**I. General information:**

1. Mission name: **SENEX 2013**

2. Instrument name: Stream-wise Thermal Gradient CCN Counter

3. What is measured: Cloud condensation nuclei

4. Short description of measurement technique:

Inlet sample aerosol is exposed to water vapor at varying user-defined supersaturations. Droplets form and are counted at the bottom of a column by an optical particle counter (OPC).

5. Contact information for all personnel going to the field with this instrument:

(*for multiple investigators,* *please list the PI or primary contact person first*)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Email** | **Office phone** | **Cell phone** |
| 1. Athanasios Nenes (US) | nenes [at] eas.gatech.edu | (404) 894-9225 | (404) 932-9429 |
| 2. Jack Lin (US) | jlin63 [at] gatech.edu | (404) 385-4695 | (701) 367-6865 |
| 3. Aikaterini Bougiatioti (GR) | kbougiatioti [at] chemistry.uoc.gr | (404) 385-4695 | (404) 610-3486 |
| 4. |  |  |  |
| 5. |  |  |  |
| 6. |  |  |  |

**II. Specific information:**

**1. Total installed weight: 130 lbs**

(rack, gas cylinders, hoses, cabling, pumps, inlets, permeation tubes, etc.)

|  |  |  |
| --- | --- | --- |
| **Rack weight and balance info** | **Allowed** | **Actual** |
| Weight, lbs.: |  |  |
| Overturning moment, in-lbs.: |  |  |

**Pod weight and CG:**

**NOTE**: Please also provide weight-and-balance information for all installed equipment. Templates for standard electronics racks are available for download [here](http://esrl.noaa.gov/csd/groups/csd7/measurements/2013senex/P3/integration/). PIs with non-standard installations will need to provide relevant information in a similar format.

**2. Individual subassembly info** (weights should sum to total listed above)

|  |  |  |
| --- | --- | --- |
| **Component name** | **Location name and flight station** | **Weight, lbs** |
| 1. CCNC | Sta 2-1 | 130 |
| 2. |  |  |
| 3. |  |  |
| 4. |  |  |
| 5. |  |  |
| 6. |  |  |

**3. Component power consumption in Amps**

Please provide an electrical power diagram in Appendix A

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Component name** | **Location name** | **400 Hz**  **3Ø** | **400 Hz**  **1Ø** | **60 Hz** | **28VDC** | **28VDC**  **WOW** |
| 1. CCN | Sta 2: Outboard Side, front face, 36” above ground |  | 5 A (max startup) |  |  |  |
| 2. |  |  |  |  |  |  |
| 3. |  |  |  |  |  |  |
| 4. |  |  |  |  |  |  |
| 5. |  |  |  |  |  |  |
| 6. |  |  |  |  |  |  |
| 7. |  |  |  |  |  |  |
| 8. |  |  |  |  |  |  |
| 9. |  |  |  |  |  |  |
| 10. |  |  |  |  |  |  |
| 11. |  |  |  |  |  |  |
| 12. |  |  |  |  |  |  |
|  | **Totals:** |  | 5 A |  |  |  |
|  |  | **400 Hz**  **3Ø** | **400 Hz**  **1Ø** | **60 Hz** | **28VDC** | **28VDC**  **WOW** |

**4. Inlet and exhaust information:**

Please provide an inlet/exhaust line diagram in Appendix B

|  |  |  |
| --- | --- | --- |
| **Inlet/exhaust name** | **Location name and flight station** | **Hole size through hull, inches** |
| 1. Inlet | LTI | ¼” non-conductive tubing |
| 2. Exhaust | FS505 | ¼” tubing with exhaust valve |
| 3. |  |  |
| 4. |  |  |
| 5. |  |  |
| 6. |  |  |

**5. Source of flow** (name and location of pump or venturi)

|  |  |
| --- | --- |
| **Pump name** | **Location name and flight station** |
| 1. 3 solenoid pumps | Water inlet/outlet within instrument |
| 2. 1 solenoid pump | OPC dry air purge within instrument |
| 3. 2 air pumps | Within instrument |
| 4. |  |
| 5. |  |
| 6. |  |

**6. Installed hazardous materials or equipment:**

(only for items *installed* *in the aircraft for use during flight*)

**A. Lasers**

Type: OPC laser

Class: 3b

Wavelength: 658 nm

Output power: 35.2 mW

Eye-safe? No

Beam fully contained within instrument during normal operation? Yes

*For non-eye-safe lasers, please attach a description of safety measures taken (safety interlocks, beam fully enclosed within instrument, etc.) and a procedure for safe instrument operation during testing and laser alignment. Please contact the* [*AIC*](mailto:carsten.warneke@noaa.gov) *for an example of laser safety documentation from TexAQS 2006.*

**B. RF transmitters**: (note that mass spectrometer RF generators are not designed to transmit, and do not need to be included here)

Description: N/A

Transmitted RF power: N/A

Frequency range: N/A

**C. Radioactive materials:**

Isotope: None during flight

Half-life:

Type of emitter:

Generally licensed?

# installed and location:

# of spares and location:

**D. Compressed gases:** (1 ft3 = 28.32 liters; cabin volume = 4260 ft3 = 1.21 x 105 liters)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Cylinder number:** | **1** | **2** | **3** | **4** | **5** |
| Gas description | N/A |  |  |  |  |
| Mixing ratio |  |  |  |  |  |
| Cylinder size (ft3) |  |  |  |  |  |
| Max pressure (psig) |  |  |  |  |  |
| # installed on aircraft |  |  |  |  |  |
| Location on aircraft |  |  |  |  |  |
| Service frequency |  |  |  |  |  |
| *toxic/flammable gases:* |  |  |  |  |  |
| In containment vessel? |  |  |  |  |  |
| Gas alarm provided? |  |  |  |  |  |
| MR if vented to cabin, ppmv |  |  |  |  |  |
| OSHA 8-hr PEL, ppmv |  |  |  |  |  |
| 30-min IDLH, ppmv |  |  |  |  |  |

**E. Chemicals (solids and liquids):**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Chemical number:** | **1** | **2** | **3** | **4** | **5** | **6** |
| Concentration | Water |  |  |  |  |  |
| Amount | 1.5 L |  |  |  |  |  |
| Container description | Glass bottles |  |  |  |  |  |
| Purpose | Supersaturation generation |  |  |  |  |  |
| Solution pH | 7 |  |  |  |  |  |
| Spill kit provided? | No |  |  |  |  |  |

**F. Cryogens:**

Location: N/A

Description:

Container description:

Quantity on board per flight:

Serviced on the aircraft?

**G. UPS and battery installation:**

Location: N/A

Description: (Manufacturer, model no., power)

Battery type:

Has an adjustable input voltage tolerance? (highly recommended)!

**H. Motors**

Description: Two brushless air pumps installed within instrument

Motor current draw: 3Ø, 400 Hz, less than 5A startup

Thermal interlock enabled?

**I. Operator seat requests -**

Test flights:

Transit flights:

Science flights:

**7. Data and plumbing drops**

Network (Cat. 5/6 ethernet) drops requested: One Ethernet drop for time sync

Serial drops requested: N/A

IRIG-B drops (BNC coax connector) requested: N/A

Vacuum/exhaust/ emergency dump lines:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Flow rate, slpm** | **Line pressure, Torr** | **Pump type** | **Trace gas concentration(s)** |
| 1. Exhaust line | 1-2 LPM | Ambient |  | Water vapor |
| 2. |  |  |  |  |
| 3. |  |  |  |  |
| 4. |  |  |  |  |

Ground gas service lines (number, location, type of service): N/A

Other gas lines (number, location, type of service): N/A

Will you be sending data to the AOC data station? If so, please provide the following information: No

|  |  |  |
| --- | --- | --- |
| **Parameter name** | **Voltage range** | **Unit conversion** |
| 1. |  |  |
| 2. |  |  |
| 3. |  |  |

**8. Aircraft access**

**a. flight days:**

Pre-flight time requested at aircraft (hours): 1.5 hrs

Routine pre-flight ground support required? No.

(stands, ladders, forklifts, covers, external equipment, etc.)

Routine post-flight time requested at aircraft (hours): 1 hr

Routine post-flight ground support required? No.

(stands, ladders, forklifts, covers, external equipment, etc.)

**b. non-flight days:**

Routine external access to inlets or zenith mounts required?

(please describe location, how often, for how long, type of ground support equipment needed, weather constraints, etc.)

Ability to run a rubber tube from the ground to the instrument via the cockpit window is requested for calibration days.

*Please note there is zero access and zero power to the aircraft (including pods) on hard-down days. These occur at least once every seven calendar days while in the field.*

**9. Aircraft maneuvers**

Briefly describe in-flight calibration frequency, duration, altitudes desired:

No in-flight calibration.

Briefly describe instrument sensitivity to flight conditions:

(issues during roll/pitch, ascent/descent, sampling in cloud, icing etc.)

Instrument is sensitive to changes in altitude below ambient pressures of 350mb

**10. Miscellaneous**

*1. Hazmat for preflight/postflight calibrations*: Please describe fully any additional hazardous materials - compressed gases, solvents, radioactive ion sources – that you anticipate *temporarily* bringing onto the aircraft for periodic instrument calibration purposes (e.g., *n*-butanol in a CN counter, 210Po in a DMA, a UPS for power, compressed gas cylinders for calibrations, etc.)

Po-210 ionizing radiation sources for DMA; n-butanol in CN counter.

*2. Fabrication and sheet metal support:* Please describe fully any anticipated requests for fabrication or sheet-metal support during installation in Tampa. This list should be kept to an absolute minimum; please recognize that this superb AOC resource is quite limited. To ease the strain on the AOC shop, we will work with each PI to ensure they arrive in Tampa with as much in hand as possible.

N/A

*3. Ferry flight/check flight procedures.* On occasion, AOC will perform an aircraft check flight, during which the instruments may be flown without power. Aircraft maintenance needs may also dictate a ferry flight without science crew or SED techs on board. Instruments should be designed with these eventualities in mind. However, if your instrument requires standby power during this kind of flight, this may be provided at the discretion of AOC personnel.

If so, the flight crew will need to be briefed well ahead of time to ensure proper instrument operation. Please provide with this document a bare-minimum checklist of instrument startup and shutdown procedures requested for these flights.

No standby power required.

**III. Ground laboratory space**

**1. Tampa space requests**:

Power requirements: 1.5 kW (max), 110V AC (standard outlets)

Special requests: None

**2. Field space requests**:

Workspace, ft2: 20

Number of tables/chairs: 2 tables, 2 chairs

Power requirements: 4 electrical outlets

Storage space, ft2: 10

Other requests: WiFi/Internet access desirable