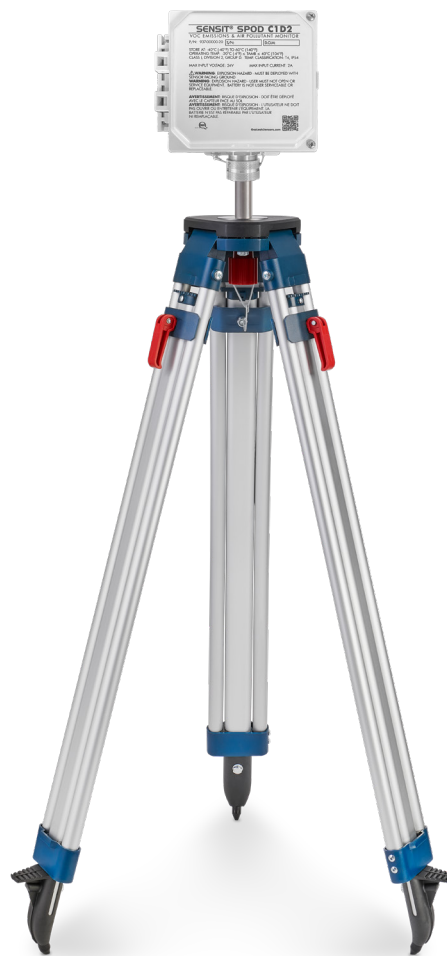


SENSIT[®] SPOD C1D2

VOC EMISSIONS & AIR POLLUTANT MONITOR

937-00000-XY - OPERATION MANUAL

This operating manual is for the **SPOD C1D2**: Normal (937-00000-20) and High Sensitivity (937-00000-21) and Nevada Nano (937-00000-22) models.



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WARNINGS



EXPLOSION HAZARD – DO NOT CONNECT OR DISCONNECT THE CABLES TO THE SPOD C1D2 UNLESS IN A NON-FLAMMABLE AREA, AND WHEN THE INSTRUMENT IS SHUT OFF (I.E., NO LIGHT CAN BE SEEN FROM THE LED ON THE SWITCH)



EXPLOSION HAZARD – BATTERY PACK IS NOT USER SERVICEABLE OR REPLACEABLE. USER MUST NOT OPEN NOR PERFORM SERVICE ON THE EQUIPMENT



EXPLOSION HAZARD – IF NOT USED IN THE MANNER SPECIFIED WITHIN THIS MANUAL, THE PROTECTIONS ASSOCIATED WITH THIS INSTRUMENT IS IMPAIRED.



EXPLOSION HAZARD – MUST BE DEPLOYED IN AN UPRIGHT CONFIGURATION (SENSOR POINTING TO THE GROUND)



EXPLOSION HAZARD – FOR 937-00000-20 AND 937-00000-21 CONFIGURATIONS USE ONLY ION SCIENCE P/N MP3SBLBXB2 (SENSIT P/N 375-PID1BIXF-01) AND (SENSIT P/N 375-PID1BIHS-01) SENSORS



EXPLOSION HAZARD – FOR 937-00000-22 CONFIGURATION USE ONLY NEVADA NANOTECH P/N MPSF02-S42309-E0 (SENSIT P/N 375-MPS5.0-01) SENSOR



EXPLOSION HAZARD – PID SENSOR REPLACEMENT SHOULD BE COMPLETED IN A NON-FLAMMABLE, CLEAN, AND DRY ENVIRONMENT.



EXPLOSION HAZARD – ALL TETHERED PORT COVERS NEED TO BE INSTALLED WHENEVER A PORT IS NOT USED.



WARNING – ALL DEVICES DESCRIBED HEREIN ARE FOR EMISSIONS MONITORING APPLICATIONS AND ARE NOT INTENDED TO BE USED AS SAFETY DEVICES

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GENERAL INFORMATION

The SENSIT SPOD measures VOC levels (including Methane & Natural Gas for configuration 937-00000-22) and transmits the collected data to a remote server. It is intended for deployment outdoors and in wet locations (e.g., rain).

DEVICE OVERVIEW

OVERVIEW	PARAMETER
Weight	Base unit: 8.5 lbs
Dimensions	Fully assembled with anemometer and antenna • D x W x H (6" x 8" x 16")
Ingress Protection	IP54
Mounting	Attached mounting flanges
Voltage Requirements	18V – 24V DC Charging (solar panel) ⁵
Current Requirements	620mA max current draw when charging
Operating Runtime	3-5 days battery backup ¹
Operating Temp	-20°C to 40°C ²
Maximum Altitude	2000 m
Atmospheric Pressure	80 kPa – 110 kPa
Relative Humidity	0-95%
Pollution Degree	4
Data Outputs	Wireless (4G IoT Cellular Included) ²

NOTES:

1. Battery backup time depends on run mode and frequency of transmission.
2. Limited by lead acid charging temperature.
3. Requires SIM card and suitable data plan on AT&T, T-mobile, or Verizon.
4. Cloud based analytics can be developed with additional contract.
5. Solar panels used with the SPOD must be NRTL certified to UL121201, Class I, Division 2, Groups A, B, C, and D T3C, and must be wired in using a method that is acceptable for use in a Class I, Div. 2 area per the NEC (National Electrical Code) and CEC (Canadian Electrical Code). The recommended panel is SENSIT Part Number 360-00769 (Solarland SLP-030-12C1D2 – CSA File Number 2721637).
6. SPOD can be plugged into an alternative power supply; the power supply must be suitably limited to ensure the peak open circuit voltage cannot exceed 24 volts and the peak short circuit current cannot exceed 620mA.

CONNECTION INFORMATION

The SPOD C1D2 only has a single connection port, located at the bottom of the unit, next to the sensor. This connection is for charging and direct data communications to the SPOD C1D2 unit. The port only takes connectors in the Phoenix Contact SAC-HZ-5P family of products (UL File E359524). When the port is in use, the retained locking clip must be used with the connection to prevent accidental disconnection. All connections must be wired using a method that is acceptable for use in a Class I, Div. 2 area per the NEC (National Electrical Code) and CEC (Canadian Electrical Code).



EXPLOSION HAZARD – ALL TETHERED PORT COVERS NEED TO BE INSTALLED WHENEVER A PORT IS NOT USED.



SENSOR INFORMATION



EXPLOSION HAZARD – FOR 937-00000-20 AND 937-00000-21 CONFIGURATIONS USE ONLY ION SCIENCE P/N MP3SBLBXBU2 (SENSIT P/N 375-PID1BIXF-01) AND (SENSIT P/N 375-PID1BIHS-01) SENSORS



ONLY NEVADA NANOTECH P/N MPSF02-S42309-E0 (SENSIT P/N 375-MPS5.0-01 SENSOR

OVERVIEW	PARAMETER
Default Detection Range	0.1– 30 ppm ^{1,2} for normal version (937-00000-20) 10 ppb – 2 ppm ^{1,2} for high sensitivity (937-00000-21) 0-100% LEL ² for Nevada Nano (937-00000-22)
Detection Technology	Photoionization Detector (PID) 937-00000-20 and 937-00000-21 MEMS Molecular Property Spectrometer (MPS) 937-00000-22
Default PID Lamp Energy	10.6 eV ² (937-00000-20 AND 937-00000-21)
Target Accuracy	+/- 200 ppb min or 10% ^{3,4} (937-00000-20) +/- 20 ppb min or 10% ^{3,4} (937-00000-21) +/- 5% LEL (937-00000-22)
Response Time	15-30 seconds ⁵
Expected Lamp Life	1 year (937-00000-20 AND (937-00000-21) ⁶ 5 year+ (937-00000-22)

NOTES:

- VOC range reference to isobutylene.
- Factory calibration conducted with 10ppm isobutylene for 937-00000-20 and 1 ppm isobutylene for 937-00000-21 and 25,000 ppm methane for 937-00000-22. These calibration gases are balanced in zero air. These values are targets and cannot be guaranteed for all environments. The operator must verify the calibration meets the requirements for their application.
- PID Sensors are sensitive to high amounts of humidity and may rail at the upper output if humidity is excessive. The SPOD contains an internal sensor heater to minimize humidity interference.
- If the unit has been off for an extended period, it could take several minutes to an hour for the PID readings to drop to normal operating condition depending on storage conditions. This stabilization may temporarily interfere with VOC detection.
- Exposure to very high levels of VOCs may saturate the PID detector for several minutes to an hour.
- Operation in high humidity, high VOC, and salt containing coastal environments may reduce the life of the sensor electrode stack considerably necessitating sensor replacement or cleaning.

CELLULAR SPECIFICATIONS

OVERVIEW	PARAMETER
Network Technology	4G/2G ¹
Carrier	AT&T, T-mobile, or Verizon ²
Transport Layer	TCP
Internet Layer	IP
Application Layer	HTTP and MQTT
Data Transfer Method	HTTP POST or MQTT Topics
HTTP Content Type	application/x-www-form-urlencoded
HTTP Body Field Identifiers	&ID, &MODULE, &STAT, &DATA
MQTT Content Type	JSON
MQTT Tags	"deviceld", "time", "voc_array", "iodb"
Post Location	Adjustable in Menu
APN	Adjustable in Menu
TLS/SSL	HTTPS and MQTTS with server authentication ³

NOTES:

7. 4G Cat 4 option and 2G Backup
8. AT&T is default/preferred.

DEPLOYMENT GUIDE

Unpack the sensor unit and check for any physical damage or obstructions at the sensor openings.

- 1). Power on unit. The illuminated switch should turn on and begin flashing blue. After initialization the LED will turn green and periodically flash blue or red once per second indicating normal operation. This is to perform a check of the unit before mounting and deployment.
- 2). Verify the absence of sensor errors with illuminated switch. If the switch is flashing only red or yellow an error occurs. For more information on the errors indicated by the illuminated switch, see “SPOD Firmware and Troubleshooting Guide”
- 3). Turn off the unit.
- 4). (OPTIONAL) Connect the solar panel to the power port on the SPOD, left and down of the sensor opening when the SPOD is placed with the front face (containing the serial number) facing up towards the sky.



EXPLOSION HAZARD – DO NOT CONNECT OR DISCONNECT THE CABLES TO THE SPOD C1D2 UNLESS IN A NON-FLAMMABLE AREA, AND WHEN THE INSTRUMENT IS SHUT OFF (I.E., NO LIGHT CAN BE SEEN FROM THE LED ON THE SWITCH)

- 5). Move the unit to the location to be deployed, and mount to hardware present at the location or a tripod. Make sure the unit after mounting can withstand the environmental conditions at the location (i.e., heavy winds).



EXPLOSION HAZARD – MUST BE DEPLOYED IN AN UPRIGHT CONFIGURATION (SENSOR POINTING TO THE GROUND)

- 6). Power on unit. The illuminated switch should turn on and begin flashing blue during initialization. After initialization the LED will turn green and periodically flash blue or red once per second indicating normal operation.

SENSOR REPLACEMENT



EXPLOSION HAZARD – PID SENSOR REPLACEMENT SHOULD BE COMPLETED IN A NON-FLAMMABLE, CLEAN, AND DRY ENVIRONMENT.

- 1). Make sure the SPOD is not powered on (i.e., there is no light coming from the LED on the switch)
- 2). Loosen the sensor cap retaining set screw $\frac{1}{2}$ turn counterclockwise using a $\frac{3}{32}$ " hex key wrench.
- 3). Unscrew the sensor cap assembly counterclockwise by hand until it can be removed from aluminum sensor holder base.
- 4). Grasp the protective sensor membrane holder and pull out to remove.

NOTE: The PID sensor may come out with the protective sensor membrane holder, or it may remain in the PID socket

- 5). Remove the sensor from the 3 pin PID socket or remove it from the sensor membrane holder.
- 6). For 937-00000-20 configuration install new sensor 375-PID1BIXF-01 (ION SCIENCE MP3SBLX-BU2) into 3-pin socket

For 937-00000-21 configuration install new sensor 375-PID1BIHS-01 (ION SCIENCE MP3SHLHSBU2) into 3-pin socket

For 937-00000-22 configuration install new sensor 375-MPS5.0-01 (Nevada Nano MPSF02-S42309-E0) into 3-pin socket

NOTE: The sensors can only be installed in one orientation and have identical pin outs.

WARNING: IT IS STRICTLY PROHIBITED TO INSTALL 375-MPS5.0-01 (Nevada Nano MPSF02-S42309-E0) into either 937-00000-20 or 937-00000-21

- 7). Reinstall the protective sensor membrane holder on the aluminum sensor holder making certain the sensor goes inside the closed cell foam tube. Securely press the membrane holder into the conical taper of the aluminum sensor holder. It may not seat completely but that is okay.

NOTE: Prior to reinstalling protective sensor membrane holder, ensure that foam tube seal is pressed securely against the sensor membrane. This minimizes any excess head space above the sensor that will slow the sensor response and recovery time.

- 8). Reinstall the sensor cap assembly making certain the stainless-steel mesh is fully seated into the sensor cap. The sensor cap should be tightened by hand until it stops rotating. At that point it should be backed off $\frac{1}{4}$ turn and retightened again until it stops rotating. This retightening step will fully seat the membrane holder and ensure the cap is fully tightened.
- 9). Tighten the sensor cap retaining screw to 0.5 Nm using a $\frac{3}{32}$ " hex key wrench. Ensure that the sensor cap is secure and cannot be loosened by hand.
- 10). Turn the SPOD on and verify sensor operation and calibration. Ideally, a bump test would be performed on the sensor to ensure sensitivity.

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MADE IN THE USA
WITH GLOBALLY SOURCED COMPONENTS

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