

1. The best measurement capability stated in the above table is based on the total measurement uncertainty, not including an uncertainty contribution due to the imperfection of the used IEC target
2. $|\Gamma dut| < 0{,}02$
3. $|\Gamma dut| < 0{,}2$

2, 3) All calibrations are based on equipment using N-type connectors. Other connector types are possible (SMA / BNC etc) but this will increase measurement uncertainties

The calibrations are carried out at an ambient temperature of 23°C nominal and a relative humidity of 50% nominal.
* 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 "Expression of the Uncertainty of Measurement in Calibration".
The measurements are carried out inside the laboratory.