NOTICE

RESTRICTIONS:

The IDT SMOD7xx Evaluation Kit and its contents are designed for sensor evaluation only. They are provided "as is."

The IDT SMOD7xx Evaluation Kit hardware and application software must not be used for module production and production test setups. IDT and its affiliates shall not be liable for any damages arising out of defects resulting from (i) delivered hardware and software (ii) non-observance of instructions contained in this document and in any other documentation provided to user, or (iii) misuse, abuse, use under abnormal conditions or alteration by anyone other than IDT. To the extent permitted by law IDT hereby expressly disclaims and user expressly waives any and all warranties, whether express, implied or statutory, including, without limitation, implied warranties of merchantability and of fitness for a particular purpose, statutory warranty of non-infringement and any other warranty that may arise by reason of usage of trade, custom, or course of dealing.

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Important Safety Warning: The SMOD7xx Smart Sensing Module is not intended, recommended, or approved for use in safety or life protecting applications or in potentially explosive environments. IDT disclaims all liability for such use. Only trained professional staff should set up and operate the hardware and software.

The metal sensor enclosure can become very hot to the touch when operated at the recommended heater voltage settings. Avoid direct contact with the sensor when in operation and keep flammable materials away from the SMOD7xx Smart Sensing Module.

- The SGAS701 sensor is designed only for gas leak detection and measurement of ppm levels of hydrogen.
- The SGAS707 sensor is designed only for measurement of ppm levels of volatile organic chemicals.
- The SGAS711 sensor is designed only for gas leak detection and measurement of ppm levels of flammable gases.

Contents

List of Figures

List of Tables

1. Introduction

This document describes the SMOD7xx Evaluation Kit hardware and application software, including the application software installation, the setup for the hardware, and application software operation.

This document applies to the following SMOD7xx Smart Sensing Modules, which will be referred to as the SMOD7xx.

- SMOD701 (utilizing the SGAS701 hydrogen sensor)
- SMOD707 (utilizing the SGAS707 VOC sensor)
- SMOD711 (utilizing the SGAS711 flammable gas sensor)

The SGAS701, SGAS707, and SGAS711 sensors will be referred to as the SGAS7xx.

The *SMOD7xx Application Software* installation and basic operation are covered in sections 3 and 5. The application software is also referred to as the graphical user interface (GUI).

After downloading and installing the *SMOD7xx Application Software*, connect the kit hardware to the user's computer as described in section 4.

1.1 Kit Contents

SMOD7xx Evaluation Kits include the following contents. Refer to section 6 for the kit part codes.

- SMOD7xx Smart Sensing Module with an SGAS7xx sensor
- USB cable (type A to type B mini)
- 9VDC wall-mounted power supply (SMOD701 and SMOD711 only)

1.2 Required or Recommended User Equipment

A computer is required to run the software and communicate with the SMOD7xx Module. It must meet the requirements given in Table 1.

Table 1.   User Computer Requirements

Parameter	Requirement
Operating System [a]	Windows® 7, Windows® 8.1, or Windows® 10
Processor	Pentium® 4M/Celeron® 866 MHz (or equivalent) or later (32-bit)
Free Disk Space	650MB
RAM	256MB
Resolution	1024 x 768
Connector	1 free USB 2.0 port

[a]   32-bit and 64-bit versions supported.

2. Hardware Description

2.1 SMOD7xx Smart Sensing Module

Figure 1 shows the SMOD7xx Smart Sensing Module, and Table 2 describes the components on the module.

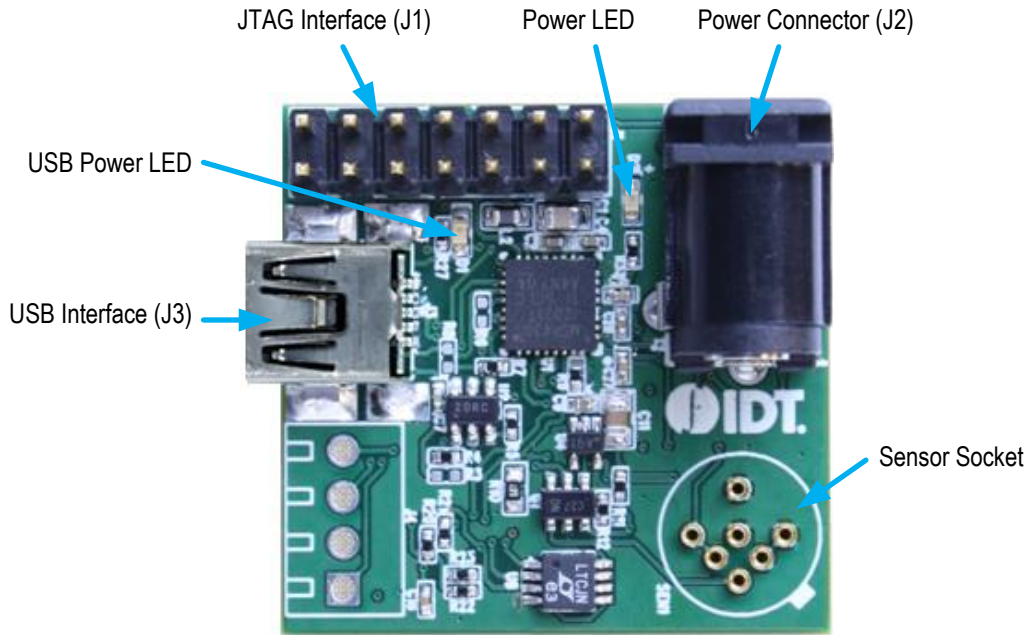**Figure 1. SMOD7xx Smart Sensing Module**

Table 2. SMOD7xx Smart Sensing Module Components

Component	Description
JTAG Interface (J1)	Standard JTAG interface for firmware debugging and flashing
Power Connector (J2)	9VDC input for SMOD701 and SMOD711 (Note: The external power supply is not required for the SMOD707 and is not included in the SMOD707 Evaluation Kit.)
USB Interface (J3)	USB 2.0 (full speed) connector enabling communication with an external device
Power LED	The power LED lights when the SMOD7xx module is connected to a power source via the USB interface or the J2 power connector
USB Power LED	The USB power LED lights when the SMOD7xx module is connected to the user's computer via the USB interface
Sensor Socket	Pin socket for leads from SGAS7xx sensor.

2.2   SGAS7xx Sensors

SMOD7xx Smart Sensing modules are shipped with SGAS7xx sensors inserted into the sensor sockets as shown in Figure 1. Sensors can be removed by pulling straight up on the TO-39 sensor package. The sensor can be inserted by aligning the tab on the sensor with the printed tab on the module, and then applying gentle downward pressure until the sensor pins are fully inserted.

Figure 2.   SMOD7xx Smart Sensing Module with SGAS7xx Sensor
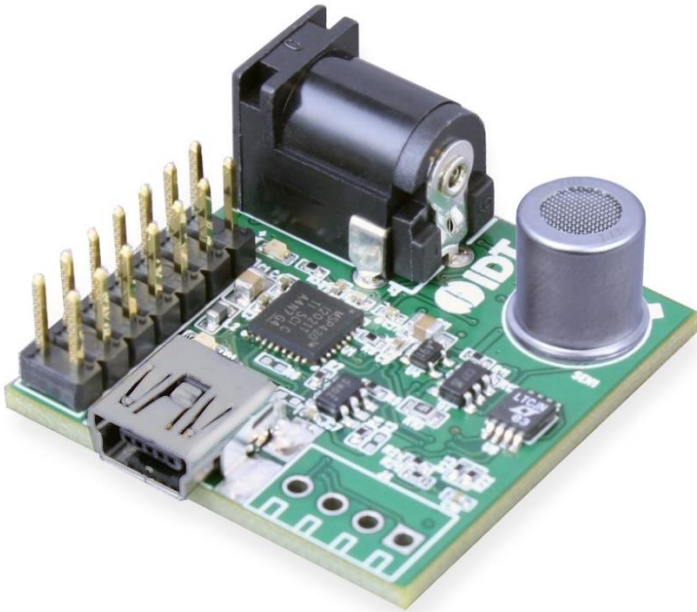
3.   Application Software Overview and Installation

3.1   Application Software Overview

The *SMOD7xx Application Software* for the SMOD7xx Evaluation Kit consists of a single PC-compatible application. This application provides a simple means of operating all varieties of IDT's SMOD7xx Smart Sensing Modules.

The *SMOD7xx Application Software* is available for download from the IDT website. It is a LabVIEW®* executable application that requires the presence of the LabVIEW runtime environment. If this environment is not present on the user's computer at application installation time, it will be automatically added to the PC as part of the installation process detailed below.

Note: The user must have administrative rights to install the *SMOD7xx Application Software* on the user's computer. Before installing the software, ensure that the computer meets the minimum requirements listed in Table 1.

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* LabVIEW® is a trademark of National Instruments Corporation.

3.2　Application Software Installation

3.2.1　*SMOD7xx Application Software* Installation Process

Download the *SMOD Evaluation Software* zip file from one of the following IDT web pages:

http://www.idt.com/SMOD701KIT

http://www.idt.com/SMOD707KIT

http://www.idt.com/SMOD711KIT

Extract the contents of the zip file to a folder on the installation PC. Then launch *setup.exe* in the root folder of the extracted files, and follow the on-screen installation instructions. Key steps in the installation are illustrated in Table 3. Because the application is LabVIEW-based, several different LabVIEW runtime environment packages will be installed to the user's PC to support operation of *SMOD7xx Application Software*. If the runtime packages were previously installed by another application, or *LabVIEW 15 Full Version* is installed on the PC, then installation of the runtime environment will be bypassed.
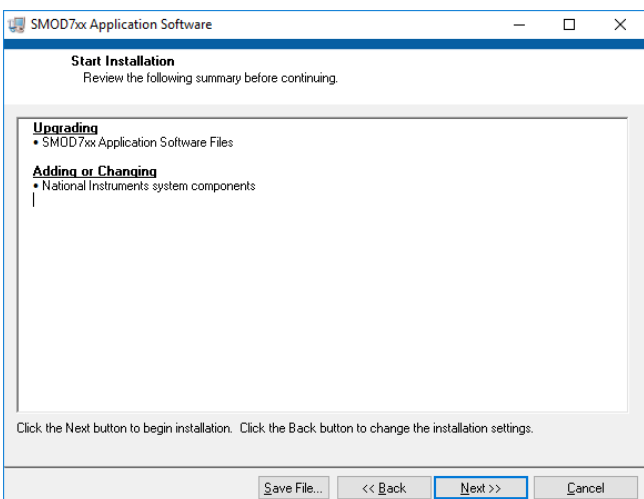
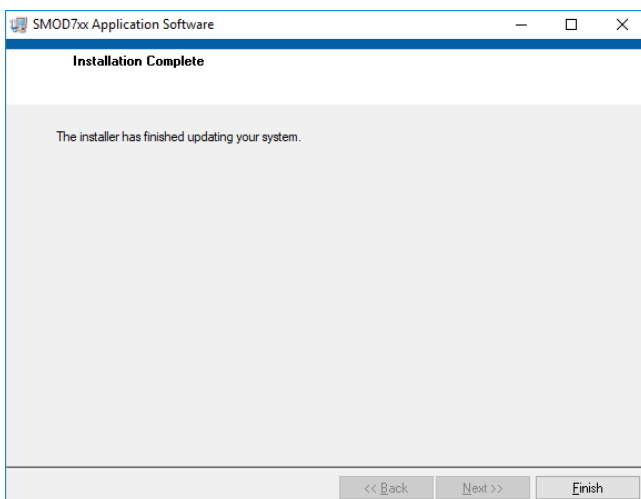**Table 3.　Software Installation Process**

Initial installation screen:
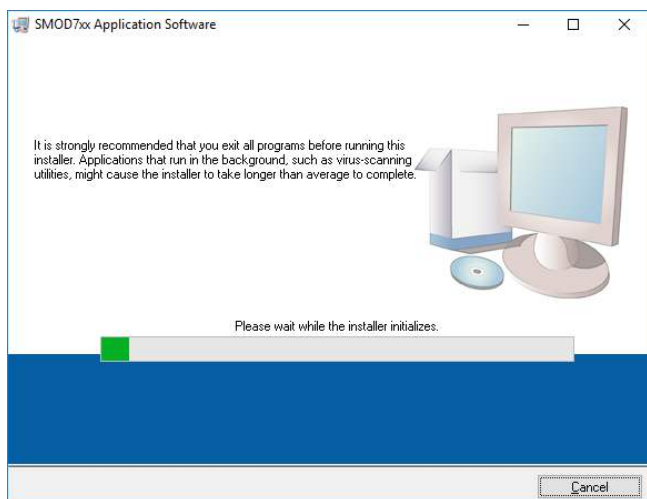
Default installation folders:
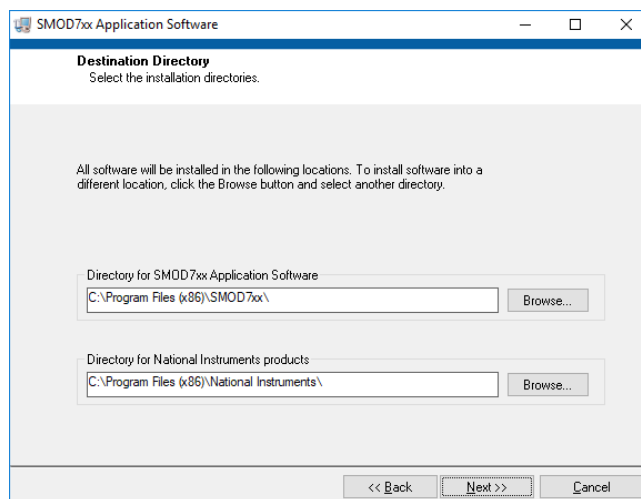
List of components that will be installed:


Final installation screen:

4. Hardware Setup

Each type of SMOD7xx Smart Sensor Module is factory configured to auto-start upon application of power either from the USB cable or from an external source through power connector J2. The SMOD701 and SMOD711 require external power using the wall-mounted power supply included in the SMOD7xx Evaluation Kit; the SMOD707 can be operated using USB power only. To avoid small power spikes to the sensor heater at power up, apply external power before connecting the USB cable.

Connect the mini-USB cable from connector J3 on the SMOD7xx Smart Sensing Module to an available USB port on the user's computer. The Windows operating system will detect the presence of the module and install a virtual COM port driver enabling communication between the SMOD7xx Smart Sensing Module and the PC. Successful installation and operation of the driver can be verified through the *Module Info* indicator in the *SMOD7xx Application Software* (described in section 5) or at a more fundamental level in the *Ports* section of the *Windows Device Manager*.

Figure 3. SMOD7xx Evaluation Kit Interconnections
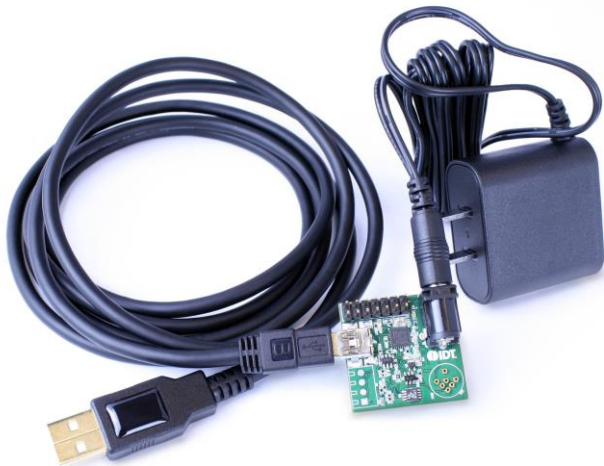
Note: The power adapter is not included in the SMOD707 Evaluation Kit.

5. SMOD7xx Application Software Operation

The application is launched from the *SMOD7xx Application Software* shortcut in the Windows Start menu. An example of the initial screen is shown in Figure 4. The GUI components are identified in Figure 4 and summarized in Table 4.
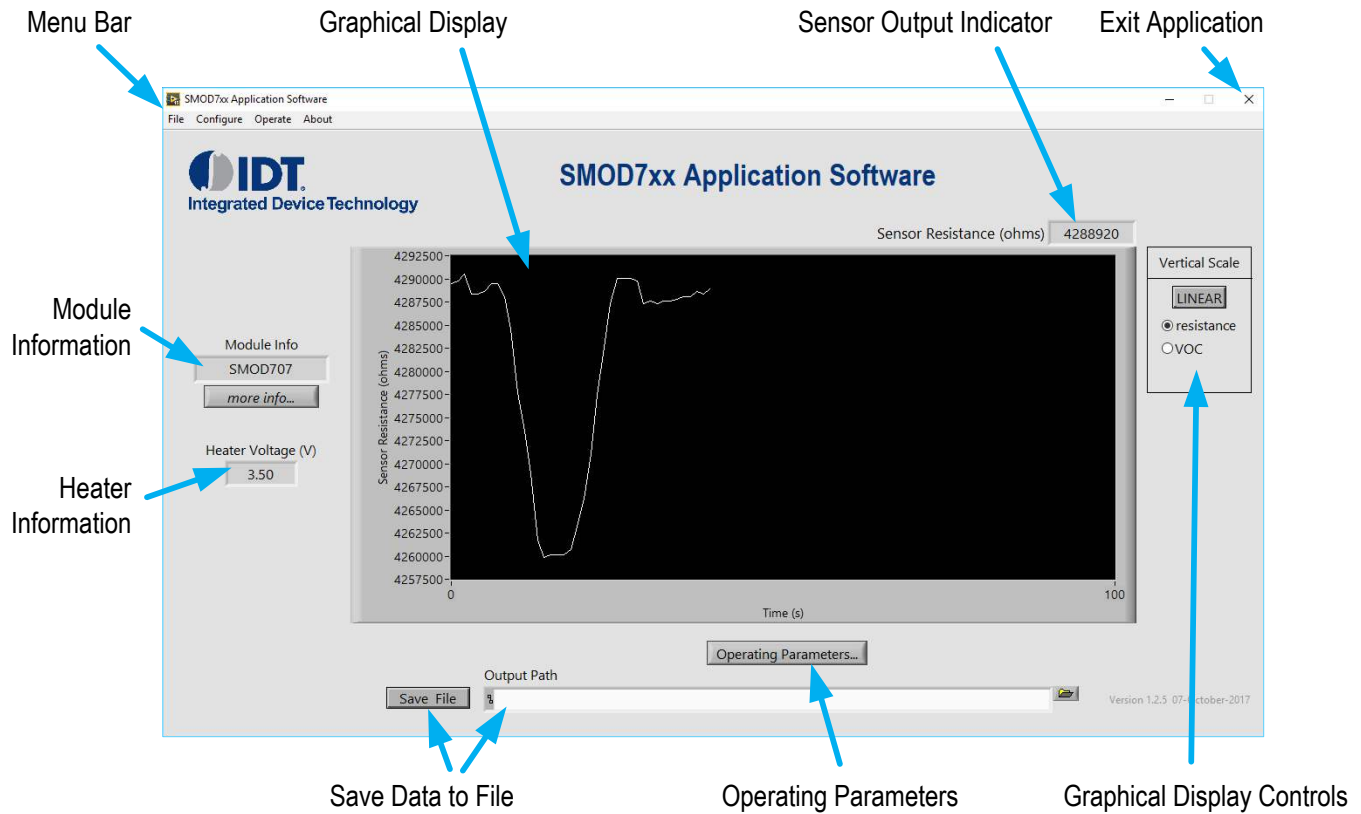
Figure 4.   Top-Level GUI Display

Table 4.   Top-Level GUI Components

Parameter Name	Description
Graphical Display	Display showing sensor output versus time
Graphical Display Controls	Allow alteration of sensor scale and output type for graphical display
Sensor Output Indicator	Numerical value of latest sensor output
Module Information	Connection and operating status of the SMOD7xx Module
Heater Information	Heater drive information
Operating Parameters	Opens a dialog window allowing setting sensor operating parameters
Save Data to File	Allows saving of sensor response data to a tab separated text file
Menu Bar	Access to additional functionalities and alternative methods for operating the GUI
Exit Application	Exit the software

5.1 Graphical Display and Graphical Display Controls

The graphical display shows the sensor output as a graph of sensor response versus time (in seconds). A display of the sensor output proceeds whenever an SMOD7xx is connected to the computer and stops when the SMOD7xx is disconnected. Right-clicking on the mouse cursor within the display area displays a context menu that allows setting the charting options as well as clearing the display. The "Vertical Scale" control section (see the example in Figure 5 using the SMOD707 VOC Smart Sensor) contains controls for manipulating the scale and output type for the vertical axis of the graphical display. The "Linear/Log" button toggles the vertical scale of the graphical display between linear and logarithmic output. The sensor response defaults to units of resistance (in ohms), but can be changed to gas concentration or other units if multiple output types are enabled during factory configuration of the SMOD7xx. If available, the sensor response units can be changed using the "radio buttons" below the "Linear/Log" button as illustrated in Figure 5 for the SMOD707 VOC Smart Sensor.

Figure 5.   Sensor Response Unit Selection
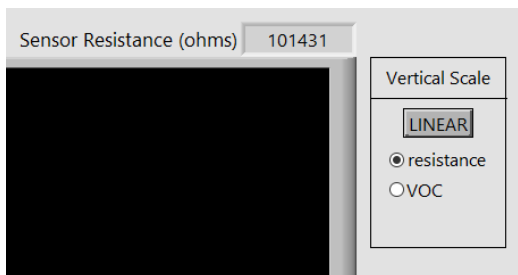
5.2 Module Information

The "Module Info" section shows the connection state of the application. If no SMOD7xx is attached to the computer, the indicator will read "No SMOD Attached." When an SMOD7xx is attached, the indicator will change to *SMOD7xx*, where *xx* is *01*, *07*, or *11*, indicating the type of SMOD7xx module attached as shown in Figure 4. If the application is unable to read from the SMOD7xx, the display will show "read error." Detection of connected SMOD7xx devices is automatic, and devices can be disconnected/reconnected repeatedly while the program is executing. Additional module information can be obtained by activating the "more info…" button, which displays the information window shown in Figure 6. A description of the individual items in this window is given in Table 5.

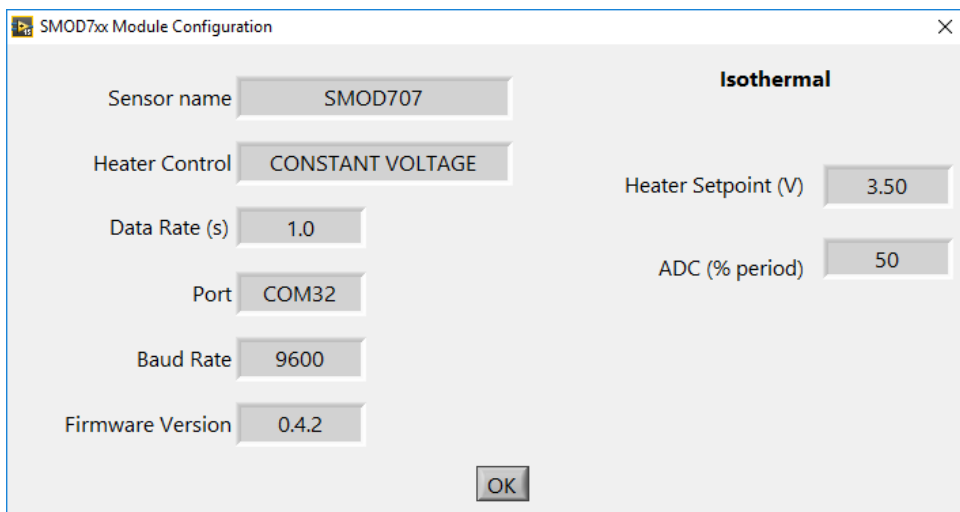**Figure 6.   Module Configuration**

Table 5.   SMOD2201 Log File Header

Parameter Name	Description
Sensor name	SMOD7xx type (SMOD701, SMOD707, or SMOD711).
Heater Control	The heater control type: CONSTANT CURRENT, CONSTANT VOLTAGE, CONSTANT POWER, or CONSTANT RESISTANCE.
Data Rate (s)	Length of time in seconds between data points.
Port	The COM port assigned by Windows to the USB virtual COM port.
Baud Rate	The baud rate used by the virtual COM port. SMOD7xx modules are assigned a fixed baud rate of 9600.
Firmware Version	The version number (major.minor.patch) of the SMOD7xx firmware.
Heater Setpoint (V)	The target heater set-point. The units change according to the heater control method; e.g. for CONSTANT POWER, the units will change from volts to mW.
ADC (% period)	The point within the data rate period (as a percentage) at which the sensor response is measured by the analog-to-digital converter (ADC).

5.3   Heater Information

The heater control drive value is shown in the middle left portion of the display (see Figure 4). The value will correspond to the drive method as shown in Table 6. SMOD7xx units are shipped with the drive control set to "Constant Voltage." When no sensor is inserted in the sensor socket, the "Heater Voltage" field will read approximately 4.5V (if USB powered) or 8.5V (if powered by J2) at any drive setting, indicating that the heater control circuitry is trying to drive current through the open circuit heater.

Table 6.   Heater Information Display

Drive Type	Displayed Value
Constant Current	Actual (measured) heater voltage in volts to two decimal places
Constant Voltage	Actual (measured) heater voltage in volts to two decimal places
Constant Power	Actual (calculated from voltage) heater power in mW to one decimal place
Constant Resistance	Actual (calculated from voltage) heater resistance in ohms to one decimal place

5.4   Modification of Sensor Operating Parameters

Activating the "Operating Parameters…" button displays a dialog window for selecting the heater voltage and data rate, as shown in Figure 7. The heater operating point can be set to values between 0 and 7.5V, defaulting to 5.4V, 3.5V, and 7.0V for the SMOD701, SMOD707, and SMOD711 respectively. The period (data collection rate) can be set to values between 1 and 60 (one point per second to one point per 60 seconds). Clicking "OK" causes the entered values to be programmed into the SMOD7xx Smart Sensor, and clicking "Cancel" causes any changes to be ignored.

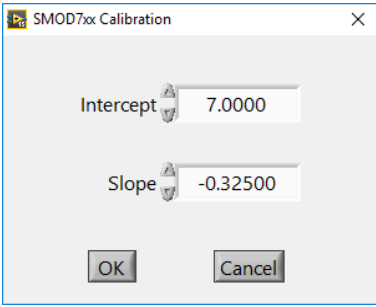**Figure 7.   Operating Parameters Dialog**
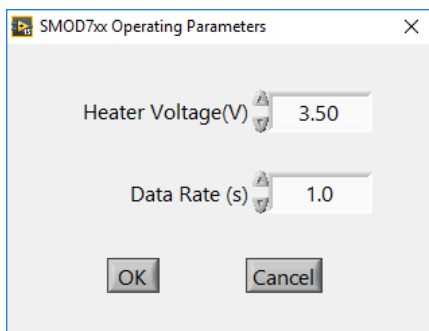
5.5   Save Data to File

The "Save File" button causes data to be saved to a tab separated file, one line per data point. The values in each line correspond to a time stamp, the actual heater voltage, and the sensor resistance. A valid filename must be entered into the "Output Path" entry field in order to save data to a file. If the "Save File" button is clicked with a blank or invalid filename, a warning will appear and no data will be saved. If the file does not exist, a new data file will be created. If the file exists, the new data will be appended to the existing file.

5.6   Menu Bar

The menu bar enables execution of less common tasks associated with the *SMOD7xx Application Software*. Operations available from the menu bar are described below for each menu item.

Table 7.   Top Menu Bar

Menu	Menu Option	Description
File	**Save File**	Provides an alternative means of activating the "Save File" button on the GUI.
	Exit	Exits the application.
Configure	**Info…**	Provides an alternative means of activating the "more info…" button in the GUI.
	Calibration…	Opens the dialog window shown below, which displays the gas sensor calibration constants presently contained within SMOD7xx non-volatile memory. Values are factory-set but can be altered and saved to the SMOD7xx using with this dialog. SMOD7xx devices might not be factory-configured for calibrated output; if this is the case, then this menu item and the associated dialog window will be disabled.
Operate	**Parameters…**	Provides an alternative means of activating the "Operating Parameters…" button in the GUI.
About	–	Displays an information window showing the version number and copyright information for the application.

5.7 Exiting the Application

The application can be terminated by activating the exit application button in the GUI (see Figure 4), or by selecting "File" > "Exit" from the top menu bar.

6. Kit Ordering Information

Orderable Part Number	Description and Package
SMOD701KITV1	SMOD701 Evaluation Kit, including the SMOD701 Smart Sensing Module, mini-USB cable, and wall-mounted 9V power supply; the kit software is available for download as described in section 3.
SMOD707KITV1	SMOD707 Evaluation Kit, including the SMOD707 Smart Sensing Module and mini-USB cable; the kit software is available for download as described in section 3.
SMOD711KITV1	SMOD711 Evaluation Kit, including the SMOD711 Smart Sensing Module, mini-USB cable, and wall-mounted 9V power supply; the kit software is available for download as described in in section 3.

7. Revision History

Revision Date	Description of Change
October 12, 2017	First release.

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