DTU Nutech, DK-4000 Roskilde, Denmark

Electrometer current calibration report for file: exp118780

CRC32 file validation = TRUE (ok.lines=231, not.ok.lines=0)

Consistency between index and number of lines in data file = FALSE

> Notes made during the analysis:

Current 23-step procedure

> End of notes.

Electrometer current calibration: 'PTW-UNIDOS2-2.04'SN775 (exp118780)

item	value
File	exp118780
Cal. note	Cal-session-21 Current source = K6430
Model (electrometer)	'PTW-UNIDOS2-2.04'
SN (electrometer)	775
Range (electrometer)	0
Range of current supplied (min / max)	-0.1 nA / 0.1 nA
Cable (data file)	'DTU-10530/DTU-10033'
Measurement time: start - stop	'28-02-2020 - 19:40:07' - '28-02-2020 - 20:30:17'
Duration	50.17 min
Measured current variable (raw):	nA.read1
Meas. current k.elec.predefined (prior information)	1.0000000
Meas. current multiplier to get nA	1.0000000
Applied input bias current correction (capped-off input read.)	0.0 fA
Reference current basis (raw):	nA.K6430
Ref. source calibration factor (nA pr. unit of ref. basis)	0.9997000
Grouping variable:	nA.K6430.setpoint
Lab. temperature	22.10 degC
Lab. humidity	42.2 %RH
Lab. pressure	1005.54 hPa
k.elec.all (all data pooled; stat.limit = 25 %)	0.998966 nA/nA sd = 0.021 % N = 16
k.elec.pos (positive current only)	0.998955 nA/nA sd = 0.012 % N = 8
k.elec.neg (negative current only)	0.998977 nA/nA sd = 0.029 % N = 8
Polarity ratio: k.pol = k.elec.pos / k.elec.neg	0.999979
Polarity difference : k.elec.pos - k.elec.neg (ANOVA)	-0.000021 +/- 0.000110 p = 0.849
Reference polarity for k.non.lin coeff.	Negative (k.elec.neg)
Current at setpoint zero	-0.52 fA sd = 4.64 fA N = 27

Uncertainty analysis for electrometer current cal.: 'PTW-UNIDOS2-2.04'SN775 (exp118780)

item	value
File	exp118780
Cal. note	Cal-session-21 Current source = K6430
Model (electrometer)	'PTW-UNIDOS2-2.04'
SN (electrometer)	775
Range (electrometer)	0
Range of current supplied (min / max)	-0.1 nA / 0.1 nA
UPARM.current.u.base.abs	0.000000
UPARM.current.u.base.pct	0.049000
UPARM.current.u.minimum.step.abs	0.000000
UPARM.current.u.minimum.step.pct	0.050000
UPARM.current.u.input.bias.fA	20.000000
UPARM.AGGREGATE.current.u.minimum.abs	0.000000
UPARM.AGGREGATE.current.u.minimum.pct	0.050000
k.elec.all (all data pooled; stat.limit = 25 %)	0.998966 nA/nA sd = 0.021 % N = 16
k.elec.pos (positive current only)	0.998955 nA/nA sd = 0.012 % N = 8
k.elec.neg (negative current only)	0.998977 nA/nA sd = 0.029 % N = 8
UAGGREGATE.k.elec.all	0.001711 (k=2)
UAGGREGATE.k.elec.pos	0.001675 (k=2)
UAGGREGATE.k.elec.neg	0.001754 (k=2)

Electrometer current calibration (3 digits): 'PTW-UNIDOS2-2.04'SN775 (exp118780)

Non-linearity correction factors (reference = k.elec.neg; Negative) :

nA.select	nA.ref	sd.pct.nA.ref	nA.meas	sd.pct.nA.meas	N	u.k.elec.step	k.elec.step	k.non.lin
-0.1	-0.100	0.00	-0.100	-0.13	9.000	0.001	0.998	1
-0.09	-0.090	-0.00	-0.090	0.00	9.000	0.001	0.999	1
-0.08	-0.080	-0.00	-0.080	0.00	9.000	0.001	0.999	1
-0.07	-0.070	-0.00	-0.070	0.00	9.000	0.001	0.999	1
-0.06	-0.060	-0.00	-0.060	0.00	9.000	0.001	0.999	1
-0.05	-0.050	-0.00	-0.050	0.00	9.000	0.001	0.999	1
-0.04	-0.040	-0.00	-0.040	0.00	9.000	0.001	0.999	1
-0.03	-0.030	-0.00	-0.030	0.00	9.000	0.001	0.999	1
-0.02	-0.020	-0.00	-0.020	-0.54	8.000	0.002	0.995	1
-0.01	-0.010	0.00	-0.010	-0.20	9.000	0.002	0.997	1
0.01	0.010	0.00	0.010	0.18	9.000	0.002	1.001	1
0.02	0.020	0.00	0.020	0.30	7.000	0.002	0.996	1
0.03	0.030	0.00	0.030	0.00	9.000	0.001	0.999	1
0.04	0.040	0.00	0.040	0.00	9.000	0.001	0.999	1
0.05	0.050	0.00	0.050	0.01	9.000	0.001	0.999	1
0.06	0.060	0.00	0.060	0.00	9.000	0.001	0.999	1
0.07	0.070	0.00	0.070	0.00	9.000	0.001	0.999	1
0.08	0.080	0.00	0.080	0.00	9.000	0.001	0.999	1
0.09	0.090	0.00	0.090	0.00	9.000	0.001	0.999	1
0.1	0.100	0.00	0.100	0.00	9.000	0.001	0.999	1

Electrometer current calibration (4 digits): 'PTW-UNIDOS2-2.04'SN775 (exp118780)

Non-linearity correction factors (reference = k.elec.neg; Negative) :

nA.select	nA.ref	sd.pct.nA.ref	nA.meas	sd.pct.nA.meas	N	u.k.elec.step	k.elec.step	k.non.lin
-0.1	-0.1000	0.00	-0.1001	-0.13	9.0000	0.0007	0.9983	1
-0.09	-0.0900	-0.00	-0.0901	0.00	9.0000	0.0005	0.9990	1
-0.08	-0.0800	-0.00	-0.0800	0.00	9.0000	0.0006	0.9991	1
-0.07	-0.0700	-0.00	-0.0700	0.00	9.0000	0.0006	0.9991	1
-0.06	-0.0600	-0.00	-0.0600	0.00	9.0000	0.0006	0.9991	1
-0.05	-0.0500	-0.00	-0.0500	0.00	9.0000	0.0006	0.9991	1
-0.04	-0.0400	-0.00	-0.0400	0.00	9.0000	0.0007	0.9990	1
-0.03	-0.0300	-0.00	-0.0300	0.00	9.0000	0.0008	0.9991	1
-0.02	-0.0200	-0.00	-0.0201	-0.54	8.0000	0.0023	0.9954	1
-0.01	-0.0100	0.00	-0.0100	-0.20	9.0000	0.0022	0.9973	1
0.01	0.0100	0.00	0.0100	0.18	9.0000	0.0022	1.0015	1
0.02	0.0200	0.00	0.0201	0.30	7.0000	0.0016	0.9964	1
0.03	0.0300	0.00	0.0300	0.00	9.0000	0.0008	0.9990	1
0.04	0.0400	0.00	0.0400	0.00	9.0000	0.0007	0.9989	1
0.05	0.0500	0.00	0.0500	0.01	9.0000	0.0006	0.9991	1
0.06	0.0600	0.00	0.0600	0.00	9.0000	0.0006	0.9990	1
0.07	0.0700	0.00	0.0700	0.00	9.0000	0.0006	0.9990	1
0.08	0.0800	0.00	0.0801	0.00	9.0000	0.0006	0.9990	1
0.09	0.0900	0.00	0.0901	0.00	9.0000	0.0005	0.9989	1
0.1	0.1000	0.00	0.1001	0.00	9.0000	0.0005	0.9987	1

Details (all data) of electrometer current calibration: 'PTW−UNIDOS2−2.04'SN775 (exp118780)

no.irradiation	no.integration	nA.select	nA.ref	nA.meas
1	1	0.000000	−0.000000	0.000000
1	2	0.000000	−0.000000	0.000000
1	3	0.000000	−0.000000	0.000000
1	4	0.000000	−0.000000	0.000000
1	5	0.000000	−0.000000	0.000000
1	6	0.000000	−0.000000	0.000000
1	7	0.000000	−0.000000	0.000000
1	8	0.000000	−0.000000	0.000000
1	9	0.000000	−0.000000	0.000000
1	10	0.000000	−0.000000	0.000000
2	1	−0.010000	−0.009997	−0.010130
2	2	−0.010000	−0.009997	−0.010070
2	3	−0.010000	−0.009997	−0.010040
2	4	−0.010000	−0.009997	−0.010030
2	5	−0.010000	−0.009997	−0.010020
2	6	−0.010000	−0.009997	−0.010020
2	7	−0.010000	−0.009997	−0.010010
2	8	−0.010000	−0.009997	−0.010010
2	9	−0.010000	−0.009997	−0.010010
2	10	−0.010000	−0.009997	−0.010010
3	3	−0.020000	−0.019992	−0.020340
3	4	−0.020000	−0.019992	−0.020110
3	5	−0.020000	−0.019992	−0.020070
3	6	−0.020000	−0.019992	−0.020040
3	7	−0.020000	−0.019992	−0.020030
3	8	−0.020000	−0.019992	−0.020030
3	9	−0.020000	−0.019992	−0.020030
3	10	−0.020000	−0.019992	−0.020020
4	1	−0.030000	−0.029992	−0.030030
4	2	−0.030000	−0.029992	−0.030020
4	3	−0.030000	−0.029992	−0.030020
4	4	−0.030000	−0.029992	−0.030020
4	5	−0.030000	−0.029992	−0.030020
4	6	−0.030000	−0.029992	−0.030020
4	7	−0.030000	−0.029992	−0.030020
4	8	−0.030000	−0.029992	−0.030020
4	9	−0.030000	−0.029993	−0.030020
4	10	−0.030000	−0.029993	−0.030020

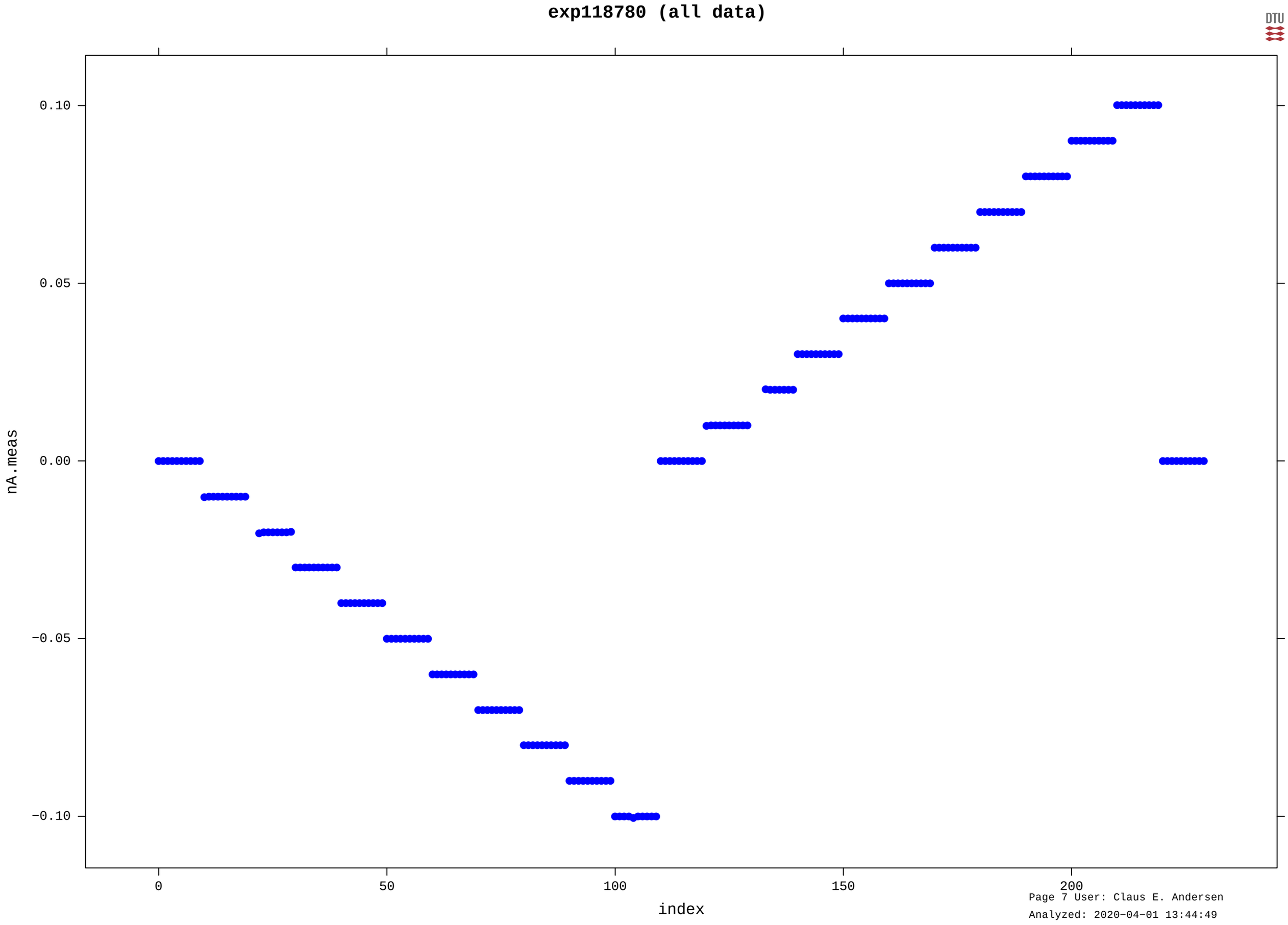
5	1	−0.040000	−0.039991	−0.040030
5	2	−0.040000	−0.039991	−0.040030
5	3	−0.040000	−0.039991	−0.040030
5	4	−0.040000	−0.039991	−0.040030
5	5	−0.040000	−0.039991	−0.040030
5	6	−0.040000	−0.039991	−0.040030
5	7	−0.040000	−0.039991	−0.040030
5	8	−0.040000	−0.039991	−0.040030
5	9	−0.040000	−0.039991	−0.040030
5	10	−0.040000	−0.039991	−0.040030
6	1	−0.050000	−0.049987	−0.050030
6	2	−0.050000	−0.049987	−0.050030
6	3	−0.050000	−0.049987	−0.050030
6	4	−0.050000	−0.049987	−0.050030
6	5	−0.050000	−0.049987	−0.050030
6	6	−0.050000	−0.049987	−0.050030
6	7	−0.050000	−0.049987	−0.050030
6	8	−0.050000	−0.049987	−0.050030
6	9	−0.050000	−0.049987	−0.050030
6	10	−0.050000	−0.049987	−0.050030
7	1	−0.060000	−0.059985	−0.060040
7	2	−0.060000	−0.059985	−0.060040
7	3	−0.060000	−0.059985	−0.060040
7	4	−0.060000	−0.059985	−0.060040
7	5	−0.060000	−0.059985	−0.060040
7	6	−0.060000	−0.059985	−0.060040
7	7	−0.060000	−0.059985	−0.060040
7	8	−0.060000	−0.059985	−0.060040
7	9	−0.060000	−0.059985	−0.060040
7	10	−0.060000	−0.059985	−0.060040
8	1	−0.070000	−0.069984	−0.070050
8	2	−0.070000	−0.069984	−0.070050
8	3	−0.070000	−0.069984	−0.070050
8	4	−0.070000	−0.069984	−0.070050
8	5	−0.070000	−0.069984	−0.070050
8	6	−0.070000	−0.069984	−0.070050
8	7	−0.070000	−0.069984	−0.070050
8	8	−0.070000	−0.069984	−0.070050
8	9	−0.070000	−0.069984	−0.070050
8	10	−0.070000	−0.069984	−0.070050

9	1	−0.080000	−0.079978	−0.080050
9	2	−0.080000	−0.079978	−0.080050
9	3	−0.080000	−0.079978	−0.080050
9	4	−0.080000	−0.079978	−0.080050
9	5	−0.080000	−0.079978	−0.080050
9	6	−0.080000	−0.079978	−0.080050
9	7	−0.080000	−0.079978	−0.080050
9	8	−0.080000	−0.079978	−0.080050
9	9	−0.080000	−0.079978	−0.080050
9	10	−0.080000	−0.079978	−0.080050
10	1	−0.090000	−0.089974	−0.090060
10	2	−0.090000	−0.089974	−0.090060
10	3	−0.090000	−0.089974	−0.090060
10	4	−0.090000	−0.089974	−0.090060
10	5	−0.090000	−0.089974	−0.090060
10	6	−0.090000	−0.089974	−0.090060
10	7	−0.090000	−0.089974	−0.090060
10	8	−0.090000	−0.089974	−0.090060
10	9	−0.090000	−0.089974	−0.090060
10	10	−0.090000	−0.089974	−0.090060
11	1	−0.100000	−0.099971	−0.100100
11	2	−0.100000	−0.099971	−0.100100
11	3	−0.100000	−0.099971	−0.100100
11	4	−0.100000	−0.099971	−0.100100
11	5	−0.100000	−0.099971	−0.100500
11	6	−0.100000	−0.099971	−0.100100
11	7	−0.100000	−0.099971	−0.100100
11	8	−0.100000	−0.099971	−0.100100
11	9	−0.100000	−0.099971	−0.100100
11	10	−0.100000	−0.099971	−0.100100
12	1	0.000000	0.000000	−0.000011
12	2	0.000000	0.000000	−0.000010
12	3	0.000000	0.000000	−0.000008
12	4	0.000000	0.000000	−0.000008
12	5	0.000000	0.000000	−0.000007
12	6	0.000000	0.000000	−0.000007
12	7	0.000000	0.000000	−0.000004
12	8	0.000000	0.000000	−0.000004
12	9	0.000000	0.000000	−0.000003
12	10	0.000000	0.000000	−0.000003

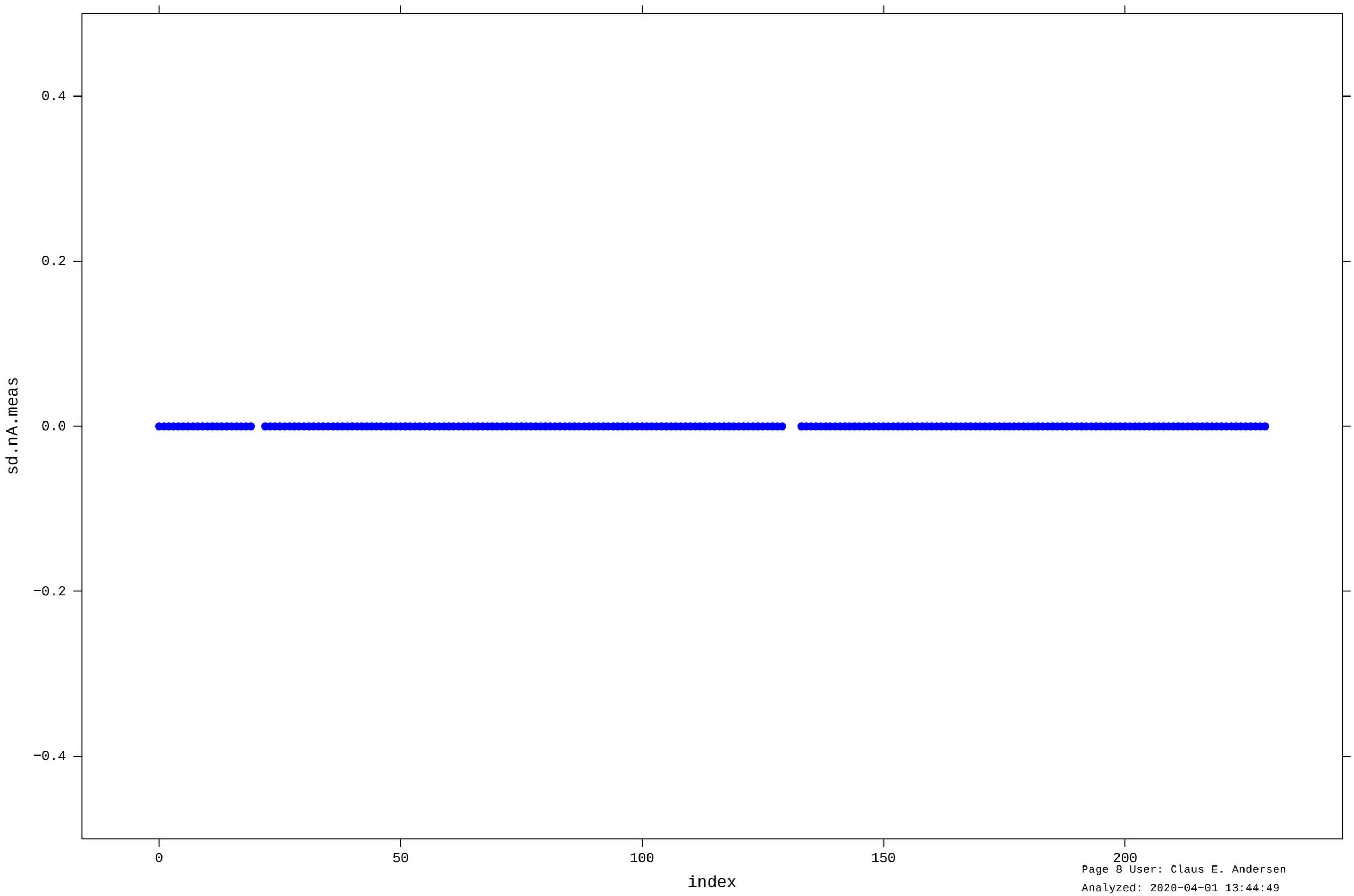
13	1	0.010000	0.009997	0.009894
13	2	0.010000	0.009997	0.009942
13	3	0.010000	0.009997	0.009965
13	4	0.010000	0.009997	0.009979
13	5	0.010000	0.009997	0.009985
13	6	0.010000	0.009997	0.009991
13	7	0.010000	0.009997	0.009993
13	8	0.010000	0.009997	0.009994
13	9	0.010000	0.009997	0.009996
13	10	0.010000	0.009997	0.009995
14	4	0.020000	0.019991	0.020190
14	5	0.020000	0.019991	0.020090
14	6	0.020000	0.019991	0.020050
14	7	0.020000	0.019991	0.020040
14	8	0.020000	0.019991	0.020030
14	9	0.020000	0.019991	0.020030
14	10	0.020000	0.019991	0.020020
15	1	0.030000	0.029990	0.030030
15	2	0.030000	0.029990	0.030020
15	3	0.030000	0.029990	0.030020
15	4	0.030000	0.029990	0.030020
15	5	0.030000	0.029990	0.030020
15	6	0.030000	0.029990	0.030020
15	7	0.030000	0.029990	0.030020
15	8	0.030000	0.029990	0.030020
15	9	0.030000	0.029990	0.030020
15	10	0.030000	0.029990	0.030020
16	1	0.040000	0.039988	0.040030
16	2	0.040000	0.039988	0.040030
16	3	0.040000	0.039988	0.040030
16	4	0.040000	0.039988	0.040030
16	5	0.040000	0.039988	0.040030
16	6	0.040000	0.039988	0.040030
16	7	0.040000	0.039988	0.040030
16	8	0.040000	0.039988	0.040030
16	9	0.040000	0.039988	0.040030
16	10	0.040000	0.039988	0.040030
17	1	0.050000	0.049986	0.050040
17	2	0.050000	0.049986	0.050040
17	3	0.050000	0.049986	0.050030

17	4	0.050000	0.049986	0.050040
17	5	0.050000	0.049986	0.050030
17	6	0.050000	0.049986	0.050030
17	7	0.050000	0.049986	0.050030
17	8	0.050000	0.049986	0.050030
17	9	0.050000	0.049986	0.050030
17	10	0.050000	0.049986	0.050030
18	1	0.060000	0.059983	0.060040
18	2	0.060000	0.059983	0.060040
18	3	0.060000	0.059983	0.060040
18	4	0.060000	0.059983	0.060040
18	5	0.060000	0.059983	0.060040
18	6	0.060000	0.059983	0.060040
18	7	0.060000	0.059983	0.060040
18	8	0.060000	0.059983	0.060040
18	9	0.060000	0.059983	0.060040
18	10	0.060000	0.059983	0.060040
19	1	0.070000	0.069981	0.070050
19	2	0.070000	0.069981	0.070050
19	3	0.070000	0.069981	0.070050
19	4	0.070000	0.069981	0.070050
19	5	0.070000	0.069981	0.070050
19	6	0.070000	0.069981	0.070050
19	7	0.070000	0.069981	0.070050
19	8	0.070000	0.069981	0.070050
19	9	0.070000	0.069981	0.070050
19	10	0.070000	0.069981	0.070050
20	1	0.080000	0.079976	0.080060
20	2	0.080000	0.079976	0.080060
20	3	0.080000	0.079976	0.080060
20	4	0.080000	0.079976	0.080060
20	5	0.080000	0.079977	0.080060
20	6	0.080000	0.079977	0.080060
20	7	0.080000	0.079977	0.080060
20	8	0.080000	0.079977	0.080060
20	9	0.080000	0.079977	0.080060
20	10	0.080000	0.079977	0.080060
21	1	0.090000	0.089971	0.090070
21	2	0.090000	0.089971	0.090070
21	3	0.090000	0.089971	0.090070

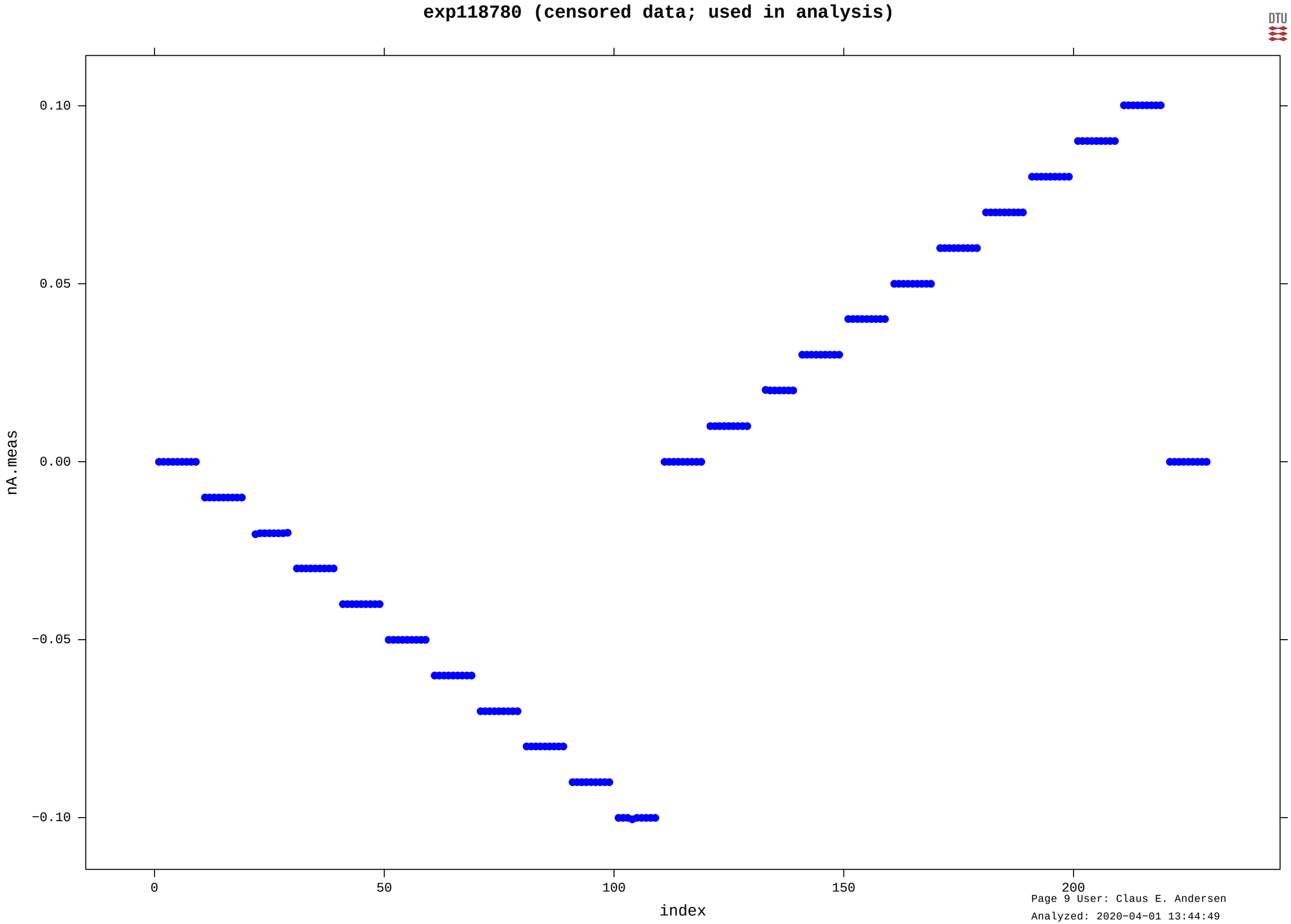
21	4	0.090000	0.089971	0.090070
21	5	0.090000	0.089971	0.090070
21	6	0.090000	0.089971	0.090070
21	7	0.090000	0.089971	0.090070
21	8	0.090000	0.089971	0.090070
21	9	0.090000	0.089971	0.090070
21	10	0.090000	0.089971	0.090070
22	1	0.100000	0.099969	0.100100
22	2	0.100000	0.099969	0.100100
22	3	0.100000	0.099969	0.100100
22	4	0.100000	0.099969	0.100100
22	5	0.100000	0.099969	0.100100
22	6	0.100000	0.099969	0.100100
22	7	0.100000	0.099969	0.100100
22	8	0.100000	0.099969	0.100100
22	9	0.100000	0.099969	0.100100
22	10	0.100000	0.099969	0.100100
23	1	0.000000	−0.000000	0.000007
23	2	0.000000	−0.000000	0.000007
23	3	0.000000	−0.000000	0.000005
23	4	0.000000	−0.000000	0.000005
23	5	0.000000	−0.000000	0.000005
23	6	0.000000	−0.000000	0.000005
23	7	0.000000	−0.000000	0.000004
23	8	0.000000	−0.000000	0.000003
23	9	0.000000	−0.000000	0.000003
23	10	0.000000	−0.000000	0.000003


exp118780 (all data)
DTU
nA.meas
0.10
0.05
0.00
−0.05
−0.10
0
50
100
150
200
index
Page 7 User: Claus E. Andersen
Analyzed: 2020−04−01 13:44:49

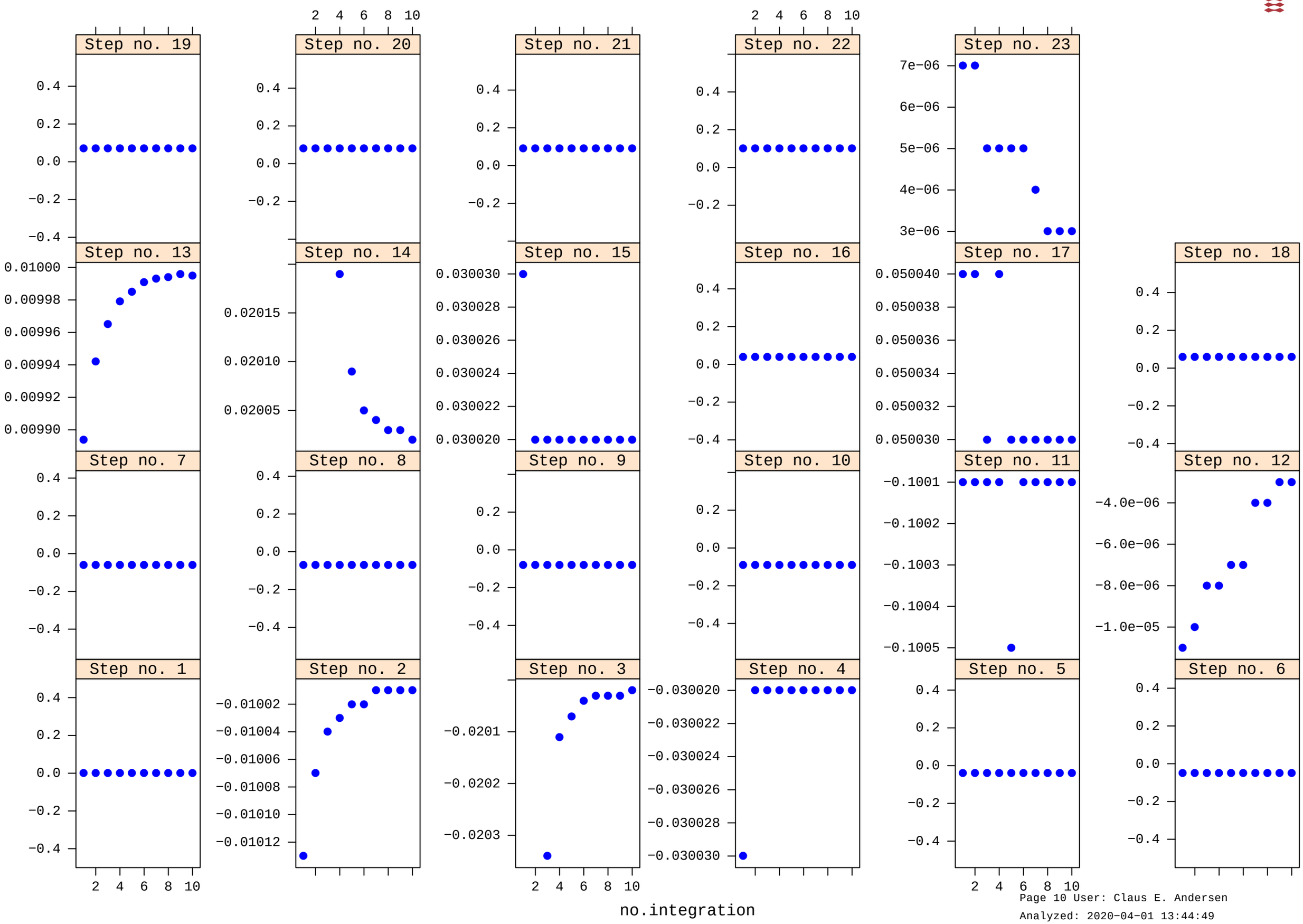
exp118780 (all data) Note that a trend in these data (especially for currents < 200 pA) could indicate that the measurements were not stable (averaging over the transient). See CAs Electrometer logbook no. 7 (April 16, 2019).



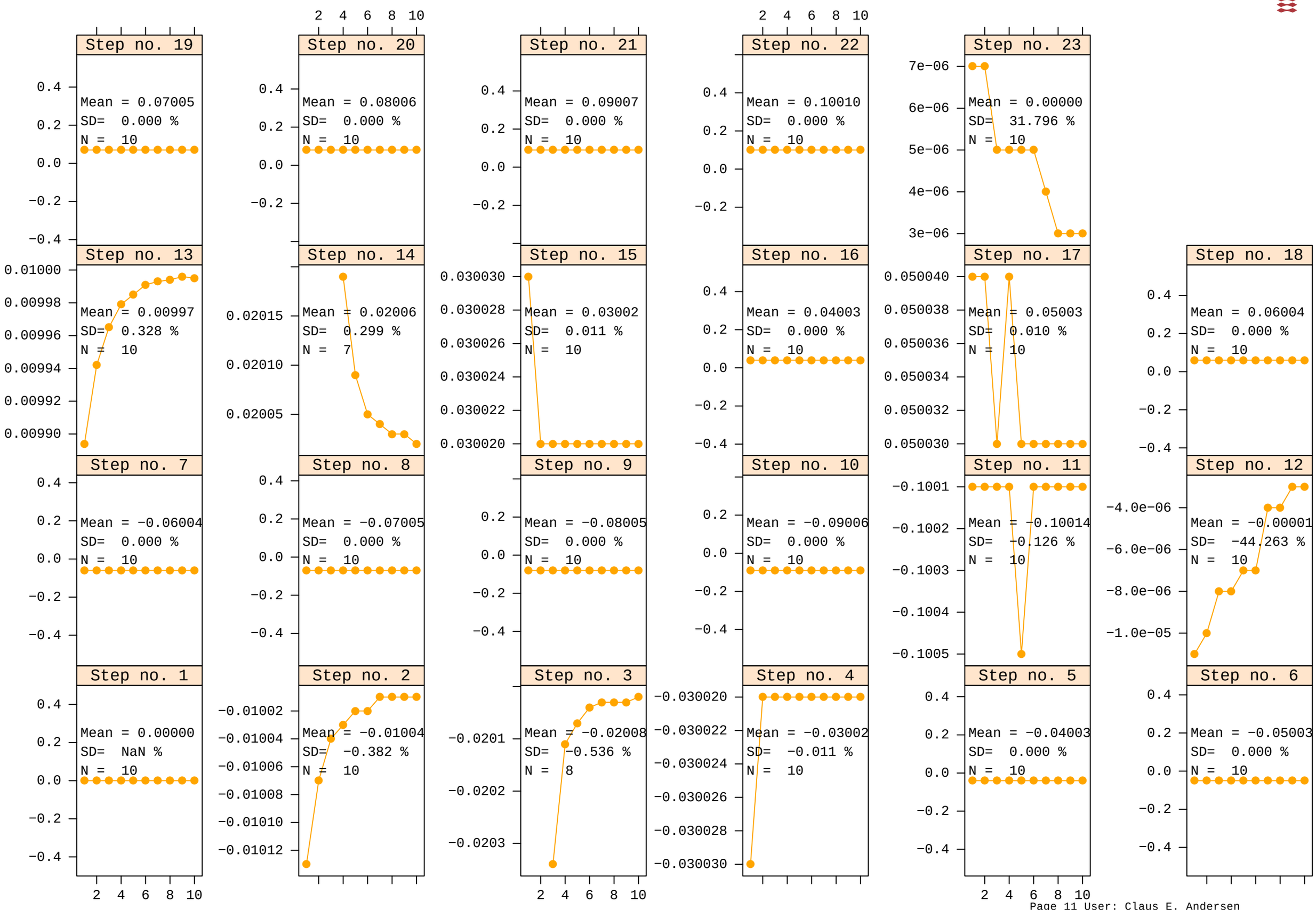
exp118780 (censored data; used in analysis)



exp118780


Step no. 19
Step no. 20
Step no. 21
Step no. 22
Step no. 23
Step no. 13
Step no. 14
Step no. 15
Step no. 16
Step no. 17
Step no. 18
Step no. 7
Step no. 8
Step no. 9
Step no. 10
Step no. 11
Step no. 12
Step no. 1
Step no. 2
Step no. 3
Step no. 4
Step no. 5
Step no. 6
nA.meas
no.integration

exp118780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SD= 0.000 %
N = 10
Step no. 20
Mean = 0.08006
SD= 0.000 %
N = 10
Step no. 21
Mean = 0.09007
SD= 0.000 %
N = 10
Step no. 22
Mean = 0.10010
SD= 0.000 %
N = 10
Step no. 23
Mean = 0.00000
SD= 31.796 %
N = 10
Step no. 13
Mean = 0.00997
SD= 0.328 %
N = 10
Step no. 14
Mean = 0.02006
SD= 0.299 %
N = 7
Step no. 15
Mean = 0.03002
SD= 0.011 %
N = 10
Step no. 16
Mean = 0.04003
SD= 0.000 %
N = 10
Step no. 17
Mean = 0.05003
SD= 0.010 %
N = 10
Step no. 18
Mean = 0.06004
SD= 0.000 %
N = 10
Step no. 7
Mean = -0.06004
SD= 0.000 %
N = 10
Step no. 8
Mean = -0.07005
SD= 0.000 %
N = 10
Step no. 9
Mean = -0.08005
SD= 0.000 %
N = 10
Step no. 10
Mean = -0.09006
SD= 0.000 %
N = 10
Step no. 11
Mean = -0.10014
SD= -0.126 %
N = 10
Step no. 12
Mean = -0.00001
SD= -44.263 %
N = 10
Step no. 1
Mean = 0.00000
SD= NaN %
N = 10
Step no. 2
Mean = -0.01004
SD= -0.382 %
N = 10
Step no. 3
Mean = -0.02008
SD= -0.536 %
N = 8
Step no. 4
Mean = -0.03002
SD= -0.011 %
N = 10
Step no. 5
Mean = -0.04003
SD= 0.000 %
N = 10
Step no. 6
Mean = -0.05003
SD= 0.000 %
N = 10
nA.meas
no.integration

This is the final page of the Electrometer current calibration report for file: exp118780