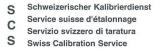


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Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

Glossary

DAE data acquisition electronics

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

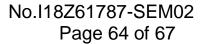
coordinate system.

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.

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DC Voltage Measurement

A/D - Converter Resolution nominal High Range: 1LSB = full range = -100...+300 mV full range = -1......+3mV $6.1\mu V$, Low Range: 1LSB = 61nV, DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	х	Υ	Z
High Range	404.540 ± 0.02% (k=2)	404.077 ± 0.02% (k=2)	405.023 ± 0.02% (k=2)
Low Range	3.92909 ± 1.50% (k=2)	3.94558 ± 1.50% (k=2)	3.97891 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	104.0 ° ± 1 °



Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	199994.32	-1.11	-0.00
Channel X + Input	20004.21	2.27	0.01
Channel X - Input	-19994.21	6.72	-0.03
Channel Y + Input	199991.01	-4.74	-0.00
Channel Y + Input	19999.15	-2.66	-0.01
Channel Y - Input	-19999.37	1.70	-0.01
Channel Z + Input	199997.50	1.46	0.00
Channel Z + Input	19998.75	-3.06	-0.02
Channel Z - Input	-20003.08	-1.96	0.01

N 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Error (%)
2001.23	-0.12	-0.01
201.73	0.03	0.02
-197.79	0.32	-0.16
2001.22	0.00	0.00
201.15	-0.62	-0.31
-198.47	-0.28	0.14
2001.41	0.23	0.01
200.99	-0.67	-0.33
-199.42	-1.11	0.56
	-197.79 2001.22 201.15 -198.47 2001.41 200.99	201.73 0.03 -197.79 0.32 2001.22 0.00 201.15 -0.62 -198.47 -0.28 2001.41 0.23 200.99 -0.67

2. Common mode sensitivity

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

(3.00)	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-10.02	-11.33
	- 200	12.53	10.76
Channel Y	200	10.66	10.40
	- 200	-12.33	-12.29
Channel Z	200	-2.18	-2.52
	- 200	0.20	-0.09

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	-	-0.85	-2.68
Channel Y	200	8.65	-	0.04
Channel Z	200	6.10	6.93	_

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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	15635	14959
Channel Y	15850	16040
Channel Z	16635	16604

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	0.40	-0.72	1.60	0.48
Channel Y	0.06	-0.99	1.84	0.46
Channel Z	-0.76	-2.17	0.18	0.48

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



The photos of HAC test are presented in the additional document:

Appendix to test report No.I18Z61787-SEM02/03

The photos of HAC test