EHSS Standard Operating Procedure			
	Subject: RAE Systems Photo-Ionization Detector Operation Procedures **EHSS SOP #024 2019**	**Sections:** All EHSS	**Distribution:** All EHSS Personnel
Issuing Authority: Rebecca Ponza, Director of EHSS **Signature:** *Rebecca J. Ponza*		**Effective:** November 1, 2019	**Supersedes:** N/A

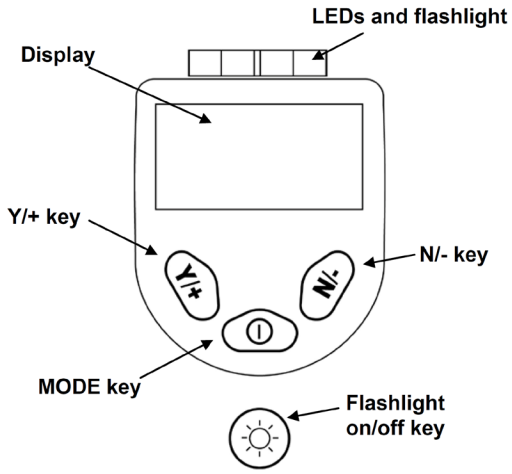
RAE Systems PID Operational Procedures

I. **Applicability:**		This Standard Operating Procedure is applicable to all Syracuse University Environmental Health and Safety Services Personnel.
II. **Purpose:**		To provide a detailed set of operational instructions for EHSS staff members responsible for the operation of the RAE Systems MiniRAE 3000 (ppm) and ppbRAE 3000 (ppb) photo-ionization detectors (PID).
III. **Role of EHSS**		The role of EHSS is to respond to and provide air monitoring during emergency response, industrial hygiene, indoor air quality, and chemical contamination operations.
IV. **Definitions:**		Photo-ionization Detector: • A MiniRAE 3000 PID is a type of gas detector that measures the presence of volatile organic compounds and other gases. Its measurement range is 0.1 part per million (ppm) to 15,000 ppm when equipped with a 10.6 eV lamp. • A ppbRAE 3000 PID is a type of gas detector that measures the presence of volatile organic compounds and other gases. Its measurement range is 1 part per billion (ppb) to 10,000 parts per million (ppm) when equipped with a 10.6 eV lamp.
V. **Items Needed**		All items are located in Lyman Hall room 034 B - Figure 1 ✓ RAE Systems - MiniRAE 3000 photo-ionization detectors (2). ✓ RAE Systems - MiniRAE ppbRAE 3000 photo-ionization detector (1). ✓ Charging Cradle ✓ Data Download Cable

VI. **Procedures**

Physical Description & User Interface:

1. The PID's user interface consists of the display and four keys as shown in the diagram below. Both the MiniRAE 3000 (ppm) and the ppbRAE 3000 operate using the same user interface and procedures.



PID Start-Up:

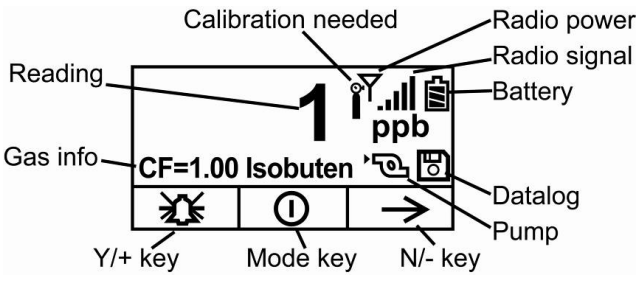
2. Turn on PID (startup) by pressing and holding the "mode" key for 2 seconds. When display powers on, release the "mode" key. Refer to the diagram above, which shows PID key locations.

   The PID is now operating and performing self-tests. After completing tests, the instrument will operate in "basic user/hygiene" mode and display a reading in ppm or ppb depending on the PID.

   Note: The PID should be started in a clean air environment (preferably Lyman 034B). Always check to make sure the instrument has been calibrated before using by checking the calibration sticker on the instrument.

Display:

3. When the PID is ready for use, the display will show the following information:



a. Gas info — Tells the Correction Factor and type of calibration gas
b. Reading — Concentration of gas as measured by the instrument
c. Calibration Needed — Dark icon indicates that calibration should be performed
d. Radio power — Indicates whether radio connection is on or off
e. Radio signal — Indicates signal strength in 5-bar bar graph
f. Battery — Indicates battery level in 3 bars
g. Pump — Indicates that pump is working
h. Datalog — Indicates whether datalog is on or off
i. Y/+ — Y/+ key's function for this screen
j. MODE — MODE key's function for this screen
k. N/- — N/- key's function for this screen

Pump Status

4. During initial startup and operation, make sure the PID pump is operating normally and the PID probe inlet and the gas outlet are not blocked and free of obstructions. The pump will alarm as described in Section 6 if it is blocked/stalled.

Indicates pump is operational

Indicates pump is blocked or stalled

Operating Modes

5. The default operating mode is:
    - User Mode: Basic
    - Operation Mode: Hygiene

   These modes provide the most commonly needed features including:
    - Continuously running automatic measurements
    - Datalogging - More discussion on datalogging in section 8

   If specialized sampling/datalogging (manual time limits) is required for a project, please consult the user guide manual, which is located with the instruments in Lyman 034B.

Alarms

6. The instrument alarms (buzzer & flashing LED) if one of the following conditions occurs during operation:
    - Pump stall
    - Lamp failure
    - Battery low

   Additionally, the instrument will alarm whenever the gas concentration exceeds a preset alarm (high alarm, low alarm, STEL & TWA) limit. The alarm limits are

adjustable, but have all been set at 999 ppm to deter the alarm from sounding during normal use. Consult the user guide to adjust the alarm limits.

To silence the alarm regardless of the reason it is alarming, press [Y/+] until the alarm stops.

Datalogging

7. During default mode operation, the PID is automatically datalogging and saving measurement readings for retrieval. See section 10 for procedures on downloading data to a PC.
    - Disk (save) icon will be displayed on the main display indicating datalogging.
    - A new datalogging event is created each time the PID is turned on/off or every 24 hours.
    - A sample measurement is datalogged every 60 seconds.

Turn-Off PID

8. Press and hold the Mode key for 3-seconds. This starts a 5-second count down. Hold the Mode key until the end of the count down. If released, the shutdown operation is canceled and the instrument continues normal operation.

Return PID to Charging Cradle

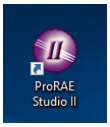
9. When finished using the PID, return the PID to the charging cradle located in Lyman 034B. Place the PID into the cradle by pressing down and leaning back to lock it in place. The LED in the cradle will blink green to indicate charging and the instrument display will show a "Charging" message to indicate the instrument is charging.

    Figure 1 shows PID properly charging in charging cradle.

Downloading Datalog to a PC

10. In order to download the datalogged measurements to a computer, you will need the following items:
    - EHSS Dell Laptop - BFAS-EHOLAPTOP1 - With preloaded ProRAE Studio software.
    - PID Charging cradle - Located in Lyman 034B
    - Data cable - Located in PID cases in Lyman 034B.
    - PID

    a. Connect the data cable to the laptop and the charging cradle.
    b. Place PID on charging cradle. The charging LED light should be lit.



    c. Start ProRAE Studio II on laptop.
    d. A login window will open and select administrator. Password is: rae. Click *OK*. Figure 2.
    e. In the top menu bar click on *Operation → Auto Detect.*
    f. An auto detect window opens with the instrument listed. Highlight the instrument by clicking on it. Click on *Select*. Figure 3.

g. Once selected a new set of commands will appear on the left side of the window. Select *Datalog.* Figure 4.
h. A Datalog window opens, select Download ALL Data (3 arrows pointing down). Figure 5.
i. A progress bar will open displaying the progress of the data download. Figure 6.
j. When the download is complete, select the sampling data from the left side of the screen by scrolling up/down. This will open a Summary of the data. Figure 7.
k. If this is the correct sampling data, download all data by selecting *Export Selected Events* (arrow pointing up to right). Figure 8.
l. A Save As window will open: Select file location for saving data. Make sure to save as CSV file.
m. Open newly created CSV file and save again as Excel Workbook.

Clear Datalog

11. The RAE Systems PID is equipped with a microcomputer capable of storing up to 260,000-points of datalogging storage capacity for download. Only clear datalog after the data has been exported to ProRAE Studio, downloaded and saved. Once cleared, data cannot be recovered from the instrument. Please consult the User Guide for procedures on clearing datalogged information.

Figure 1


Fully charged!
Charging..
Fully charged!
CALIBRATED
ppbRAE3000
MiniRAE3000
MiniRAE3000

Figure 2

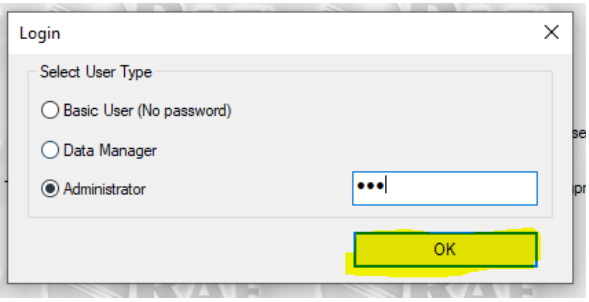


Figure 3

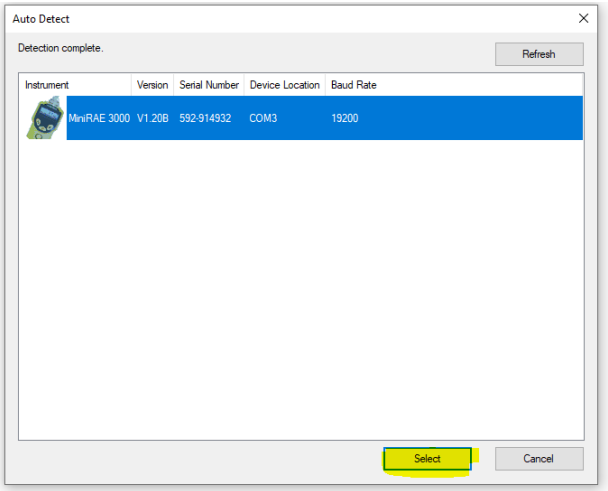


Figure 4

Figure 5

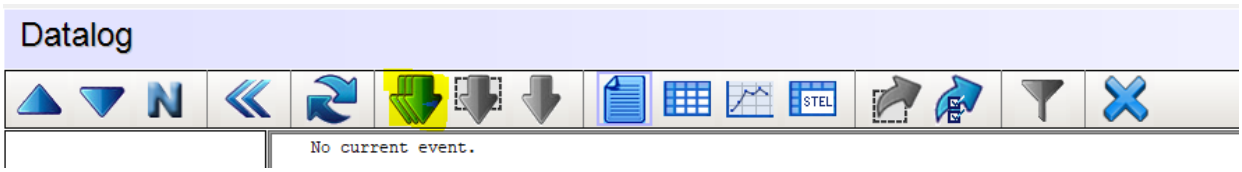


Figure 6

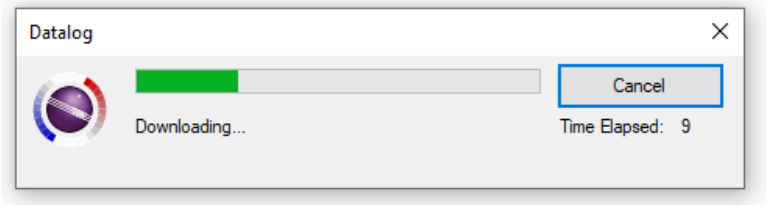


Figure 7

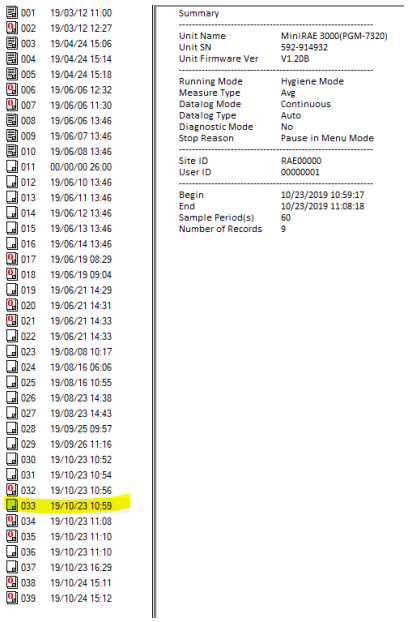


Figure 8