CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP155 Serial Number: F3810047

CSI Calibration Number: 170517341
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 16-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP155 Relative Humidity and Temperature

S/N: F3810047

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.36	20.42	0.06	20.26	20.37	0.11
50.01	50.6	0.59	50.47	51.41	0.94
89.8	89.9	0.1	90.03	90.3	0.27

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.06	24.18	0.12	23.8	23.69	-0.11

Ambient Conditions[%RH,°C]: 23.74, 24.33

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP155 Serial Number: F3810050

CSI Calibration Number: 170517349
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: Out of Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 16-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP155 Relative Humidity and Temperature

S/N: F3810050

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.36	20.71	0.35	20.26	20.18	-0.08
50.01	54.55	4.54	50.47	49.72	-0.75
89.8	100	10.2	90.03	90.4	0.37

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.06	24.26	0.2	23.8	23.82	0.02

Ambient Conditions[%RH,°C]: 23.74, 24.33

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP155 Serial Number: F3810056

CSI Calibration Number: 170517347
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 16-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP155 Relative Humidity and Temperature

S/N: F3810056

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.36	20.29	-0.07	20.26	20.4	0.14
50.01	50.17	0.16	50.47	51.46	0.99
89.8	89.5	-0.3	90.03	90.6	0.57

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.06	24.05	-0.01	23.8	23.68	-0.12

Ambient Conditions[%RH,°C]: 23.74, 24.33

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP155 Serial Number: F3810057

CSI Calibration Number: 170517343
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 16-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP155 Relative Humidity and Temperature

S/N: F3810057

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.36	20.25	-0.11	20.26	20.36	0.1
50.01	50.17	0.16	50.47	51.32	0.85
89.8	89.4	-0.4	90.03	90.3	0.27

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.06	24	-0.06	23.8	23.69	-0.11

Ambient Conditions[%RH,°C]: 23.74, 24.33

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP155 Serial Number: F3810058

CSI Calibration Number: 170517345
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: Out of Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 16-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP155 Relative Humidity and Temperature

S/N: F3810058

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.36	19.98	-0.38	20.26	20.37	0.11
50.01	50.42	0.41	50.47	51.25	0.78
89.8	90.5	0.7	90.03	90.5	0.47

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.06	23.83	-0.23	23.8	23.77	-0.03

Ambient Conditions[%RH,°C]: 23.74, 24.33

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP155 Serial Number: H2940034

CSI Calibration Number: 170517345
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 16-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP155 Relative Humidity and Temperature

S/N: H2940034

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.36	20.93	0.57	20.26	20.41	0.15
50.01	49.83	-0.18	50.47	51.11	0.64
89.8	88	-1.8	90.03	90.3	0.27

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.06	24.22	0.16	23.8	23.89	0.09

Ambient Conditions[%RH,°C]: 23.74, 24.33

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: A2220055

CSI Calibration Number: 170518301
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: A2220055

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
21.03	20.55	-0.48	21.02	20.54	-0.48
50.73	51.44	0.71	50.71	51.4	0.69
90.36	89.9	-0.46	90.39	89.9	-0.49

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.57	24.49	-0.08	24.57	24.51	-0.06

Ambient Conditions[%RH,°C]: 22.89, 24.59

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: B1240013

CSI Calibration Number: 170520416
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 20-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: B1240013
Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH
Accuracy [°C]: ±0.2 at 20
Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.72	20.33	-0.39	20.18	19.75	-0.43
50.27	51.17	0.9	50.39	51.28	0.89
89.64	89.7	0.06	90.04	89.8	-0.24

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.64	24.73	0.09	23.91	23.96	0.05

Ambient Conditions[%RH,°C]: 25.87, 24.13

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: B1240025

CSI Calibration Number: 170520414
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 20-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: B1240025

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.26	19.53	-0.73	20.18	19.68	-0.5
50.73	51.84	1.11	50.39	51.08	0.69
90.36	90.1	-0.26	90.04	89.4	-0.64

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.95	24.92	-0.03	23.91	23.87	-0.04

Ambient Conditions[%RH,°C]: 25.87, 24.13

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: C4210024

CSI Calibration Number: 170518247
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 17-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: C4210024
Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH
Accuracy [°C]: ±0.2 at 20
Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	19.97	-0.74	20.71	19.97	-0.74
49.93	50.54	0.61	49.94	50.57	0.63
89.32	89.5	0.18	89.29	89.4	0.11

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.8	0.07	24.74	24.8	0.06

Ambient Conditions[%RH,°C]: 21.97, 24.22

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: D3520029

CSI Calibration Number: 170518331
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: Out of Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: D3520029

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	19.83	-0.88	20.48	19.67	-0.81
49.93	48.5	-1.43	50.1	50.48	0.38
89.32	85.6	-3.72	89.53	89.1	-0.43

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.76	0.03	24.83	24.84	0.01

Ambient Conditions[%RH,°C]: 21.46, 24.28

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: D3520074

CSI Calibration Number: 170518309
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: D3520074

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.48	19.75	-0.73	21.02	20.4	-0.62
50.12	50.71	0.59	50.71	51.21	0.5
89.75	89.7	-0.05	90.39	90.2	-0.19

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.83	24.71	-0.12	24.57	24.45	-0.12

Ambient Conditions[%RH,°C]: 22.89, 24.59

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: D3520077

CSI Calibration Number: 170520412
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: Out of Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 20-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: D3520077

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.26	19.02	-1.24	20.18	19.79	-0.39
50.27	48.73	-1.54	50.39	50.94	0.55
89.64	85.7	-3.94	90.04	89.5	-0.54

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.95	24.96	0.01	23.91	23.88	-0.03

Ambient Conditions[%RH,°C]: 25.87, 24.13

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: E2630037

CSI Calibration Number: 170518245

Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance

Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 17-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: E2630037

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	20.6	-0.11	20.71	20.6	-0.11
49.93	50.51	0.58	49.94	50.5	0.56
89.32	88.6	-0.72	89.29	88.5	-0.79

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.81	0.08	24.74	24.81	0.07

Ambient Conditions[%RH,°C]: 21.97, 24.22

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: E2630054

CSI Calibration Number: 170518333
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: E2630054
Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH
Accuracy [°C]: ±0.2 at 20
Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	20.36	-0.35	20.48	20.08	-0.4
49.93	50.91	0.98	50.1	50.93	0.83
89.32	89.8	0.48	89.53	89.2	-0.33

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.73	0.0	24.83	24.8	-0.03

Ambient Conditions[%RH,°C]: 21.46, 24.28

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: E2630055

CSI Calibration Number: 170518303
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: E2630055

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.48	20.3	-0.18	21.02	20.73	-0.29
50.12	51.49	1.37	50.71	51.47	0.76
89.75	90.2	0.45	90.35	89.8	-0.55

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.83	24.84	0.01	24.57	24.59	0.02

Ambient Conditions[%RH,°C]: 22.89, 24.59

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: E2630111

CSI Calibration Number: 170518334
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: E2630111

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	20.37	-0.34	20.48	20.07	-0.41
49.93	50.94	1.01	50.1	50.91	0.81
89.32	89.8	0.48	89.53	89.3	-0.23

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.73	0.0	24.83	24.82	-0.01

Ambient Conditions[%RH,°C]: 21.46, 24.28

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: E3010020

CSI Calibration Number: 170518303
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: E3010020

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
21.03	20.96	-0.07	21.02	20.95	-0.07
50.73	51.54	0.81	50.71	51.49	0.78
90.36	89.5	-0.86	90.39	89.5	-0.89

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.57	24.67	0.1	24.57	24.67	0.1

Ambient Conditions[%RH,°C]: 22.89, 24.59

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: F4010005

CSI Calibration Number: 170518334
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: F4010005

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	19.74	-0.97	20.4	20.18	-0.22
49.93	50.31	0.38	50.1	51.05	0.95
89.32	89.4	0.08	89.53	89.2	-0.33

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.69	-0.04	24.78	24.76	-0.02

Ambient Conditions[%RH,°C]: 21.71, 24.28

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: F4010022

CSI Calibration Number: 170519302
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: F4010022
Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH
Accuracy [°C]: ±0.2 at 20
Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
21.03	19.83	-1.2	20.63	19.77	-0.86
50.73	50.23	-0.5	50.24	50.66	0.42
90.36	88.6	-1.76	89.95	89.8	-0.15

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.57	24.52	-0.05	24.66	24.68	0.02

Ambient Conditions[%RH,°C]: 21.72, 24.23

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: F4010023

CSI Calibration Number: 170520417
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 20-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: F4010023

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.26	19.31	-0.95	20.18	19.3	-0.88
50.27	50.54	0.27	50.39	50.68	0.29
89.64	89.2	-0.44	90.04	89.3	-0.74

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.95	25.02	0.07	23.91	23.94	0.03

Ambient Conditions[%RH,°C]: 25.87, 24.13

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: F4010024

CSI Calibration Number: 170518305
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: F4010024

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.48	19.46	-1.02	21.02	20.04	-0.98
50.12	50.51	0.39	50.71	50.92	0.21
89.75	89.5	-0.25	90.35	89.8	-0.55

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.83	24.73	-0.1	24.57	24.48	-0.09

Ambient Conditions[%RH,°C]: 22.89, 24.59

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: X1710120

CSI Calibration Number: 170519308
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: X1710120
Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH
Accuracy [°C]: ±0.2 at 20
Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
21.03	21.34	0.31	20.63	20.01	-0.62
50.73	52.01	1.28	50.24	50.53	0.29
90.36	90.7	0.34	89.95	89.5	-0.45

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.57	24.48	-0.09	24.66	24.59	-0.07

Ambient Conditions[%RH,°C]: 21.72, 24.23

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: X2120034

CSI Calibration Number: 170518241
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 17-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: X2120034
Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH
Accuracy [°C]: ±0.2 at 20
Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	20.04	-0.67	20.71	20.04	-0.67
49.93	50.52	0.59	49.94	50.53	0.59
89.32	89.4	0.08	89.29	89.3	0.01

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.79	0.06	24.74	24.79	0.05

Ambient Conditions[%RH,°C]: 21.97, 24.22

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: X3410042

CSI Calibration Number: 170518301
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: X3410042

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.48	20.3	-0.18	21.02	20.81	-0.21
50.12	51.34	1.22	50.71	51.49	0.78
89.75	89.7	-0.05	90.35	89.6	-0.75

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.83	24.74	-0.09	24.57	24.52	-0.05

Ambient Conditions[%RH,°C]: 22.89, 24.59

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: X3410050

CSI Calibration Number: 170518249

Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance

Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 17-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: X3410050
Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH
Accuracy [°C]: ±0.2 at 20
Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	20.05	-0.66	20.71	20.05	-0.66
49.93	50.48	0.55	49.94	50.5	0.56
89.32	89.1	-0.22	89.29	89	-0.29

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.72	-0.01	24.74	24.72	-0.02

Ambient Conditions[%RH,°C]: 21.97, 24.22

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: X3410053

CSI Calibration Number: 170520414
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 20-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: X3410053
Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH
Accuracy [°C]: ±0.2 at 20
Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.26	19.48	-0.78	20.18	19.6	-0.58
50.73	51.89	1.16	50.39	50.82	0.43
90.36	90.3	-0.06	90.04	89.3	-0.74

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.95	25.09	0.14	23.91	24.05	0.14

Ambient Conditions[%RH,°C]: 25.87, 24.13

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: X3410056

CSI Calibration Number: 170518305
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: X3410056

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.48	19.91	-0.57	21.02	20.75	-0.27
50.12	51.48	1.36	50.71	51.74	1.03
89.75	90.6	0.85	90.35	90.2	-0.15

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.83	24.64	-0.19	24.57	24.64	0.07

Ambient Conditions[%RH,°C]: 22.89, 24.59

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: X3410059

CSI Calibration Number: 170518307
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: X3410059

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
21.03	20.66	-0.37	21.02	20.65	-0.37
50.73	51.57	0.84	50.71	51.53	0.82
90.36	89.9	-0.46	90.39	90	-0.39

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.57	24.4	-0.17	24.57	24.42	-0.15

Ambient Conditions[%RH,°C]: 22.89, 24.59

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: X3410060

CSI Calibration Number: 170518336
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: X3410060
Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH
Accuracy [°C]: ±0.2 at 20
Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	21	0.29	20.48	20.11	-0.37
49.93	50.98	1.05	50.1	50.99	0.89
89.32	88.8	-0.52	89.53	89	-0.53

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.6	-0.13	24.83	24.71	-0.12

Ambient Conditions[%RH,°C]: 21.46, 24.28

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: X3410062

CSI Calibration Number: 170518339
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: X3410062

Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH

Accuracy [°C]: ±0.2 at 20

Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	20.58	-0.13	20.48	19.97	-0.51
49.93	50.44	0.51	50.1	50.96	0.86
89.32	88.1	-1.22	89.53	89.1	-0.43

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.7	-0.03	24.83	24.79	-0.04

Ambient Conditions[%RH,°C]: 21.46, 24.28

Calibration Technician

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Certificate of Calibration

Model: HMP45C Serial Number: Y2410067

CSI Calibration Number: 170518338
Calibration Procedures: TST_HMPCAL R4 PRC33A R22

Instrument Calibration Condition

Received Disposition: In Tolerance
Returned Disposition: In Tolerance

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated in accordance with the interval stated below to insure sustained accuracy and reliable performance.

Calibration Date: 18-May-17 **Recommended Interval:** 1 year of service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
CR3000	1870	06-Mar-19	170306585
HMT-337	F0840130	07-Jun-17	2000939-160607-HMT337-F0840130

CSI certifies the above instrument meets or exceeds published specifications and has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. Policies and procedures at this facility comply with ISO-9001.

Campbell Scientific, Inc. | 815 W 1800 N | Logan, UT 84321-1784| 435.227.9000 | 435.227.9001 F | www.campbellsci.com

Instrument Data Report

HMP45C Relative Humidity and Temperature

S/N: Y2410067
Accuracy [%RH]: ±2% over 10-90 %RH; ±3% over 90-100 %RH
Accuracy [°C]: ±0.2 at 20
Calibration Results:

Reference Before [%RH]	Observed Before [%RH]	Difference Before [%RH]	Reference After [%RH]	Observed After [%RH]	Difference After [%RH]
20.71	20.15	-0.56	20.48	19.99	-0.49
49.93	50.12	0.19	50.1	50.53	0.43
89.32	88.4	-0.92	89.69	89.3	-0.39

Reference Before [°C]	Observed Before [°C]	Difference Before [°C]	Reference After [°C]	Observed After [°C]	Difference After [°C]
24.73	24.75	0.02	24.83	24.87	0.04

Ambient Conditions[%RH,°C]: 21.46, 24.28

Calibration Technician

CAMPBELL SCIENTIFIC®

Production Test Report

Model: SR50A

Work Order#: 27024

Serial #: 8482

Temperature Rating: -45°C to +50°C

Room Temperature	Minimum	Maximum	Standard	Tolerance	Pass	Test Duration
	4997.0 mm	5000.0 mm	0.8 mm	±20 mm	YES	2Hrs

Cold Temperature	Minimum	Maximum	Standard	Tolerance	Pass	Test Duration
	997.0 mm	1001.0 mm	0.9 mm	±10 mm	YES	4Hrs

Test Details:

1) Room temperature test with a target at a fixed distance of 5.00 Metres. 300 measurements are taken over a 2 hour period. The minimum,
2) Cold test is conducted at a minimum of 5°C below the cold temperature rating with a target at a distance of ≈1.00 Metre. 600 measurements are

Signature: _____

Renz Geraldez
Edmonton, AB
Canada

Date: January 17, 2017

CAMPBELL SCIENTIFIC®

Production Test Report

Model: SR50A-316SS

Work Order#: 27958

Serial #: 8702

Temperature Rating: -45°C to +50°C

Room Temperature Test	Minimum	Maximum	Standard	Tolerance	Pass	Test Duration
	4991.0 mm	5002.0 mm	2.4 mm	±20 mm	YES	2Hrs

Cold Temperature Test	Minimum	Maximum	Standard	Tolerance	Pass	Test Duration
	999.0 mm	1003.0 mm	0.7 mm	±10 mm	YES	4Hrs

Test Details:

1) Room temperature test with a target at a fixed distance of 5.00 Metres. 300 measurements are taken over a 2 hour period. The minimum, maximum and
2) Cold test is conducted at a minimum of 5°C below the cold temperature rating with a target at a distance of ≈1.00 Metre. 600 measurements are taken

Signature: Renz Geraldez

Renz Geraldez
Edmonton, AB
Canada

Date: March 17, 2017

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 53108 **Checkout Date:** 5/25/2017

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☐	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	33	92	179	272	352		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW& CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC®
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 87995 **Checkout Date:** 05/18/17

Accessories Included: **Cable** ☒ **Vane** ☒ **Propeller** ☒ **Propeller Nut** ☒ **Hose Clamp** ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☐	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	31	91	180	270	350		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW&CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 87997 **Checkout Date:** 05/22/17

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☒	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	30	91	181	271	351		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW& CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 87998 **Checkout Date:** 5/24/2017

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☐	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	31	91	180	270	351		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW& CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 90934 **Checkout Date:** 05/18/17

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☐	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	32	92	181	270	350		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW& CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 90940 **Checkout Date:** 05/22/17

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☒	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	29	89	179	269	349		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW& CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 90957 **Checkout Date:** 5/25/2017

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				Additional Repair Notes
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☐	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						Wind Speed Output Test	
*Reference Point	30	90	180	270	350	Pass ☒	Fail ☐
Measured	32	91	179	269	350		

* Reference is not traceable to a standard. It is used for checkout purposes only.

*Wind Vane Torque Test			**Propeller Torque Test		
Vane Torque:		Pass ☒	Propeller Torque:		Pass ☒

*Measured with RM Young Torque Gauge and fixture in CW& CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 95214 **Checkout Date:** 05/18/17

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☐	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	30	90	180	269	351		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW&CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 95219 **Checkout Date:** 5/17/2017

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☐	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	32	90	180	271	351		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW& CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 95856 **Checkout Date:** 5/17/2017

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☐	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	30	91	181	271	351		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW&CWW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 95859 **Checkout Date:** 5/17/2017

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	Replaced the bent propeller shaft w/Hub with new shaft w/Hub.
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☒	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	31	91	180	270	350		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW& CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 105731 **Checkout Date:** 05/23/17

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☐	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	30	89	179	270	350		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW& CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RM Young Checkout Sheet
Model 05103

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 126353 **Checkout Date:** 05/22/17

Accessories Included: Cable ☒ Vane ☒ Propeller ☒ Propeller Nut ☒ Hose Clamp ☒

Condition as received:	Good condition.

Repairs				**Additional Repair Notes**
Replaced Prop Bearings...	☒	Replaced Propeller Nut....	☐	
Replaced Vertical Bearings	☒	Replaced Prop Shaft w/Hub	☐	
Replaced Coil.....	☐	Replaced Nose Cone.....	☐	
Replaced Potentiometer...	☐	Replaced Lower Housing.	☐	
Aligned Potentiometer.....	☒	Replaced Circuit Board....	☐	
Replaced Vane.....	☐	Repaired Cable.....	☐	
Replaced Propeller.....	☐	Replaced Cable.....	☐	
No Repairs Needed.....	☐			

Wind Direction Linearity Test						**Wind Speed Output Test**	
***Reference Point**	**30**	**90**	**180**	**270**	**350**	**Pass** ☒	**Fail** ☐
Measured	30	91	182	271	351		

* Reference is not traceable to a standard. It is used for checkout purposes only.

***Wind Vane Torque Test**			****Propeller Torque Test**		
Vane Torque:		**Pass** ☒	**Propeller Torque:**		**Pass** ☒

*Measured with RM Young Torque Gauge and fixture in CW& CCW at four locations.

**Measured with RM Young Torque Disk.

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

TE525 Calibration Sheet

RMA: 25690 **Technician:** Tristan Worley

Serial Number: 30959-702 **Checkout Date:** 5/18/2017

Funnel Size 8.00 in.

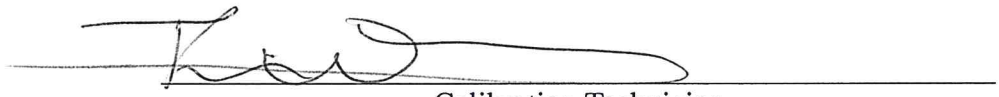
As Received Measurements

Tips Per 473mL Reservoir				
Nozzle #	**1st**	**2nd**	**3rd**	**Average**
1	58	58	58	58

As Returned; Repair/Calibration Measurements

Tips Per 473mL Reservoir				
Nozzle #	**1st**	**2nd**	**3rd**	**Average**
1	57	57	57	57

The average flow rate for the testing above is just under 2 in/hr or (50 mm/hr)



Calibration Technician

Funnel Inner Diameter	Funnel Area	Bucket Capacity	Rainfall Per Tip	Optimal Tips Per 473mL Reservoir	Acceptable Tips Per 473mL Reservoir (±1%) up to 1 in/hr	Acceptable Tips Per 473mL Reservoir (±3%) 1-2 in/hr
5.94 in.	27.71 in^2	4.54 mL	0.01 in.	104.2	103.1-105.5	101.1-107.3
6.064 in.	28.88 in^2	4.73 mL	0.01 in.	100.0	99.0-101.0	97.0-103.0
8.00 in.	50.27 in^2	8.25 mL	0.01 in.	57.3	56.8-57.9	55.6-59.1
9.664 in.	73.35 in^2	4.73 mL	0.1 mm.	100.0	99.0-101.0	97.0-103.0

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY36882
Calibration Date	:	17-May-2017
Previous Calibration Date	:	3-Apr-2014
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	171.31 **W m^{-2} per mV**
Output	:	104.6 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	179.57 **W m^{-2} per mV**
Output as Received	:	99.8 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	55.8 **Ω**
Change in Output	:	4.8 **%**
Change in Output per Year	:	1.5 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

Website: www.apogeeinstruments.com E-mail: techsupport@apogeeinstruments.com Ph: (435)792-4700 Fax: (435)787-8268

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY36882

Last Known Calib. Date	Recalib. Date	Time (Months)
4/14	5/17	37

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
99.8	104.6	1.05	4.8

Past measurements may be corrected using the following formulas:

$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY43042
Calibration Date	:	17-May-2017
Previous Calibration Date	:	3-Apr-2014
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	189.78 **W m^{-2} per mV**
Output	:	104.8 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	200.21 **W m^{-2} per mV**
Output as Received	:	99.3 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	50.3 **Ω**
Change in Output	:	5.5 **%**
Change in Output per Year	:	1.8 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

Website: www.apogeeinstruments.com E-mail: techsupport@apogeeinstruments.com Ph: (435)792-4700 Fax: (435)787-8268

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY43042

Last Known Calib. Date	Recalib. Date	Time (Months)
4/14	5/17	37

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
99.3	104.8	1.06	5.5

Past measurements may be corrected using the following formulas:

$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY43082
Calibration Date	:	17-May-2017
Previous Calibration Date	:	20-Mar-2013
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	181.34 **W m^{-2} per mV**
Output	:	103.7 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	199.54 **W m^{-2} per mV**
Output as Received	:	94.2 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	53.2 **Ω**
Change in Output	:	10.0 **%**
Change in Output per Year	:	2.4 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

Website: www.apogeeinstruments.com E-mail: techsupport@apogeeinstruments.com Ph: (435)792-4700 Fax: (435)787-8268

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY43082

Last Known Calib. Date	Recalib. Date	Time (Months)
3/13	5/17	50

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
94.2	103.7	1.10	10.1

Past measurements may be corrected using the following formulas:

$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY43089
Calibration Date	:	17-May-2017
Previous Calibration Date	:	6-Mar-2015
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	194.86 **W m^{-2} per mV**
Output	:	98.3 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	199.55 **W m^{-2} per mV**
Output as Received	:	96.0 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	52.2 **Ω**
Change in Output	:	2.4 **%**
Change in Output per Year	:	1.1 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

Website: www.apogeeinstruments.com E-mail: techsupport@apogeeinstruments.com Ph: (435)792-4700 Fax: (435)787-8268

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY43089

Last Known Calib. Date	Recalib. Date	Time (Months)
3/14	5/17	38

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
96.0	98.3	1.02	2.4

Past measurements may be corrected using the following formulas:

$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY43093
Calibration Date	:	17-May-2017
Previous Calibration Date	:	3-Apr-2014
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	186.02 **W m^{-2} per mV**
Output	:	87.3 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	195.35 **W m^{-2} per mV**
Output as Received	:	83.1 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	61.6 **Ω**
Change in Output	:	5.0 **%**
Change in Output per Year	:	1.6 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

Website: www.apogeeinstruments.com E-mail: techsupport@apogeeinstruments.com Ph: (435)792-4700 Fax: (435)787-8268

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY43093

Last Known Calib. Date	Recalib. Date	Time (Months)
4/14	5/17	37

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
83.1	87.3	1.05	5.1

Past measurements may be corrected using the following formulas:

$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY43130
Calibration Date	:	17-May-2017
Previous Calibration Date	:	20-Mar-2013
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	184.06 **W m^{-2} per mV**
Output	:	99.9 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	198.94 **W m^{-2} per mV**
Output as Received	:	92.4 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	54.4 **Ω**
Change in Output	:	8.1 **%**
Change in Output per Year	:	1.9 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

Website: www.apogeeinstruments.com E-mail: techsupport@apogeeinstruments.com Ph: (435)792-4700 Fax: (435)787-8268

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY43130

Last Known Calib. Date	Recalib. Date	Time (Months)
3/13	5/17	50

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
92.4	99.9	1.08	8.1

Past measurements may be corrected using the following formulas:

$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY45080
Calibration Date	:	17-May-2017
Previous Calibration Date	:	3-Apr-2014
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	187.30 **W m^{-2} per mV**
Output	:	92.1 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	195.70 **W m^{-2} per mV**
Output as Received	:	88.1 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	58 **Ω**
Change in Output	:	4.5 **%**
Change in Output per Year	:	1.4 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

Website: www.apogeeinstruments.com E-mail: techsupport@apogeeinstruments.com Ph: (435)792-4700 Fax: (435)787-8268

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY45080

Last Known Calib. Date	Recalib. Date	Time (Months)
4/14	5/17	37

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
88.1	92.1	1.05	4.5

Past measurements may be corrected using the following formulas:

$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY60148
Calibration Date	:	17-May-2017
Previous Calibration Date	:	11-Jun-2012
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	192.48 **W m^{-2} per mV**
Output	:	99.5 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	199.35 **W m^{-2} per mV**
Output as Received	:	96.1 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	52.2 **Ω**
Change in Output	:	3.6 **%**
Change in Output per Year	:	0.7 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

Website: www.apogeeinstruments.com E-mail: techsupport@apogeeinstruments.com Ph: (435)792-4700 Fax: (435)787-8268

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY60148

Last Known Calib. Date	Recalib. Date	Time (Months)
6/12	5/17	59

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
96.1	99.5	1.04	3.5

Past measurements may be corrected using the following formulas:

$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY63434
Calibration Date	:	17-May-2017
Previous Calibration Date	:	31-Mar-2009
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	195.52 **W m^{-2} per mV**
Output	:	91.0 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	199.48 **W m^{-2} per mV**
Output as Received	:	89.2 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	56.2 **Ω**
Change in Output	:	2.0 **%**
Change in Output per Year	:	0.2 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

Website: www.apogeeinstruments.com E-mail: techsupport@apogeeinstruments.com Ph: (435)792-4700 Fax: (435)787-8268

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY63434

Last Known Calib. Date	Recalib. Date	Time (Months)
3/09	5/17	98

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
89.2	91.0	1.02	2.0

Past measurements may be corrected using the following formulas:

$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY63675
Calibration Date	:	17-May-2017
Previous Calibration Date	:	3-Apr-2014
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	194.46 **W m^{-2} per mV**
Output	:	95.6 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	204.03 **W m^{-2} per mV**
Output as Received	:	91.1 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	53.8 **Ω**
Change in Output	:	4.9 **%**
Change in Output per Year	:	1.6 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

Website: www.apogeeinstruments.com E-mail: techsupport@apogeeinstruments.com Ph: (435)792-4700 Fax: (435)787-8268

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY63675

Last Known Calib. Date	Recalib. Date	Time (Months)
4/14	5/17	37

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
91.1	95.6	1.05	4.9

Past measurements may be corrected using the following formulas:

$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

apogee
INSTRUMENTS
721 West 1800 North
Logan, UT 84321

Certificate of Calibration
LI-COR Pyranometer
Model LI-200X

Customer Name	:	Kenneth Hill
Serial Number	:	PY64395
Calibration Date	:	17-May-2017
Previous Calibration Date	:	3-Apr-2014
Recommended Recalibration Date	:	17-May-2019
Calibration Factor	:	182.57 **W m^{-2} per mV**
Output	:	90.8 **µA per 1000 W m^{-2}**
Calibration Factor as Received	:	193.51 **W m^{-2} per mV**
Output as Received	:	85.7 **µA per 1000 W m^{-2}**
Resistance (Measured)	:	60.3 **Ω**
Change in Output	:	6.0 **%**
Change in Output per Year	:	1.9 **%**

Calibration Procedure

Calibration is based on a side-by-side comparison under high intensity discharge metal halide lamps using the mean of (4) LI-COR transfer standard pyranometers. LI-COR transfer standards are calibrated to the mean of at least (2) ISO-classified reference pyranometers under sunlight (clear sky conditions) in Logan, Utah. Each of the four ISO-classified reference pyranometers are recalibrated on an alternating year schedule (two instruments per year) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. NREL reference standards are calibrated to the World Radiometric Reference (WRR) in Davos, Switzerland.

Traceability

Instrument (Serial #)	ISO Classification	Calibration Date	Calibration Due Date
Kipp & Zonen CM21 (041269)	Secondary Standard	20-Jun-2015	20-Jun-2017
Kipp & Zonen CM11 (060089)	Secondary Standard	13-Jul-2016	13-Jul-2018
Kipp & Zonen CMP11 (101625)	Secondary Standard	13-Jul-2016	13-Jul-2018
Hukseflux SR20 (2497)	Secondary Standard	20-Jun-2015	20-Jun-2017
LICOR (PY68846)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68847)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68895)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017
LICOR (PY68896)	Photodiode Transfer Standard	15-Jun-2016	15-Jun-2017

Technical Manager : Jacob Bingham Date : 17-May-2017

Please keep this document for your records

CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

RECALIBRATION OF LICOR LI200 PYRANOMETER

This unit has been repaired (if needed) and recalibrated. Sensors fitted with connectors and LI200X sensors have been adjusted to reflect the new calibration. LI200S Sensors require entry of the new calibration coefficient in the datalogger program. A copy of the recalibration sheet is enclosed; information pertaining to your sensor is summarized below.

User/Address

KENNETH HILL
FAIRBANKS HEADQUARTERS NPS
4175 GEIST RD
FAIRBANKS AK 99709
907-455-0678

Serial Number

PY64395

Last Known Calib. Date	Recalib. Date	Time (Months)
4/14	5/17	37

Original Calib. (uA/kW/m^2)	New Calib. (uA/kW/m^2)	F (New/Old)	Calib. Drift (%)
85.7	90.8	1.06	6.0

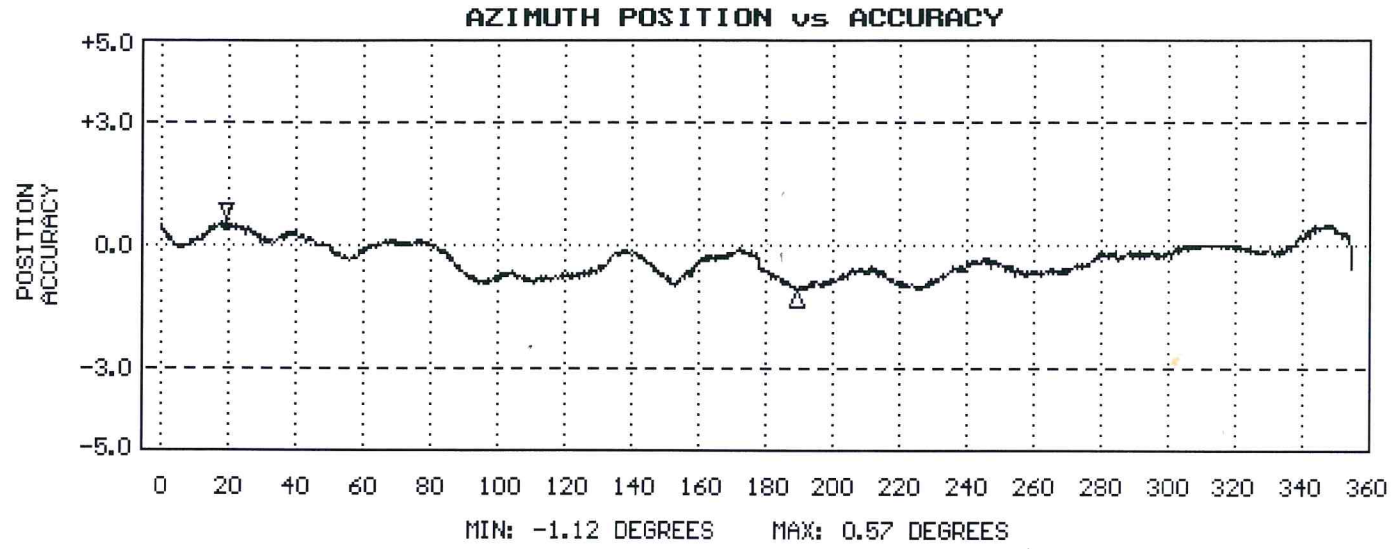
Past measurements may be corrected using the following formulas:

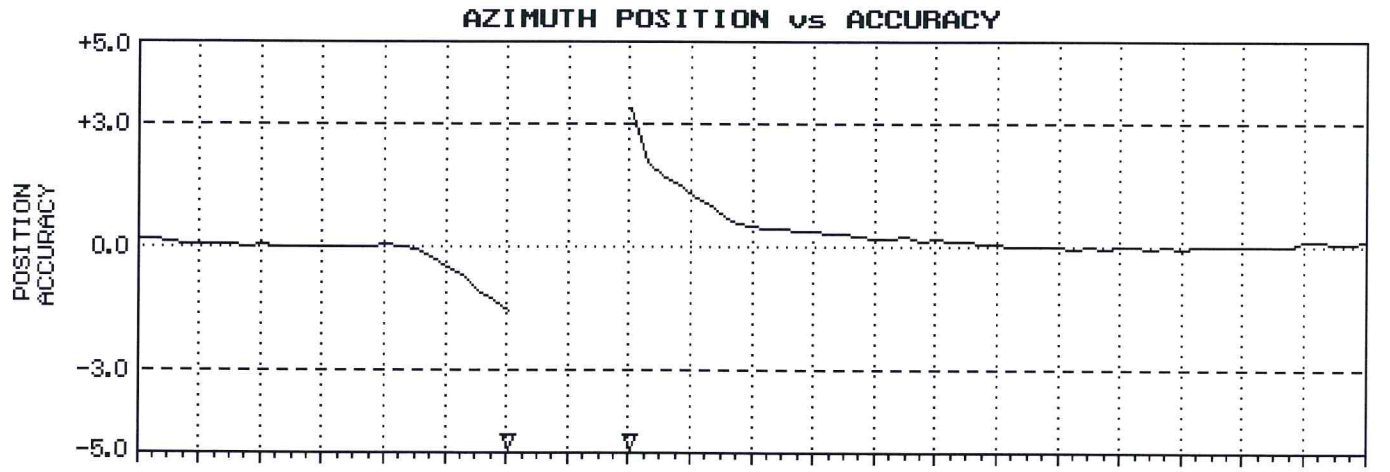
$$Rc = F'Rm$$
$$F' = Ko/Kn'$$

Rc corrected radiation value
Rm value measured using the original calibration
Ko original calibration
Kn' is the calibration at the time of the measurement computed by assuming a linear drift with time between Ko and Kn

R. M. YOUNG COMPANY WIND SENSOR CALIBRATION CERTIFICATE

SENSOR: 05108-45-5A WIND MONITOR-HD
SENSOR SERIAL NUMBER: WM146182
BEARINGS: CERAMIC
DATE: JAN 14 2016
WIND SPEED THRESHOLD TEST: PASS
LOW WIND SPEED AMPLITUDE/FREQUENCY TEST: PASS
HIGH WIND SPEED AMPLITUDE/FREQUENCY TEST: PASS
VANE TORQUE TEST: PASS
SPECIAL NOTES:
SPECIAL NOTES:





YOUNG

CALIBRATION CERTIFICATE

R.M. Young Company certifies that the following sensor

Serial Number WM146182

was inspected and calibrated prior to shipment in accordance with established manufacturing and testing procedures. Standards established by R.M. Young Company for calibrating measuring and test equipment used in controlling product quality are traceable to the National Institute of Standards and Technology.

To maintain published specifications, regular maintenance intervals are required.

Date: 1/14/16

By: (stamp)

R. M. YOUNG COMPANY 2801 Aero-Park Drive , Traverse City, Michigan 49686 U.S.A.
Tel: (231) 946-3980 Fax: (231) 946-4772 Email: met.sales@youngusa.com

Model 525 Series Certification/Calibration Information

The sequence for calibration after the sensors are completely assembled is as follows:

1. The completed tipping bucket assembly is tested using a high-speed digital counter to check for multiple counts or missed counts and proper positioning of the sensor and actuator, then the assembly is installed into the main housing in which it will be shipped.
2. Sensors are then moved to the calibration stand that incorporates a bank of Micro Metering Pumps that output at the rate of 1inch per hour and a volume equal to 100 counts. The sensors are run through the calibration cycle until achieving 99 to 101 counts 3 times in a row.

The last 3 readings for this sensor were 100.0 101.0 101.0
Calibration Date 3-14-16 S/N: 69752-616
By _____

NOTICE!

During shipment the tipping assembly has been secured to avoid possible damage to the pivot assembly. Lift off collector and remove rubber band from inside to release tipping mechanism before installation.

Model 525 Series Certification/Calibration Information

The sequence for calibration after the sensors are completely assembled is as follows:

1. The completed tipping bucket assembly is tested using a high-speed digital counter to check for multiple counts or missed counts and proper positioning of the sensor and actuator, then the assembly is installed into the main housing in which it will be shipped.
2. Sensors are then moved to the calibration stand that incorporates a bank of Micro Metering Pumps that output at the rate of 1inch per hour and a volume equal to 100 counts. The sensors are run through the calibration cycle until achieving 99 to 101 counts 3 times in a row.

The last 3 readings for this sensor were 100.8 101.0 101.0
Calibration Date 8-17-16 S/N: 70374-816
By CS

NOTICE!

During shipment the tipping assembly has been secured to avoid possible damage to the pivot assembly. Lift off collector and remove rubber band from inside to release tipping mechanism before installation.

Model 525 Series Certification/Calibration Information

The sequence for calibration after the sensors are completely assembled is as follows:

1. The completed tipping bucket assembly is tested using a high-speed digital counter to check for multiple counts or missed counts and proper positioning of the sensor and actuator, then the assembly is installed into the main housing in which it will be shipped.
2. Sensors are then moved to the calibration stand that incorporates a bank of Micro Metering Pumps that output at the rate of 1inch per hour and a volume equal to 100 counts. The sensors are run through the calibration cycle until achieving 99 to 101 counts 3 times in a row.

The last 3 readings for this sensor were 100-8 101-8 101.0
Calibration Date 12-2015 S/N: 69747-616
By CS