FSS, FSS-SMT, FSA, BASIC TBF, 1865, MICROFORCE FMA AND ABP2 SERIES

1.0 OVERVIEW

The Honeywell Sensor Evaluation Board (SEB) is an Arduino™ UNO stackable shield that allows evaluation of all Honeywell force sensors and ABP2 Series pressure sensors. Sensor capabilities can be demonstrated and evaluated. In some cases, the evaluation board can be used as part of a prototype.

The SEB, along with the readily available components shown in Table 1, and the free evaluation software, comprise a simple set of components used to evaluate the sensors listed in Table 2.

The SEB assembly allows the user to obtain sensor readings without needing to develop any code. The Desktop Application controls the Arduino board to take sensor readings and display them on the screen.

The readings may also be recorded to a .csv file for further analysis.

Sensors can be mounted on the SEB break-away cards and wired to the SEB main board via jumper wires, or sensors can be connected to SEB main board directly using jumper wires

2.0 SEB AND USER-PROVIDED COMPONENTS
2.1 Assemble Components shown in Table 1.

Create required assembly from the components shown in Table 1.

HONEYWELL SENSOR EVALUTION KIT, SEB	
Includes: • Sensor Evaluation Board	

USER-PROVIDED COMPONENTS				
Arduino Microcontroller Board Arduino UNO (A000073)	USB Interface Cable USB Cable (538-68768-0401)	Jumper Wires (for use with remote connections) Jumper Wires (377-2264-ND)	Honeywell Force Sensors 	Honeywell ABP2 Pressure Sensors

Honeywell

Sensor	Description
FSS Series	The FSS Series force sensor provides precise, reliable force sensing performance in a compact, commercial-grade package. The sensor features a proven sensing technology that uses a specialized piezo resistive, micromachined silicon sensing element. The low power, unamplified, uncompensated Wheatstone bridge circuit design provides inherently stable mV outputs over the force range. https://sps.honeywell.com/us/en/products/sensing-and-iot/sensors/force-sensors/fss-series
FSS SMT Series	Honeywell FSS-SMT Series force sensors are unamplified, uncompensated sensors. This low profile surface mount technology (SMT) sensor allows for automated assembly on a printed circuit board. https://sps.honeywell.com/us/en/products/sensing-and-iot/sensors/force-sensors/fss-smt-series
FSG Series	The FSG Series force sensor provides precise, reliable force sensing performance in a compact commercial-grade package. The sensor features a proven sensing technology that utilizes a specialized piezoresistive micro-machined silicon sensing element. The low power, unamplified, non-compensated Wheatstone bridge circuit design provides inherently stable mV outputs over the 5 N, 10 N, 15 N and 20 N force ranges. https://sps.honeywell.com/us/en/products/sensing-and-iot/sensors/force-sensors/fsg-series
FSA Series	The FSA Series are piezoresistive-based force sensors offering a ratiometric analog or digital output for reading force over the specified full scale force span and temperature range. They are fully calibrated and temperature compensated for sensor offset, sensitivity, temperature effects and nonlinearity using an on-board Application Specific Integrated Circuit (ASIC). Direct mechanical coupling allows for easy interface with the sensor, coupling with tubing, membrane or a plunger, providing repeatable performance and a reliable mechanical interface to the application. https://sps.honeywell.com/us/en/products/sensing-and-iot/sensors/force-sensors/fsa-series
Basic TBF Series	Basic TBF Series force sensors are small flush diaphragm pressure sensors designed for customers who require a simple device for applications where media compatibility and low trapped volume are important. The TBF Series is an unamplified, but compensated sensor. https://sps.honeywell.com/us/en/products/sensing-and-iot/sensors/force-sensors/basic-tbf-series
1865 Series	The 1865 Series is a high-performance transducer specifically designed to address the needs of medical and specialized OEM applications. Offering laser-trimmed compensation, these products may be specified to operate with either a constant current or voltage supply. The 1865 Series is a compensated, unamplified series. https://sps.honeywell.com/us/en/products/sensing-and-iot/sensors/force-sensors/1865-series
Microforce FMA Series	The FMA Series are piezoresistive-based force sensors offering a digital output for reading force over the specified full scale force span and temperature range. They are fully calibrated and temperature compensated for sensor offset, sensitivity, temperature effects, and nonlinearity using an on-board Application Specific Integrated Circuit (ASIC). The FMAMSDXX015WCSC3 is available on a breakout board. https://sps.honeywell.com/us/en/products/sensing-and-iot/sensors/force-sensors/microforce-fma-series
ABP2 Series	The ABP2 Series are I²C or SPI digital output sensors available in pressure ranges of 4 in-H_2O to 175 psi. They are fully calibrated and temperature compensated for sensor offset, sensitivity, temperature effects and non-linearity using an on-board Application Specific Integrated Circuit (ASIC). https://sps.honeywell.com/us/en/products/sensing-and-iot/sensors/pressure-sensors/board-mount-pressure-sensors/basic-abp2-series

Board Name	Supported Sensors	Interface/Output
SEB	FSA	Analog
	FSA	I²C, SPI
	Microforce FMA	I²C, SPI
	FSS	Analog
	FSG	Analog
	1865	Analog
	TBF	Analog
	ABP2	I²C, SPI

2.2 Review Sensor Connection Methods

(Please note that a white dot on the card indicates connector pin 1, or pin 1 of the sensor being inserted on the break-away card.)

Part 1 – Break-away Cards (Pinout): Mount sensors directly on the SEB main board break-away cards. This allows the sensor to be tested in the normal mounting means. Use the jumper wires to match pins from the break-away card to the appropriate port and equivalent pins on the SEB (see Part 2 table). Please see the Honeywell Technical Note for the recommended SMT handling procedure for additional soldering instructions such as stencil design, etc. Please consult the FMA Series datasheet for availability for a break-out board that greatly simplifies sensor mounting and provides an in-lead termination to assist in connecting to the device.

1865 and TBF Break-away Card

	1	Vs
	2	1865_OUT+
	3	1865_OUT-
P1	4	TBF_OUT+
	5	TBF_OUT-
	6	GND

Microforce FMA, FSS, ABP2 Break-away Card

	1	Vs
	2	FSS_OUT+
	3	FSS_OUT-
	4	FMA, ABP2 SS
P3	5	FMA, ABP2 SCLK/SCL
	6	FMA, ABP2 MOSI/SDA
	7	FMA MISO
	8	GND

Part 2 – SEB Main Board (Pinout): Connect sensors to the SEB main board using jumper wires from pins on the break-away cards, or directly to legs on the sensor. This could be for proof of concept in preparation for testing/implementation with a break-away card.

Header	Associated Sensor
P2	1865 & TBF
P4	FMA and FSS Series
P5	FSG Series
P6	FSA Series Analog
P7	External Power Supply
P8	FSA Digital

1865 and TBF Pinout

	1	Vs
	2	1865_OUT+
	3	1865_OUT-
P2	4	TBF_OUT+
	5	TBF_OUT-
	6	GND

Microforce FMA, ABP2, FSS Pinout

	1	Vs
	2	FSS_OUT+
	3	FSS_OUT-
	4	FMA SS
P4	5	FMA SCLK / SCL
	6	FMA MOSI / SDA
	7	FMA MISO
	8	GND

FSG Series Pinout

	1	Vs
P5	2	FSG_VOUT+
	3	FSG_VOUT-
	4	GND

FSA/FSA Analog Series Pinout

	1	Vs
P6	2	VOUT
	3	GND

External Power Supply Pinout

P7	1	External Vs
	2	GND

FSA Digital Pinout

	1	GND
	2	Vs
P8	3	SS
	4	MISO/SDA
	5	SCLK/SCL

2.3 Connect the sensor to be evaluated to the SEB Main Board

Connect the sensor to the break-away card, then with jumper wires to the SEB main board using pinout from section 2.2. Or, it can also be connected directly from pins on the sensor to be tested to the appropriate header on the SEB main board using pinout from section 2.2.

Figure 1. SEB

Primary Side

Secondary Side

Main Board

Main Board

Break-away Cards

Break-away Cards

2.4 Connect the SEB to the Arduino UNO

Place the SEB over the Arduino Uno board and align all pins and sockets. Gently press both boards together until the SEB is seated on top of the Arduino board (see Figure 2 below).

Figure 2. SEB Arduino Assembly

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3.0 SOFTWARE INSTALLATION

3.1 Installation of PC and Laptop Software and Drivers or Smartphone App

The desktop application installation includes necessary software drivers for the Arduino UNO board.

Please follow these instructions to obtain and load the required software.

Before installing, be sure to remove any earlier versions by using the uninstall programs feature on your computer.

3.1.1 System Requirements

- Operating system – Microsoft® Windows® 7 or Windows® 10, 64 bit

- The screen must support and be set for a resolution of 800 x 600 or higher

3.1.2 Loading PC or Laptop Software and Device Drivers

This step is required only when the SEB assembly is connected to a USB port for the first time.

1. Connect the Arduino/SEB assembly to the PC or laptop. Refer to Table 1 and sections 2.3 and 2.4 to identify correct Arduino board and USB cable.

2. Download the required SEB software and device drivers from the following URL:

   https://sps.honeywell.com/us/en/products/sensing-and-iot/sensors/sensor-evaluation-kits/sensor-evaluation-kits

3. Unzip the downloaded file to a location on the computer or laptop.

4. Navigate to that location, open the subfolder named ArduinoDrivers, and find the correct setup file:

   - dpinst-amd64.exe - for 64-bit system
   - dpinst-x86.exe – for 32-bit system

5. For most computers, the drivers will load automatically. But if this is an issue, please perform the following steps. Otherwise, go to step 3.1.2d.

6. Load Arduino drivers by right-clicking the correct file and selecting Run as administrator.

Figure 3.1.2a. Run Arduino Driver Setup
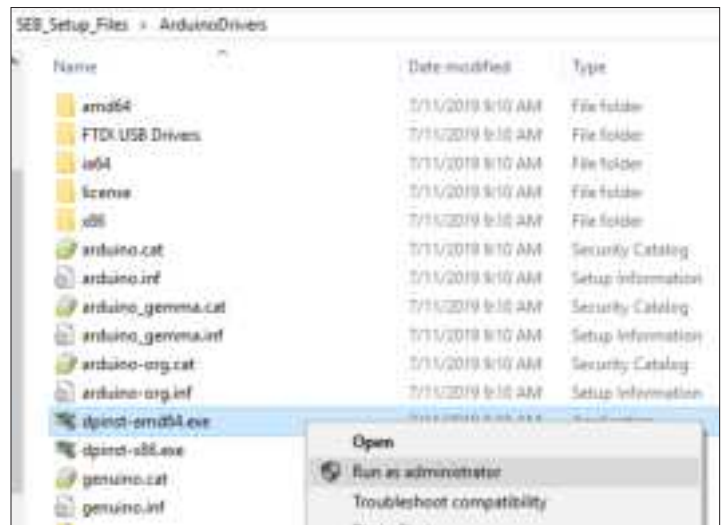
If asked to Accept a license agreement, select the radio button and click Next.

7. At the Welcome screen, click Next.

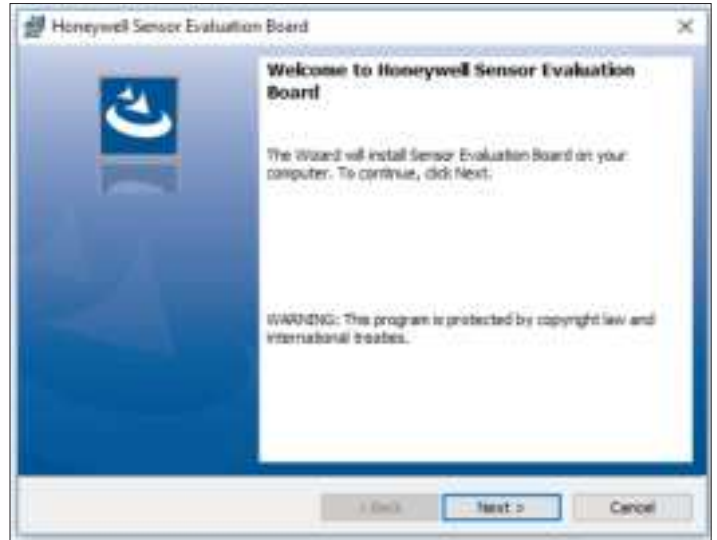**Figure 3.1.2b. Device Driver Welcome Screen**

8. Allow the device driver installation to run. Drivers will display as Ready to use when installation is complete. Click Finish.

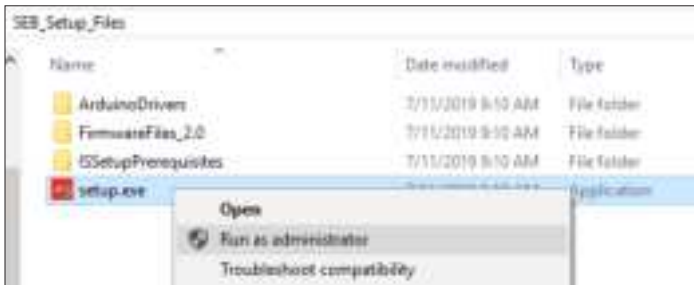**Figure 3.1.2c Device Driver Installation Completion**

Figure 3.1.2e. Installation Welcome Screen

9. Return to the main install folder. Right-click the Setup.exe file, and select Run as administrator to start the Desktop Application installation.

Figure 3.1.2d. Run Setup.exe in Administrator Mode

10. Observe the Welcome screen, and click the Next button.

11. Click the Complete radio button to install all program features and drivers, then click the Next button.

To modify any of the defaults, such as installation directory, click the Custom radio button and then click the Next button. Make modifications as desired and continue.
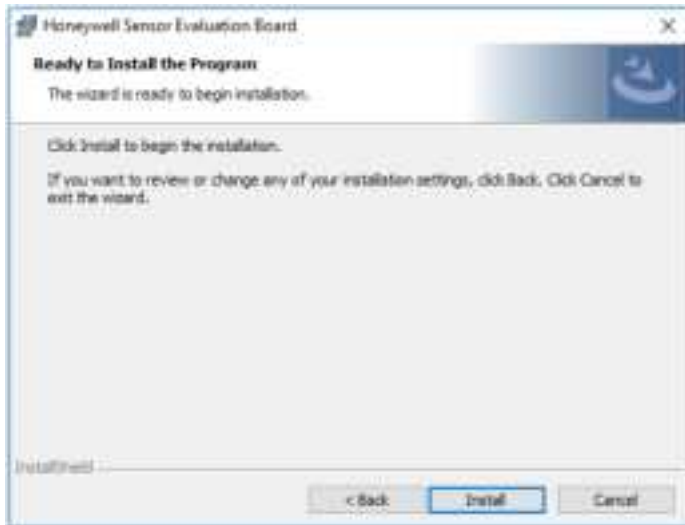
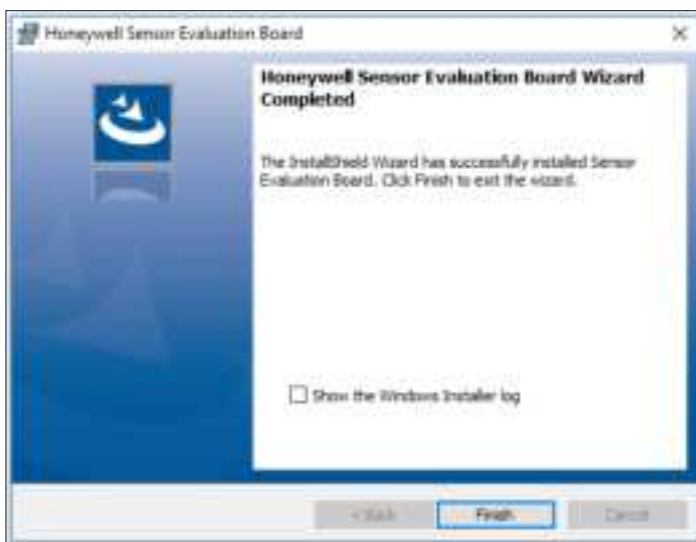**Figure 3.1.2f. Continue Installation**

12. Observe the Ready to Install screen, and click the Install button.

Figure 3.1.2g Desktop Application Ready to Install

13. The Desktop Application install completes. Click the Finish button.

Figure 3.1.2h. Desktop Application Install Complete

3.2 Launch the Desktop Application

3.2.1 Verify Connections

1. Using the desktop application, verify that the SEB assembly is connected to the PC or laptop.

3.2.2 Launch Application

1. Using a PC or laptop, launch the Sensor Evaluation Board desktop application on the PC.

4.0 USING THE SOFTWARE

4.1 Sensor Selection

• If device drivers were loaded during initial setup, the desktop application recognizes the SEB assemply.

• When the desktop application automatically recognizes the SEB assembly, it also selects it as the Host Board Type.

• The Device Status will show green rather than red to indicate the application is communicating with the assembly.

• Arduino firmware is verified by the desktop application, which also gives a provision to flash the current or new version if desired. Flashing firmware isn't necessary if version is correct.

The firmware flashing can be found under flashing detail in the pull down to the right and is initiate by clicking on the browse and flash firmware . The path is then selected by the user to the location it was saved on the hard drive (see Table 5).

Step	
1.	
	• Connect SEB assembly to PC or laptop
	• Open desktop application
	• Verify correct Host Board Type appears and that Device Status light is green. Select correct Host Board Type, if necessary
2.	
	• If desired part number configuration appears as a recent Part Number selection, select it
	• Otherwise, select Force or Pressure from the Sensor Type drop down

Step	
3.	
	• Select desired series from the Sensor Series dropdown.
4.	
	• Click in the Part Number field
	• Start entering desired part number. As you type, valid part numbers appear in a drop down
	• Pick the desired listing. Appropriate options appear. A description of the part number shows in the window, select from the drop down menu
	• Complete missing option selections, or change existing ones. This includes SEB power supply, and required test settings under Settings
	• Click Apply Configuration

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Step	
1.	
	• Start and run the test using the bottom of the Sensor Data window. Start, stop and save data for comparison with other test runs

Step	
1.	
	Verify and flash SEB software to the Ardunio board anytime using the firmware details option on the desktop application input panel.
	• Open the option to view the firmware version currently running on selected Host Board Type
	• Select Browse And Flash Firmware to re-flash the current version, or flash an update
	• Occasionally, firmware updates may be released to the website. Download the necessary .Hex file for use with this flashing application

Function	Description
Sensor Type	Select **Sensor Type** from the drop-down menu.
Sensor Series	Select the Sensor **Series** from the drop-down menu
Part Number	<u>Slowly</u> begin to enter the part number of the sensor to be evaluated until all but the last several digits appear. Then, select the final part number from the remaining drop-down list. After the part number appears, click on the SUBMIT button *(Note: Do not enter the entire part number or copy/paste it into the field. The part number must be selected from the drop-down list.)*
Serial Number	Not used
Recent Selections	If applicable, a part number may be selected from this list directly. It is not necessary to enter the sensor type or series first

Function	Description
Output Data Format	Selects engineering units or raw counts for measurement
Auto Zero	Enable Auto Zero; Identify samples taken before Auto Zero, and choose Data Rate (per second) from drop down

Function	Description
About this software	Provides software revision number and release date

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DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠ **WARNING**
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- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

For more information

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