

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 063**

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

This annex is valid from: **01-12-2011** to **01-11-2013**

Replaces annex dated: **27-10-2010**

HCS code	Measured quantity, Range	Frequency / Range	CMC *	Remarks
LF 0 0	CD/LF ELECTRICITY			
LF 1 0	DIRECT 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		$1,1 \cdot 10^{-5} \cdot U + 1,0 \mu V$	
	2 V - 20 V		$6 \cdot 10^{-6} \cdot U + 8 \mu V$	
	20 V - 200 V		$8 \cdot 10^{-6} \cdot U + 0,08 mV$	
	200 V - 1000 V		$1,0 \cdot 10^{-5} \cdot U + 0,8 mV$	
	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	DIRECT 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 μ A		$1,2 \cdot 10^{-4} \cdot I + 5 \text{ nA}$	Measuring
	200 μ A - 2 mA		$1,2 \cdot 10^{-4} \cdot I + 0,05 \mu\text{A}$	
	2 - 20 mA		$1,2 \cdot 10^{-4} \cdot I + 0,5 \mu\text{A}$	
	20 - 200 mA		$1,2 \cdot 10^{-4} \cdot I + 5 \mu\text{A}$	
	200 mA - 2 A		$2,4 \cdot 10^{-4} \cdot I + 0,05 \text{ mA}$	
LF 3 0	ALTERNATING VOLTAGE			
	0 - 2 mV	30 Hz – 3,3 kHz	$1,1 \cdot 10^{-3} \cdot U + 7 \mu\text{V}$	Generating, 2-wire
		3,3 – 10 kHz	$1,8 \cdot 10^{-3} \cdot U + 7 \mu\text{V}$	
		10 - 33 kHz	$4 \cdot 10^{-3} \cdot U + 7 \mu\text{V}$	
		33 - 100 kHz	$1,0 \cdot 10^{-2} \cdot U + 7 \mu\text{V}$	
	2 mV - 20 mV	30 Hz - 1 kHz	$3,2 \cdot 10^{-4} \cdot U + 6 \mu\text{V}$	
		1 - 3,3 kHz	$5 \cdot 10^{-4} \cdot U + 6 \mu\text{V}$	
		3,3 – 10 kHz	$1,3 \cdot 10^{-3} \cdot U + 6 \mu\text{V}$	
		10 - 33 kHz	$3,5 \cdot 10^{-3} \cdot U + 6 \mu\text{V}$	
		33 - 100 kHz	$1,2 \cdot 10^{-2} \cdot U + 6 \mu\text{V}$	
	20 mV - 200 mV	30 - 330 Hz	$2,3 \cdot 10^{-4} \cdot U + 10 \mu\text{V}$	
		330 Hz - 1 kHz	$3,1 \cdot 10^{-4} \cdot U + 10 \mu\text{V}$	
		1 – 3,3 kHz	$6 \cdot 10^{-4} \cdot U + 6 \mu\text{V}$	
		3,3 - 10 kHz	$1,3 \cdot 10^{-3} \cdot U + 6 \mu\text{V}$	
		10 - 33 kHz	$3,6 \cdot 10^{-3} \cdot U + 6 \mu\text{V}$	
		33 - 100 kHz	$1,2 \cdot 10^{-2} \cdot U + 6 \mu\text{V}$	
	90 mV - 2V	10 - 32 Hz	$1,3 \cdot 10^{-4} \cdot U + 50 \mu\text{V}$	Generating, 4-wire
		32 - 330 Hz	$9 \cdot 10^{-5} \cdot U + 50 \mu\text{V}$	
		330 Hz – 3,3 kHz	$7 \cdot 10^{-5} \cdot U + 25 \mu\text{V}$	

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		3,3 - 33 kHz	$9 \cdot 10^{-5} \cdot U + 25 \mu\text{V}$	
		33 - 100 kHz	$2,2 \cdot 10^{-4} \cdot U + 20 \mu\text{V}$	
		100 - 330 kHz	$1,6 \cdot 10^{-3} \cdot U + 0,8 \text{ mV}$	
		330 kHz - 1 MHz	$1,4 \cdot 10^{-2} \cdot U + 2,0 \text{ mV}$	
	2 V - 20 V	30 - 32 Hz	$1,3 \cdot 10^{-4} \cdot U + 0,4 \text{ mV}$	
		32 - 330 Hz	$9 \cdot 10^{-5} \cdot U + 0,30 \text{ mV}$	
		330 Hz - 33 kHz	$8 \cdot 10^{-5} \cdot U + 0,20 \text{ mV}$	
		33 - 100 kHz	$2,2 \cdot 10^{-4} \cdot U + 2,0 \text{ mV}$	
		100 - 330 kHz	$1,6 \cdot 10^{-3} \cdot U + 7 \text{ mV}$	
		330 kHz - 1 MHz	$1,1 \cdot 10^{-2} \cdot U + 12 \text{ mV}$	
	20 V - 200 V	10 - 32 Hz	$1,7 \cdot 10^{-4} \cdot U + 9 \text{ mV}$	
		32 - 330 Hz	$1,2 \cdot 10^{-4} \cdot U + 6 \text{ mV}$	
		330 Hz - 10 kHz	$1,1 \cdot 10^{-4} \cdot U + 2,0 \text{ mV}$	
		10 - 33 kHz	$1,2 \cdot 10^{-4} \cdot U + 3,0 \text{ mV}$	
		33 kHz – 100 kHz	$4 \cdot 10^{-4} \cdot U + 18 \text{ mV}$	
	200 V - 1000 V	50 - 330 Hz	$9 \cdot 10^{-4} \cdot U + 50 \text{ mV}$	
		330 Hz- 10 kHz	$7 \cdot 10^{-4} \cdot U + 40 \text{ mV}$	
		10 - 33 kHz	$9 \cdot 10^{-4} \cdot U + 50 \text{ mV}$	
	2 mV - 200 mV	20 - 40 Hz	$3 \cdot 10^{-4} \cdot U + 5 \mu\text{V}$	Measuring
		40 Hz - 2 kHz	$2,8 \cdot 10^{-4} \cdot U + 5 \mu\text{V}$	
		2 - 10 kHz	$2,7 \cdot 10^{-4} \cdot U + 7 \mu\text{V}$	
		10 - 30 kHz	$5 \cdot 10^{-4} \cdot U + 12 \mu\text{V}$	
		30 - 100 kHz	$1,0 \cdot 10^{-3} \cdot U + 25 \mu\text{V}$	
	200 mV - 2 V	20 - 40 Hz	$2,1 \cdot 10^{-4} \cdot U + 23 \mu\text{V}$	
		40 - 100 Hz	$1,9 \cdot 10^{-4} \cdot U + 23 \mu\text{V}$	
		100 - 300 Hz	$1,7 \cdot 10^{-4} \cdot U + 23 \mu\text{V}$	
		300 - 1000 Hz	$1,6 \cdot 10^{-4} \cdot U + 23 \mu\text{V}$	

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		1 - 3 kHz	$1,8 \cdot 10^{-4} \cdot U + 23 \mu\text{V}$	
		3 - 10 kHz	$3 \cdot 10^{-4} \cdot U + 0,05 \text{ mV}$	
		10 - 60 kHz	$6 \cdot 10^{-4} \cdot U + 0,23 \text{ mV}$	
		60 - 100 kHz	$6 \cdot 10^{-4} \cdot U + 0,23 \text{ mV}$	
		100 - 300 kHz	$4 \cdot 10^{-3} U + 2,3 \text{ mV}$	
		300 kHz - 1 MHz	$1,2 \cdot 10^{-2} \cdot U + 23 \text{ mV}$	
	2 V - 20 V	20 - 40 Hz	$2,1 \cdot 10^{-4} \cdot U + 0,23 \text{ mV}$	
		40 - 100 Hz	$1,9 \cdot 10^{-4} \cdot U + 0,23 \text{ mV}$	
		100 Hz - 3 kHz	$1,9 \cdot 10^{-4} \cdot U + 0,23 \text{ mV}$	
		3 - 10 kHz	$3,0 \cdot 10^{-4} \cdot U + 0,5 \text{ mV}$	
		10 - 60 kHz	$6 \cdot 10^{-4} \cdot U + 2,3 \text{ mV}$	
		60 - 300 kHz	$3,7 \cdot 10^{-3} \cdot U + 23 \text{ mV}$	
		300 kHz - 1 MHz	$1,2 \cdot 10^{-2} \cdot U + 0,23 \text{ V}$	
	20 V - 200 V	20 - 40 Hz	$2,2 \cdot 10^{-4} \cdot U + 2,3 \text{ mV}$	
		40 - 100 Hz	$1,9 \cdot 10^{-4} \cdot U + 2,3 \text{ mV}$	
		100 Hz – 300 Hz	$1,7 \cdot 10^{-4} \cdot U + 2,3 \text{ mV}$	
		300 Hz - 10 kHz	$1,8 \cdot 10^{-4} \cdot U + 2,3 \text{ mV}$	
		10 – 30 kHz	$3,0 \cdot 10^{-4} \cdot U + 5 \text{ mV}$	
		30 - 100 kHz	$7 \cdot 10^{-4} \cdot U + 23 \text{ mV}$	
	200 V - 1000 V	40 Hz - 3 kHz	$2,2 \cdot 10^{-4} \cdot U + 23 \text{ mV}$	
		3 - 10 kHz	$1,9 \cdot 10^{-4} \cdot U + 23 \text{ mV}$	
		10 - 30 kHz	$4 \cdot 10^{-4} \cdot U + 50 \text{ mV}$	
LF 4 0	ALTERNATING CURRENT			
	10 - 200 μA	10 - 32 Hz	$3,0 \cdot 10^{-4} \cdot I + 11 \text{ nA}$	Generating
		32 - 330 Hz	$1,9 \cdot 10^{-4} \cdot I + 11 \text{ nA}$	
		330 - 1000 Hz	$6 \cdot 10^{-4} \cdot I + 5 \text{ nA}$	

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	200 µA - 2 mA	10 - 32 Hz	$1,6 \cdot 10^{-4} \cdot I + 0,11 \mu\text{A}$	
		32 - 330 Hz	$1,6 \cdot 10^{-4} \cdot I + 0,12 \mu\text{A}$	
		330 - 1000 Hz	$1,5 \cdot 10^{-4} \cdot I + 0,12 \mu\text{A}$	
		1 - 3,3 kHz	$2,6 \cdot 10^{-4} \cdot I + 0,12 \mu\text{A}$	
		3,3 - 5 kHz	$2,8 \cdot 10^{-4} \cdot I + 0,12 \mu\text{A}$	
	2 mA - 20 mA	10 - 32 Hz	$1,6 \cdot 10^{-4} \cdot I + 1,1 \mu\text{A}$	
		32 - 330 Hz	$1,6 \cdot 10^{-4} \cdot I + 1,2 \mu\text{A}$	
		330 - 1000 Hz	$1,4 \cdot 10^{-4} \cdot I + 1,2 \mu\text{A}$	
		1 - 3,3 kHz	$2,6 \cdot 10^{-4} \cdot I + 1,2 \mu\text{A}$	
		3,3 - 5 kHz	$2,7 \cdot 10^{-4} \cdot I + 1,2 \mu\text{A}$	
	20 mA - 200 mA	10 - 32 Hz	$1,6 \cdot 10^{-4} \cdot I + 11 \mu\text{A}$	
		32 - 330 Hz	$1,6 \cdot 10^{-4} \cdot I + 12 \mu\text{A}$	
		330 - 1000 Hz	$1,4 \cdot 10^{-4} \cdot I + 12 \mu\text{A}$	
		1 - 3,3 kHz	$2,6 \cdot 10^{-4} \cdot I + 12 \mu\text{A}$	
		3,3 - 5 kHz	$2,7 \cdot 10^{-4} \cdot I + 12 \mu\text{A}$	
	200 mA - 2 A	10 - 32 Hz	$4 \cdot 10^{-4} \cdot I + 0,12 \text{ mA}$	
		32 - 330 Hz	$6 \cdot 10^{-4} \cdot I + 0,12 \text{ mA}$	
		330 - 1000 Hz	$1,5 \cdot 10^{-3} \cdot I + 0,10 \text{ mA}$	
		1 - 3,3 kHz	$5 \cdot 10^{-3} \cdot I + 0,09 \text{ mA}$	
		3,3 - 5 kHz	$8 \cdot 10^{-3} \cdot I + 33 \mu\text{A}$	
	10 µA - 200 µA	50 - 1000 Hz	$4 \cdot 10^{-4} \cdot I + 23 \text{ nA}$	Measuring
		1 - 5 kHz	$7 \cdot 10^{-4} \cdot I + 23 \text{ nA}$	
	200 µA - 2 mA	50 - 300 Hz	$4 \cdot 10^{-4} \cdot I + 0,23 \mu\text{A}$	
		300 - 1000 Hz	$4 \cdot 10^{-4} \cdot I + 0,23 \mu\text{A}$	
		1 - 5 kHz	$7 \cdot 10^{-4} \cdot I + 0,23 \mu\text{A}$	

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	2 mA - 20 mA	50 - 300 Hz	$4 \cdot 10^{-4} \cdot I + 2,3 \mu\text{A}$	
		300 - 1000 Hz	$4 \cdot 10^{-4} \cdot I + 2,3 \mu\text{A}$	
		1 - 5 kHz	$7 \cdot 10^{-4} \cdot I + 2,3 \mu\text{A}$	
	20 mA - 200 mA	50 - 1000 Hz	$4 \cdot 10^{-4} \cdot I + 23 \mu\text{A}$	
		1 - 5 kHz	$7 \cdot 10^{-4} \cdot I + 23 \mu\text{A}$	
	200 mA - 2 A	50 - 1000 Hz	$1,2 \cdot 10^{-3} \cdot I + 0,5 \text{ mA}$	
		1 - 5 kHz	$2,5 \cdot 10^{-3} \cdot I + 1,2 \text{ mA}$	
LF 6 0	IMPEDANCE (DC/LF)			
LF 6 2	DC resistance			
	1 Ω		0,2 m Ω	Generating, 4-wire
	10 Ω		0,5 m Ω	
	100 Ω		1,9 m Ω	
	1 k Ω		21 m Ω	
	10 k Ω		0,2 Ω	
	100 k Ω		2,3 Ω	
	1 M Ω		33 Ω	
	10 M Ω		0,7 k Ω	
	100 M Ω		9 k Ω	
	10 Ω		0,24 Ω	Generating, 2-wire
	100 Ω		0,24 Ω	
	1 k Ω		0,35 Ω	
	10 k Ω		0,5 Ω	
	100 k Ω		2,6 Ω	
	1 M Ω		33 Ω	
	10 M Ω		0,7 k Ω	
	100 M Ω		22 k Ω	

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HCS code	Measured quantity, Range	Frequency / Range	CMC *	Remarks
	0 - 20 Ω		$2,0 \cdot 10^{-5} \cdot R + 0,12 \text{ m}\Omega$	Measuring, 4-wire
	20 - 200 Ω		$1,5 \cdot 10^{-5} \cdot R + 0,2 \text{ m}\Omega$	
	200 - 2000 Ω		$1,2 \cdot 10^{-5} \cdot R + 1,3 \text{ m}\Omega$	
	2 - 20 kΩ		$1,2 \cdot 10^{-5} \cdot R + 13 \text{ m}\Omega$	
	20 - 200 kΩ		$2,1 \cdot 10^{-5} \cdot R + 110 \text{ m}\Omega$	
	200 kΩ - 2 MΩ		$3,1 \cdot 10^{-5} \cdot R + 1,6 \Omega$	
	2 - 20 MΩ		$3,6 \cdot 10^{-5} \cdot R + 100 \Omega$	Measuring, 2-wire
	20 - 200 MΩ		$1,7 \cdot 10^{-4} \cdot R + 10 \text{ k}\Omega$	
	200 MΩ - 2 GΩ		$3,5 \cdot 10^{-3} \cdot R + 1,1 \text{ M}\Omega$	
RF 0 0	HIGH FREQUENCY QUANTITIES			
RF 2 0	Impedance			
	LISN Impedance	30 kHz – 30 MHz	$0,3 \Omega - 1,1 \Omega$ $1,2^\circ - 3,8^\circ$	$50 \Omega // (50 \mu\text{H} + 5 \Omega)$ and $50 \Omega // 50 \mu\text{H}$
		100 kHz – 150 MHz	$0,5 \Omega - 0,9 \Omega$ $3,3^\circ - 8^\circ$	$50 \Omega // (5 \mu\text{H} + 1 \Omega)$ and $50 \Omega // 5 \mu\text{H}$
	CDN Impedance	150 kHz – 300 MHz	$5 \Omega - 6 \Omega$ $2,4^\circ - 3,9^\circ$	$150 \Omega, 0^\circ$ nominal
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 50Ω 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 $+180^\circ$	30 kHz -18 GHz	$u(\theta) = \arcsin\left(\frac{u(\Gamma)}{ \Gamma }\right)$	If the magnitude is less than its uncertainty, the phase uncertainty is 180°

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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	9 kHz - 10 MHz	0,05 dB	0 dBm nominal
		10 MHz - 3 GHz	0,06 dB	0 dBm nominal
		3 GHz - 10 GHz	0,07 dB	0 dBm nominal
		10 GHz - 14 GHz	0,08 dB	0 dBm nominal
		14 GHz - 18 GHz	0,09 dB	0 dBm nominal
		10 MHz - 2 GHz	0,06 dB	-30 dBm nominal
		2 GHz - 7 GHz	0,07 dB	-30 dBm nominal
		7 GHz - 12 GHz	0,08 dB	-30 dBm nominal
		12 GHz - 14 GHz	0,09 dB	-30 dBm nominal
		14 GHz - 18 GHz	0,11 dB	-30 dBm nominal
	Linearity of RF power			
	0 - 10 dBm	30 kHz - 6 GHz	0,04 dB	
	0 - 20 dBm	30 kHz - 6 GHz	0,05 dB	
	0 - 30 dBm	30 kHz - 6 GHz	0,07 dB	

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	0 – 40 dBm	10 MHz – 6 GHz	0,09 dB	
	0 – 50 dBm	10 MHz – 6 GHz	0,09 dB	
	0 – 60 dBm	10 MHz – 6 GHz	0,15 dB	
	Absolute power -60 to +20 dBm			
		9 kHz – 10 MHz	0,05 dB	0 dBm nominal
		10 MHz – 2 GHz	0,06 dB	0 dBm nominal
		2 GHz – 6 GHz	0,07 dB	0 dBm nominal
		6 GHz – 18 GHz	0,08 dB	0 dBm nominal
		10 MHz – 700 MHz	0,06 dB	-30 dBm nominal
		700 MHz – 10 GHz	0,06 dB	-30 dBm nominal
		10 GHz – 14 GHz	0,08 dB	-30 dBm nominal
		14 GHz – 18 GHz	0,10 dB	-30 dBm nominal
	Frequency response of power measuring devices			
		9 kHz – 10 MHz	0,05 dB	0 dBm nominal
		10 MHz – 2 GHz	0,06 dB	0 dBm nominal
		2 GHz – 6 GHz	0,07 dB	0 dBm nominal
		6 GHz – 14 GHz	0,08 dB	0 dBm nominal
		14 GHz – 18 GHz	0,08 dB – 0,12 dB	0 dBm nominal
		10 MHz – 700 MHz	0,06 dB	-30 dBm nominal
		700 MHz – 6 GHz	0,07 dB	-30 dBm nominal
		6 GHz – 14 GHz	0,08 dB	-30 dBm nominal
		14 GHz – 18 GHz	0,08 dB – 0,12 dB	-30 dBm nominal

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	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	$0,8 + 0,02 \cdot BW$	
	1 Hz to 10 MHz	10 MHz - 18 GHz	$0,08 + 0,02 \cdot BW$	
RF 5 0	ELECTRICAL / MAGNETIC FIELD QUANTITIES /EMC			
	Electrical Field Strength 1 – 200 V/m	9 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	
	Antenna factor			
	ANSI C63.5 (2006-02)	30 MHz – 5 GHz	0,8 dB	OATS, Standard Site method
	ANSI C63.5 (2006-02)	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	

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		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	
	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	

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HCS code	Measured quantity, Range	Frequency / Range	CMC *	Remarks
	Field Uniformity			On Site measurement According to IEC 61000-4-3
	Forward Power	80 MHz – 18 GHz	$\pm 1,3$ dB	
	Field Uniformity	80 MHz – 18 GHz	$\pm 1,7$ 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 μ s pulse 10/700 μ s pulse 0,5/700 μ s pulse
	0 V – 550 V		$6,7$ V + $0,022 \cdot U$ $6,7$ V + $0,025 \cdot U$ (<i>on site</i>)	Coupling/decoupling networks for AC/DC power supply circuits only in combination with appropriate surge generator
	0 V – 1,1 kV		$13,4$ V + $0,022 \cdot U$ $13,4$ V + $0,025 \cdot U$ (<i>on site</i>)	
	0 V – 2,8 kV		$33,5$ V + $0,022 \cdot U$ $33,5$ V + $0,025 \cdot U$ (<i>on site</i>)	
	0 V – 5,5 kV		67 V + $0,022 \cdot U$ 67 V + $0,025 \cdot U$ (<i>on site</i>)	
	Waveform surge current			
	Current amplitude			1,2/50 μ s pulse 10/700 μ s pulse 0,5/700 μ s pulse
	0 – 15 A		$0,18$ + $0,022 \cdot I$ $0,18$ + $0,029 \cdot I$ (<i>on site</i>)	Measurements at coupling/decoupling network input, output; coupling modes line to neutral, line to earth and neutral to earth
	0 – 30 A		$0,36$ + $0,022 \cdot I$ $0,36$ + $0,029 \cdot I$ (<i>on site</i>)	
	0 – 60 A		$0,72$ + $0,022 \cdot I$ $0,72$ + $0,029 \cdot I$ (<i>on site</i>)	
	0 – 150 A		$1,8$ + $0,022 \cdot I$ $1,8$ + $0,029 \cdot I$ (<i>on site</i>)	
	0 – 300 A		$3,6$ + $0,022 \cdot I$ $3,6$ + $0,029 \cdot I$ (<i>on site</i>)	

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 063**

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Woerden**

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Replaces annex dated: **27-10-2010**

HCS code	Measured quantity, Range	Frequency / Range	CMC *	Remarks
	0 – 600 A		7,2 + 0,022 * I 7,2 + 0,029 * I (<i>on site</i>)	
	0 – 1500 A		18 + 0,022 * I 18 + 0,029 * I (<i>on site</i>)	
	0 – 3000 A		36 + 0,022 * I 36 + 0,029 * I (<i>on site</i>)	
	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 – 6,5 µs 1,0 – 2,2 µs	0,27 µs 0,031 µs	
	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	

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 063**

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Woerden**

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HCS code	Measured quantity, Range	Frequency / Range	CMC *	Remarks
	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	14 μs	
	0,5/700 μs			
	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	

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 063**

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

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HCS code	Measured quantity, Range	Frequency / Range	CMC *	Remarks
	EFT/burst generators waveform (im)pulse, voltage into 50 ohms			According to EN 61000-4-4 (July 2004)
	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
	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

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 063**

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Woerden**

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HCS code	Measured quantity, Range	Frequency / Range	CMC *	Remarks
	Repetition rate			Also applies to On-Site
	5 μ s – 15 μ s		0,15 μ s	
	150 μ s – 600 μ s		2,5 μ s	
	Burst duration			Also applies to On-Site
	10 ms to 20 ms		0,5 μ s + 0,0005 * T	
	Burst period			Also applies to On-Site
	200 ms to 400 ms		500 μ s	
	ESD Simulators Waveform discharge current			
	First peak current		$\pm 7\%$	Networks and standard: 150pF / 330 Ω IEC61000-4-2 (2008-12)
	Rise time		$\pm 15\%$	
	Current at t1 and t2		$\pm 7\%$	
	ESD Simulators Waveform discharge current			
	First peak current 0 – 10 A 0 – 20 A 0 – 50 A		0,08 + 0,032*I 0,16 + 0,032*I 0,4 + 0,032*I	Networks and standard: 150pF / 330 Ω IEC61000-4-2 (1995-01) ISO10605 (2008-07)
	Rise time 0,5 – 1,2 ns		0,08 ns	330pF / 330 Ω ISO10605 (2008-07)
	Current at t1 and t2 0 – 10 A 0 – 20 A 0 – 50 A		0,08 + 0,023*I 0,16 + 0,023*I 0,4 + 0,023*I	

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HCS code	Measured quantity, Range	Frequency / Range	CMC *	Remarks
	ESD Simulators Waveform discharge current			
	First peak current 0 – 1,0 A 0 – 2,0 A 0 – 5,0 A		0,08 + 0,032*I 0,16 + 0,032*I 0,4 + 0,032*I	Networks and standard: 150pF / 2000 Ω 330pF / 2000 Ω ISO10605 (2008-07)
	Rise time 0,5 – 1,2 ns		0,08 ns	
	Current at t1 and t2 0 – 1,0 A 0 – 2,0 A 0 – 5,0 A		0,008 + 0,023*I 0,02 + 0,023*I 0,04 + 0,023*I	
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:

* 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".

1. $|\Gamma_{dut}| < 0,02$
2. $|\Gamma_{dut}| < 0,2$

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.