



# Molecular Property Spectrometer™ MPS™ Flammable Gas Sensor

## MPS Firmware Upgrades

The MPS Flammable Gas Sensor comes preprogrammed with firmware that operates the sensor. This document provides instructions for upgrading the firmware to the latest version, if desired. Also provided in this document is a version history of this firmware.

Firmware upgrades are performed using the “Evaluation Kit” and accompanying “MPS Flammable Gas Sensor Interface” application (Figure 1). Information about these can be found on our web page: <https://www.nevadanano.com/downloads/>



Figure 1: On the left, the “Evaluation Kit” hardware; on the right, the “MPS Flammable Gas Sensor interface” application.

Make sure you have downloaded and installed the latest version of the application on your target PC. The PC must be connected to the internet for firmware upgrade. After installing the application, follow these steps:

1. Physically connect the interface board to the PC (Windows) via USB **directly**. Make sure the cable is fully connected to the PC and the interface board. Do **not** connect via a USB hub. When powered, the Green LED on the interface board should be on.
2. Start the “MPS Flammable Gas Sensor Interface” application.
3. Select “Find MPS Devices”. From the drop-down list select your sensor.
4. The application will then connect to the cloud and check to see if the sensor is running the latest firmware. If the sensor is already running the latest firmware, the upgrade button will indicate “Firmware Up-To-Date”.
5. If a new firmware is available, the upgrade button will indicate “Upgrade Firmware”. Press the button to start firmware upgrade. During the upgrade process, make sure there is no disruption in communication between the sensor and the PC. Any disruption during upgrade could result in a “dead” sensor.
6. When firmware upgrade is completed successfully, a message box will appear indicating “Firmware upgraded successfully!”



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7. Disconnect USB to the sensor and reconnect (i.e. “power cycle” the sensor).
8. Re-launch the “MPS Flammable Gas Sensor Interface” and select “Find MPS Devices” again. The sensor should appear with a new firmware version number.

### MPS Firmware Version History

#### **MPS Flammable Gas Sensor Firmware Version 3.0.5.0 Release Notes**

Build 3.0.5.0 has the following improvements and updates:

- Improved repeatability when delivering gases from a cylinder without humidity.
- Improved (decreased) cross-sensitivity to carbon dioxide (CO<sub>2</sub>).
- Improved accuracy to heavy gases.

#### **MPS Flammable Gas Sensor Firmware Version 3.0.4.0 Release Notes**

Build 3.0.4.0 has the following improvements and updates:

- Improved capability for heavy gases.

#### **MPS Flammable Gas Sensor Firmware Version 3.0.3.0 Release Notes**

Build 3.0.3.0 has the following improvements and updates:

- Improved chemometric algorithms for handling rapid environmental transients.
- Sensor reconfigured to enable output of all concentration readings < -5 %LEL and to also report fault 0x30 “HW\_SENSOR\_NEGATIVE” if < -15 %LEL.

#### **MPS Flammable Gas Sensor Firmware Version 3.0.2.0 Release Notes**

Build 3.0.2.0 has the following improvements and updates:

- Improved chemometric algorithms for handling environmental extremes.
- Sensor reconfigured to output Gas ID = 255 (“Over Range – Concentration greater than 100 %LEL”) when exposed to very high gas concentrations (e.g., 10-100% by volume). Previous



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versions of firmware could sometimes report a sensor malfunction under such conditions.

- Voltage-supply related faults now latch the fault until the sensor is power cycled and supplied the correct voltage.
- For sensors configured to utilize the “Analog Out” pin, the sensor voltage is used to indicate the level of gas concentration (%LEL). When the sensor detects an error condition, the “Analog Out” pin generates a specific voltage indicating an error, detailed in section 2.2 of the MPS Flammable Gas Sensor User Manual.

### **MPS Flammable Gas Sensor Firmware Version 3.0.1.0 Release Notes**

Build 3.0.1.0 has the following improvements and updates:

- New UART command (SENSOR\_INFO) to retrieve sensor-specific information, e.g. serial number, manufacturing date, etc.

### **MPS Flammable Gas Sensor Firmware Version 3.0.0.0 Release Notes**

Build 3.0.0.0 has the following improvements and updates:

- Enhanced chemometrics and bug fixes.
- “Power-On” and “Built-In” Self Tests (POST and BIST) are now enabled. The host system should check the “Status” field in the reply header as well as the “Concentration” in the Answer reply.
- Simplified error status reporting for the UART interface. In the unlikely event that the sensor has multiple concurrent errors, only the highest priority error is reported. The command to retrieve additional error codes (0x0A) is deprecated and no longer available.

### **MPS Flammable Gas Sensor Firmware Version 2.0.2.0 Release Notes**

Build 2.0.2.0 has the following improvements and updates:

- Significantly reduced average power consumption from 55 mW to 29 mW.
- Enhanced chemometrics
- Bug fixes
- For the UART interface:
  - All integers are now represented in Little Endian format. For processors with Little Endian format, this eliminates the need to swap bytes into native format. This change



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- is **not backward compatible** with clients written against previous firmware releases.
- A new command (ID 0x09) is available to query “engineering data” for debugging. The size of the data packet “payload” has been significantly reduced in size to 84-128 bytes. The previous command (ID 0x02) is now deprecated.