

IAQRAE

Using the IAQRAE Indoor Air Quality Monitor



PROTECTION THROUGH DETECTION

Training Agenda

- IAQRAE features
- Operation
- User Displays
- Alarm Modes
- Programming Displays
- Calibration



PROTECTION THROUGH DETECTION

IAQRAE Features: Sensors

- CO₂: 0-20,000 ppm
- Temperature: 32-122°F (0-50°C)
- Relative Humidity: 5-95% RH
- Toxic Sensor: choose from CO, H₂S, SO₂, NO, NO₂, Cl₂, HCN, NH₃, PH₃
- Photoionization Detector (PID) Monitor: 0-1000 ppm Volatile Organic Compounds (VOC)



PROTECTION THROUGH DETECTION

IAQRAE Features: PID

- Traditional IAQ monitors measure CO₂ which is only a *secondary* assessment tool for IAQ
- PIDs provide *direct* measurement of three major IAQ contaminants
 - Microbial VOCs (mVOCs)
 - VOCs in Tobacco smoke
 - VOCs from construction & office activities
- **Result:** PIDs compliment CO₂ readings by providing an accurate & instantaneous means of directly measuring VOC levels



PROTECTION THROUGH DETECTION

IAQRAE Features: Reliability

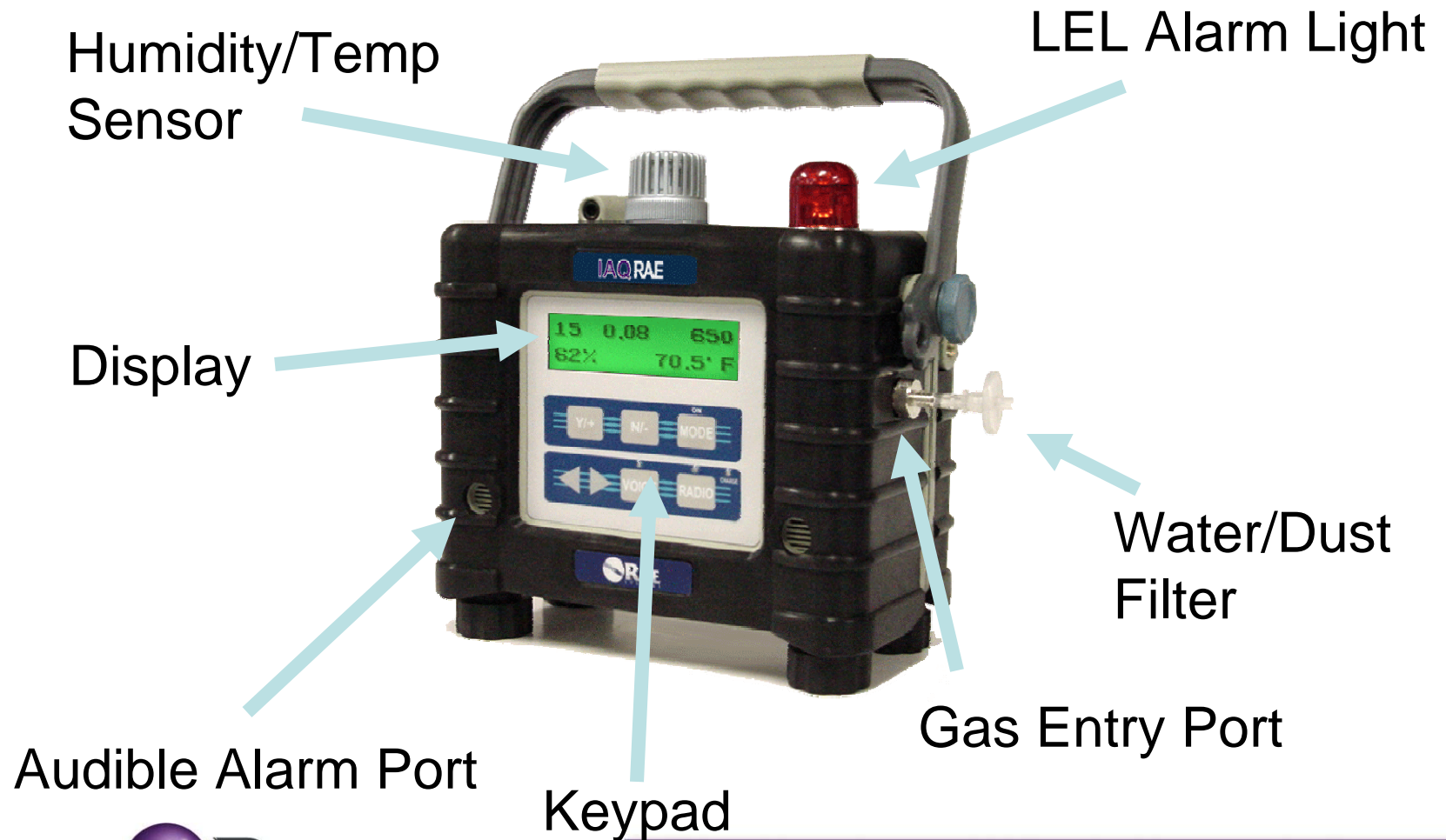
- Extremely rugged for extensive field use
- Weather proof case
- Temperature range of 32°F to 104°F (0°C to 40°C)
- RFI protection against radio interference



PROTECTION THROUGH DETECTION

IAQRAE Features: Rugged Case

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PROTECTION THROUGH DETECTION

IAQRAE Features: Internal Pump

- Makes remote sampling easy
- Liquid water trap for added protection
- *Pump Duty Cycle*: allows user to control the time the pump is on for a specified 10 second period
- *Pump Stall Feature*: when moisture is detected or when the pump is blocked the pump will shut off, protecting the IAQRAE from potential damage
- ~300cc/min at Low Pump speed;
~400cc/min at High Pump speed



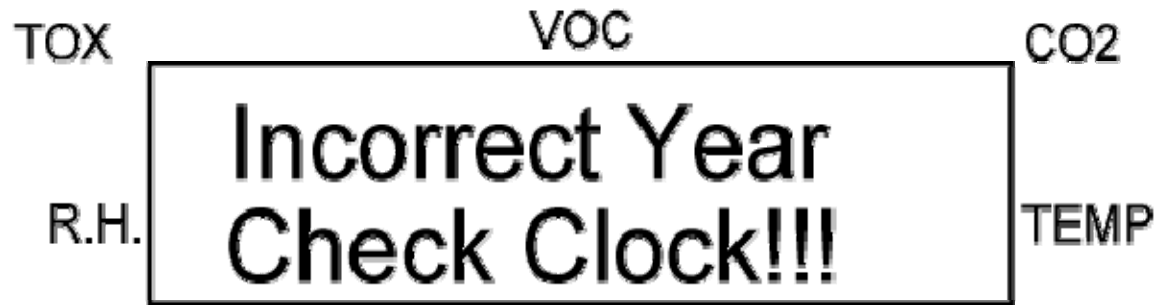
PROTECTION THROUGH DETECTION

IAQRAE Start-up: Turning On

- Unplug IAQRAE from charger
- Hold “MODE” key to turn on
- Alarm will beep once
- Watch display screen for messages such as:
 - Sensors installed & their warranty expiration
 - Alarm limits
 - Last calibration date
 - User/Alarm/Datalog modes
- Warm-up will take approximately 90 seconds



IAQRAE Start-up: Warnings



- If this screen appears during start-up just acknowledge it with the “Y” key and follow the procedure for setting the clock
- The battery has gone dead and the IAQRAE has detected a mismatch between the date code on the sensors and its internal clock

IAQRAE Start-up: Warnings



- This is a warning screen. As long as the sensor calibrates properly it is valid to continue using it. Acknowledge by pressing the “Y” key to continue warm-up
- For maximum IAQRAE availability, RAE Systems recommends replacing sensors at the end of their warranty period



IAQRAE Start-up: Lamp Alarm

TOX	VOC	CO2
0	0.0	5200
R.H.	Lamp	TEMP
10%	73.3F	

- “Lamp” display along with audible alarm indicates that PID lamp has failed to light
- Press “Y/+” key to clear alarm. If it clears, IAQRAE is ready for use
- If alarm does not clear, wait a few minutes and check again

IAQRAE Start-up: Lamp Alarm

TOX		VOC		CO2
	0	0.0	5200	
R.H.	10%	Lamp	73.3F	TEMP

- If after a few minutes the “Lamp” message remains, turn off IAQRAE and restart
- If after restart “Lamp” message disappears, IAQRAE is ready for use
- If after restart “Lamp” message remains, the PID Lamp needs service



IAQRAE Start-up: Pump Alarm

TOX		VOC		CO2
	0	0.0	5200	
R.H.	10%	Pump	73.3F	TEMP

- It is important to check pump flow every time the IAQRAE is used
- Block the filter on the pump inlet
- Reset the pump alarm by pressing the “Y” key
- If pump does not go into alarm, check for loose/cracked filter or service pump



PROTECTION THROUGH DETECTION

2 Display Modes

- **Advanced Mode (default):** 9 screens for most advanced users
- **Basic Mode:** 3 screens

Comparison of Display Modes

Advanced (9):

Instantaneous Reading /
Sensor Name

Peak Values

Minimum Values

Reset Peak & Min?

Battery Voltage

Run Time / Clock

Start / Stop Datalog*

VOC Gas = Isobutylene

Communicate with PC?

Basic (3):

Instantaneous Reading /
Sensor Name

Battery Voltage

PC Comm?

* Start / Stop will only appear with Datalogging is set to manual mode



PROTECTION THROUGH DETECTION

Instantaneous Reading (Main Display)

TOX	VOC	CO2
0	0.0	5200
R.H.		TEMP
10%		73.3F

- IAQRAE will return to this screen in 60 seconds if left on any subsequent screen
- This screen alternates between the instantaneous reading and the sensor name approximately every three seconds

Instantaneous Reading (Main Display)



- CO: Carbon Monoxide Sensor (toxic sensor)
- VOC: Photo-Ionization Detector (PID)
- CO₂: Carbon Dioxide sensor
- *R.H.*: Humidity Sensor
- *Temp*: Precision Thermistor
- Tap “MODE” key to proceed

Peak Reading Display

This screen is deleted in Basic Mode

TOX	VOC	CO2
34	584	3460
R.H.	Peak	TEMP
27%		74.5F

- Holds highest reading since IAQRAE was turned on
- Tap “MODE” key to proceed to next screen



PROTECTION THROUGH DETECTION

Minimum Reading Display

This screen is deleted in Basic Mode

TOX	VOC	CO2
0	0.00	0
R.H.	Min	TEMP
10%	50.6F	

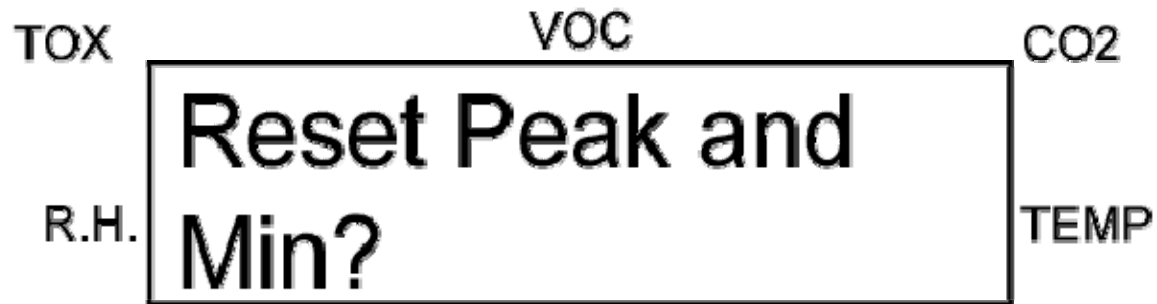
- Holds lowest reading since IAQRAE was turned on
- Tap “MODE” key to proceed to next screen



PROTECTION THROUGH DETECTION

Reset Peak & Min Display

This screen is deleted in Basic Mode



- Press “Y” to clear peak/min
- Screen will state “Peak and Min reset!!”
- To skip this screen, tap “MODE” to proceed

Battery Voltage Display

TOX VOC CO2
R.H. **Battery=7.4V** TEMP
Shut off at 6.4V

- IAQRAE shuts down when battery drops below 6.4 volts
- Normal Full Charge is over 7.7 volts
- Tap “MODE” key to proceed to next screen

Run Time/Clock Display

This screen is deleted in Basic Mode

TOX	VOC	CO2
	20 May '03	10:54
R.H.	ON=01:55	TEMP

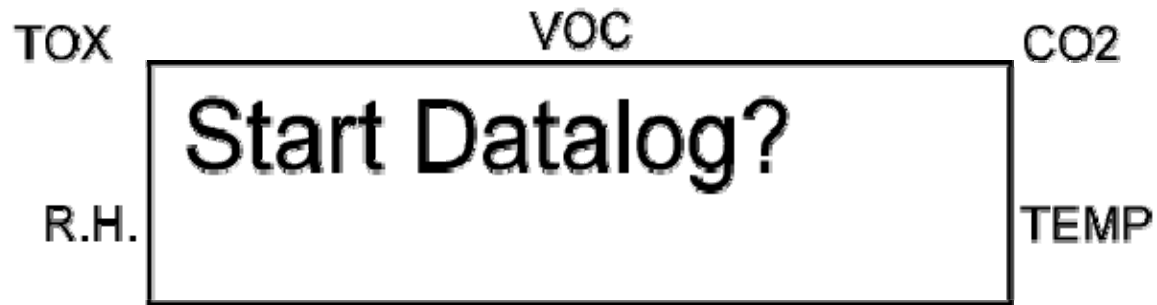
- Date, Time of day
- Accumulated time in hours and minutes since the IAQRAE was turned on
- Tap “MODE” key to proceed



PROTECTION THROUGH DETECTION

Datalog Mode Display

This screen is deleted in Basic Mode



- *Manual:* Logs if “Y/+” key is pushed now
- *Automatic:* this screen is deleted and it logs data as soon as the IAQRAE is on
- *Scheduled:* logs data at preset time
- *Periodic:* sets a recurring start and stop time that repeats every day when unit is turned on
- Entering programming pauses datalogging



PROTECTION THROUGH DETECTION

Run Time/Clock Display

This screen is deleted in Basic Mode

TOX	VOC	CO2
	20 May '03	10:54
R.H.	ON=01:55	TEMP

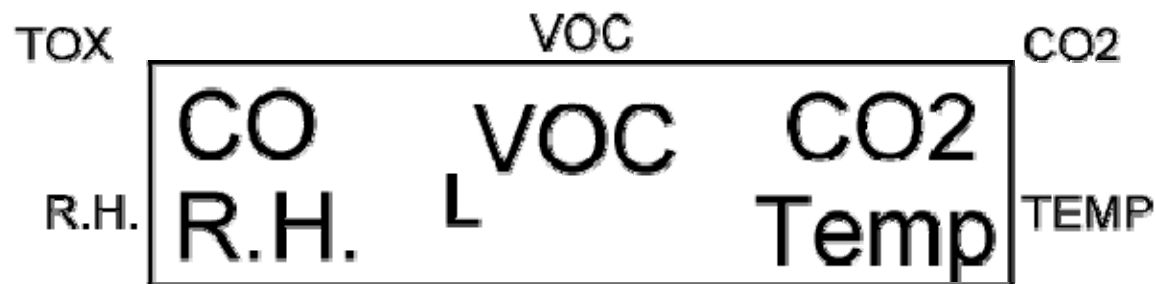
- Date, Time of day
- Accumulated time in hours and minutes since the IAQRAE was turned on
- Tap “MODE” key to proceed



PROTECTION THROUGH DETECTION

Datalog Mode Display

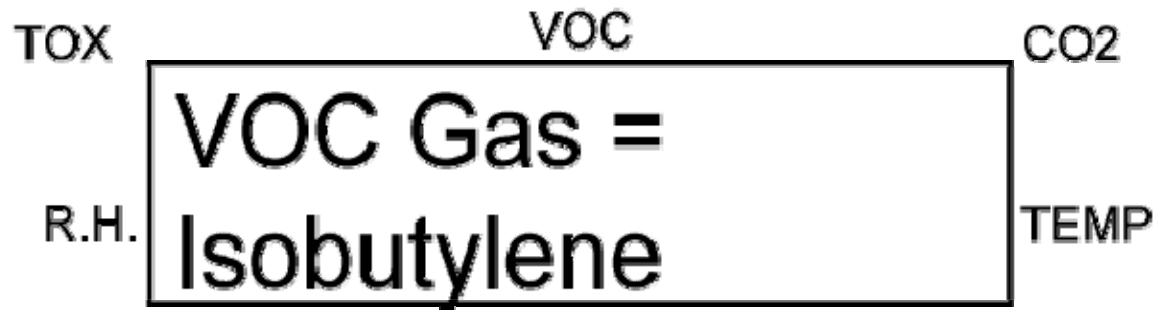
This screen is deleted in Basic Mode



- A small “L” is displayed in the left center of the IAQRAE screen to indicate datalogging
- Will datalog 20,000 points (7 days on VOC, CO₂, Temperature, Humidity, and Toxic at 2.5 minute intervals)
- User can choose one of 4 datalog modes (Manual, Automatic, Periodic & Scheduled in ProRAE Suite)

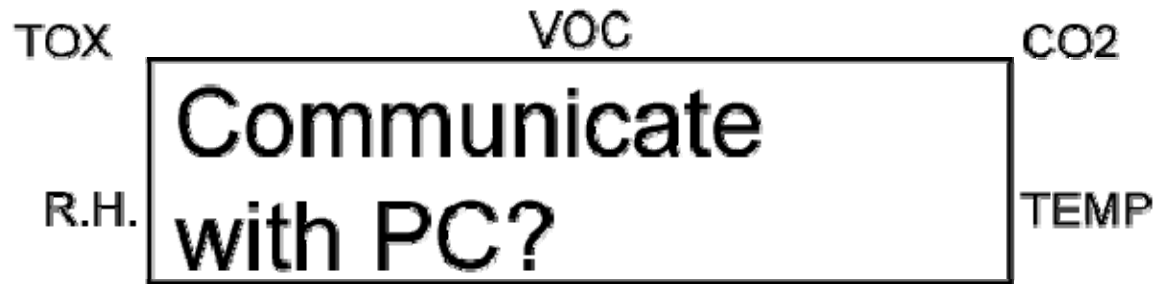
VOC Units Display

This screen is deleted in Basic Mode



- Target Gas VOC is displayed here (IAQRAE is currently measuring VOC in units of isobutylene)
- Correction factor can only be changed in programming mode
- Tap "MODE" key to proceed to next screen

Communicate with PC Display



- If the “Y/+” key is pressed, IAQRAE will display “Ready . . .” until it receives a signal from the computer or the “MODE” key is pressed
- When IAQRAE is in the communication standby mode it stops monitoring gas concentrations and stops datalogging
- Tap “MODE Key to proceed

IAQRAE Alarm Signals

- The IAQRAE can provide audible and visual alarms
- It is extremely important to note that during the following conditions the alarm signals are disabled:
 - When entering the “Communicate with PC?” standby mode
 - When entering the “Calibrate Monitor?” menu



IAQRAE Alarms: High

TOX	VOC	CO2
0	High	620
R.H.		TEMP
10%		73.3F

- “High” display along with 3 beat/second audible/visual alarm indicates that VOC sensor (PID) has exceeded high alarm set-point (10 ppm VOC default)
- Press “Y/+? Key to clear if latching arm



PROTECTION THROUGH DETECTION

IAQRAE Alarms: Low

TOX	VOC	CO2
0	0.0	Low
R.H.		TEMP
10%		73.3F

- “Low” display along with 2 beat/second audible and visual alarm indicates that CO₂ sensor has gone into low alarm (less than 5000 ppm CO₂ default)
- Press “Y/+” key to clear if latching arm



PROTECTION THROUGH DETECTION

IAQRAE Alarms: NEG

TOX	VOC	CO2
0	Neg	5200
R.H.		TEMP
10%		73.3F

- NEG display indicates that the VOC sensor has drifted negative (below zero) because the sensor was calibrated in an area containing VOCs.
- If the audible/visual alarm function is turned on, a 1 beat/second audible/visual alarm will be activated
- ***Perform “Fresh Air Calibration” in an area clear of all VOCs.***



IAQRAE Alarms: OVR

TOX	VOC	CO2
0	OVR	5200
R.H.		TEMP
R.H.		73.3F

- “OVR” display indicates that VOCs (or Toxics) exceed the sensor-rated ppm range maximum
- If the audible/visual alarm function is turned on, a 3 beats/second audible/visual alarm will be activated

IAQRAE Alarms: Pump

TOX		VOC		CO2
	0	0.0	5200	
R.H.	10%	Pump	73.3F	TEMP

- “Pump” display along with 3 beep audible alarm indicates that pump has stopped due to line clog
- Pump alarm is a latching alarm
- Clear line/filter and press “Y/+” key to clear alarm and restart pump

IAQRAE Alarms: Low Battery

TOX	VOC	CO2
0	0.0	5200
R.H.	Bat	TEMP
10%	73.3F	

- A flashing “Bat” display along with a 1 beep alarm every 10 seconds indicates that the battery voltage has dropped below 6.4 V and it will shut down in 20-30 minutes
- Quickly complete confined space entry and charge IAQRAE or install alkaline battery

IAQRAE Alarms: Memory Full

TOX		VOC		CO2
	0	0.0	5200	
R.H.	10%	Mem	73.3F	TEMP

- A flashing “Mem” display along with a 1 beat/second audible/tactile/visual alarm indicates that the datalog memory is full
- Clear datalog in “View or Change Datalog?”
- User can change datalog option in “Select memory full type?” to “Wrap Around”

Accessing Programming

- Press and hold “MODE” and “N/-” keys simultaneously for 3 seconds to enter Programming Mode
- When IAQRAE asks a question “?”
 - Answer “Y” or “N” (“Yes” or “No”)
- To Accept or Escape
 - Use the “MODE” Key
 - Repeatedly pushing the “MODE” key will always eventually return user to main display



Programming Menus

- Calibrate Monitor?
 - Change Alarm Limits?
 - Change Datalog Setting?
 - Change Monitor Setup?
 - Change Sensor Configuration?
-
- *Choose “Y” to accept or “N” to move on, “MODE” to escape*



Calibrate Monitor?

- Fresh Air Calibration?
 - *Make sure air is clean!*
- Multiple Sensor Calibration?
- Single Sensor Calibration?
- Modify Span Gas Value?
- Change VOC Span Gas?

- *Choose “Y” to accept or “N” to move on, “MODE” to escape*



Multiple Sensor Calibration

TOX	VOC			CO2
	*CO	VOC	*CO2	
R.H.	R.H.	OK?	Temp	TEMP

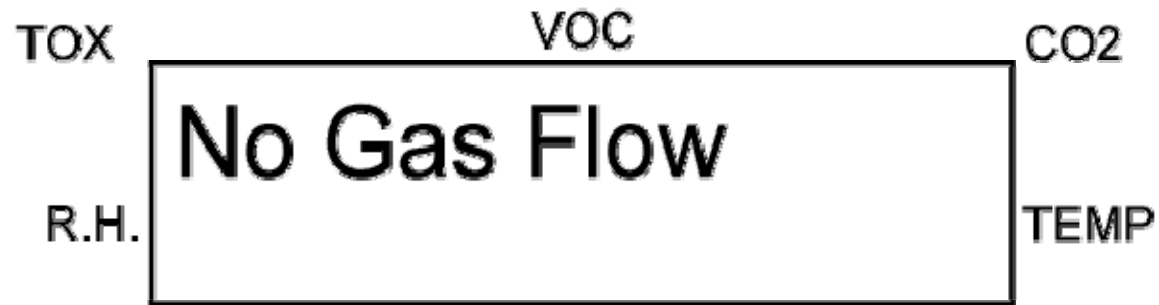
- At “Multiple Sensor Calibration?” press “Y/+” key
- For CO/CO2 mixed gas calibration the next screen should appear as above

Multiple Sensor Calibration



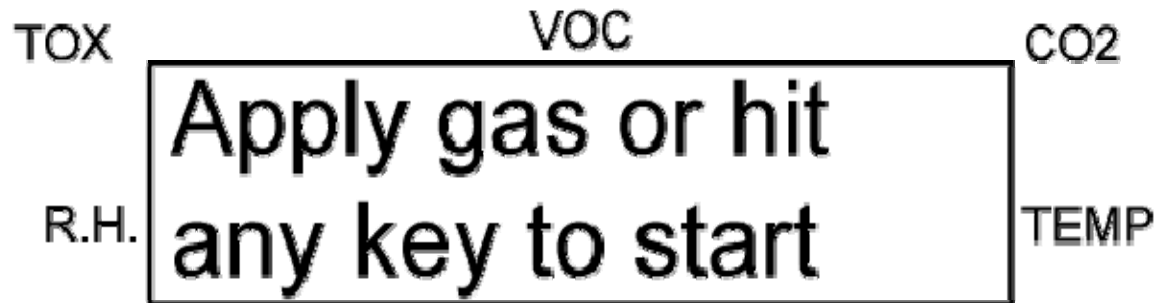
- Press “Y/+” key to display this screen
- Attach calibration gas regulator to mixed gas cylinder
- Turn on calibration gas
- Attach calibration hose to IAQRAE
- Follow instructions on screen

Multiple Sensor Calibration



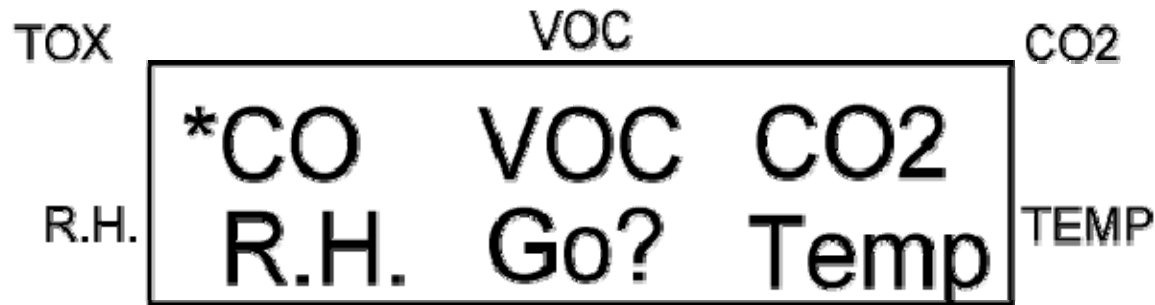
- If you get this screen check for gas flow, the IAQRAE will not perform span calibrations unless it senses calibration gas

Multiple Sensor Calibration



- Try again after you have verified that the gas is correct and it is flowing properly
- Follow instructions on screen
- Disconnect regulator from gas cylinder when calibration is complete

Single Sensor Calibration



- At “Single Sensor Calibration?” press “Y/+” key
- Use “MODE” to scroll through sensors and “Y/+” to select sensor for calibration
- To exit Single Sensor Calibration menu, press “N/-” to move to next submenu

Single Sensor Calibration

- VOC can only be calibrated individually:
 - Use “MODE” to select VOC
 - Attach calibration gas regulator to VOC (Isobutylene) cylinder
 - Turn on calibration gas
 - Attach calibration hose to IAQRAE and make sure it is tight
 - With cursor on VOC press “Y/+” key
 - Follow instructions on screen
 - Repeat if necessary for other gases
 - Disconnect regulator



Single Sensor Calibration

- CO₂ sensor must be calibrated individually:
 - Apply pure air or nitrogen gas from cylinder or 10 ppm isobutylene to zero CO₂ sensor
 - When monitor asks “0% CO₂?” press “Y/+” if CO₂ free gas is being used to calibrate
 - After 0% CO₂ calibration, user must perform span calibration



Single Sensor Calibration

- R.H. and Temp sensor calibration:
 - Annual calibration is usually adequate
 - The RH sensor uses dry gas (10% relative humidity) as the zero gas, such as dry air, nitrogen, or 10 ppm isobutylene.
 - The span calibration uses >90% RH gas, obtained by bubbling the gas supply through pure water.
- The temperature sensor does not need zero calibration
 - The span temperature is set to the ambient temperature as measured by a thermometer.



Calibration

- **Modify Span Value?**
 - Allows user to change the calibration gas values to use other cal gases
 - Do not change if using RAE Systems cal gases supplied with your meter
- **Change VOC Span Gas?**
 - Allows user to change the calibration gas from isobutylene
 - Do not change if you are using RAE Systems cal gas supplied



Change Alarm Limits?

- Change High Alarm Limit?
 - 3 beeps and flashes per second (“High”)
- Change Low Alarm Limit?
 - 2 beeps and flashes per second (“Low”)
- Choose “Y” to accept or “N” to move on, “MODE” to escape



Change Datalog Setting?

- Clear All Data?
- Change Datalog Period?
- Select Datalog Mode?
- Enable/Disable Datalog?
- Select Memory Full Type?



Select Memory Full Type?

- **Wrap Around (default):** After the memory becomes full the newest data is written over the oldest data (First in First Out or FIFO)
 - This is an excellent feature to provide “background” datalogging that is only used in the event of an incident
- **Stop:** Datalogging will stop when the memory is full and the “MEM” alarm will sound

Change Monitor Setup?

- **Change Site ID?**
 - User may enter an 8-character site ID to be included in datalog report
- **Change User ID?**
 - User may enter an 8-character user ID to be included in datalog report
- **Change Alarm Mode?**
- **Change User Mode?**
 - Advanced?
 - Basic?



Change Monitor Setup?

- Change Real Time Clock?
- Change Light and Buzzer Mode?
- Change Password?
- Change Pump Duty Cycle?
- Change Display Language?
- Set Temperature Unit? (C⁰ or F⁰)

- Choose “Y” to accept or “N” to move on, “MODE” to escape



Change Sensor Configuration?

- Change VOC Gas (measurement)?
 - Edit Correction Factor?
 - Enable/Disable Sensor?
 - Change Custom Gas Name?
-
- Choose “Y” to accept or “N” to move on, “MODE” to escape



IAQRAE: Power Off

- Press and hold “MODE” key for full 5 seconds
- Audible alarm will beep and display will read “Power down in . . . 5 seconds”
- Plug 12 VDC charger into IAQRAE charge port when instrument is not in use



Questions?



PROTECTION THROUGH DETECTION