

## Certificate of Calibration

This certificate provides measurement results that are traceable to the SI (The International System of Units) through internationally recognized standards.

Object to calibrate	DS600UB-10V
Serial no.	19010460004
Certificate no.	1907A30704
Date of calibration	11-02-2019
For the measurements	Christian Markvardsen
Approved by	Henrik Elbæk
Date	11-02-2019

## Extent of the Calibration

Primary current [A]:

50	100	200	300	400	500	600
-50	-100	-200	-300	-400	-500	-600

## Measurement procedure

Known primary DC current are send throw the transducer to calibrate. The output of the transducer to calibrate is measured with a high-resolution accuracy voltmeter. Calibration setup are illustrated in page 6.

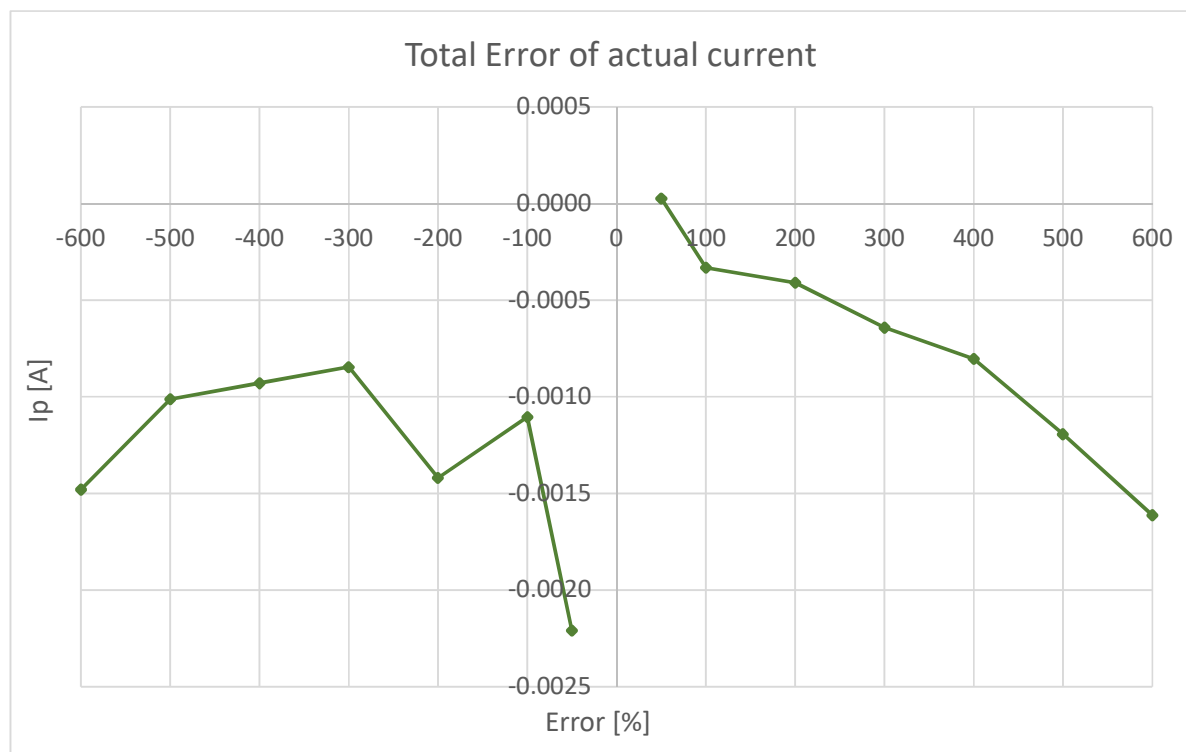
## Laboratory conditions

Ambient temperature: 23°C ±1°C, Relative humidity 45% ±15%.

## Uncertainty

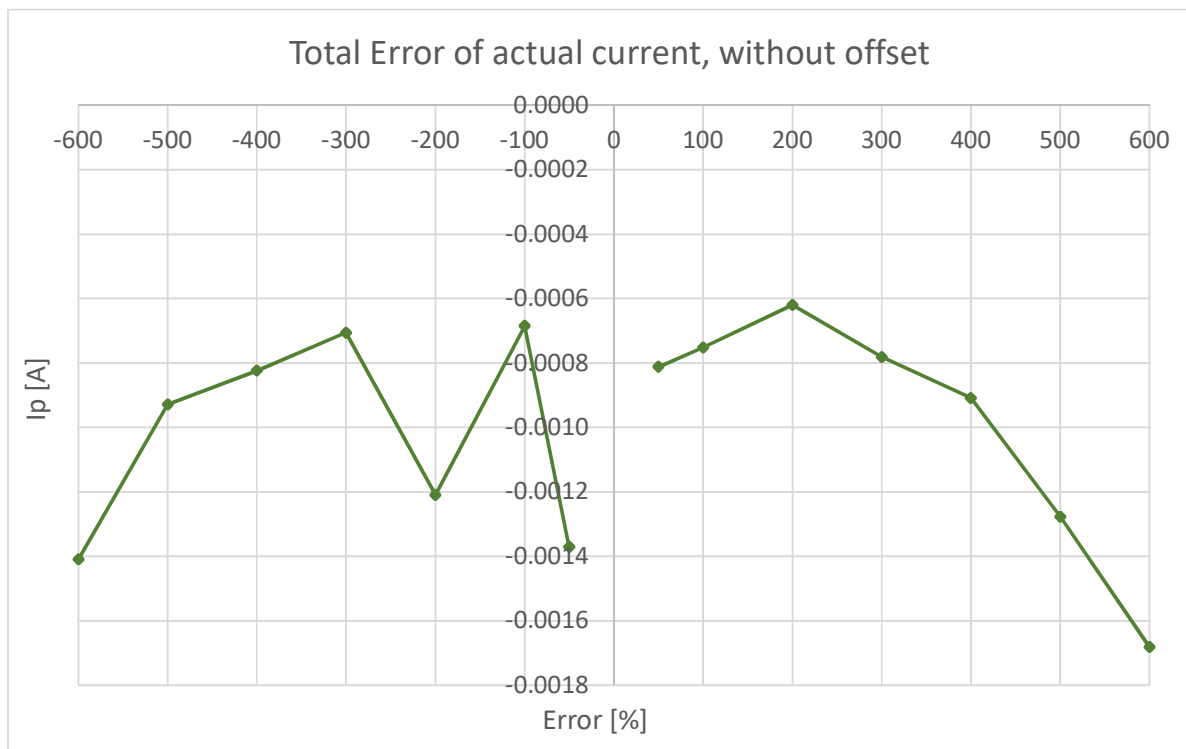
The uncertainly is based on the expanded uncertainty of measurement. Stated as the combined standard uncertainty multiplied by a coverage factor K=2 (Level of confidence at 95 percent).

## Calibration Result



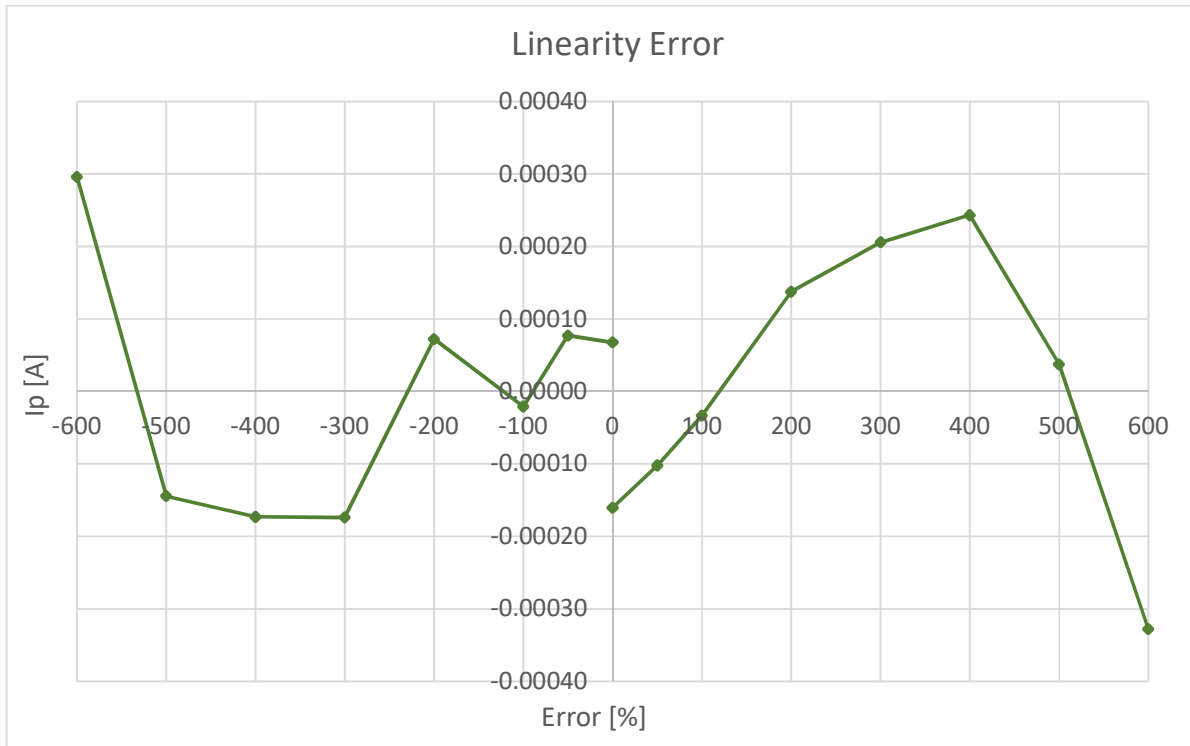
Total error: Offset, Gain and Linearity error.

Percent of Nominal current [%]	Primary Current [A]	Measured Current [A]	Total Error of actual current [%]	Datasheet specification [%]	Uncertainty [%]	Note
0	0	0.0004	0.0001	0.0015	0.002	****
8.3	50	50.0000	0.0000	0.0732	0.004	*
16.7	100	99.9997	-0.0003	0.0366	0.004	*
33.3	200	199.9992	-0.0004	0.0183	0.004	*
50.0	300	299.9981	-0.0006	0.0122	0.004	*
66.7	400	399.9968	-0.0008	0.0092	0.004	*
83.3	500	499.9940	-0.0012	0.0073	0.004	*
100	600	599.9903	-0.0016	0.0061	0.004	*
0	0	0.0005	0.0001	0.0015	0.002	****
8.3	-50	-49.9989	-0.0022	0.0732	0.004	*
16.7	-100	-99.9989	-0.0011	0.0366	0.004	*
33.3	-200	-199.9972	-0.0014	0.0183	0.004	*
50.0	-300	-299.9975	-0.0008	0.0122	0.004	*
66.7	-400	-399.9963	-0.0009	0.0092	0.004	*
83.3	-500	-499.9949	-0.0010	0.0073	0.004	*
100	-600	-599.9911	-0.0015	0.0061	0.004	*



Total error, without offset: Gain and Linearity error.

Percent of Nominal current [%]	Primary Current [A]	Measured Current [A]	Total Error of actual current, without offset [%]	Datasheet specification [%]	Uncertainty [%]	Note
0	0	0.0004	0	n/a	n/a	
8.3	50	50.0000	-0.0008	0.0552	0.004	*
16.7	100	99.9997	-0.0008	0.0276	0.004	*
33.3	200	199.9992	-0.0006	0.0138	0.004	*
50.0	300	299.9981	-0.0008	0.0092	0.004	*
66.7	400	399.9968	-0.0009	0.0069	0.004	*
83.3	500	499.9940	-0.0013	0.0055	0.004	*
100	600	599.9903	-0.0017	0.0046	0.004	**
0	0	0.0005	0	n/a	n/a	
8.3	-50	-49.9989	-0.0014	0.0552	0.004	*
16.7	-100	-99.9989	-0.0007	0.0276	0.004	*
33.3	-200	-199.9972	-0.0012	0.0138	0.004	*
50.0	-300	-299.9975	-0.0007	0.0092	0.004	*
66.7	-400	-399.9963	-0.0008	0.0069	0.004	*
83.3	-500	-499.9949	-0.0009	0.0055	0.004	*
100	-600	-599.9911	-0.0014	0.0046	0.004	**



Linearity error: Maximum full-scale positive or negative deviation between the output signal of the transducer and the linear regression line.

Percent of Nominal current [%]	Primary Current [A]	Measured Current [A]	Linearity Error [%]	Datasheet specification [%]	Uncertainty [%]	Note
0	0	0.0004	-0.0002	0.0040	0.002	*
8.3	50	50.0000	-0.0001	0.0040	0.004	****
16.7	100	99.9997	0.0000	0.0040	0.004	****
33.3	200	199.9992	0.0001	0.0040	0.004	****
50.0	300	299.9981	0.0002	0.0040	0.004	****
66.7	400	399.9968	0.0002	0.0040	0.004	****
83.3	500	499.9940	0.0000	0.0040	0.004	****
100	600	599.9903	-0.0003	0.0040	0.004	****
0	0	0.0005	0.0001	0.0040	0.002	*
8.3	-50	-49.9989	0.0001	0.0040	0.004	****
16.7	-100	-99.9989	0.0000	0.0040	0.004	****
33.3	-200	-199.9972	0.0001	0.0040	0.004	****
50.0	-300	-299.9975	-0.0002	0.0040	0.004	****
66.7	-400	-399.9963	-0.0002	0.0040	0.004	****
83.3	-500	-499.9949	-0.0001	0.0040	0.004	****
100	-600	-599.9911	0.0003	0.0040	0.004	****

Measurements notes:

- \* Measurement results are within the specification with added measurement uncertainty.
- \*\* Measurement result is within the specification, but it is outside when added the measurement uncertainty.
- \*\*\* Measurement result is outside the specification, but it is inside when added the measurement uncertainty.
- \*\*\*\* The measured value is inside (outside) the specification, but the uncertainty is larger than the specification.
- F The measurement result added the measurement uncertainty is outside the specification: No Compliance.

## Illustration of measurement procedure

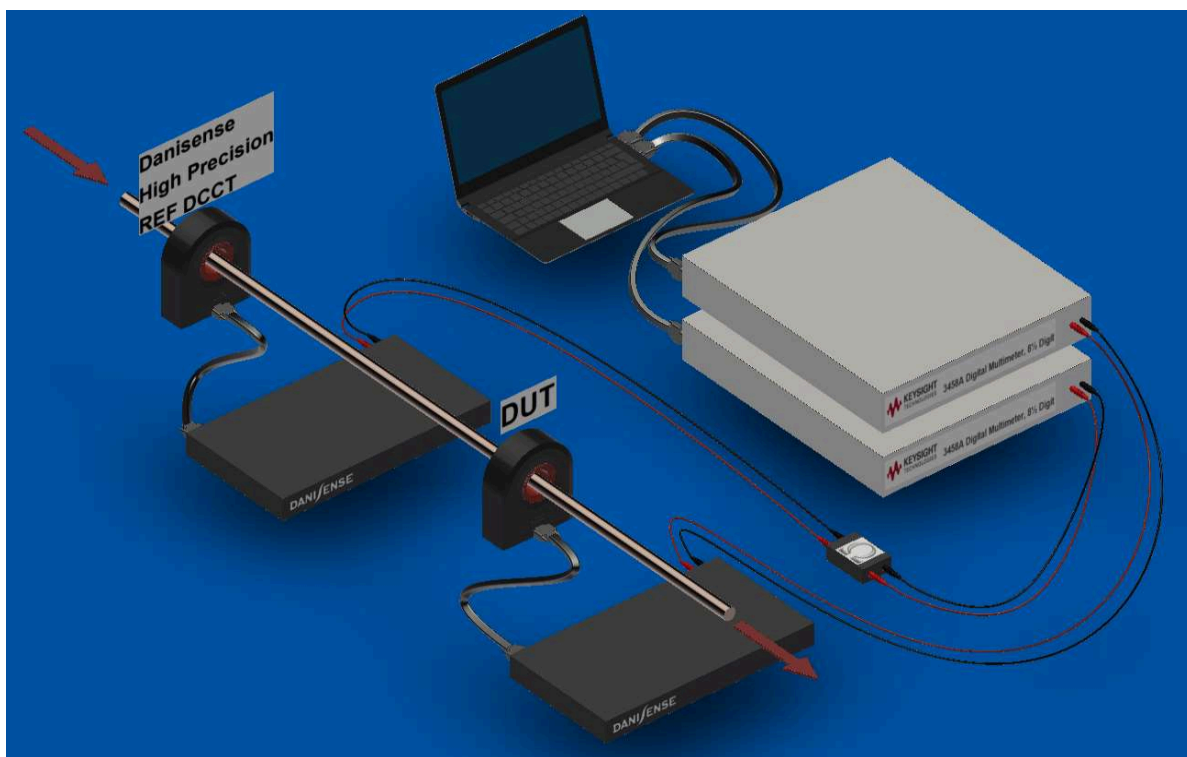


Figure 1 - Calibration of voltage out transducer. Red arrow indicating primary current through the Danisense high precision REF transducer (REF DCCT) and the transducer to calibrate (DUT). The primary current is measured at each step after maximum 1 minute. The voltage measurement of REF DCCT and DUT are done simultaneously with two Digital Multimeters.

## Instruments used for Calibration

Danisense id.	Type	Description	Cal. Due
59	Keysight 3458A	8½ digit multimeter	21-11-2020
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63	Magna-power	TSA5-1800/380, Current Source	N/A
93	Reference resistor ( $\Omega$ )	2.5025R	21-02-2020
18239010001	DS REF DCCT	Danisense, High Precision REF DCCT	23-06-2020