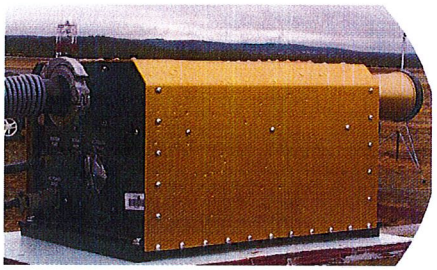
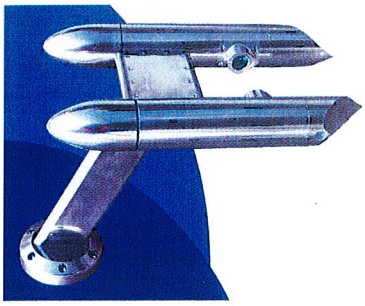
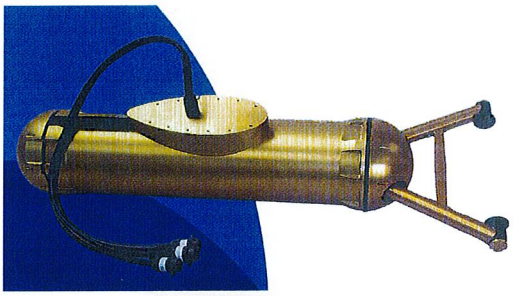
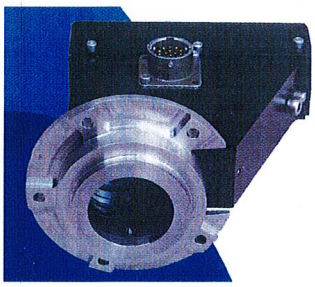




Droplet Measurement Technologies

Calibration Data



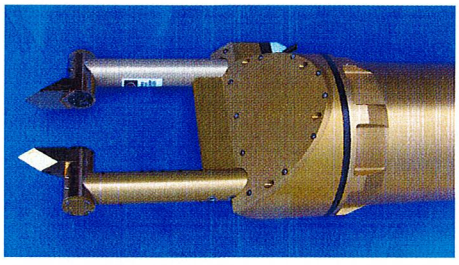


DROPLET MEASUREMENT TECHNOLOGIES

US Patent #7,656,510

MODEL NO.: CCN-100
SERIAL NO.: 2007-179
MFG. DATE: July 2020

Longmont, CO, USA
www.dropletmeasurement.com



DROPLET MEASUREMENT TECHNOLOGIES

Calibrated 7/2020
Calibration Due 7-2021
By DSJ

Longmont, CO, USA
www.dropletmeasurement.com

DROPLET MEASUREMENT TECHNOLOGIES

2400 Trade Centre Avenue, Longmont, CO 80503, ph. 303-440-5576, www.dropletmeasurment.com

CERTIFICATE
OF
CONFORMANCE

Droplet Measurement Technologies, Inc.

certifies that the

Cloud Condensation Nuclei Counter-Single Column
(CCN-100/AAA-0024)
S/N: 2007-179

has received factory optical cleaning, optical alignment and calibrations. The instrument is certified to meet all factory calibration tolerances in accordance with DMT standards as of the date of this certificate.

Certificate Date.....7/2020

Sales Order.....1706050

Expiration Month 7/2021

Calibration by: _____ Verified by: _____

D Johnson
CCN Product Engineer

C Puga
Service Engineer

Atmospheric Particle Spectrometers are used in very harsh environments and require routine cleaning and calibration verification during campaigns. The user is responsible for routine maintenance. DMT advises a full factory optical cleaning, optical alignment and calibration adjustment once per year.

DROPLET MEASUREMENT TECHNOLOGIES

2400 Trade Center Avenue
Longmont, CO USA 80305
Tel: 303-440-5576
www.dropletmeasurement.com
customer-contact@dropletmeasurement.com

Certificate of Calibration

Customer: LACy
Instrument: CCN-100
Serial Number: 2007-179
Invoice Number:1706050

Field Office: Longmont, Colorado
Temperature: 25°C

Humidity: 42%RH

Instrument Status

Customer Recommended Calibration:
DMT Recommended Calibration: XX

Calibration Due: 7/2021
Customer Invoice Number: ADDAIR

Instrument Condition Received:

In Tolerance:	Operational Failure:	New: XX
Out of Tolerance:	Physical Damage:	

Out of Tolerance Description:

Instrument Condition Shipped:
Meets DMT Specifications: **XX**
Other (description attached):

Standards Used:
Particles

Manufacturer	Particle Size	Standard Deviation	Lot No.	Expiration Date

Flowmeter

Type	Manufacturer	Serial Number
BUCK mini Calibrator	AP Buck	A55022

Reference Unit

Type	Manufacturer	Serial Number
SEMS	Brechtel	02
Thermometer	Fluke	00356720012S

Calibrated by: David Johnson **Calibration Date: 7/20/2020**

Quality checked by: Chuck Puga **Date:** 7/20/20

Droplet Measurement Technologies Inc.
2400 Trade Centre Avenue, Longmont, CO, 80503, USA
Ph: 303-440-5576, Fax: 303-440-1965
www.dropletmeasurement.com

CCN
CAL Data

Customer: LACy	Project: New Instrument	Work Order No.: C179
Serial No. CCN: 2007-179	Technician: dsj	Date: 7/20/2020
Labels: ☒	Serial Tag: ☒	Software Rev Level: 6.0.2.100
OPC SN: H311	Win 7 SN: 02219-088-190-640	CDPE Firmware Rev: 20120418BBCN.mcs
Computer Speed: 1GHZ	Hard drive: 128gb	
Leak Rate: < 1 mb per sec.	Power Supplies: ☒	0Ω Between All GNDs: ☒
Set 2.17V: ☒	Check +7V: 7.54V	Check Fuse Values: ☒
Fans: ☒	LEDS: ☒	Diamond card Calibration: ☒
Power Resistors: 3ohm 50W	Power switch: 20A	
D.C. Voltage Set: ☒	D.C. Voltage Read: ☒	Temperatures Calibrated: ☒
Solenoid Pumps: 60ML ☒ 20ML☐		
Valve Min: 0.1	Valve max: 4.9	
Sample Flow Slope: 66.16	Sheath Flow Slope: 736.30	Pressure Slope: 221.45
Sample Flow Int.: -163.69	Sheath Flow Int.: -1845.73	Pressure Int.: 109.84
Current T1: 3.19A	Current T2: 3.19A	Current T3: 3.20A
T1 Gain: 1.985	T2 Gain: 1.989	T3 Gain: 1.993
T1 Offset: 0	T2 Offset: 0	T3 Offset: 0
TG %: 7	DMA Calibration Slope: 18.86	DMA Calibration INT: .99
P.I.D, Values: P:1 I:1 D:0		
Laser Power:23mW	Laser Current: 87mA	Current limit: 3.53V
Current Alarm: 105 mA	Baseline 0 level: 2.71V	Baseline calibrated: 2.81V
OPC 1st Stage: .04V	CDPE +-5V: 5.15V	1st stage Rail: 5.00V
Chiller ON: 22K	Chiller OFF: 26K	OPC Air Pump: ☒
Water Pumps: ☒	60 Min Zero Count: ☒	48 Hour burn in: ☒
Cold Turn on: ☒		
USB Port: ☒	Data Out Port: ☒	Ethernet Port: ☒
Touch Screen Cal.: ☒	Computer Directory: ☒	Computer Start Menu: ☒
Keyboard Verification: ☒	28V PS verification: ☒	
Bottle Caps Secured: ☒	Column Dried: ☒	Final Visual Inspection: ☒
Wires Dressed neatly: ☒	USB Stick: ☒	Torque seal Pots: ☒

Accessories:
KIT-0112 CCN-100 Consumables
KIT-0113 CCN-100 Basic Field Service

Comments:
System has 60 micro liter supply, drain, and OPC pumps.
Windows 7 based computer.
System has ABD-0234 Rev. C (CDPE DSP board).
100% tested as a system.

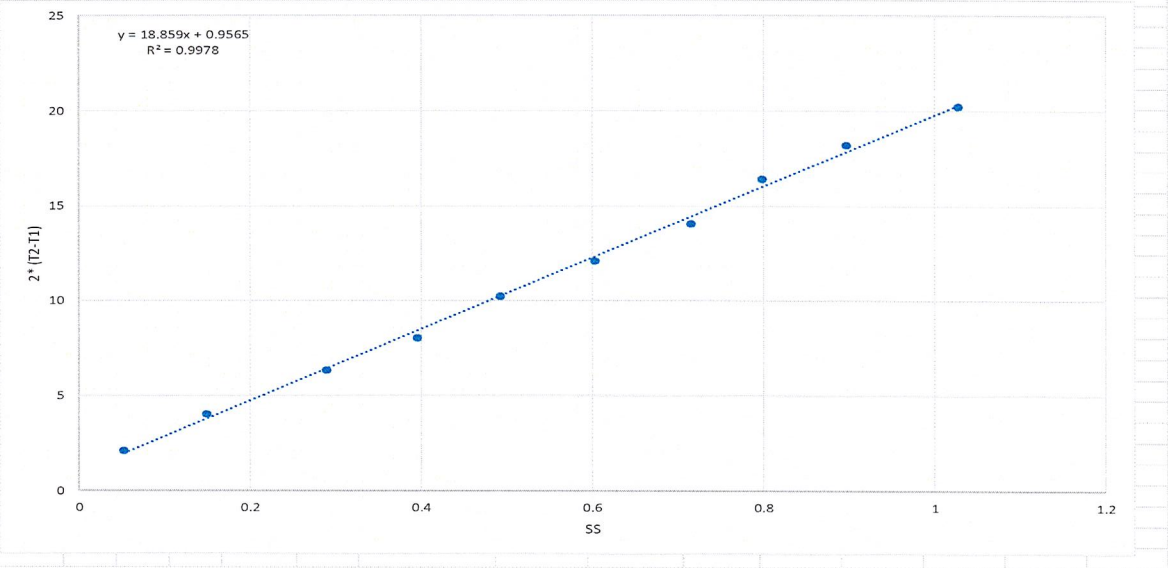
Warranty of repairs:
Warranty of 6 months on any repair work performed or parts replaced (except consumable items). Customer pays shipping to DMT. DMT will pay return shipping via standard ground.

CCN Flow Calibration Worksheet

CCN SN:	179	DATE:	7/20/2020	Tech:	dsj		
Sample flow							NOTE: take 5 points only in range of 20-75, one must be 45 +-2, RSQ must be >.99
				slope	66.16469		
				intercept	-163.694		
Volts		Flow		rsq	0.999495		
2.78		20.32					20
2.97		32.66					32
3.16		45.81					45
3.4		60.51					60
3.6		74.91					75
Pressure calibration				slope	221.4551		Note: take only 5 points in range of 400mb to 1000mb, one will be around 840, one will be around 1000, other 3 will be less than 840, RSQ.must be >.99
				intercept	109.8387		
Volts		press mbar		rsq	0.999875		
1.3		400					400
1.82		510					510
2.3		620					620
2.81		730					730
3.32		847					840
4		1000					1000
Sheath flow					slope	736.30127	NOTE: take 5 points only in range 200-750, one must be 450 +-10, RSQ.must be >.99
					intercept	-1845.729	
Volts	sample	sheath	total		rsq	0.9913296	
2.73	16.45	183.55	200				200
2.94	29.15	296.35	325.5				325
3.07	37.67	412.83	450.5				450
3.27	50.76	549.44	600.2				600
3.41	67.25	682.95	750.2				750
				Flow Meter	**CCN Display**	**%**	Set total flow to 500, flow ratio to 10 and measure flows, sample must be +-2.5%, Total must be +-5%
			Sample	45	45	0.00	
			Total	500	500	0.00	
							Max Flow ratio Must be 10.6-10.8, adjust restriction if needed
							Sample flow rail >150
							5/6/2015 dsj

10pt Temperature VS. SS% calibration flow 500vccm and 840mb

target delta T	T1	T2	T3	delta T: (T2-T1)	delta T: (T3-T1)	Kohler Lookup T: 1/2*(T1+T2)	d50	SS%	delta T: 2*(T2-T1)
2	26.78	27.85	28.68	1.1	1.9	27.3	193.0	0.05251	2.1
4	27.38	29.40	31.13	2.0	3.8	28.4	97.0	0.14981	4.0
6	26.69	29.85	32.48	3.2	5.8	28.3	63.5	0.28912	6.3
8	28.10	32.12	35.53	4.0	7.4	30.1	51.5	0.39488	8.0
10	28.61	33.71	37.97	5.1	9.4	31.2	44.5	0.49177	10.2
12	28.51	34.56	39.79	6.0	11.3	31.5	39.0	0.60325	12.1
14	27.85	34.89	40.91	7.0	13.1	31.4	35.0	0.71562	14.1
16	28.23	36.42	43.37	8.2	15.1	32.3	32.5	0.79827	16.4
18	29.08	38.20	46.00	9.1	16.9	33.6	30.0	0.89606	18.2
20	28.49	38.62	47.32	10.1	18.8	33.6	27.5	1.02807	20.3



Final calibration data CCN-100
SN:2007-179 7/20/2020

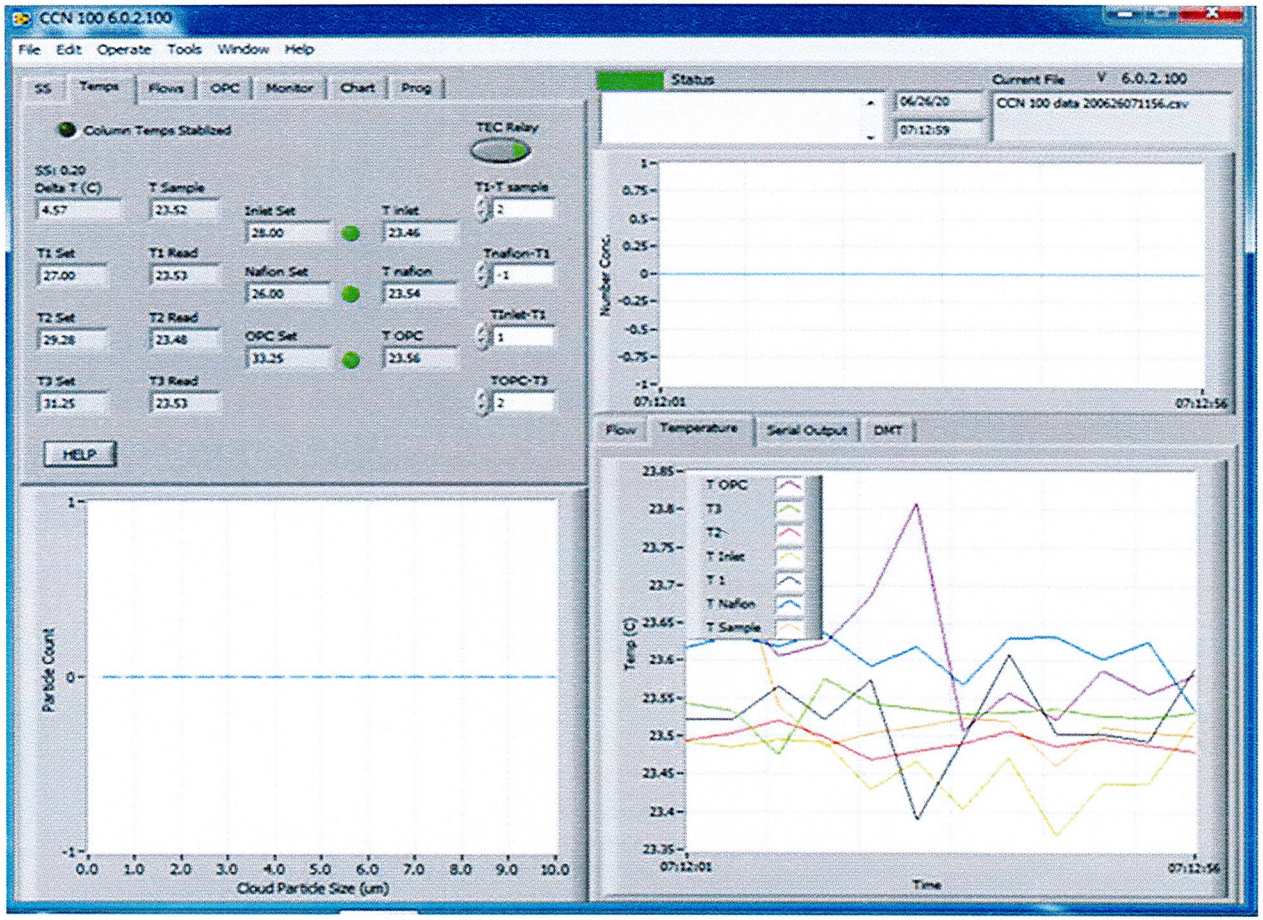
Zero degree

Final calibration data CCN-100
SN:2007-179 7/20/2020

Ambient scan

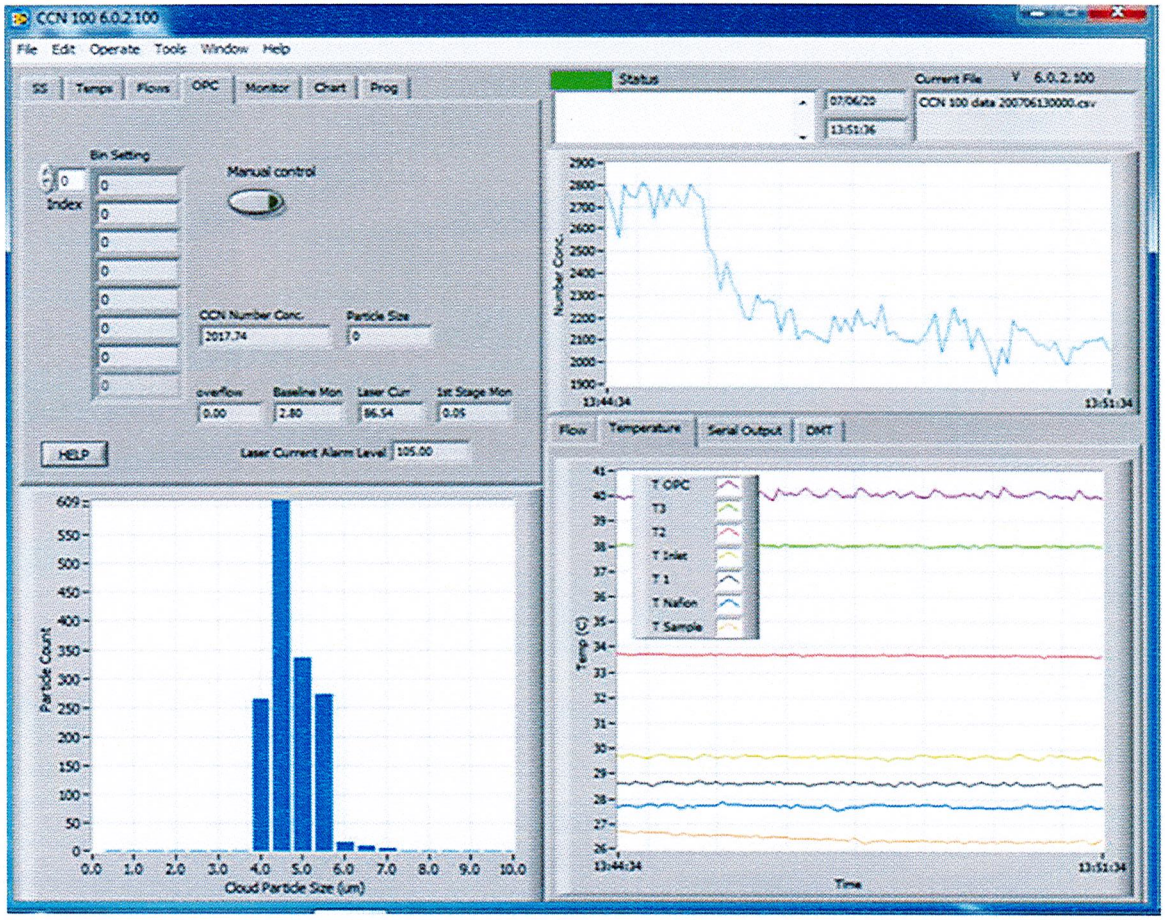
Final calibration data CCN-100
SN:2007-179 7/20/2020

Final temperature calibration



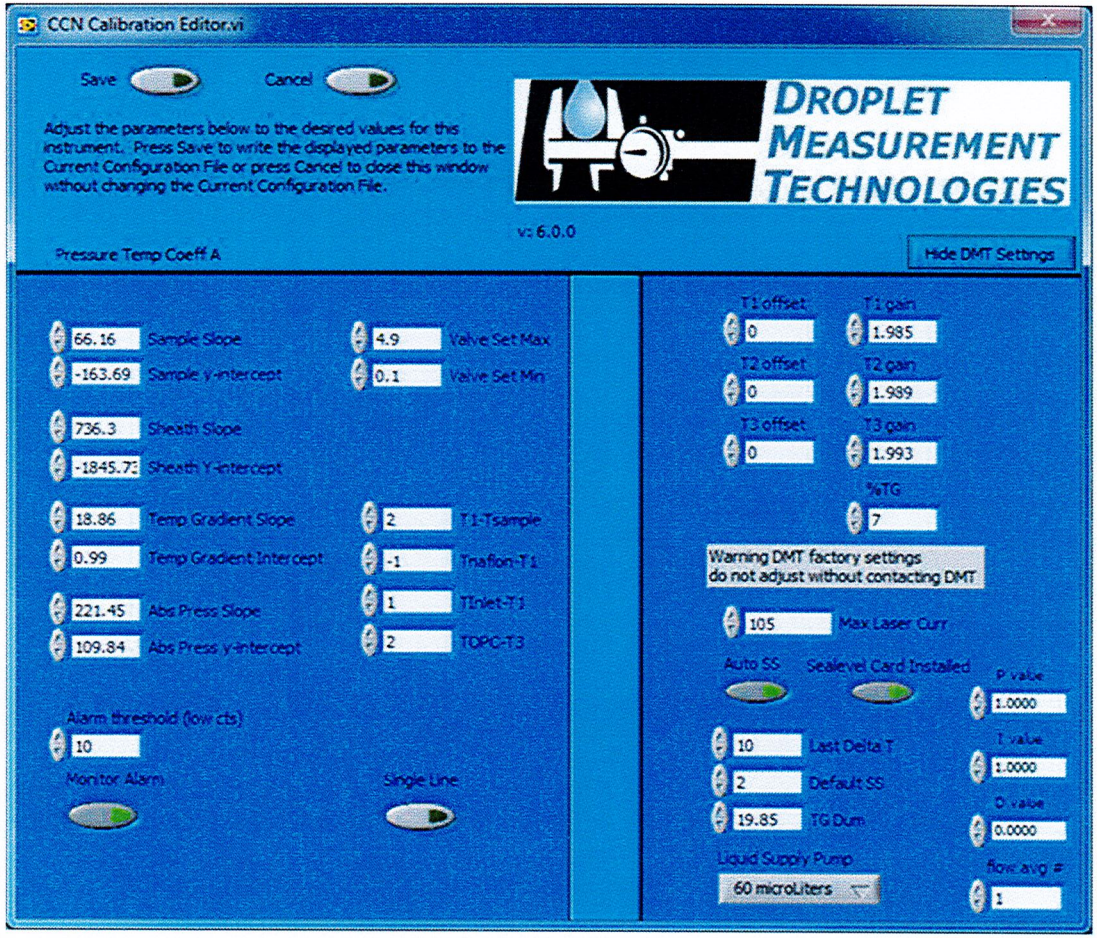
Final calibration data CCN-100
SN:2007-179 7/20/2020

10 Degree gradient



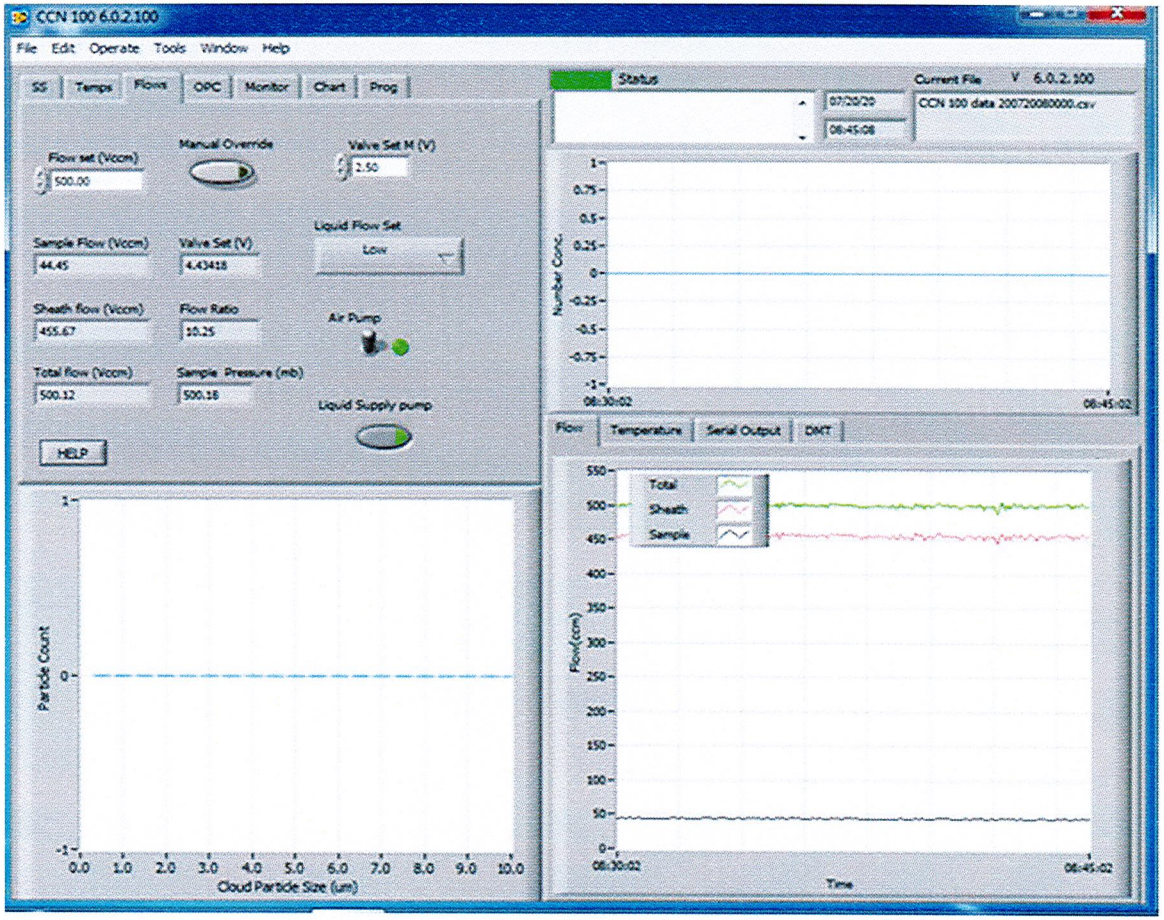
Final calibration data CCN-100
SN:2007-179 7/20/2020

Calibration Coefficients



Final calibration data CCN-100
SN:2007-179 7/20/2020

Zero Count at 500 mb



Final calibration data CCN-100
SN:2007-179 7/20/2020