



Certificate of Calibration

Model: CR1000

Serial Number: 66276

Temperature Option: Extended Temperature Tested

Test Panel Location: 2

CSI Calibration Number: 200319322

Calibration Procedures: TST12215A R14 TST12215C R21 PRC33A R24

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: 19-Mar-20

Recommended Interval: 3 Years of Service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
Krohn Hite 523	AF50066	24-Feb-21	AF50066
CSI Oscillator	08/20 01	14-Jun-20	USNO/NIST

Calibration Procedures

Voltage Excitation

Analog Input Ranges

Pulse Counters

System Power

Period Averaging

Control Ports

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. The collective measurement uncertainty of the calibration process exceeds a 4:1 accuracy ratio. Policies and procedures at this facility comply with ISO-9001.

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Instrument Data Report

Analog Input Accuracy

S/N: 66276

Datalogger Option: Extended Temperature Tested

Range	Input (mV)	*Tolerance (mV)	Single-Ended (Full Scale)		Differential		Temp. (°C)
			As Received (mV)	As Returned (mV)	As Received (mV)	As Returned (mV)	
6	5000	±3	5001.02	4999.48	5002.21	5000.34	24.8
6	-5000	±3	-5001.20	-5000.51	-5000.51	-5000.00	24.8
5	2500	±1.5	N/A	N/A	2500.76	2500.08	24.8
4	250	±0.15	N/A	N/A	250.032	250.061	24.8
3	25	±0.015	N/A	N/A	25.005	25.004	24.8
2	7.5	±0.0045	N/A	N/A	7.501	7.503	24.8
1	2.5	±0.0015	N/A	N/A	2.500	2.500	24.8
1	-2.5	±0.0015	N/A	N/A	-2.501	-2.501	24.8
6	5000	±6	N/A	5000.13	N/A	5000.34	-25
6	5000	±6	N/A	5002.09	N/A	5001.70	50
6	5000	±9	N/A	5000.74	N/A	5001.03	-55
6	5000	±9	N/A	5001.57	N/A	5000.34	85

*Tolerance values are specified accuracy not including offset. Offset voltages are not included because an offset removal procedure is used to account for calibrator offset. Refer to CSI Process Control Document PRC7A.

Quiescent System Power

Typical (mA)	As Received (mA)	As Returned (mA)	Temp. (°C)
<1.0	0.55	0.71	24.8

Real-Time Clock

Tolerance (min/year)	As Returned (min/year)	Temp. (°C)
± 3 minutes	Within Tolerance	-55 to +85

Laboratory Environment

Temperature (°C)	Relative Humidity (%)
24.8	45.



Calibration Technician

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Certificate of Calibration

Model: CR1000

Serial Number: 35785

Temperature Option: Extended Temperature Tested

Test Panel Location: 2

CSI Calibration Number: 200320633

Calibration Procedures: TST12215A R14 TST12215C R21 PRC33A R24

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-Mar-20

Recommended Interval: 3 Years of Service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
Krohn Hite 523	AF50066	24-Feb-21	AF50066
CSI Oscillator	08/20 01	14-Jun-20	USNO/NIST

Calibration Procedures

Voltage Excitation
System Power

Analog Input Ranges
Period Averaging

Pulse Counters
Control Ports

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. The collective measurement uncertainty of the calibration process exceeds a 4:1 accuracy ratio. Policies and procedures at this facility comply with ISO-9001.

Instrument Data Report

Analog Input Accuracy

S/N: 35785

Datalogger Option: Extended Temperature Tested

Range	Input (mV)	*Tolerance (mV)	Single-Ended (Full Scale)		Differential		Temp. (°C)
			As Received (mV)	As Returned (mV)	As Received (mV)	As Returned (mV)	
6	5000	±3	4998.23	4999.84	4999.32	4999.32	24.3
6	-5000	±3	-4999.07	-5000.16	-4999.33	-4999.33	24.3
5	2500	±1.5	N/A	N/A	2500.00	2499.79	24.3
4	250	±0.15	N/A	N/A	250.044	249.999	24.3
3	25	±0.015	N/A	N/A	24.998	25.001	24.3
2	7.5	±0.0045	N/A	N/A	7.500	7.500	24.3
1	2.5	±0.0015	N/A	N/A	2.499	2.499	24.3
1	-2.5	±0.0015	N/A	N/A	-2.500	-2.501	24.3
6	5000	±6	N/A	5000.34	N/A	5000.00	-25
6	5000	±6	N/A	4998.99	N/A	5001.35	50
6	5000	±9	N/A	5001.41	N/A	5001.37	-55
6	5000	±9	N/A	4998.95	N/A	4998.99	85

*Tolerance values are specified accuracy not including offset. Offset voltages are not included because an offset removal procedure is used to account for calibrator offset. Refer to CSI Process Control Document PRC7A.

Quiescent System Power

Typical (mA)	As Received (mA)	As Returned (mA)	Temp. (°C)
<1.0	0.52	0.73	24.3

Real-Time Clock

Tolerance (min/year)	As Returned (min/year)	Temp. (°C)
± 3 minutes	Within Tolerance	-55 to +85

Laboratory Environment

Temperature (°C)	Relative Humidity (%)
24.3	44.



Calibration Technician

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Certificate of Calibration

Model: CR1000

Serial Number: 35782

Temperature Option: Extended Temperature Tested

Test Panel Location: 4

CSI Calibration Number: 200319323

Calibration Procedures: TST12215A R14 TST12215C R21 PRC33A R24

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: 19-Mar-20

Recommended Interval: 3 Years of Service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
Krohn Hite 523	AF50066	24-Feb-21	AF50066
CSI Oscillator	08/20 01	14-Jun-20	USNO/NIST

Calibration Procedures

Voltage Excitation

Analog Input Ranges

Pulse Counters

System Power

Period Averaging

Control Ports

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Instrument Data Report

Analog Input Accuracy

S/N: 35782

Datalogger Option: Extended Temperature Tested

Range	Input (mV)	*Tolerance (mV)	Single-Ended (Full Scale)		Differential		Temp. (°C)
			As Received (mV)	As Returned (mV)	As Received (mV)	As Returned (mV)	
6	5000	±3	5000.71	4999.38	4998.66	4998.66	24.8
6	-5000	±3	-4999.30	-4999.29	-4999.33	-4998.66	24.8
5	2500	±1.5	N/A	N/A	2499.41	2499.07	24.8
4	250	±0.15	N/A	N/A	249.897	249.947	24.8
3	25	±0.015	N/A	N/A	24.994	24.998	24.8
2	7.5	±0.0045	N/A	N/A	7.498	7.499	24.8
1	2.5	±0.0015	N/A	N/A	2.500	2.501	24.8
1	-2.5	±0.0015	N/A	N/A	-2.500	-2.500	24.8
6	5000	±6	N/A	5001.19	N/A	4999.66	-25
6	5000	±6	N/A	4999.26	N/A	4997.99	50
6	5000	±9	N/A	5001.28	N/A	4999.66	-55
6	5000	±9	N/A	4997.71	N/A	4997.33	85

*Tolerance values are specified accuracy not including offset. Offset voltages are not included because an offset removal procedure is used to account for calibrator offset. Refer to CSI Process Control Document PRC7A.

Quiescent System Power

Typical (mA)	As Received (mA)	As Returned (mA)	Temp. (°C)
<1.0	0.56	0.63	24.8

Real-Time Clock

Tolerance (min/year)	As Returned (min/year)	Temp. (°C)
± 3 minutes	Within Tolerance	-55 to +85

Laboratory Environment

Temperature (°C)	Relative Humidity (%)
24.8	45.



Calibration Technician

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Certificate of Calibration

Model: CR1000

Serial Number: 19459

Temperature Option: Extended Temperature Tested

Test Panel Location: 5

CSI Calibration Number: 200319324

Calibration Procedures: TST12215A R14 TST12215C R21 PRC33A R24

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: 19-Mar-20

Recommended Interval: 3 Years of Service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
Krohn Hite 523	AF50066	24-Feb-21	AF50066
CSI Oscillator	08/20 01	14-Jun-20	USNO/NIST

Calibration Procedures

Voltage Excitation

Analog Input Ranges

Pulse Counters

System Power

Period Averaging

Control Ports

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. The collective measurement uncertainty of the calibration process exceeds a 4:1 accuracy ratio. Policies and procedures at this facility comply with ISO-9001.

Instrument Data Report

Analog Input Accuracy

S/N: 19459

Datalogger Option: Extended Temperature Tested

Range	Input (mV)	*Tolerance (mV)	Single-Ended (Full Scale)		Differential		Temp. (°C)
			As Received (mV)	As Returned (mV)	As Received (mV)	As Returned (mV)	
6	5000	±3	4999.29	5000.41	5000.34	5001.68	24.8
6	-5000	±3	-5000.03	-5001.61	-5000.34	-5001.68	24.8
5	2500	±1.5	N/A	N/A	2500.34	2500.58	24.8
4	250	±0.15	N/A	N/A	250.002	250.019	24.8
3	25	±0.015	N/A	N/A	25.003	25.003	24.8
2	7.5	±0.0045	N/A	N/A	7.499	7.500	24.8
1	2.5	±0.0015	N/A	N/A	2.500	2.500	24.8
1	-2.5	±0.0015	N/A	N/A	-2.500	-2.499	24.8
6	5000	±6	N/A	5000.93	N/A	5000.34	-25
6	5000	±6	N/A	5000.52	N/A	5001.67	50
6	5000	±9	N/A	5003.21	N/A	5002.20	-55
6	5000	±9	N/A	5001.63	N/A	5001.16	85

*Tolerance values are specified accuracy not including offset. Offset voltages are not included because an offset removal procedure is used to account for calibrator offset. Refer to CSI Process Control Document PRC7A.

Quiescent System Power

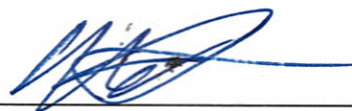
Typical (mA)	As Received (mA)	As Returned (mA)	Temp. (°C)
<1.0	0.59	0.66	24.8

Real-Time Clock

Tolerance (min/year)	As Returned (min/year)	Temp. (°C)
± 3 minutes	Within Tolerance	-55 to +85

Laboratory Environment

Temperature (°C)	Relative Humidity (%)
24.8	45.



Calibration Technician

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TE525 CALIBRATION SHEET

RMA: 31678

Technician: Carlos Santos

Serial Number: 69925-716

Checkout Date: 3/27/2020

Funnel Size 6.064 in.

As Received Measurements

Tips Per 473mL Reservoir				
Nozzle #	1 st	2 nd	3 rd	Average
NB-6	56	57	56	56.33

As Returned; Repair/Calibration Measurements

Tips Per 473mL Reservoir				
Nozzle #	1 st	2 nd	3 rd	Average
NB-6	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



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TE525 CALIBRATION SHEET

RMA: 31678

Technician: Carlos Santos

Serial Number: 47094-708

Checkout Date: 3/27/2020

Funnel Size 8.00 in.

As Received Measurements

Tips Per 473mL Reservoir				
Nozzle #	1 st	2 nd	3 rd	Average
NB-6	56	56	56	56

As Returned; Repair/Calibration Measurements

Tips Per 473mL Reservoir				
Nozzle #	1 st	2 nd	3 rd	Average
NB-6	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



TE525 CALIBRATION SHEET

RMA: 31678

Technician: Carlos Santos

Serial Number: 44946-0810

Checkout Date: 4/6/2020

Funnel Size 8.00 in.

As Received Measurements

Tips Per 473mL Reservoir				
Nozzle #	1 st	2 nd	3 rd	Average
NB-6	58	56	57	57

As Returned; Repair/Calibration Measurements

Tips Per 473mL Reservoir				
Nozzle #	1 st	2 nd	3 rd	Average
NB-6	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



RM Young Service Model 05103

RMA: 31678

Technician: Carlos Santos

Serial Number: 105343

Checkout Date: 3/25/2020

Accessories Received: Cable ☒ Vane ☒ Propeller ☐ Propeller Nut ☒ Mount Clamp ☒

Condition as received: Fair

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	300 ☒	Pass ☒
Measured	30	90	179	268	349	1500 ☒	
						1800 ☒	

* 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.



RM Young Service Model 05103

RMA: 31678

Technician: Carlos Santos

Serial Number: 105345

Checkout Date: 3/25/2020

Accessories Received: Cable ☒ Vane ☒ Propeller ☐ Propeller Nut ☒ Mount Clamp ☒

Condition as received: Good.

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	300 ☒	Pass ☒
Measured	30	90	180	270	350	1500 ☒	
						1800 ☒	

* 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.

Certificate of Calibration

Model: HMP45C

Serial Number: C0540083

CSI Calibration Number: 200325411

Calibration Procedures: TST_HMPCAL R4 PRC33A R24

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: 25-Mar-20

Recommended Interval: 1 Year of Service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
HMT-337	F0840130	05-Aug-20	2000939-190805-HMT337-F0840130
CR3000	1870	04-Mar-23	170306585

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.

Instrument Data Report

S/N: C0540083

Relative Humidity Measurements

As Received (%RH)			As Returned (%RH)			Tolerance (%RH)
Reference	Device	Difference	Reference	Device	Difference	
20.2	20.3	0.1	20.5	21.0	0.5	±2
49.7	49.6	-0.1	50.0	50.5	0.5	±2
88.0	87.0	-1.0	88.5	87.9	-0.6	±2

Temperature Measurements

As Received (°C)			As Returned (°C)			Tolerance (°C)
Reference	Device	Difference	Reference	Device	Difference	
24.0	23.8	-0.2	24.5	24.4	-0.1	±0.2

Laboratory Environment

Temperature (°C)	Relative Humidity (%)
24.0	24.


Calibration Technician

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Certificate of Calibration

Model: HMP45C

Serial Number: D3230013

CSI Calibration Number: 200325418

Calibration Procedures: TST_HMPCAL R4 PRC33A R24

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: 25-Mar-20

Recommended Interval: 1 Year of Service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
HMT-337	F0840130	05-Aug-20	2000939-190805-HMT337-F0840130
CR3000	1870	04-Mar-23	170306585

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Instrument Data Report

S/N: D3230013

Relative Humidity Measurements

As Received (%RH)			As Returned (%RH)			Tolerance (%RH)
Reference	Device	Difference	Reference	Device	Difference	
20.2	20.1	-0.1	20.5	20.4	-0.1	±2
49.7	49.7	0.0	50.0	50.3	0.3	±2
88.0	87.6	-0.4	88.5	88.3	-0.2	±2

Temperature Measurements

As Received (°C)			As Returned (°C)			Tolerance (°C)
Reference	Device	Difference	Reference	Device	Difference	
24.0	23.9	-0.1	24.5	24.4	-0.1	±0.2

Laboratory Environment

Temperature (°C)	Relative Humidity (%)
24.0	24.


Calibration Technician

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Certificate of Calibration

Model: HMP45C

Serial Number: F3450040

CSI Calibration Number: 200325415

Calibration Procedures: TST_HMPCAL R4 PRC33A R24

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: 25-Mar-20

Recommended Interval: 1 Year of Service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
HMT-337	F0840130	05-Aug-20	2000939-190805-HMT337-F0840130
CR3000	1870	04-Mar-23	170306585

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Instrument Data Report

S/N: F3450040

Relative Humidity Measurements

As Received (%RH)			As Returned (%RH)			Tolerance (%RH)
Reference	Device	Difference	Reference	Device	Difference	
20.2	20.3	0.1	20.5	21.2	0.7	±2
49.7	49.6	-0.1	50.0	50.8	0.8	±2
88.0	86.4	-1.6	88.5	87.6	-0.9	±2

Temperature Measurements

As Received (°C)			As Returned (°C)			Tolerance (°C)
Reference	Device	Difference	Reference	Device	Difference	
24.0	24.2	0.2	24.5	24.6	0.0	±0.2

Laboratory Environment

Temperature (°C)	Relative Humidity (%)
24.0	24.


Calibration Technician

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Certificate of Calibration

Model: HMP45C

Serial Number: F3450047

CSI Calibration Number: 200325413

Calibration Procedures: TST_HMPCAL R4 PRC33A R24

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: 25-Mar-20

Recommended Interval: 1 Year of Service

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
HMT-337	F0840130	05-Aug-20	2000939-190805-HMT337-F0840130
CR3000	1870	04-Mar-23	170306585

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.

Instrument Data Report

S/N: F3450047

Relative Humidity Measurements

As Received (%RH)			As Returned (%RH)			Tolerance (%RH)
Reference	Device	Difference	Reference	Device	Difference	
20.2	20.0	-0.2	20.5	20.8	0.3	±2
49.7	49.3	-0.4	50.0	50.4	0.4	±2
88.0	87.2	-0.8	88.5	88.3	-0.2	±2

Temperature Measurements

As Received (°C)			As Returned (°C)			Tolerance (°C)
Reference	Device	Difference	Reference	Device	Difference	
24.0	24.1	0.1	24.5	24.6	0.1	±0.2

Laboratory Environment

Temperature (°C)	Relative Humidity (%)
24.0	24.


Calibration Technician

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Certificate of Calibration

Model: 109

Serial Number: 31678-1

CSI Calibration Number: 633355

Calibration Date: 23-Mar-20

Instrument Data Report

Measurement Point #1

PRT Temperature	20.000 °C
Sensor Measurement	20.02 °C
Sensor Offset	0.02 °C

Report of Calibration Standards Used

Make/Model	Serial Number	Cal. Due Date	Trace Number
Fluke 1502	A67376	15-Apr-20	162N2623
CR1000	10142	13-Mar-21	010142

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. The collective measurement uncertainty of the calibration process exceeds a 4:1 accuracy ratio. Policies and procedures at this facility comply with ISO-9001.



Calibration Technician

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721 West 1800 North
Logan, UT 84321

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

Customer Name : Mike Bower
Serial Number : PY86501
Calibration Date : 26-Mar-2020
Previous Calibration Date : 17-Apr-2014
Recommended Recalibration Date : 26-Mar-2022
Calibration Factor : 194.39 W m⁻² per mV
Output : 93.9 μ A per 1000 W m⁻²
Calibration Factor as Received : 198.52 W m⁻² per mV
Output as Received : 91.9 μ A per 1000 W m⁻²
Resistance (Measured) : 54.8 Ω
Change in Output : 2.1 %
Change in Output per Year : 0.4 %

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

Reference Instrument	Serial Number	ISO 9060 Classification
EKO Instruments MS80*	S16088044	Spectrally Flat Class A
Kipp & Zonen CM11	060089	Spectrally Flat Class A
Kipp & Zonen CMP11	101625	Spectrally Flat Class A
Hukseflux SR20	2497	Spectrally Flat Class A
Li-Cor LI-200	PY68846	Fast Response Class C
Li-Cor LI-200	PY68847	Fast Response Class C
Li-Cor LI-200	PY68895	Fast Response Class C
Li-Cor LI-200	PY68896	Fast Response Class C

*MS80 purchased new in 2017. Initial calibration conducted by EKO Instruments with traceability to the World Radiometric Reference.

Technical Manager :

Jacob Bingham

Date : 26-Mar-2020

Please keep this document for your records



721 West 1800 North
Logan, UT 84321

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

Customer Name	:	Mike Bower
Serial Number	:	PY86488
Calibration Date	:	26-Mar-2020
Previous Calibration Date	:	12-Apr-2017
Recommended Recalibration Date	:	26-Mar-2022
Calibration Factor	:	204.59 W m^{-2} per mV
Output	:	94.2 μA per 1000 W m^{-2}
Calibration Factor as Received	:	198.84 W m^{-2} per mV
Output as Received	:	96.9 μA per 1000 W m^{-2}
Resistance (Measured)	:	51.9 Ω
Change in Output	:	-2.8 %
Change in Output per Year	:	-1.0 %

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.

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Kipp & Zonen CM11	060089	Spectrally Flat Class A
Kipp & Zonen CMP11	101625	Spectrally Flat Class A
Hukseflux SR20	2497	Spectrally Flat Class A
Li-Cor LI-200	PY68846	Fast Response Class C
Li-Cor LI-200	PY68847	Fast Response Class C
Li-Cor LI-200	PY68895	Fast Response Class C
Li-Cor LI-200	PY68896	Fast Response Class C

*MS80 purchased new in 2017. Initial calibration conducted by EKO Instruments with traceability to the World Radiometric Reference.

Technical Manager :

Jacob Bingham

Date : 26-Mar-2020

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721 West 1800 North
Logan, UT 84321

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

Customer Name : Mike Bower
Serial Number : PY68983
Calibration Date : 26-Mar-2020
Previous Calibration Date : 4-May-2010
Recommended Recalibration Date : 26-Mar-2022
Calibration Factor : 201.04 W m⁻² per mV
Output : 94.6 μ A per 1000 W m⁻²
Calibration Factor as Received : 198.57 W m⁻² per mV
Output as Received : 95.7 μ A per 1000 W m⁻²
Resistance (Measured) : 52.6 Ω
Change in Output : -1.2 %
Change in Output per Year : -0.1 %

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.

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Kipp & Zonen CM11	060089	Spectrally Flat Class A
Kipp & Zonen CMP11	101625	Spectrally Flat Class A
Hukseflux SR20	2497	Spectrally Flat Class A
Li-Cor LI-200	PY68846	Fast Response Class C
Li-Cor LI-200	PY68847	Fast Response Class C
Li-Cor LI-200	PY68895	Fast Response Class C
Li-Cor LI-200	PY68896	Fast Response Class C

*MS80 purchased new in 2017. Initial calibration conducted by EKO Instruments with traceability to the World Radiometric Reference.

Technical Manager :

Jacob Bingham

Date : 26-Mar-2020

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721 West 1800 North
Logan, UT 84321

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

Customer Name	:	Mike Bower
Serial Number	:	PY83363
Calibration Date	:	26-Mar-2020
Previous Calibration Date	:	12-Apr-2017
Recommended Recalibration Date	:	26-Mar-2022
Calibration Factor	:	205.37 W m ⁻² per mV
Output	:	83.7 µA per 1000 W m ⁻²
Calibration Factor as Received	:	198.41 W m ⁻² per mV
Output as Received	:	86.6 µA per 1000 W m ⁻²
Resistance (Measured)	:	58.2 Ω
Change in Output	:	-3.4 %
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.

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Li-Cor LI-200	PY68847	Fast Response Class C
Li-Cor LI-200	PY68895	Fast Response Class C
Li-Cor LI-200	PY68896	Fast Response Class C

*MS80 purchased new in 2017. Initial calibration conducted by EKO Instruments with traceability to the World Radiometric Reference.

Technical Manager :

Jacob Bingham

Date : 26-Mar-2020

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721 West 1800 North
Logan, UT 84321

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

Customer Name : Mike Bower
Serial Number : PY59846
Calibration Date : 26-Mar-2020
Previous Calibration Date : 15-May-2015
Recommended Recalibration Date : 26-Mar-2022
Calibration Factor : 203.66 W m^{-2} per mV
Output : 90.1 μA per 1000 W m^{-2}
Calibration Factor as Received : 199.44 W m^{-2} per mV
Output as Received : 92.0 μA per 1000 W m^{-2}
Resistance (Measured) : 54.5 Ω
Change in Output : -2.1 %
Change in Output per Year : -0.4 %

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.

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