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| Instrument Acceptance Testing, Setup & Operating Parameters, and Designations Guide |
| SOP Reference |
| Revision Number 1  09/22/15 |

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# [Monitoring Instruments’ Acceptance Testing Process Guide](#Table_Of_Contents)

This guide applies to newly received Monitoring Equipment with a value of $5000 or more.

## [General Information](#Table_Of_Contents)

1. Check for shipping damage. If there is damage, work with the Senior Office Specialist to notify the vendor for repair or replacement.
2. Conduct an inventory of the shipment to ensure the instrument and all accessories were received. If there are items missing, work with the Senior Office Specialist to notify the vendor and obtain missing equipment.
3. Once all the parts/items are received, check off each item on the packing slip, initial and date. Provide packing slip to the supervisor for processing.
4. Work with Monitoring’s Senior Office Specialist to obtain Clark County asset tags. Complete the Asset Description, Manufacturer, Serial Number, Vendor Name, Warranty Expiration Date, Purchase Date, Purchase Order #, Model, Estimated Life in Years and Purchase Cost on the Property Input Form located at: [P:\Air Monitoring\Admin\Inventory & Disposal\Forms\Property Input Form (Use every time).docx](file:///P:\Air%20Monitoring\Admin\Inventory%20&%20Disposal\Forms\Property%20Input%20Form%20(Use%20every%20time).docx). Submit the paperwork via email or hard copy to the Senior Office Specialist. The Senior Office Specialist will ensure the County inventory and DAQ Equipment Inventory is updated and will issue the asset tags to the Technician.
5. For instruments that have certifications, provide a copy of each certificate to the Senior Office Specialist so the certificates can be placed on the P drive.
6. Create the instrument log and fill out the appropriate information in the header and body of the document. The logbook template is located at: [P:\Air Monitoring\Instrumentation \Logs](file:///P:\Air%20Monitoring\Instrumentation\Logs). Indicate information related to shipping damage, performance of QC checks, standard operational settings, Clark County asset tag number, serial number, vendor name, make, model, PO #, purchase date and other relevant information.

1. Complete the appropriate acceptance form at: [P:\Air Monitoring\Instrumentation\](file:///P:\\Air%20Monitoring\\Instrumentation\\Acceptance%20Tests)

[Acceptance Tests](file:///P:\\Air%20Monitoring\\Instrumentation\\Acceptance%20Tests). If the form does not exist, inform supervisor, create the form, complete the form and post it. Ensure the instrument’s standard operational settings are documented in the form and instrument log.

1. Complete all QC checks. For example, on gas instruments, verify and adjust (if necessary) zero and span points. On PM instruments, verify and adjust (if necessary) flow, temperature, pressure, and leak (where appropriate). Externalize in-line particulate filter. Ensure all operational settings are within tolerance.

## [Instrument Setup](#Table_Of_Contents)

**NOTE: DEPENDING ON INSTRUMENT OPTIONS AND CONFIGURATIONS, NOT ALL TEST PARAMETERS WILL BE AVAILABLE IN THE INSTRUMENTS**

* 1. **TAPI 200 Series Nitrogen Oxides Analyzer** 
     1. See the manufacturer’s manual on how to perform a Pneumatic Leak Check
     2. See the manufacturer’s manual on how to perform a Sample Flow Check
     3. See the manufacturer’s manual on how to set the analog output to 0 – 1 VDC (all 3 channels)
     4. See the manufacturer’s manual on how to set the scale 0 – 500 ppb (all 3 channels). Note: the NOy analyzer is set to 0 – 200 ppb

Verify Instrument specifications match values in table below. If not, see instrument manual or TAPI Technical Support of corrective action.

|  |  |  |
| --- | --- | --- |
| **PARAMETER** | **RECORDED VALUE** | **ACCEPTABLE VALUE** |
| **RANGE** | PPB/PPM | 50 PPB TO 20 PPM |
| **NOx STAB** | PPB/PPM | ≤ 1 PPB WITH ZERO AIR |
| **SAMPLE FLOW** | CM3 | 500 ± 50 |
| **OZONE FLOW** | CM3 | 80 ± 15 |
| **PMT SIGNAL WITH ZERO AIR** | MV | -20 TO 150 |
| **PMT SIGNAL AT SPAN GAS CONC** | MV PPB | 0-5000MV  0-20,000 PPB |
| **NORM PMT SIGNAL AT SPAN GAS CONC** | MV PPB | 0-5000MV  0-20000PPB |
| **AZERO** | MV | -20 TO 150 |
| **HVPS** | V | 400 – 900 |
| **RCELL TEMP** | ºC | 50 ± 1 |
| **BOX TEMP** | ºC | AMBIENT ± 5ºC |
| **PMT TEMP** | ºC | 7 ± 2ºC |
| **MOLY TEMP** | ºC | 315 ± 5ºC |
| **RCEL PRESS** | IN-HG-A | <10 |
| **SAMP PRESS** | IN-HG-A | AMBIENT ± 1 |
| **NOx SLOPE** |  | 1.0 ± 0.3 |
| **NOx OFFSET** |  | 50 To 150 |
| **NO SLOPE** |  | 1.0 ± 0.3 |
| **NO OFFSET** |  | 50 To 150 |
| **ETEST** | PMT MV | 2000 ± 1000 |
| **OTEST** | PMT MV | 2000 ± 1000 |
| Values are in the Signal I/O | | |
| **REF\_4096\_MV** | MV | 4096mv ±2mv and Must be Stable |
| **REF\_GND** | MV | 0± 0.5 and Must be Stable |

* 1. **TAPI 300 Series Carbon Monoxide Analyzer**
     1. See the manufacturer’s manual on how to perform a Pneumatic Leak Check
     2. See the manufacturer’s manual on how to perform a Sample Flow Check
     3. See the manufacturer’s manual on how to set the analog output to 0 – 1 VDC
     4. See the manufacturer’s manual on how to set the scale 0 – 50 ppm
     5. See the manufacturer’s manual on how to setup Auto-Zero; Note: the instrument’s Amber light will remain on

Verify Instrument specifications match values in table below. If not, see instrument manual or TAPI Technical Support of corrective action.

|  |  |  |  |
| --- | --- | --- | --- |
| **PARAMETER** | **DISPLAYED AS** | **UNITS** | **NOMINAL RANGE** |
| **Range** | Range | PPM, MGM1,2 PPB, UGM1 | 1 – 1000 PPM1  5 – 5000 PPM2 |
| **Stability** | STABIL | PPM | <1.0 PPM  with Zero Air |
| **CO Measure** | CO MEAS | mV | 2500 – 4800 MV |
| **CO Reference** | CO REF | mV | 2500 – 4800MV |
| **Measure/Reference Ratio** | MR RATIO | – | 1.1 – 1.3 W/ Zero Air |
| **Pressure** | PRES | In-Hg-A | -2”Ambient Absolute |
| **Sample Flow** | SAMP FL | cm3/min | 800 ± 10% |
| **Sample Temp** | SAMPLE TEMP | °C | 48 ± 4 |
| **Bench Temp** | BENCH TEMP | °C | 48 ± 2 |
| **Wheel Temp** | WHEEL TEMP | °C | 68 ± 2 |
| **Box Temp** | BOX TEMP | °C | Ambient + 7 ± 10 |
| **Photo Drive** | PHT DRIVE | mV | 250 mV – 4750 mV |
| **Slope of CO Measurement** | CO SLOPE | – | 1.0 ± .3 |
| **Offset of CO Measurement** | CO OFFSET | PPM | 0 ± 0.3 |
| **Dark Cal Reference signal** | REF DARK OFFSET | mV | 125 ± 50 mV |
| **Dark Cal Measurement Signal** | MEAS DARK OFFSET | mV | 125 ± 50 mV |
| **Electric Test** |  | PPM | 40 ± 2 PPM |

1T300, M300E, 2T300M, M300EM

* 1. **TAPI 400 Series Ozone Analyzer**
     1. See the manufacturer’s manual on how to perform a Pneumatic Leak Check
     2. See the manufacturer’s manual on how to perform a Sample Flow Check
     3. See the manufacturer’s manual on how to set the analog output to 0 – 1 VDC
     4. See the manufacturer’s manual on how to set the scale 0 – 500 ppb

Verify Instrument specifications match values in table below. If not, see instrument manual or TAPI Technical Support of corrective action.

|  |  |  |
| --- | --- | --- |
| **PARAMETER** | **RECORDED VALUE** | **ACCEPTABLE VALUE** |
| **RANGE** | PPB/PPM | 1 – 10,000 PPB |
| **STABIL** |  | <= 1.0 PPB WITH ZERO AIR |
| **O3 MEAS** | mV | 2500 – 4800 mV |
| **O3 REF** | mV | 2500 – 4800 mV |
| **O3 GEN1** | mV | 80 mV. – 5000 mV. |
| **O3 DRIVE1** | mV | 0 – 5000 mV. |
| **PRES** | IN-HG-A | ~ - 2”AMBIENT ABSOLUTE |
| **SAMPLE FL** | CM3/MIN | 800 ± 10% |
| **SAMPLE TEMP** | ºC | 10 – 50 ºC |
| **PHOTO LAMP** | ºC | 58 ºC ± 1 ºC |
| **O3 GEN TMP1** | ºC | 48 ºC ± 3 ºC |
| **BOX TEMP** | ºC | 10 – 50 ºC |
| **SLOPE** |  | 1.0 ± .15 |
| **OFFSET** | PPB | 0.0 ± 5.0 PPB |
| *FOLLOWING VALUES ARE UNDER THE SIGNAL I/O SUBMENU* | | |
| **REF\_4096\_MV** | mV | 4096 mv ± 2mv and Must be Stable |
| **REF\_GND** | mV | 0 ± 0.5 and Must be Stable |
| **1** If IZS valve option installed. | | |

* 1. **TAPI 100 Series Sulfur Dioxide Analyzer**
     1. See the manufacturer’s manual on how to perform a Pneumatic Leak Check
     2. See the manufacturer’s manual on how to perform a Sample Flow Check
     3. See the manufacturer’s manual on how to set the analog output to 0 – 1 VDC
     4. See the manufacturer’s manual on how to set the scale 0 – 100 ppb

Verify Instrument specifications match values in table below. If not, see instrument manual or TAPI Technical Support of corrective action.

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Recorded Value** | **Acceptable Value** |
| **RANGE** | PPB/PPM |  |
| **STABIL** | PPB | ≤ 1 PPB WITH ZERO AIR |
| **SAMP PRESS** | IN-HG-A | AMBIENT ± 2 IN-HG-A |
| **SAMPLE FLOW** | CM3/MIN | 650 ± 10% |
| **PMT SIGNAL WITH ZERO AIR** | mV | -20 TO 150 mV |
| **PMT SIGNAL AT SPAN GAS CONC** | mV PPB/PPM | 0-5000 mV  0-20000 PPB |
| **NORM PMT AT SPAN GAS CONC** | mV PPB/PPM | 0-5000 mV  0-20000 PPB |
| **UV LAMP** | mV | 1000 TO 4800 mV |
| **LAMP RATIO** | mV | 30 TO 120% |
| **STR. LGT** | PPB | ≤ 100 PPB/ ZERO AIR |
| **DARK PMT** | mV | -50 TO 200 mV |
| **DARK LAMP** | mV | -50 TO 200 mV |
| **SLOPE** |  | 1.0 ± 0.3 |
| **OFFSET** | mV | < 250 mV |
| **HVPS** | V | ≈ 400 – 900 |
| **RCELL TEMP** | ºC | 50ºC ± 1 |
| **BOX TEMP** | ºC | AMBIENT + ~ 5 |
| **PMT TEMP** | ºC | 7ºC ± 2º CONSTANT |
| **ETEST** | mV | 2000 mV ± 1000 |
| **OTEST** | mV | 2000 mV ± 1000 |
| Values are in the Signal I/O | | |
| **REF\_4096\_MV** | mV | 4096mv ± 2mv and Must be Stable |
| **REF\_GND** | mV | 0 ± 0.5 and Must be Stable |

* 1. **TAPI 700 Series Calibrators**
     1. See the manufacturer’s manual on how to perform a Pneumatic Leak Check
     2. For multi-gas dilution calibrators, see the manufacturer’s manual on how to verify that the mass flow controllers (MFCs) are working properly
     3. For O3-only calibrators, see the manufacturer’s manual on how to verify that the photometer & generator is working

Verify Instrument specifications match values in table below. If not, see instrument manual or TAPI Technical Support of corrective action.

**Multi-Gas**

|  |  |  |
| --- | --- | --- |
| **PARAMETER** | **UNITS** | **NOMINAL RANGE** |
| ACT CAL | LPM | TARG ± 2% |
| TARG CAL | LPM | 0.001 - 0.100 |
| ACT DIL | LPM | TARG ± 2% |
| TARG DIL | LPM | 0.010 - 10 |
| 03 Gen Ref | mV | 100 - 5000 |
| 03 Flow | CC/MIN | 100 ± 25 |
| 03 Gen Drive | mV | 0 - 5000 |
| 03 Lamp Temp | Deg. C | 48 ± 1 |
| CAL Press | In-Hg-A | 25 - 30 |
| DIL Press | In-Hg-A | 25 - 30 |
| REG Press | In-Hg-A | 20 ± 1 |
| ACT | PPB/PPM | TARG ± 2% |
| TARG | PPB/PPM | Requested Conc. |
| Box Temp | Deg. C | Amb ± 3 |
| PERM Temp | Deg. C | 50.0 ± 1 |
| PERM Flow | CC/MIN | 100 ± 25 |
| Photo Meas | mV | 2500 - 4800 |
| Photo Ref | mV | 2500 - 4800 |
| Photo Flow | LPM | 0.8 ± 0.08 |
| Photo Lamp | Deg. C | 52 ± 1 |
| Phot Spress | In-Hg-A | Amb ± 1 |
| Phot Stemp | Deg. C | Amb ± 3 |
| Phot Slope |  | 0.85 - 1.5 |
| Phot Offs |  | ± 10 |
| DCPS | mV | 2500 ± 200 |

**O3-Only**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Units** | **Normal Range** |
| TIME | HH:MM:SS: |  |
| DCPS | MV | 2500 ± 200 |
| BOX TEMP | DEG C | 10-50°c |
| O3 OFFSET | PPB | 0 ± 10 |
| O3 SLOPE | - | 1 ± .15 |
| REG PRESSURE | IN-HG-A | 20 ± 2 |
| O3 GEN TMP | DEG C | 48 ± 3 |
| O3 GEN FLOW | L/MIN | 1-5LPM |
| ANA LAMP TMP | DEG C | 52 ± 3 |
| SAMPLE TEMP | DEG C | 10 –50 |
| SAMPLE FLOW | SCC/MIN | 800 ±10% |
| SAMPLE PRESS | IN-HG-A | -2” ambient absolute |
| O3 DRIVE | MV | 0-5000 |
| O3 GEN REF | MV | 0-5000 |
| O3 REF | MV | 2500-4800 |
| O3 MEAS | MV | 2500 - 4800 mV |
| O3 SET | PPB/PPM | 50ppb – 1000ppb |

* 1. **TAPI 700 Series and Sabio Zero Air Generators (ZAG)**
     1. Ensure the ZAG powers up properly
     2. Conduct a leak check. See the manufacturer’s manual on how to perform a pneumatic leak check
     3. Ensure the ZAG is configured with the proper scrubbers

Inform the Supervisor when the above ZAG checks are done. ZAGs that are designated as standards should be stored in the appropriate standard’s area. For field-going ZAGs, the Supervisor will assign the ZAG to a specific site, and ZAG will then be verified at the site in accordance with the Zero Air Generator Verification Guide and Schedule.

* 1. **Thermo 5014i (Continuous PM 10 or 2.5)**
     1. Ensure the 5014i powers up properly
     2. Determine if the Instrument will be used for PM 10 or PM 2.5
     3. Configure the unit as described in the 5014i Acceptance Testing Guide
     4. Once located in the field, the unit must have addition setup parameters checks before it may go into operation.

| **5014i SETUP GUIDE** | | **PM10** | **PM2.5** |
| --- | --- | --- | --- |
|  |  |  |  |
| **Instrument Main Menu** |  |  |  |
| Range |  |  |  |
|  | CONC Units | ug/m3 | ug/m3 |
|  | PM Range | 1500 ug/m3 (Custom Range) | 1000 ug/m3 |
|  | Integration Time | 20 min | 20 min |
|  |  |  |  |
| 24-Hour Average |  |  |  |
|  | Start Time | 00:00 | 00:00 |
|  |  |  |  |
| Calibration Factors |  |  |  |
|  | PM BKG | 0.0 | 0.0 |
|  | PM COFF | 1.0 | 1.0 |
|  |  |  |  |
| **Instrument Controls Menu** |  |  |  |
| Set Flow Pump |  |  |  |
|  | Flow | 16.67 | 16.67 |
|  | Pump | On | On |
|  |  |  |  |
| Set Heater |  |  |  |
|  | Control Set To | RH Control | RH Control |
|  | RH Threshold | 35% | 35% |
|  | Temp Threshold | 30C° | 30C° |
|  |  |  |  |
| Filter Tape Control |  |  |  |
|  | Mass Limit | 1500 ug/m3 | 1500 ug/m3 |
|  | Start Date | Next Day’s Date | Next Days’ Date |
|  | Hour | 00:00 | 00:00 |
|  | Set Period | 8 Hours | 8 Hours |
|  |  |  |  |
| Tape Counter |  | Reset to zero after replacing filter tape | |
|  |  |  |  |
| Volumetric Conditions | Temperature | STD | ACT |
|  | Pressure | STD | ACT |
|  |  |  |  |
| **I/O Configuration** |  |  |  |
| Analog Output Configuration |  |  |  |
|  | Allow Over/Under Range | OFF | OFF |
|  | Voltage Control |  |  |
|  | 1. Select Range | 0-5 V | 0-5 V |
|  | Select Min Value | 000.0% | 000.0% |
|  |  |  |  |
| **I/O Configuration** |  |  |  |
| Analog Output Configuration |  |  |  |
|  | Select Max Value | 100.0% | 100.0% |
|  |  |  |  |
| Choose Signal Output |  |  |  |
| Choose Signal Type | Concentration | 1. PM | 1. PM |
|  |  |  |  |
|  | 1. Select Range | 0-5 V | 0-5 V |
|  | Select Min Value | 003.8% | 003.8% |
|  | Select Max Value | 028.8% | 028.8% |
|  |  |  |  |
| Choose Signal Output |  |  |  |
| Choose Signal Type | Other Measurements (2) | Mass | Mass |
|  |  |  |  |
|  | Select Range | 0-5 V | 0-5 V |
|  | Select Min Value | 000.0% | 000.0% |
|  | Select Max Value | 100.0% | 100.0% |
|  |  |  |  |
| Choose Signal to Output |  |  |  |
| Choose Signal Type | Other Measurements (3) | FLOW VOL | FLOW VOL |
|  |  |  |  |
|  | DATE/TIME | Today/PST | Today/PST |
|  | TIMEZONE | UTC (GMT) | UTC (GMT) |
|  |  |  |  |
| **Alarms Configuration Menu** |  |  |  |
| Instrument Alarms |  |  |  |
|  | Filter Tape Counter | 450 | 450 |
|  | Detector Alarms Alpha | 0-100 1/s | 0-100 1/s |
|  | Detector Alarms Beta | 5000-20000 1/s | 5000-20000 1/s |
|  |  |  |  |
| RH/Temperature Alarms |  |  |  |
|  | Ambient RH | 0% - 95% | 0% - 95% |
|  | Sample RH | 0% - 75% | 5% - 75% |
|  | Ambient Temp | -30 to 60C° | -30 to 60C° |
|  | Flow Temp | 0 to 60C° | 0 to 60C° |
|  | Board Temp | 0 to 40C° | 0 to 40C° |
|  |  |  |  |
| Pressure/Vacuum Alarms |  |  |  |
|  | Baro Press | 400-800 mmHg | 400-800 mmHg |
|  | Vacuum | 0-250 mmHg | 0-250 mmHg |
|  | Flow | 0-40 mmHg | 0-40 mmHg |
|  |  |  |  |
| Flow Alarms |  |  |  |
| Flow Actual |  |  |  |
|  | Min | 16.25 | 16.25 |
|  | Max | 17.09 | 17.09 |
|  |  |  |  |
| Concentration Alarms |  |  |  |
|  | AVG PM | 0-10000 | 0-10000 |
|  | INST PM | 0-10000 | 0-10000 |

Inform the Supervisor when the above 5014i checks are done. 5014i’s that are designated as extras or spares should be stored in the appropriate area. For field-going 5014i’s, the Supervisor will assign the 5014i to a specific site, and 5014i will then be verified at the site in accordance with the Guide and Schedule.

* 1. **MetOne BAM 1020 (Continuous PM 10 or 2.5)**
     1. Ensure the BAM 1020 powers up properly
     2. Determine if the Instrument will be used for PM 10 or PM 2.5
     3. Configure the unit as described in the BAM 1020 Acceptance Testing Guide or manufacturer’s manual.

|  |  |
| --- | --- |
| **BAM 1020 Setup Guide** | |
| Assemble Sampler | Determine if unit will collect PM 10 or 2.5. If setting up for 2.5, the sharp cut cyclone must be in place on the down tube. See Manual |
|  | If used to determine PM Coarse two units must be setup, 1 for PM10 the other for PM 2.5 |
|  |  |
| Initial Power on Settings | Set Sampler Date and Time (PST) |
|  | Set PM 2.5 to Slave if using Coarse |
|  | Set up Clock Synchronization (Cable between both samplers) |
|  | Set Flow Type to Actual |
|  | Set Concentration Type to Actual |
|  | If using a Sutron Datalogger Output Parameters must match unit which is being replaced or currently in operation. |
|  |  |
| Checks Before Operation | Verification of Flow rate |
|  | Verification of Ambient Temperature |
|  | Verification of Barometric Pressure |
|  | Verification of Date and Time |
|  | Verification of Leak Rates (Conducted before Flow rate Checks) |

Inform the Supervisor when the above BAM 1020 checks are done. BAM 1020’s that are designated as extras or spares should be stored in the appropriate area. For field-going BAM 1020’s, the Supervisor will assign the BAM 1020 to a specific site, and BAM 1020 will then be verified at the site in accordance with the Guide and Schedule.

* 1. **MetOne SASS (Filter Based PM 2.5)**
     1. Ensure all the parts have been accounted for in the shipment.
     2. Ensure the SASS powers up properly
     3. Configure the unit as described in the SASS manufacturer’s manual.

|  |  |
| --- | --- |
| **SASS Setup Guide** | |
| Assemble Sampler | Only Channels 1 and 2 need to be active (Hose Connections Made From Pump Unit to Sampling Unit) |
|  |  |
| Initial Power on Settings | Set Sampler Date and Time (PST) |
|  | Set Default Sample Time to 24:00 Hours |
|  | Set Default Active Canisters to #1 and #2 |
|  | Set Collection Times to Every 3 Days |
|  | Set Channel Sample Flow Rate to 6.7 lpm |
|  |  |
| Checks Before Operation | Verification of flow rates through Canisters with 2.5 Cyclone head attached |
|  | Verification of Filter Temperature |
|  | Verification of Ambient Temperature |
|  | Verification of Barometric Pressure |
|  | Verification of Date and Time |
|  | Verification of Leak Rates (Conducted before Flowrate Checks) |

Inform the Supervisor when the above SASS checks are done. A SASS that is designated as an extra or spare should be stored in the appropriate area. For field-going SASS, the Supervisor will assign the SASS to a specific site, and SASS will then be verified at the site in accordance with the Guide and Schedule.

* 1. **Thermo 2025i (Filter Based PM 2.5)**
     1. Ensure all the parts have been accounted for in the shipment.
     2. Ensure the 2025i powers up properly
     3. Configure the unit as described in the 2025i Acceptance Testing Guide and manufacturer’s manual.
     4. Once located in the field, the unit must have addition setup parameters checks before it may go into operation.

|  |  |
| --- | --- |
| **2025i Setup Guide** | |
| Assemble Sampler | Follow Unit Setup Guide in Manual |
|  |  |
| Initial Power on Settings | Set Method to Basic |
|  | Set Flowrate to 16.7 |
|  | Set Filter Type to P (EPA Filter) |
|  | Set Start Time to 00:00 |
|  | Set Duration to 24h 00m |
|  | Set Repeat Time to 72h 00m (1 in 3) 144h 00 m to (1 in 6) |
|  | Set Average Temp to 99 |
|  | Set Std Temp to 25 |
|  | Set Avg Pressure to 99 |
|  | Set Std Pressure to 760 |
|  | Set Report Volume to Actual |
|  | Set Fan On to Auto |
|  | Set Auto Run to On |
|  | Set Date and Time (PST) |
|  |  |
| Checks Before Operation | Verification of Flowrate |
|  | Verification of Filter Temperature |
|  | Verification of Ambient Temperature |
|  | Verification of Barometric Pressure |
|  | Verification of Date and Time |
|  | Verification of Leak Rates (Internal and External) |

Inform the Supervisor when the above 2025i checks are done. A 2025i that is designated as an extra or spare should be stored in the appropriate area. For field-going 2025i, the Supervisor will assign the 2025i to a specific site, and 2025i will then be verified at the site in accordance with the Guide and Schedule.

* 1. **URG (Filter Based PM 2.5)**
     1. Ensure all the parts have been accounted for in the shipment.
     2. Ensure the URG powers up properly
     3. Configure the unit as described in the URG manufacturer’s manual.
     4. Once located in the field, the unit must have addition setup parameters checks before it may go into operation.

|  |  |
| --- | --- |
| **URG Setup Guide** | |
| Assemble Sampler | Follow Unit Setup Guide in Manual |
|  |  |
| Initial Power on Settings | Insert Filter Cartridge |
|  | Insert Memory Card |
|  | Set Sampler Date and Time (PST) |
|  | Set Collection Times to Every 3 Days |
|  | Flow on Screen Instructions for Complete Setup |
|  |  |
| Checks Before Operation | Verification of Flowrate |
|  | Verification of Ambient Temperature |
|  | Verification of Barometric Pressure |
|  | Verification of Date and Time |
|  | Verification of Leak Rates (Conducted before Flowrate Checks) |

Inform the Supervisor when the above URG checks are done. A URG that is designated as an extra or spare should be stored in the appropriate area. For field-going URG, the Supervisor will assign the URG to a specific site, and URG will then be verified at the site in accordance with the Guide and Schedule.

* 1. **Ecotech HI-Vol Pb Sampler (Filter Based TSP)**
     1. Ensure all the parts have been accounted for in the shipment.
     2. Ensure the HI-Vol powers up properly
     3. Configure the unit as described in the HI-Vol manufacturer’s manual.
     4. Once located in the field, the unit must have addition setup parameters checks before it may go into operation.

|  |  |
| --- | --- |
| **Hi-Vol Setup Guide** | |
| Assemble Sampler | Setup Sampler per the manual |
|  |  |
| Initial Power on Settings | Set Start Date for next 6 in 1 sample date. Set time for 24:00 |
|  | Set End Date for time in future. Set Time to 24:00 |
|  | Set On Time 1 to 00:00 |
|  | Set Off Time 1 to 24:00, all others 00:00 |
|  | Set Each Day to Yes |
|  | Set Days/Cycle to 6 |
|  | Set Wind to CCW W, Dir to CW W Dir 360 |
|  | Set Lo W Speed to 0 |
|  | Set Hi W Speed to 100 |
|  | Set Trigger Lo to 0 |
|  | Set Trigger Hi to 0 |
|  | Set Off Delay to 00:00 |
|  | Set Retrigger to No |
|  | Set Logger AvPeriod to 60 |
|  | Set Date and Time (PST) |
|  | Set Flow Alarms to Min Flow 50 Max to 90 |
|  | Set Major Faults Retry Delay to 10 Max Retries to 5 |
|  | Set Flow to M3/H to 70 |
|  | Set Ref Temp to C to 20 |
|  | Set Ref BP mmHg to 760 |
|  | Set Size Select to No |
|  | Set Protection to No |
|  |  |
| Checks Before Operation | Calibrate Flowrate Per Manual |
|  | Verification of Flowrate |
|  | Verification of Ambient Temperature |
|  | Verification of Barometric Pressure |
|  | Verification of Date and Time |

Inform the Supervisor when the above HI-Vol checks are done. A HI-Vol that is designated as an extra or spare should be stored in the appropriate area. For field-going HI-Vol, the Supervisor will assign the HI-Vol to a specific site, and HI-Vol will then be verified at the site in accordance with the Guide and Schedule.

## [Administrative](#Table_Of_Contents)

1. Submit the hard copy of the factory calibration test and validate data to the Senior Office Specialist for scanning and placement in the corresponding acceptance test folder.
2. When the aforementioned is successful, tag the instrument with a green sticker, include the serial number, initial and date. Place the instrument in the appropriate storage location.

**The instrument is now ready for field use.**

## [Instrument Designations](#Table_Of_Contents)

**List of EPA FRM and FEM**

**Ozone**

***Teledyne Advanced Pollution Instrumentation, Model 400E or T400; Advanced Pollution Instrumentation, Model 400/400A; Teledyne Monitor Labs sensor-e™ Model TML-10 Ozone Analyzers; or recordum* airpointer® system module 801-004000*;***

**Automated Equivalent Method: EQOA-0992-087**

“Teledyne Advanced Pollution Instrumentation. Model 400E or T400; Advanced Pollution Instrumentation,. Model 400 or 400A; or Teledyne Monitor Labs sensor-e™ Model TML-10 Ozone Analyzer” operated on any full scale range between 0-100 ppb1 and 0-1000 ppb, with any range mode (Single, Dual, or AutoRange), at any ambient temperature in the range of 5°C to 40°C, and with a TFE filter or a Kynar® DFU. **Models 400E, T400 and TML-10:** operated with a sample flow rate of 800 ±80 cm3/min (sea level), with the dilution factor set to 1, with Dynamic Zero ON or OFF, with Dynamic Span OFF, with Temp/Press compensation ON, and with or without any of the following options: Internal or external sample pump, Sample/Cal valve option, Internal Zero/Span (IZS), Rack mount with or without slides, analog input option, 4-20 mA isolated current loop output.2 **Models 400/400A:** operated with the dynamic zero and span adjustment feature (some Model 400 units only) set to OFF, and with or without any of the following options: Zero/Span Valve option, Internal Zero/Span (IZS) option, IZS ozone generator reference feedback option, standard serial port or Multi-drop RS-232, digital status outputs, analog outputs: 100 mV, 1V, 5V, 10V, 4-20 mA current loop, optional metal wool ozone scrubber, optional external sample pump, optional 47 mm diameter filter, optical bench heater, rack mount with slides. **airpointer® system module 801-004000 only:** operated on any full scale range between 0-0.100 ppm and 0-1.0 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any temperature in the range of 10°C to 45°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; installed in the compact. thermally controlled (-40°C to + 45°C) and weather proof airpointer base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without the internal span option as module supplement consisting of ozone generator; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with the appropriate instrument manual. Note 2 applies to the following Teledyne Advanced Pollution Instrumentation, Models 400E, T400, and Teledyne Monitor Labs, Inc. Sensor-e™ Model TML-10.

***Federal Register: Vol. 57, page 44565, 09/28/1992; Vol. 63, page 31992, 06/11/1998 Vol. 67, page 57811, 09/12/2002***

***Latest Modification: 08/2010; 05/2013; 07/2014***

**Oxides of Nitrogen**

***Teledyne Advanced Pollution Instrumentation Models 200A, 200AU, 200E, 200EU, T200, T200U, T204; Teledyne Analytical Instruments Model 9110A; or Teledyne Monitor Labs sensor-e™ Model TML-41 NO2 Analyzers; or recordum airpointer® System, Module 801-002000;***

**Automated Reference Method: RFNA-1194-099**

“Teledyne Advanced Pollution Instrumentation Models 200A, 200AU, 9110A, 200E, 200EU, T200, T200U, T204; Teledyne Analytical Instruments Model 9110A; or Teledyne Monitor Labs, Inc. sensor-e™ Model TML-41 Chemiluminescence Nitrogen Oxides Analyzer,” operated on any full scale range between 0-0.05 ppm and 0-1.0 ppm, with a PTFE filter element or a Kynar® DFU installed in the internal filter assembly, with the following software settings: dynamic zero: OFF or ON; dynamic span: OFF; cal-on-NO2: OFF; dilution factor: OFF or set to 1.0; autocal: ON or OFF; independent range: ON or OFF; autorange: ON or OFF; temperature/pressure compensation: ON; and with or without any of the following options (if available): rack mounts with or without slides, rack mount for external pump, zero/span valves, 4-20 mA analog outputs, status outputs, RS-232 output. **Models 200A, 200E, and T200 and TML-41 only:** operated at any temperature in the range of 5°C to 40°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 10 inches mercury or less at 2 sLpm, with or without optional internal zero/span (IZS) and permeation tubes for IZS, gold-plated reaction chamber, or Nafion-type sample gas conditioner, ethernet output, control input, analog input option, RS-485 output. **Model 200AU, 200EU, and T200U only:** operated at any temperature in the range of 20°C to 30°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 4 inches mercury or less at 1 sLpm**. Model T204 NOX + O3 Analyzer only:** operated on any full scale range between 0-100 ppb and 0-500 ppb, at any operating temperature from 5°C to 40°C, with either a user-or vendor-supplied vacuum pump capable of providing an absolute pressure of 10 inches mercury or less at 3 sLpm, in accordance with the associated instrument manual, and with or without any of the following options: Zero/Span valves, external communication and data monitoring interfaces. **Airpointer® system module 801-002000 only:** operated on any full scale range between 0-0.05 ppm and 0-1.0 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any temperature in the range of 10°C to 45°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; installed in the compact. thermally controlled (-40°C to + 45°C) and weather proof airpointer base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without internal span option as module supplement consisting of permeation oven and permeation tube; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with the appropriate instrument manual. Note 2 applies to the following Teledyne Advanced Pollution Instrumentation Models 200E, 200EU, T200, T200U, T204 and Teledyne Monitor Labs, Inc. Sensor-e™ Model TML-41.

***Federal Register: Vol. 59, page 61892, 12/02/1994***

***Latest modifications: 03/2009; 08/2010; 10/2012; 5/2013; 06/2014; 07/2014***

***Teledyne Advanced Pollution Instrumentation, Model T500U CAPS Nitrogen Dioxide Analyzer***

**Automated Equivalent Method: EQNA-0514-212**

“Teledyne Advanced Pollution Instrumentation, Model T500U cavity attenuated phase shift spectroscopy Nitrogen Dioxide Analyzer”, operated on any full scale range between 0-50 ppb and 0-1000 ppb, with any range mode (Single, Dual, or AutoRange), at any operating temperature from 5°C to 40°C, with a sample particulate filter, with the following software setting: Temperature and Pressure compensation ON; in accordance with the associated instrument manual, and with or without any of the following options: Zero/Span valves, internal Zero/Span permeation oven (IZS), external communication and data monitoring interfaces. Note 2 applies to the Teledyne Advanced Pollution Instrumentation, Model T500U.

***Federal Register: Vol.79, pages 34734-34735, 06/18/2014***

**Sulfur Dioxide**

***Teledyne Advanced Pollution Instrumentation, Models 100A, 100AS, 100E, 100EU, T100, T100U; Teledyne Analytical Instruments Model 6400A; or Teledyne Monitor Labs sensor-e™ Model TML-50 SO2 Analyzers; or recordum airpointer® system* module 801-001000**

**Automated Equivalent Method: EQSA-0495-100**

‘Teledyne Advanced Pollution Instrumentation Models 100A, 100AS, 100E, 100EU, T100 or T100U; Teledyne Analytical Instruments Model 6400A; or Teledyne Monitor Labs, Inc. sensor-e™ Model TML-50 UV Fluorescent Sulfur Dioxide Analyzer; operated on any full scale range between 0-50 ppb1 and 0-1000 ppb, at any temperature in the range of 5 to 40 degrees C, with a TFE filter element or a Kynar® DFU installed in the filter assembly, with either the vendor-supplied internal pump or a user- or vender-supplied external vacuum pump capable of maintaining an absolute pressure of 35 cm (14 inches) of mercury (or less) at 1.0 standard liter per minute flow rate, with the following software settings: Dynamic zero: OFF or ON; Dynamic span: OFF; AutoCal: ON or OFF; Dual range: ON or OFF; Autorange: ON or OFF; Temp/pressure compensation: ON; dilution factor: OFF or 1.0; and with or without any of the following options (if available for the various models):2 Rack mount with or without chassis slides; Fluorocarbon zero/span valves; Internal zero/span (IZS); Three-point internal zero/span (IZS, option 51C); 4-20 mA, isolated analog outputs; analog input option; External pump; Status outputs; Control inputs; Rack mount for external pump with tray; RS-232 output; Ethernet output; Zero air scrubber; Combustion Filter; SO2 Permeation tube, certified or uncertified, 0.4 ppm @ 0.7 L/min; SO2 Permeation tube, certified or uncertified, 0.8 ppm @ 0.7 L/min. **Airpointer® module 801-001000 only:** operated on any full scale range between 0-0.05 ppm and 0-1.0 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any temperature in the range of 10°C to 45°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; installed in the compact. thermally controlled (-40°C to + 45°C) and weather proof airpointer base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without internal span option as module supplement consisting of permeation oven and permeation tube; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with the appropriate instrument manual. Note 2 applies to the following Teledyne Advanced Pollution Instrumentation,. Models 100E, 100EU, T100, T100U, and Teledyne Monitor Labs, Inc. Sensor-eTM Model TML-50.

***Federal Register: Vol. 60, page 17061, 04/04/1995***

***Latest Modification: 08/2010; 05/2013; 07/2014***

**Carbon Monoxide**

***Teledyne Advanced Pollution Instrumentation Models 300, 300E, 300EU, T300, T300U or Teledyne Monitor Labs sensor-e™ Model TML-30 CO Analyzer; or recordum* airpointer® system module 801-003000*;***

**Automated Reference Method: RFCA-1093-093**

“Teledyne Advanced Pollution Instrumentation Models 300, 300E, 300EU, T300, T300U or Teledyne Monitor Labs, Inc. sensor-e™ Model TML-30, Gas Filter Correlation Carbon Monoxide Analyzer,” operated on any full scale range between 0-10 ppm and 0-50 ppm (0 - 0.1 ppm for **Models 300EU and T300U**), at any temperature in the range of 15°C to 35°C for **Model 300** or 10°C to 40°C for **Models 300E, 300 EU, T300, T300U and TML-30**, with a 5-micron TFE filter element or a Kynar® DFU installed in the sample filter assembly, with the dynamic zero and span adjustment set to *Off* for **Model 300**, and with or without any of the following options:2 Option 50, Zero/Span Valves with pressurized span gas and shutoff valve; Option 51, Zero/Span Valves with pressurized span gas and shutoff valve and Internal Zero Air Generator; Option 52, Zero/Span Valves; Option 53, Zero/Span Valves with Internal Zero Air Generator; Rack Mount with slides; RS-232 serial port with status outputs; analog input option; and (for **Models 300E, 300EU, T300, T300U and TML-30**) 4-20 mA isolated outputs. **airpointer® model 801-003000 only:** operated on any full scale range between 0-10 ppm and 0-50 ppm, with a PTFE filter element installed in the internal filter assembly, with the software setting: FRM/FEM conform mode; at any temperature in the range of 10°C to 45°C, with either a user- or vendor-supplied vacuum pump capable of providing an absolute pressure of 16 inches mercury or less at 2.5 sLpm; installed in the compact. thermally controlled (-40°C to + 45°C) and weather proof airpointer® base unit with integrated data acquisition and management system mounted on a frame, pole, or wall; with or without wireless telemetry; with or without internal dilution system with internal span gas bottle; with or without modules for other criteria pollutants; with or without analyzer for particulate matter; with or without additional 3rd party sensors for e.g. meteorology, noise, or traffic counting. Operated with the appropriate instrument manual. Note 2 applies to the following Teledyne Advanced Pollution Instrumentation Models 300E, 300EU, T300, T300U, and Teledyne Monitor Labs, Inc. Sensor-e™ Model TML-30.

***Federal Register: Vol. 58, page 58166, 10/29/1993***

***Latest Modification: 08/2010; 05/2013; 07/2014***

**PM10 – FH62C14**

***Thermo Scientific Model 5014i or Thermo Scientific FH62C14-DHS Continuous Ambient Particle Monitor***

**Automated Equivalent Method: EQPM-0609-183**

“Thermo Scientific Model 5014i or FH62C14-DHS Continuous Ambient Particle Monitor,” operated at a flow rate of 16.67 liters per minute for 24-hour average measurements configured for PM2.5 with a louvered PM10 size selective inlet as specified in 40 CFR 50 Appendix L, Figs. L-2 through L-19, a PM2.5 BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator, inlet connector, sample tube, DHS heater with 35% RH threshold, mass foil kit, GF10 filter tape, 8-hour filter change, and operational calibration and servicing as outlined in the 5014i Continuous Ambient Particulate Monitor or FH62C14-DHS Continuous Ambient Particulate Monitor operating manual.

***Federal Register: Vol. 74, page 28696, 06/17/2009***

***Latest modification: 03/2010***

**PM10 – 5014i**

***Thermo Scientific Model 5014i or Thermo Scientific FH62C14-DHS Continuous Ambient Particle Monitor***

**Automated Equivalent Method: EQPM-0609-183**

“Thermo Scientific Model 5014i or FH62C14-DHS Continuous Ambient Particle Monitor,” operated at a flow rate of 16.67 liters per minute for 24-hour average measurements configured for PM2.5 with a louvered PM10 size selective inlet as specified in 40 CFR 50 Appendix L, Figs. L-2 through L-19, a PM2.5 BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator, inlet connector, sample tube, DHS heater with 35% RH threshold, mass foil kit, GF10 filter tape, 8-hour filter change, and operational calibration and servicing as outlined in the 5014i Continuous Ambient Particulate Monitor or FH62C14-DHS Continuous Ambient Particulate Monitor operating manual.

***Federal Register: Vol. 74, page 28696, 06/17/2009***

***Latest modification: 03/2010***

**PM10 – BAM 1020**

***Met One Instruments BAM-1020 PM10-2.5 Measurement System***

**Automated Equivalent Method: EQPM-0709-185**

“Met One Instruments BAM-1020 PM10-2.5 Measurement System,” consisting of 2 BAM-1020 monitors, the first of which (PM2.5 measurement) is configured as a PM2.5 FEM (EQPM-0308-170). The second BAM-1020 monitor (**PM10 measurement**) is configurable as a PM2.5 FEM (EQPM-0308-170), but set to monitor PM10. The BAM-1020 monitors are collocated to within 1-4 meters of one another. The BAM-1020 performing the PM2.5 measurement is equipped with Met One Instruments, Inc. P/N BX-Coarse interface board and accessories; the units are interconnected to provide concurrent sampling and to report PM10-2.5 concentrations directly to the user. Both units are operated in accordance with BAM-1020 PM-Coarse Addendum Rev. 5-5 or later and the BAM-1020 Operations Manual Rev. D or later.

***Federal Register: Vol. 74, page 28241, 06/15/2009***

**PM2.5 – 5014i**

***Thermo Scientific Model 5014i or Thermo Scientific FH62C14-DHS Continuous Ambient Particle Monitor***

**Automated Equivalent Method: EQPM-0609-183**

“Thermo Scientific Model 5014i or FH62C14-DHS Continuous Ambient Particle Monitor,” operated at a flow rate of 16.67 liters per minute for 24-hour average measurements configured for PM2.5 with a louvered PM10 size selective inlet as specified in 40 CFR 50 Appendix L, Figs. L-2 through L-19, a PM2.5 BGI Inc. Very Sharp Cut Cyclone (VSCC™) particle size separator, inlet connector, sample tube, DHS heater with 35% RH threshold, mass foil kit, GF10 filter tape, 8-hour filter change, and operational calibration and servicing as outlined in the 5014i Continuous Ambient Particulate Monitor or FH62C14-DHS Continuous Ambient Particulate Monitor operating manual.

***Federal Register: Vol. 74, page 28696, 06/17/2009***

***Latest modification: 03/2010***

**PM2.5 – BAM 1020**

***Met One Instruments BAM-1020 PM10-2.5 Measurement System***

**Automated Equivalent Method: EQPM-0709-185**

“Met One Instruments BAM-1020 PM10-2.5 Measurement System,” consisting of 2 BAM-1020 monitors, the first of which (**PM2.5 measurement**) is configured as a PM2.5 FEM (EQPM-0308-170). The second BAM-1020 monitor (PM10 measurement) is configurable as a PM2.5 FEM (EQPM-0308-170), but set to monitor PM10. The BAM-1020 monitors are collocated to within 1-4 meters of one another. The BAM-1020 performing the PM2.5 measurement is equipped with Met One Instruments, Inc. P/N BX-Coarse interface board and accessories; the units are interconnected to provide concurrent sampling and to report PM10-2.5 concentrations directly to the user. Both units are operated in accordance with BAM-1020 PM-Coarse Addendum Rev. 5-5 or later and the BAM-1020 Operations Manual Rev. D or later.

***Federal Register: Vol. 74, page 28241, 06/15/2009***

**PM2.5 – 2025i**

***Thermo Scientific Partisol®-Plus 2025 Sequential PM2.5 Air Sampler or Thermo Fisher Scientific Partisol® 2025i Sequential PM2.5 Air Sampler or Rupprecht & Patashnick Partisol®-Plus 2025 PM2.5 Sequential Sampler***

**Manual Reference Method: RFPS-0498-118 or Manual Equivalent Method: EQPM-0202-145**

“Thermo Scientific Partisol®-Plus 2025 *PM2.5* Sequential Air Sampler” or “Thermo Fisher Scientific Partisol® 2025*i PM2.5* Sequential Air Sampler” or “Rupprecht & Patashnick Partisol®-Plus 2025 PM2.5 (FEM) Sequential Air Sampler,” configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator with either R&P-specified machined or molded filter cassettes, for 24-hour continuous sampling periods. Partisol®-Plus 2025 to be operated with any software version 1.003 through 1.5 and Partisol® 2025*i* with firmware version 2.0 or greater, and with the modified filter shuttle mechanism. Method to be operated in accordance with the Partisol®-Plus 2025 or Partisol® 2025*i* instruction manual, as appropriate, with the VSCC™ supplemental manual, and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.

***Federal Register: Vol. 67, page 15567, 04/02/2002***

***Latest modification: 06/ 2011***

**Lead**

***Inductively Coupled Plasma - Mass Spectrometry (US EPA/OAQPS)***

**Manual Equivalent Method: EQL-0510-191**

“Determination of Lead Concentration in TSP by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) with Heated Ultrasonic Nitric and Hydrochloric Acid Filter Extraction,” where total suspended particulate matter (TSP) is collected according to 40 CFR Appendix B to part 50, *EPA Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method)*, extracted with a solution of nitric and hydrochloric acids, heated to 80° C and sonicated for one hour, brought to a final volume of 40mL, and analyzed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) based on EPA SW-846 Method 6020A.

***Federal Register: Vol.75, page 30022, 05/28/2010***