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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client

SCOPE (AUG-11)

Certificate No: **D2450V2-736 Jul11**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 736**

Calibration procedure(s) **QA CAL-05 v8**  
**Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **July 25, 2011**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by: **Claudio Laubler** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Issued: July 25, 2011

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### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

### Additional Documentation:

- d) DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

<b>DASY Version</b>	DASY5	V52.6.2
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	2450 MHz ± 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	39.2	1.80 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	38.9 ± 6 %	1.85 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	13.9 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	54.8 mW / g ± 17.0 % (k=2)

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	6.44 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.6 mW / g ± 16.5 % (k=2)

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	52.7	1.95 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	51.7 ± 6 %	2.00 mho/m ± 6 %
<b>Body TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	Condition	
SAR measured	250 mW input power	13.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	52.3 mW / g ± 17.0 % (k=2)

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	6.18 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	24.5 mW / g ± 16.5 % (k=2)

## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	$54.4 \Omega + 1.5 j\Omega$
Return Loss	- 27.0 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	$50.8 \Omega + 2.8 j\Omega$
Return Loss	- 30.7 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.159 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 26, 2003

# DASY5 Validation Report for Head TSL

Date: 25.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

## DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 736

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.85$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

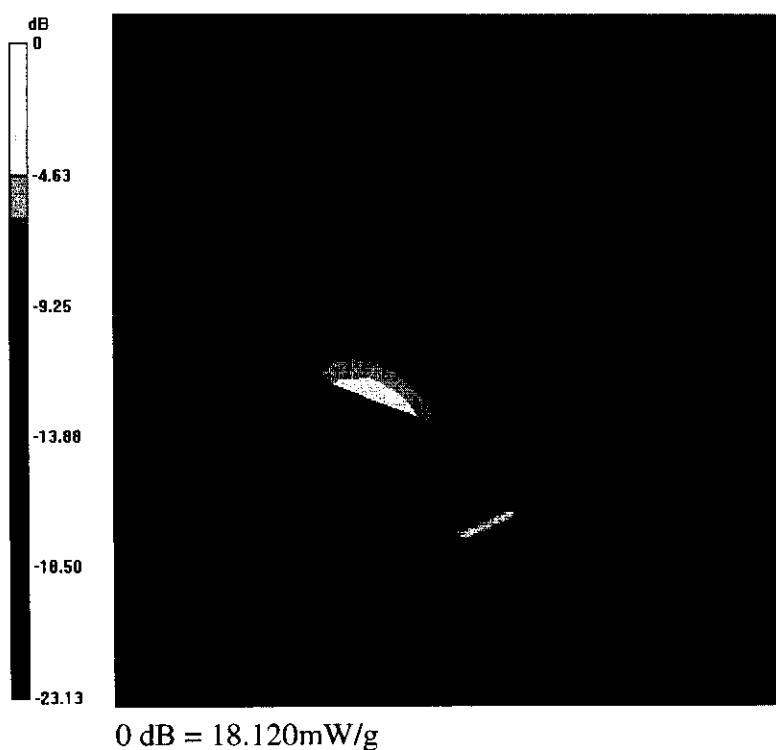
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.095 V/m; Power Drift = 0.09 dB

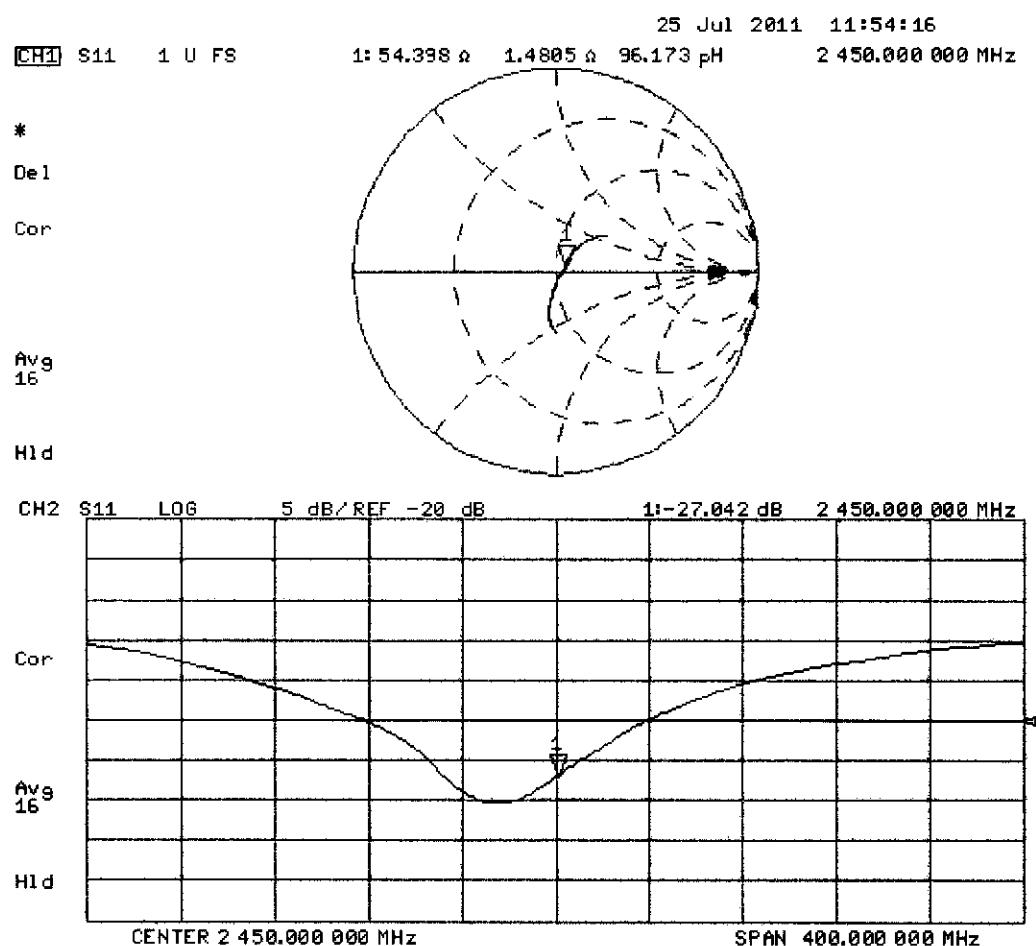
Peak SAR (extrapolated) = 28.615 W/kg

**SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.44 mW/g**

Maximum value of SAR (measured) = 18.121 mW/g



## Impedance Measurement Plot for Head TSL



# DASY5 Validation Report for Body TSL

Date: 25.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 736**

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 51.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

## Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

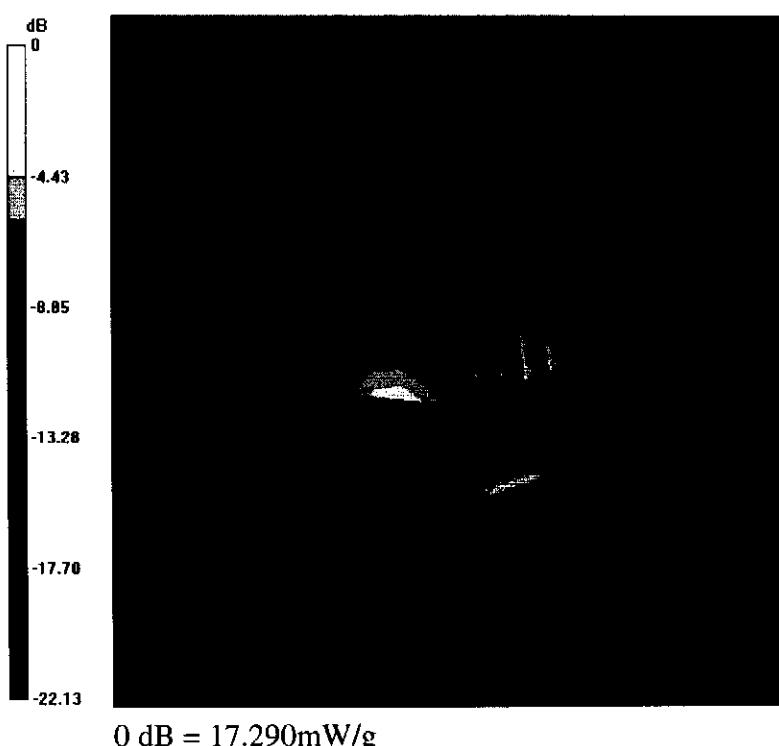
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.550 V/m; Power Drift = 0.02 dB

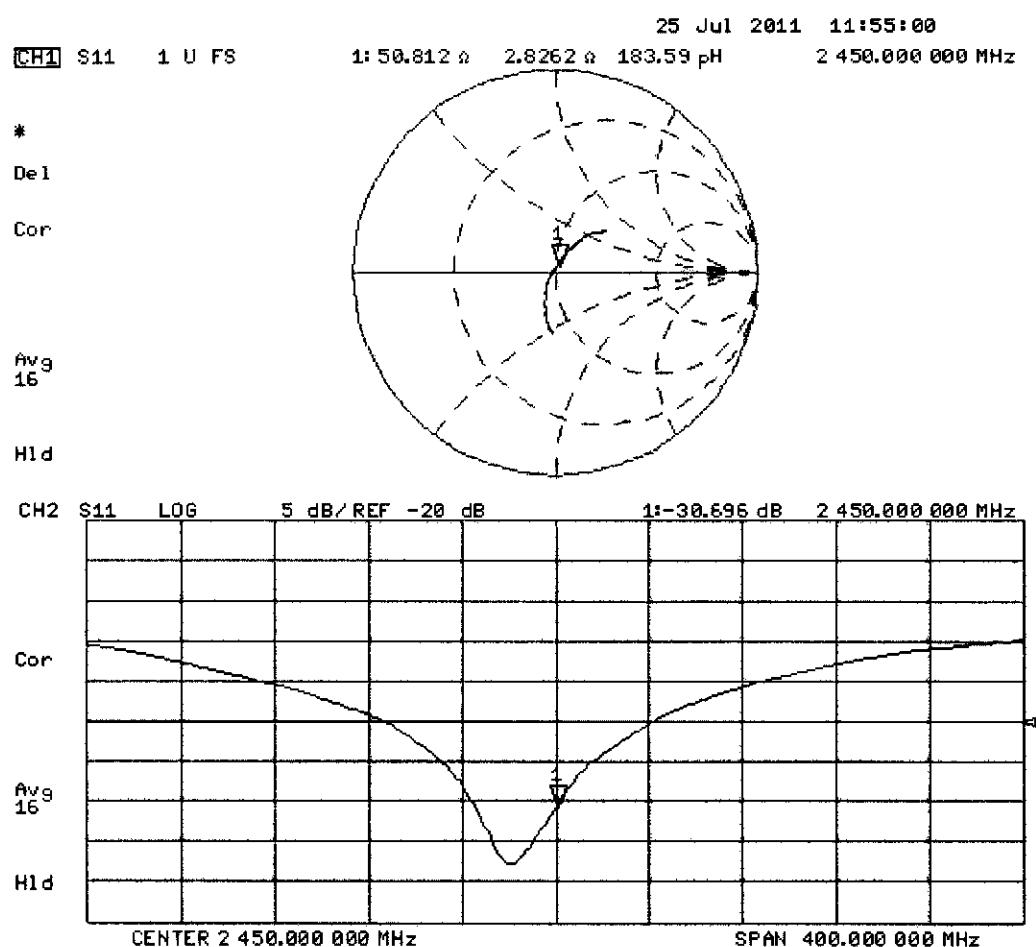
Peak SAR (extrapolated) = 27.432 W/kg

**SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.18 mW/g**

Maximum value of SAR (measured) = 17.294 mW/g



## Impedance Measurement Plot for Body TSL



## **IMPORTANT NOTICE**

### **USAGE OF THE DAE 4**

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

**Battery Exchange:** The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

**Shipping of the DAE:** Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

**E-Stop Failures:** Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

**Repair:** Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

**DASY Configuration Files:** Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 M $\Omega$  is given in the corresponding configuration file.

**Important Note:**

**Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.**

**Important Note:**

**Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.**

**Important Note:**

**To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.**



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Accreditation No.: **SCS 108**

Client **Sporton\_TW (Auden)**

Certificate No: **DAE4-778\_Oct11**

## CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BJ - SN: 778**

Calibration procedure(s) **QA CAL-06.v23**  
 Calibration procedure for the data acquisition electronics (DAE)

Calibration date: **October 11, 2011**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	28-Sep-11 (No:11450)	Sep-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	08-Jun-11 (in house check)	In house check: Jun-12

Calibrated by: Name **Andrea Guntli** Function **Technician**

Signature

Approved by: Name **Fin Bomholt** Function **R&D Director**

Signature

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Issued: October 11, 2011



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Accreditation No.: **SCS 108**

## Glossary

<b>DAE</b>	data acquisition electronics
<b>Connector angle</b>	information used in DASY system to align probe sensor X to the robot coordinate system.

## Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
  - **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
  - **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage
  - **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
  - **Input Offset Current:** Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - **Input resistance:** Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
  - **Power consumption:** Typical value for information. Supply currents in various operating modes.

## DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB =  $6.1\mu\text{V}$ , full range =  $-100\ldots+300\text{ mV}$

Low Range: 1LSB =  $61\text{nV}$ , full range =  $-1\ldots+3\text{mV}$

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	$404.686 \pm 0.1\% \text{ (k=2)}$	$403.482 \pm 0.1\% \text{ (k=2)}$	$405.039 \pm 0.1\% \text{ (k=2)}$
Low Range	$3.98457 \pm 0.7\% \text{ (k=2)}$	$3.96262 \pm 0.7\% \text{ (k=2)}$	$3.99752 \pm 0.7\% \text{ (k=2)}$

## Connector Angle

Connector Angle to be used in DASY system	$257.0^\circ \pm 1^\circ$
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## Appendix

### 1. DC Voltage Linearity

High Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	200005.5	0.51	0.00
Channel X	+ Input	20003.37	2.57	0.01
Channel X	- Input	-19997.60	1.80	-0.01
Channel Y	+ Input	199997.6	-7.39	-0.00
Channel Y	+ Input	20002.12	1.42	0.01
Channel Y	- Input	-19999.29	-0.19	0.00
Channel Z	+ Input	200005.6	1.63	0.00
Channel Z	+ Input	19999.40	-0.30	-0.00
Channel Z	- Input	-20004.64	-5.54	0.03

Low Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	1999.6	-0.40	-0.02
Channel X	+ Input	200.32	0.52	0.26
Channel X	- Input	-199.20	0.90	-0.45
Channel Y	+ Input	1999.7	-0.34	-0.02
Channel Y	+ Input	199.87	-0.03	-0.01
Channel Y	- Input	-200.23	-0.13	0.07
Channel Z	+ Input	1999.2	-0.88	-0.04
Channel Z	+ Input	199.57	-0.53	-0.26
Channel Z	- Input	-200.50	-0.70	0.35

### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	-5.07	-6.45
	-200	7.34	6.01
Channel Y	200	-2.25	-2.26
	-200	1.24	0.86
Channel Z	200	-9.66	-9.53
	-200	7.64	7.60

### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	-	5.10	-0.03
Channel Y	200	-1.33	-	5.62
Channel Z	200	1.59	-2.99	-

#### 4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16049	16415
Channel Y	16162	14953
Channel Z	16439	16156

#### 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec  
Input  $10M\Omega$

	Average ( $\mu$ V)	min. Offset ( $\mu$ V)	max. Offset ( $\mu$ V)	Std. Deviation ( $\mu$ V)
Channel X	-1.37	-2.10	-0.41	0.31
Channel Y	-0.61	-2.02	1.13	0.52
Channel Z	-1.73	-2.94	0.33	0.69

#### 6. Input Offset Current

Nominal Input circuitry offset current on all channels:  $<25fA$

#### 7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

#### 8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

#### 9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

## IMPORTANT NOTICE

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Accreditation No.: SCS 108

Client

Sporton (Auden)

Certificate No: DAE4-1279\_Jun11

## CALIBRATION CERTIFICATE

Object DAE4 - SD 000 D04 BJ - SN: 1279

Calibration procedure(s) QA CAL-06.v23  
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: June 17, 2011

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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Calibration Equipment used (M&TE critical for calibration)

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Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	08-Jun-11 (in house check)	In house check: Jun-12

Calibrated by: Name: Dominique Steffen Function: Technician Signature:

Approved by: Name: Fin Bomholt Function: R&D Director Signature:

Issued: June 17, 2011

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## Glossary

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Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

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  - *Common mode sensitivity*: Influence of a positive or negative common mode voltage on the differential measurement.
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  - *Input resistance*: Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage*: Typical value for information. Below this voltage, a battery alarm signal is generated.
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## DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB =  $6.1\mu\text{V}$ , full range =  $-100...+300\text{ mV}$

Low Range: 1LSB =  $61\text{nV}$ , full range =  $-1.....+3\text{mV}$

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	$405.162 \pm 0.1\% \text{ (k=2)}$	$404.963 \pm 0.1\% \text{ (k=2)}$	$404.302 \pm 0.1\% \text{ (k=2)}$
Low Range	$3.98709 \pm 0.7\% \text{ (k=2)}$	$3.98815 \pm 0.7\% \text{ (k=2)}$	$3.99781 \pm 0.7\% \text{ (k=2)}$

## Connector Angle

Connector Angle to be used in DASY system	$118.0^\circ \pm 1^\circ$
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## Appendix

### 1. DC Voltage Linearity

High Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	200002.8	-4.26	-0.00
Channel X	+ Input	20001.11	0.81	0.00
Channel X	- Input	-19998.30	1.20	-0.01
Channel Y	+ Input	199995.9	-0.67	-0.00
Channel Y	+ Input	20000.72	0.62	0.00
Channel Y	- Input	-19999.63	-0.23	0.00
Channel Z	+ Input	199995.6	0.15	0.00
Channel Z	+ Input	20000.35	0.35	0.00
Channel Z	- Input	-20000.36	-0.96	0.00

Low Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	1999.5	-0.70	-0.04
Channel X	+ Input	200.23	0.03	0.02
Channel X	- Input	-198.52	1.58	-0.79
Channel Y	+ Input	1999.8	-0.15	-0.01
Channel Y	+ Input	198.26	-1.84	-0.92
Channel Y	- Input	-200.72	-0.62	0.31
Channel Z	+ Input	1999.8	0.10	0.00
Channel Z	+ Input	199.24	-0.86	-0.43
Channel Z	- Input	-200.82	-0.92	0.46

### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	16.73	15.44
	-200	-15.03	-16.55
Channel Y	200	7.99	7.96
	-200	-9.76	-9.79
Channel Z	200	-0.47	-0.96
	-200	-0.90	-0.88

### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	-	2.87	-0.12
Channel Y	200	2.95	-	4.72
Channel Z	200	0.64	-1.17	-

#### 4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15670	15865
Channel Y	16434	16415
Channel Z	15919	15447

#### 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10MΩ

	Average (µV)	min. Offset (µV)	max. Offset (µV)	Std. Deviation (µV)
Channel X	0.19	-0.98	1.40	0.51
Channel Y	-0.58	-2.05	0.62	0.61
Channel Z	-1.53	-3.41	0.30	0.56

#### 6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

#### 7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

#### 8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

#### 9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

**Calibration Laboratory of**  
**Schmid & Partner**  
**Engineering AG**  
**Zeughausstrasse 43, 8004 Zurich, Switzerland**



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Accreditation No.: **SCS 108**

Client **Sporton (Auden)**

Certificate No: **EX3-3792\_Jun11**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3792**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4**  
 Calibration procedure for dosimetric E-field probes

Calibration date: **June 20, 2011**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^\circ\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: June 21, 2011

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.