DTU Nutech, DK-4000 Roskilde, Denmark

Temperature calibration

report for file: exp116215

CRC32 file validation(s) = TRUE (ok.lines=353, not.ok.lines=353)

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

> Notes made during the analysis:

The K6510/2450 ohmmeter was calibrated in exp116697
(see file modifications function).

> End of notes.

Temperature calibration: DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm) (exp116215)

item	value
Session	Cal-session-20
File	exp116215
Thermistor / temperature gauge signal (DUT)	DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm)
LFMD reference temperature signal (REF)	Reference = Burns.3925.HP3458.ohm (degC)
Treat / analyze DUT as a thermistor?	Yes
MELab temperature script	MELab-script-BATH-temperature-019.txt
Measurement time: start - stop	'16-07-2019 - 09:22:36' - '17-07-2019 - 17:03:36'
Duration	31.68 h
Variable(s) with thermistor current	K2450.setpoint.uA
Variable(s) with thermistor power	HDRL.4035.K6510.102.uW.neutral
Lab. temperature	22.70 degC
Lab. humidity	45.8 %RH
Lab. pressure	1011.41 hPa

Thermistor tab. 1. Resistance estimates at zero power (R0) data.
 Reference = Burns.3925.HP3458.ohm
 DUT signal = HDRL.4035.K6510.102.ohm.neutral
 DUT unit = ohm
 DUT extra info = Thermistor HDRL−4035

BATH.group	fn	Temp.index	N	R0	u.R0	REF.degC	sd.REF.degC
10	exp116215	1	23	3665.439	0.081	10.004	0.002
20	exp116215	2	23	2440.138	0.104	19.997	0.004
20	exp116215	10	23	2439.189	0.029	19.997	0.001
30	exp116215	3	23	1663.571	0.087	29.993	0.004
30	exp116215	9	23	1663.081	0.037	29.992	0.002
40	exp116215	4	23	1159.356	0.059	39.998	0.005
40	exp116215	8	23	1159.687	0.024	39.991	0.003
50	exp116215	5	23	825.531	0.007	49.996	0.001
50	exp116215	7	23	825.723	0.013	49.996	0.001
60	exp116215	0	23	600.296	0.023	59.996	0.001
60	exp116215	6	23	599.953	0.012	59.997	0.002

Thermistor tab. 2. Resistance estimates at zero power (R0) data.
 Reference = Burns.3925.HP3458.ohm
 DUT signal = HDRL.4035.K6510.102.ohm.neutral
 DUT unit = ohm
 DUT extra info = Thermistor HDRL−4035
 Slp.ohm.mW is the slope from a lin. regression of R (ohm) vs. power (mW). u.Slp is the uncertainty.

BATH.group	fn	Temp.index	N	R0	u.R0	slp.ohm.mW	u.slp.ohm.mW
10	exp116215	1	23	3665.439	0.081	−83.062	0.539
20	exp116215	2	23	2440.138	0.104	−52.871	1.039
20	exp116215	10	23	2439.189	0.029	−74.969	0.293
30	exp116215	3	23	1663.571	0.087	−36.348	1.268
30	exp116215	9	23	1663.081	0.037	−45.118	0.535
40	exp116215	4	23	1159.356	0.059	−25.677	1.243
40	exp116215	8	23	1159.687	0.024	−21.262	0.508
50	exp116215	5	23	825.531	0.007	−12.874	0.196
50	exp116215	7	23	825.723	0.013	−15.955	0.396
60	exp116215	0	23	600.296	0.023	−11.084	0.942
60	exp116215	6	23	599.953	0.012	−9.723	0.465

Thermistor Tab. 3. Resistance estimates at zero power (R0).
 Reference = Burns.3925.HP3458.ohm
 DUT signal = HDRL.4035.K6510.102.ohm.neutral
 DUT unit = ohm
 DUT extra info = Thermistor HDRL−4035
 R.mean, R.sd, R.min, and R.max were computed regardless of test current (power).

BATH.group	fn	Temp.index	N	R0	R.mean	R.sd	R.min	R.max
10	exp116215	1	23	3665.439	3657.900	10.186	3637.978	3665.616
20	exp116215	2	23	2440.138	2436.936	4.343	2428.217	2440.954
20	exp116215	10	23	2439.189	2434.658	6.120	2422.613	2439.295
30	exp116215	3	23	1663.571	1662.069	2.056	1657.917	1663.952
30	exp116215	9	23	1663.081	1661.218	2.521	1656.090	1663.332
40	exp116215	4	23	1159.356	1158.616	1.025	1156.619	1160.046
40	exp116215	8	23	1159.687	1159.073	0.834	1157.369	1159.784
50	exp116215	5	23	825.531	825.267	0.358	824.548	825.560
50	exp116215	7	23	825.723	825.396	0.446	824.525	825.802
60	exp116215	0	23	600.296	600.130	0.240	599.642	600.479
60	exp116215	6	23	599.953	599.808	0.201	599.388	600.002

Thermistor tab. 4. Model 1 fit.
DUT signal = HDRL.4035.K6510.102.ohm.neutral
DUT extra info = Thermistor HDRL−4035

MODEL 1: We fit the thermistor data using the LFMD model (see Nicholas & White Traceabel temperatures p.250):

```
fm <− lm(1/T ~ a0 + a1*log(R/Rn) + a2*log(R/Rn)^2 + a3*log(R/Rn)^3))
```

where T is the measured reference temperatrature in K and where R is the resistance at zero power (R=R0) normalized by an arbitary constant Rn = 1 ohm. The four coefficients (a0 to a3) are:

fm.LFMD.p
9.0291270270e−04
3.9875252086e−04
−1.6313677003e−05
8.2326011561e−07

Goodness of model fit: std. dev. of residuals = 5.893 mK

R0	REF.degC	FIT.degC	delta.mK
3665.439	10.004	10.003	1.5
2440.138	19.997	19.995	2.3
2439.189	19.997	20.005	−7.7
1663.571	29.993	29.987	6.8
1663.081	29.992	29.995	−2.2
1159.356	39.998	39.996	1.6
1159.687	39.991	39.988	2.6
825.531	49.996	50.004	−7.6
825.723	49.996	49.996	−0.4
600.296	59.996	59.985	10.4
599.953	59.997	60.004	−7.2

Thermistor tab. 5. Model 1 vs. 2 comparison.
DUT signal = HDRL.4035.K6510.102.ohm.neutral
DUT extra info = Thermistor HDRL−4035

Comparsion between Model 1 (the LFMD model) and Model 2 (the HDRL model).
For given temperatures, we use model 1 to compute the resistance,
and we then convert that back to a temperature using model 2.
The difference (delta) between the original temperature is given in mK.
The change in resistance pr. degC is given as ohm.pr.degC for the LFMD model.

degC	R0.ohm.LFMD	ohm.pr.degC.LFMD	degC.HDRL.model	mK.delta
10.000	3665.85	−153.7	10.019	18.8
10.100	3650.50	−153.0	10.118	18.3
15.000	2981.44	−121.4	14.997	−3.0
20.000	2439.65	−96.4	19.987	−12.7
20.100	2430.03	−95.9	20.087	−12.8
25.000	2008.24	−77.0	24.987	−13.5
25.100	2000.56	−76.6	25.087	−13.4
30.000	1662.75	−61.8	29.992	−8.4
30.100	1656.58	−61.6	30.092	−8.3
35.000	1384.51	−49.9	35.000	−0.4
40.000	1159.20	−40.5	40.008	7.7
40.100	1155.15	−40.4	40.108	7.8
45.000	975.76	−33.1	45.013	13.2
50.000	825.63	−27.2	50.014	13.7
50.100	822.92	−27.1	50.114	13.7
55.000	702.13	−22.4	55.007	6.8
59.900	601.88	−18.6	59.891	−9.2
60.000	600.02	−18.6	59.990	−9.7

Thermistor tab. 6. Model 2 fit.
DUT signal = HDRL.4035.K6510.102.ohm.neutral
DUT extra info = Thermistor HDRL−4035

MODEL 2: We fit the thermistor data using the HDRL model(see HDRL I−004):

$$T \sim B/(\log(R) + A)) - Tk$$

where T is the measured reference temperatrature in degC and where R is the resistance at zero power (R0).
The coefficients are (A, B, Tk) :

p.HDRL
4.5709929867e+00
3.8695713822e+03
2.9281647864e+02

Goodness of model fit: std. dev. of residuals = 13.939 mK

R0	REF.degC	FIT.degC	delta.mK
3665.439	10.004	10.021	17.3
2440.138	19.997	19.982	−15.0
2439.189	19.997	19.992	−5.0
1663.571	29.993	29.978	−15.2
1663.081	29.992	29.986	−6.2
1159.356	39.998	40.004	6.0
1159.687	39.991	39.996	5.0
825.531	49.996	50.017	21.3
825.723	49.996	50.010	14.2
600.296	59.996	59.976	−20.0
599.953	59.997	59.994	−2.5

ohm	degC
500.000	65.95549
1000.000	44.29096
1500.000	32.78954
2000.000	25.09386
2500.000	19.37063
3000.000	14.84516
3500.000	11.12005
4000.000	7.96538

Thermistor tab. 7. Model 2 vs. 1 comparison.
DUT signal = HDRL.4035.K6510.102.ohm.neutral
DUT extra info = Thermistor HDRL−4035

Comparsion between Model 2 (the HDRL model) and Model 1 (the LFMD model).
For given temperatures, we use model 2 to compute the resistance,
and we then convert that back to a temperature using model 2.
The difference (delta) between the original temperature is given in mK.
The change in resistance pr. degC is given as ohm.pr.degC for the HDRL model.

degC	R0.ohm.HDRL	ohm.pr.degC.HDRL	degC.LFMD.model	mK.delta
10.000	3668.76	−154.8	9.981	−18.9
10.100	3653.32	−154.0	10.082	−18.4
15.000	2981.08	−121.7	15.003	3.0
20.000	2438.43	−96.4	20.013	12.7
20.100	2428.81	−96.0	20.113	12.8
25.000	2007.20	−76.9	25.013	13.5
25.100	1999.53	−76.5	25.113	13.4
30.000	1662.23	−61.7	30.008	8.4
30.100	1656.07	−61.4	30.108	8.3
35.000	1384.49	−49.8	35.000	0.4
40.000	1159.51	−40.5	39.992	−7.6
40.100	1155.46	−40.3	40.092	−7.8
45.000	976.20	−33.1	44.987	−13.2
50.000	826.00	−27.2	49.986	−13.7
50.100	823.29	−27.1	50.086	−13.7
55.000	702.28	−22.5	54.993	−6.8
59.900	601.71	−18.7	59.909	9.3
60.000	599.84	−18.6	60.010	9.7

Thermistor tab. 8. Repeats.
DUT signal = HDRL.4035.K6510.102.ohm.neutral
DUT extra info = Thermistor HDRL−4035
Evaluate the thermistor gives the same results for given temp. set points
N is the number a given setpoint was used.
ohm.per.degC.LFMD is the change in resistance pr. degC for the LFMD model.
R0 is the resistance (in ohm) at zero power.
R0.sd is the standard dev. of the N results in ohm
R0.sd.mK is the same thing expressed in mK

BATH.group	R0.mean	R0.sd	R0.range	N	ohm.pr.degC.LFMD	R0.sd.mK	R0.range.mK
10	3665.44	NaN	0.000	1	−153.7	NaN	0.0
20	2439.66	0.670	0.948	2	−96.4	7.0	9.8
30	1663.33	0.347	0.491	2	−61.8	5.6	7.9
40	1159.52	0.234	0.331	2	−40.5	5.8	8.2
50	825.63	0.136	0.192	2	−27.2	5.0	7.1
60	600.12	0.242	0.343	2	−18.6	13.1	18.5

Overview tab. 1.

Reference = Burns.3925.HP3458.ohm

DUT signal = HDRL.4035.K6510.102.ohm.neutral

DUT unit = ohm

DUT extra info = Thermistor HDRL−4035

Note that for thermistors this table contains just the raw (pooled) results without estimation of zero−power resistance.

BATH.group	fn	REF.degC.mean	DUT.signal.mean	REF.degC.sd	DUT.signal.sd	date	delta
10	exp116215	10.004	3657.900	0.002	10.186	'16−07−2019	3647.8956
20	exp116215	19.997	2435.797	0.003	5.372	'16−07−2019	2415.8002
30	exp116215	29.993	1661.644	0.003	2.315	'16−07−2019	1631.6506
40	exp116215	39.994	1158.845	0.005	0.952	'16−07−2019	1118.8504
50	exp116215	49.996	825.331	0.001	0.405	'17−07−2019	775.3351
60	exp116215	59.996	599.969	0.002	0.273	'16−07−2019	539.9728

Overview tab. 2.

Fitting Stein−Hart equation to DUT resistance (only relevant if DUT is a Pt−100 sensor).

Reference = Burns.3925.HP3458.ohm

DUT signal = HDRL.4035.K6510.102.ohm.neutral

DUT unit = ohm

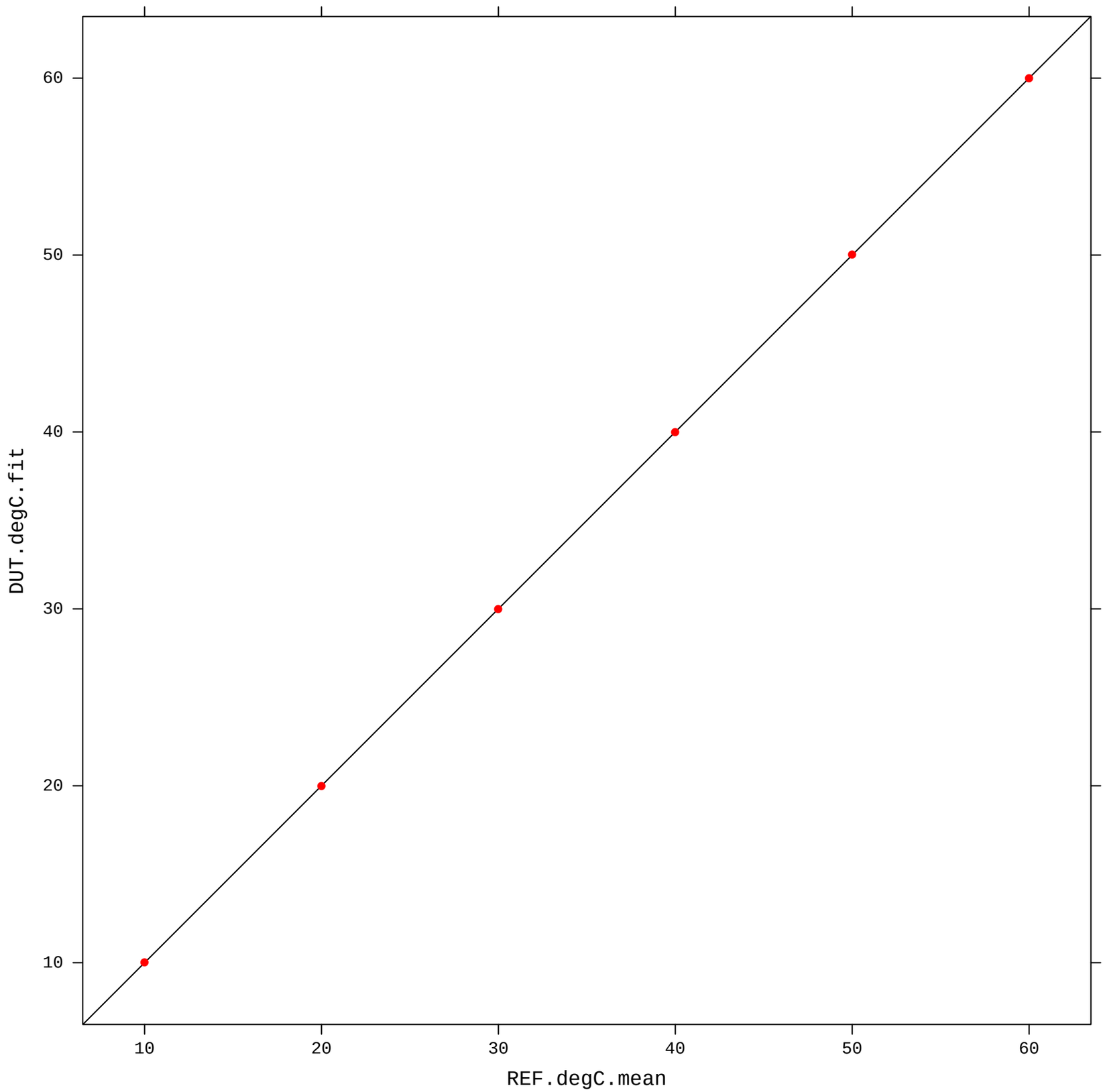
Stein−Hart A−coeff = 0.0011910467372275

Stein−Hart B−coeff = 0.000279657565462669

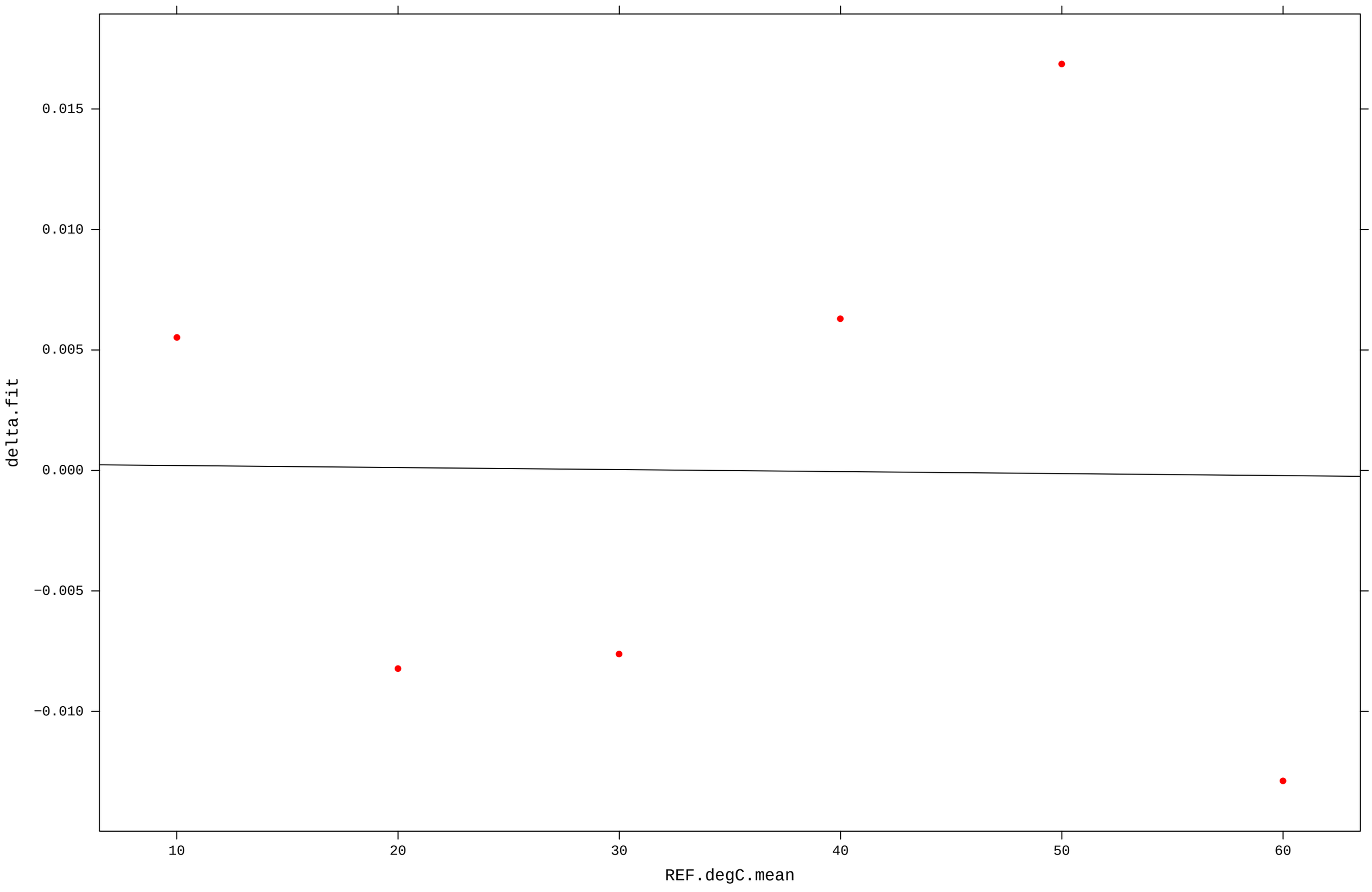
Stein−Hart C−coeff = 8.33570467240254e−08

BATH.group	fn	REF.degC.mean	DUT.signal.mean	REF.degC.sd	DUT.signal.sd	DUT.degC.fit	delta.fit
10	exp116215	10.004	3657.900	0.002	10.186	10.010	0.0055
20	exp116215	19.997	2435.797	0.003	5.372	19.989	−0.0082
30	exp116215	29.993	1661.644	0.003	2.315	29.985	−0.0076
40	exp116215	39.994	1158.845	0.005	0.952	40.000	0.0063
50	exp116215	49.996	825.331	0.001	0.405	50.013	0.0169
60	exp116215	59.996	599.969	0.002	0.273	59.983	−0.0129

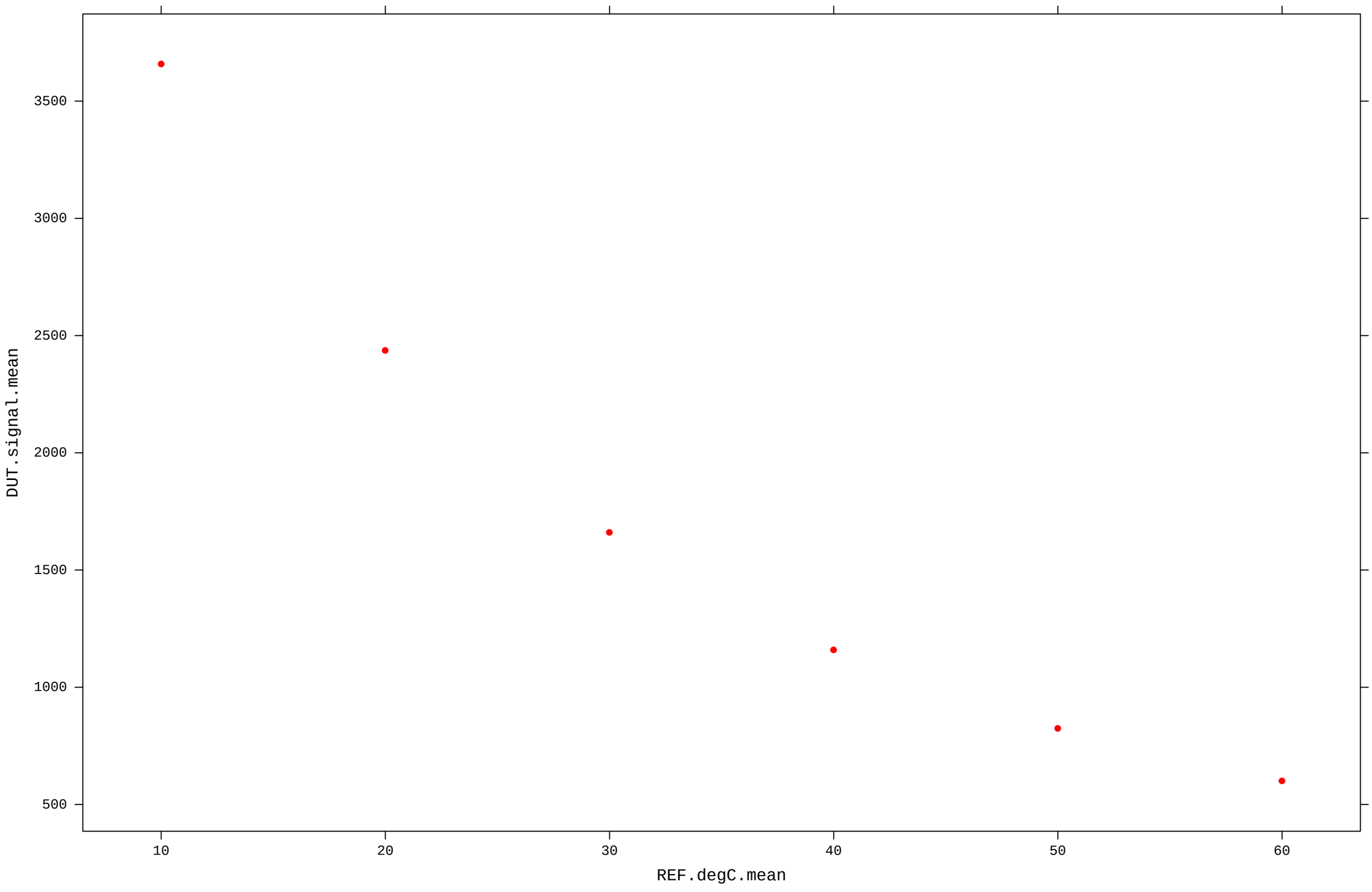
DUT (Stein−Hart model fit) vs. REF
DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm)
Reference = Burns.3925.HP3458.ohm (degC)



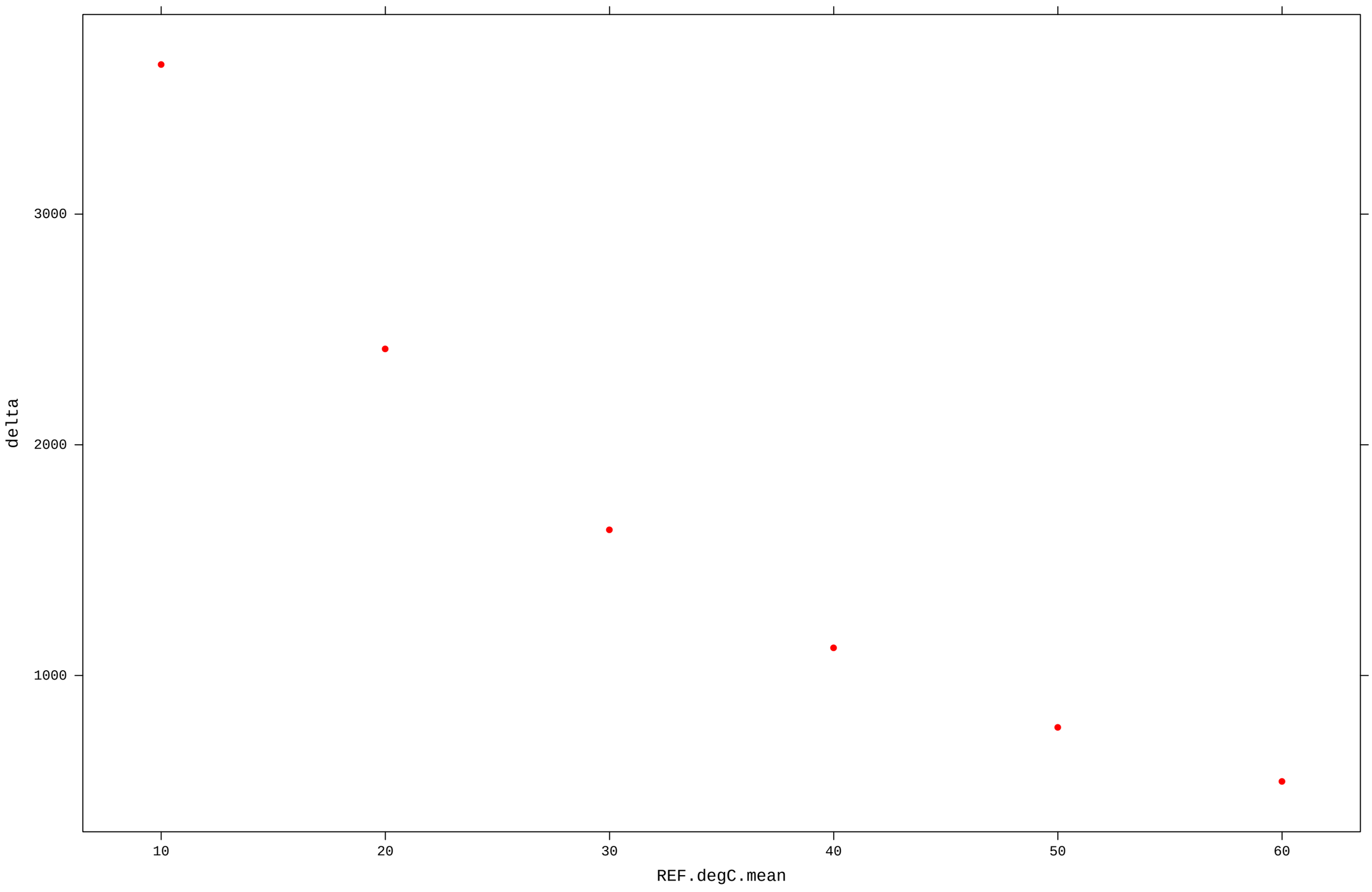
Residuals for DUT (Stein-Hart model fit) vs. REF
DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm)
Reference = Burns.3925.HP3458.ohm (degC)



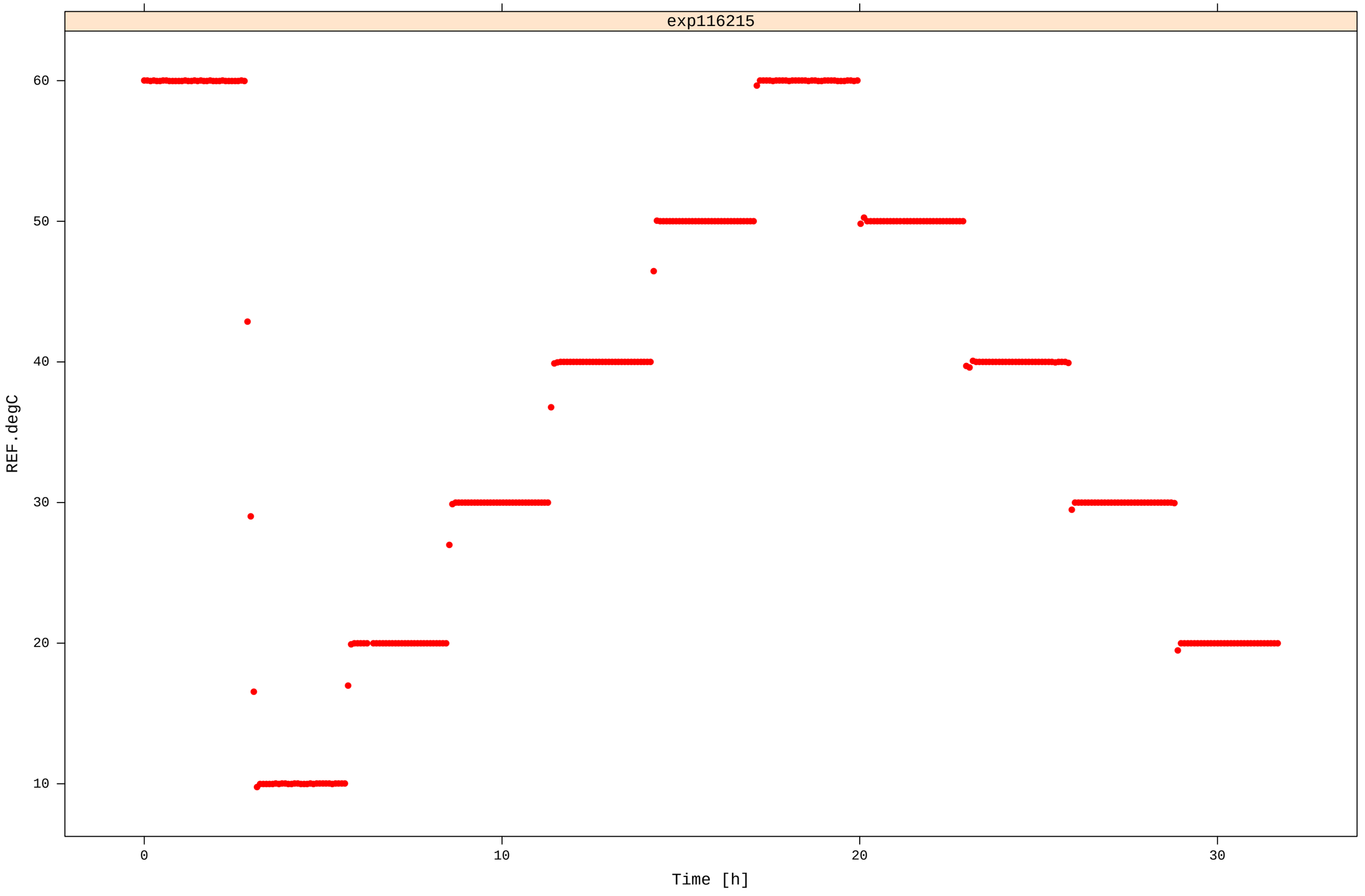
DUT vs. REF
DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm)
Reference = Burns.3925.HP3458.ohm (degC)



Difference plot: DUT minus REF (only meaningful if DUT and REF are of the same nature)
DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm)
Reference = Burns.3925.HP3458.ohm (degC)



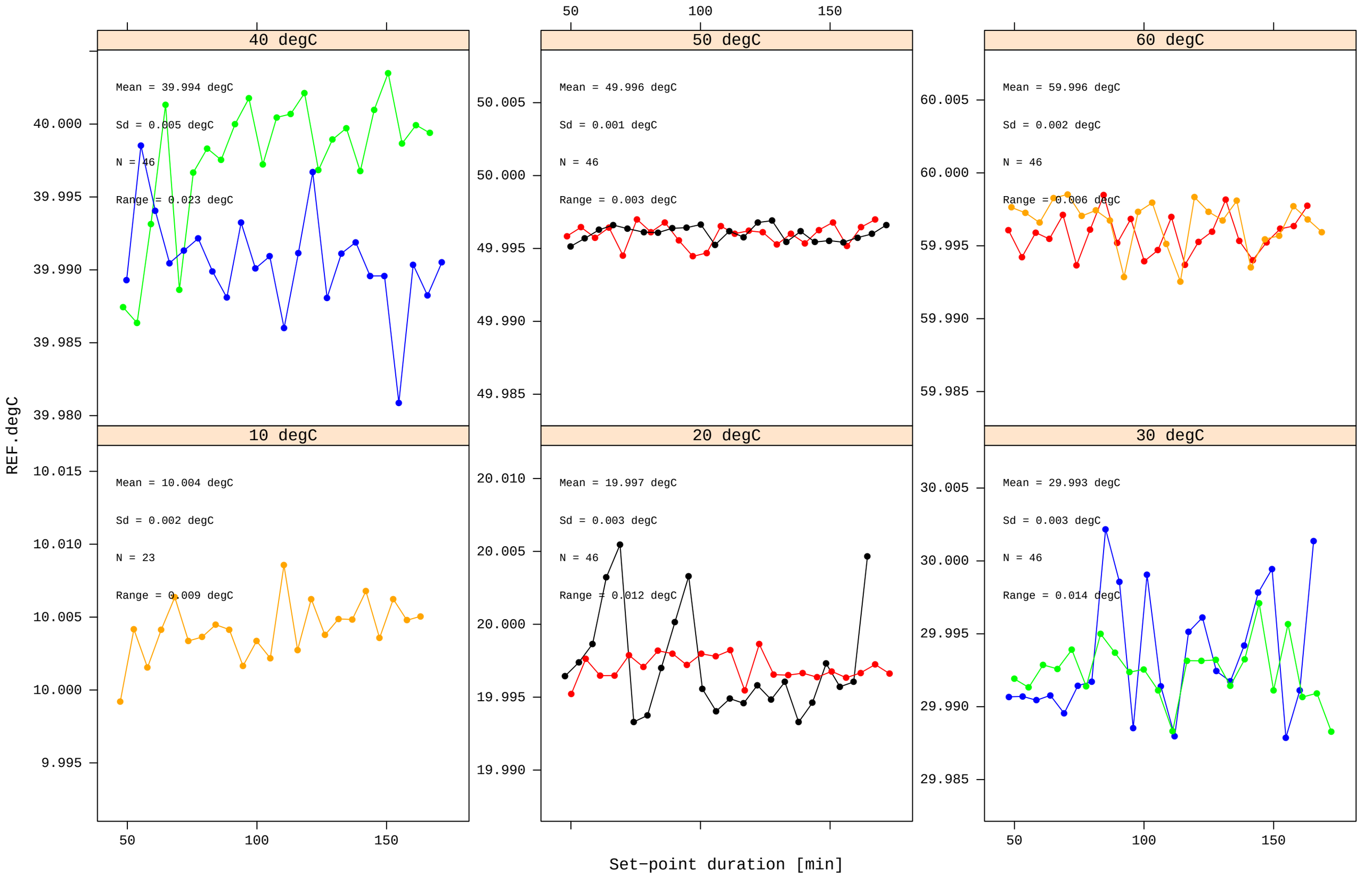
REF vs. global time
Reference = Burns.3925.HP3458.ohm (degC)



REF vs. time the setpoint has been active

Reference = Burns.3925.HP3458.ohm (degC)

0 1 2 3 4 5 6 7 8 9 10



DUT vs. time the setpoint has been active

DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm)

0 1 2 3 4 5 6 7 8 9 10

40 degC

Mean = 1158.845 ohm
Sd = 0.952 ohm
N = 46
Range = 3.427 ohm

50 degC

Mean = 825.331 ohm
Sd = 0.405 ohm
N = 46
Range = 1.277 ohm

60 degC

Mean = 599.969 ohm
Sd = 0.273 ohm
N = 46
Range = 1.091 ohm

10 degC

Mean = 3657.900 ohm
Sd = 10.186 ohm
N = 23
Range = 27.637 ohm

20 degC

Mean = 2435.797 ohm
Sd = 5.372 ohm
N = 46
Range = 18.341 ohm

30 degC

Mean = 1661.644 ohm
Sd = 2.315 ohm
N = 46
Range = 7.862 ohm

DUT.signal

Set-point duration [min]

REF vs. time the setpoint has been active (all data)

Reference = Burns.3925.HP3458.ohm (degC)

0 1 2 3 4 5 6 7 8 9 10

40 degC

Mean = 39.933 degC
Sd = 1.827 degC
N = 64
Range = 19.987 degC

50 degC

Mean = 49.943 degC
Sd = 1.836 degC
N = 64
Range = 19.993 degC

60 degC

Mean = 59.836 degC
Sd = 1.249 degC
N = 64
Range = 10.007 degC

10 degC

Mean = 13.385 degC
Sd = 10.803 degC
N = 32
Range = 50.221 degC

20 degC

Mean = 19.939 degC
Sd = 1.832 degC
N = 63
Range = 19.938 degC

30 degC

Mean = 29.936 degC
Sd = 1.817 degC
N = 64
Range = 19.946 degC

REF.degC

Set-point duration [min]

REF vs. time the setpoint has been active (stable data)

Reference = Burns.3925.HP3458.ohm (degC)

0 1 2 3 4 5 6 7 8 9 10

40 degC

Mean = 39.994 degC
Sd = 0.005 degC
N = 46
Range = 0.023 degC

50 degC

Mean = 49.996 degC
Sd = 0.001 degC
N = 46
Range = 0.003 degC

60 degC

Mean = 59.996 degC
Sd = 0.002 degC
N = 46
Range = 0.006 degC

10 degC

Mean = 10.004 degC
Sd = 0.002 degC
N = 23
Range = 0.009 degC

20 degC

Mean = 19.997 degC
Sd = 0.003 degC
N = 46
Range = 0.012 degC

30 degC

Mean = 29.993 degC
Sd = 0.003 degC
N = 46
Range = 0.014 degC

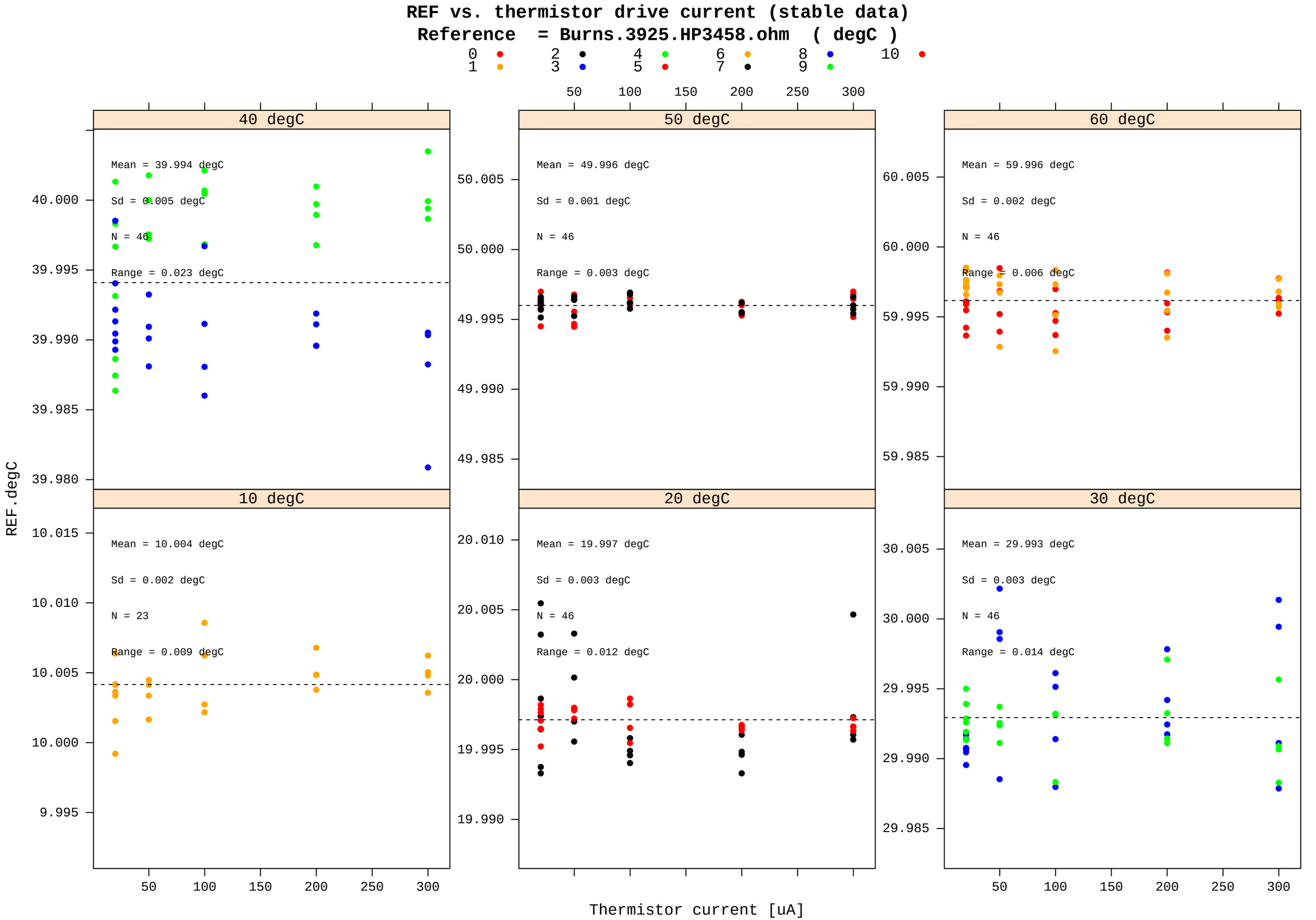
REF.degC

Set-point duration [min]

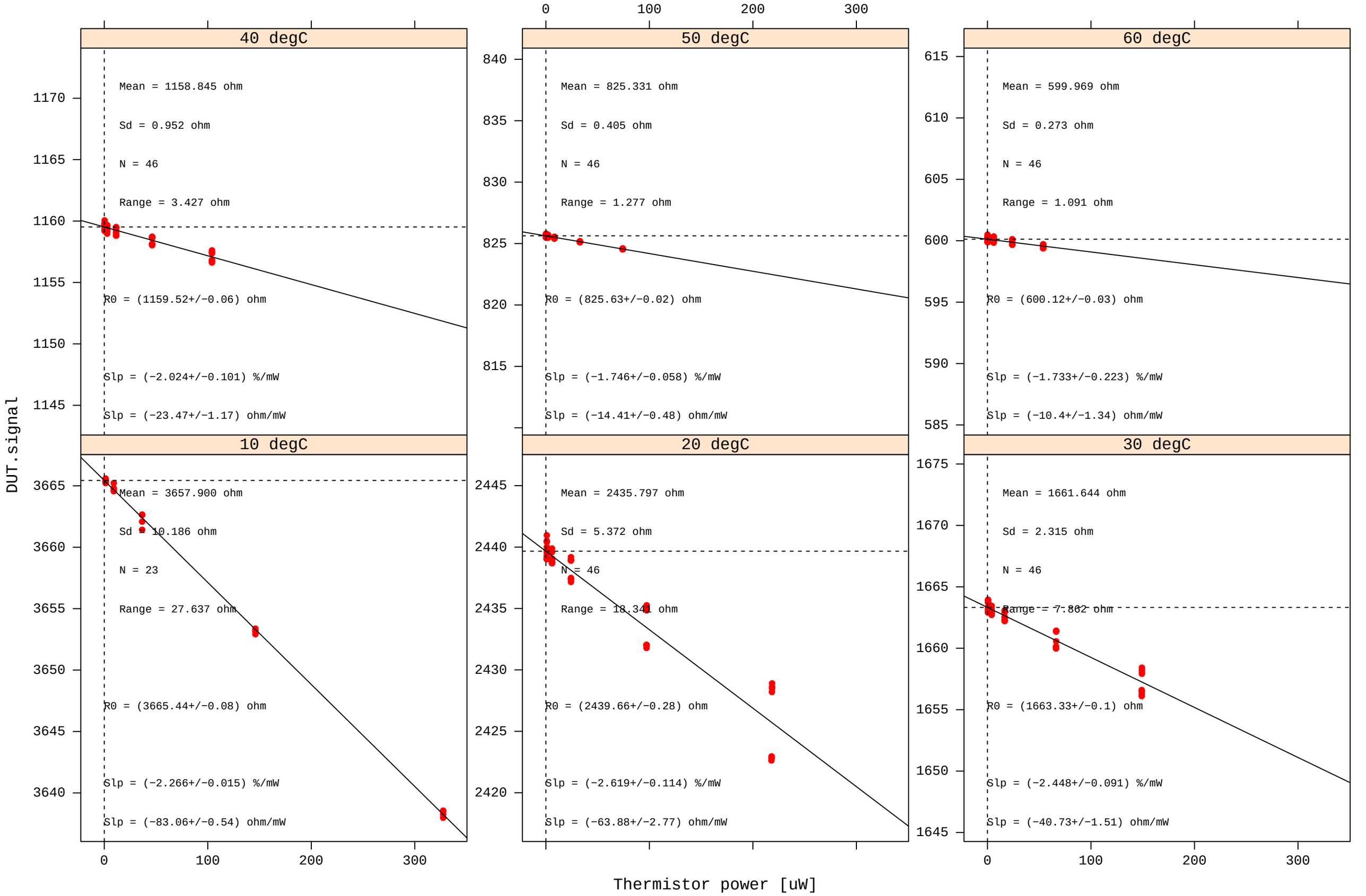
REF vs. thermistor drive current (stable data)

Reference = Burns.3925.HP3458.ohm (degC)

0 1 2 3 4 5 6 7 8 9 10



DUT vs. thermistor power
DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm)



DUT vs. thermistor power (grouped by setpoint run no.)

DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm)

0 1 2 3 4 5 6 7 8 9 10

40 degC

Mean = 1158.845 ohm
Sd = 0.952 ohm
N = 46
Range = 3.427 ohm
R0 = (1159.52+/−0.06) ohm
Slp = (−2.024+/−0.101) %/mW
Slp = (−23.47+/−1.17) ohm/mW

50 degC

Mean = 825.331 ohm
Sd = 0.405 ohm
N = 46
Range = 1.277 ohm
R0 = (825.63+/−0.02) ohm
Slp = (−1.746+/−0.058) %/mW
Slp = (−14.41+/−0.48) ohm/mW

60 degC

Mean = 599.969 ohm
Sd = 0.273 ohm
N = 46
Range = 1.091 ohm
R0 = (600.12+/−0.03) ohm
Slp = (−1.733+/−0.223) %/mW
Slp = (−10.4+/−1.34) ohm/mW

10 degC

Mean = 3657.900 ohm
Sd = 10.186 ohm
N = 23
Range = 27.637 ohm
R0 = (3665.44+/−0.08) ohm
Slp = (−2.266+/−0.015) %/mW
Slp = (−83.06+/−0.54) ohm/mW

20 degC

Mean = 2435.797 ohm
Sd = 5.372 ohm
N = 46
Range = 18.341 ohm
R0 = (2439.66+/−0.28) ohm
Slp = (−2.619+/−0.114) %/mW
Slp = (−63.88+/−2.77) ohm/mW

30 degC

Mean = 1661.644 ohm
Sd = 2.315 ohm
N = 46
Range = 7.862 ohm
R0 = (1663.33+/−0.1) ohm
Slp = (−2.448+/−0.091) %/mW
Slp = (−40.73+/−1.51) ohm/mW

DUT.signal

Thermistor power [uW]

DUT vs. thermistor power (grouped by setpoint run no.)
DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm)

50 degC No. 7
Mean = 825.396 ohm
Sd = 0.446 ohm
N = 23
Range = 1.277 ohm
R0 = (825.72+/−0.01) ohm
Slp = (−1.932+/−0.048) %/mW
Slp = (−15.96+/−0.4) ohm/mW

60 degC No. 0
Mean = 600.130 ohm
Sd = 0.240 ohm
N = 23
Range = 0.837 ohm
R0 = (600.3+/−0.02) ohm
Slp = (−1.846+/−0.157) %/mW
Slp = (−11.08+/−0.94) ohm/mW

60 degC No. 6
Mean = 599.808 ohm
Sd = 0.201 ohm
N = 23
Range = 0.614 ohm
R0 = (599.95+/−0.01) ohm
Slp = (−1.621+/−0.078) %/mW
Slp = (−9.72+/−0.47) ohm/mW

30 degC No. 9
Mean = 1661.218 ohm
Sd = 2.521 ohm
N = 23
Range = 7.242 ohm
R0 = (1663.08+/−0.04) ohm
Slp = (−2.713+/−0.032) %/mW
Slp = (−45.12+/−0.53) ohm/mW

40 degC No. 4
Mean = 1158.616 ohm
Sd = 1.025 ohm
N = 23
Range = 3.427 ohm
R0 = (1159.36+/−0.06) ohm
Slp = (−2.215+/−0.107) %/mW
Slp = (−25.68+/−1.24) ohm/mW

40 degC No. 8
Mean = 1159.073 ohm
Sd = 0.834 ohm
N = 23
Range = 2.415 ohm
R0 = (1159.69+/−0.02) ohm
Slp = (−1.833+/−0.044) %/mW
Slp = (−21.26+/−0.51) ohm/mW

50 degC No. 5
Mean = 825.267 ohm
Sd = 0.358 ohm
N = 23
Range = 1.012 ohm
R0 = (825.53+/−0.01) ohm
Slp = (−1.559+/−0.024) %/mW
Slp = (−12.87+/−0.2) ohm/mW

10 degC No. 1
Mean = 3657.900 ohm
Sd = 10.186 ohm
N = 23
Range = 27.637 ohm
R0 = (3665.44+/−0.08) ohm
Slp = (−2.266+/−0.015) %/mW
Slp = (−83.06+/−0.54) ohm/mW

20 degC No. 10
Mean = 2434.658 ohm
Sd = 6.120 ohm
N = 23
Range = 16.682 ohm
R0 = (2439.19+/−0.03) ohm
Slp = (−3.074+/−0.012) %/mW
Slp = (−74.97+/−0.29) ohm/mW

20 degC No. 2
Mean = 2436.936 ohm
Sd = 4.343 ohm
N = 23
Range = 12.737 ohm
R0 = (2440.14+/−0.1) ohm
Slp = (−2.167+/−0.043) %/mW
Slp = (−52.87+/−1.04) ohm/mW

30 degC No. 3
Mean = 1662.069 ohm
Sd = 2.056 ohm
N = 23
Range = 6.035 ohm
R0 = (1663.57+/−0.09) ohm
Slp = (−2.185+/−0.076) %/mW
Slp = (−36.35+/−1.27) ohm/mW

DUT.signal

Thermistor power [uW]

REF vs. thermistor power (grouped by setpoint run no.)
DUT signal = HDRL.4035.K6510.102.ohm.neutral (ohm)

DTU

50 degC No. 7
Mean = 49.996 degC
Sd = 0.001 degC
N = 23
Range = 0.002 degC
T0 = (49.996+/−0) degC
Slp = (−0.008+/−0.008) %/mW
Slp = (0+/−0) degC/mW

60 degC No. 0
Mean = 59.996 degC
Sd = 0.001 degC
N = 23
Range = 0.005 degC
T0 = (59.996+/−0) degC
Slp = (0.024+/−0.024) %/mW
Slp = (0.01+/−0.01) degC/mW

60 degC No. 6
Mean = 59.997 degC
Sd = 0.002 degC
N = 23
Range = 0.006 degC
T0 = (59.997+/−0) degC
Slp = (−0.015+/−0.03) %/mW
Slp = (−0.01+/−0.02) degC/mW

30 degC No. 9
Mean = 29.992 degC
Sd = 0.002 degC
N = 23
Range = 0.009 degC
T0 = (29.993+/−0.001) degC
Slp = (−0.02+/−0.026) %/mW
Slp = (−0.01+/−0.01) degC/mW

40 degC No. 4
Mean = 39.998 degC
Sd = 0.005 degC
N = 23
Range = 0.017 degC
T0 = (39.996+/−0.001) degC
Slp = (0.112+/−0.06) %/mW
Slp = (0.04+/−0.02) degC/mW

40 degC No. 8
Mean = 39.991 degC
Sd = 0.003 degC
N = 23
Range = 0.018 degC
T0 = (39.992+/−0.001) degC
Slp = (−0.094+/−0.044) %/mW
Slp = (−0.04+/−0.02) degC/mW

50 degC No. 5
Mean = 49.996 degC
Sd = 0.001 degC
N = 23
Range = 0.003 degC
T0 = (49.996+/−0) degC
Slp = (0.011+/−0.012) %/mW
Slp = (0.01+/−0.01) degC/mW

10 degC No. 1
Mean = 10.004 degC
Sd = 0.002 degC
N = 23
Range = 0.009 degC
T0 = (10.004+/−0.001) degC
Slp = (0.048+/−0.034) %/mW
Slp = (0+/−0) degC/mW

20 degC No. 10
Mean = 19.997 degC
Sd = 0.001 degC
N = 23
Range = 0.003 degC
T0 = (19.997+/−0) degC
Slp = (−0.015+/−0.011) %/mW
Slp = (0+/−0) degC/mW

20 degC No. 2
Mean = 19.997 degC
Sd = 0.004 degC
N = 23
Range = 0.012 degC
T0 = (19.997+/−0.001) degC
Slp = (−0.004+/−0.049) %/mW
Slp = (0+/−0.01) degC/mW

30 degC No. 3
Mean = 29.993 degC
Sd = 0.004 degC
N = 23
Range = 0.014 degC
T0 = (29.993+/−0.001) degC
Slp = (0.049+/−0.055) %/mW
Slp = (0.01+/−0.02) degC/mW

REF.degC

Thermistor power [uW]

This is the final page of the temperature report for file: exp116215