

# EK-HV-S/C Evaluation Kit

## Differential Pressure Sensor for HVAC Applications

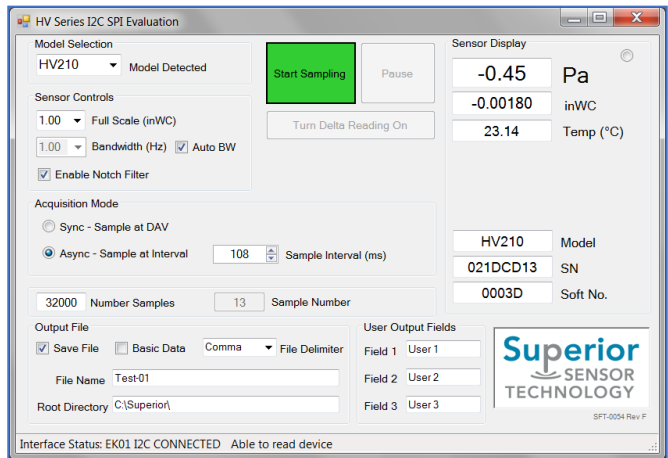
### 1. Overview

This evaluation kit is designed to exercise the programmable features of the HV Series Pressure Sensors. It also allows exercising the data acquisition mode by the host (asynchronous/synchronous) and provides a mechanism to record a sensor output trace file.

The software supports commands to the four HV-Series products, HV120, HV110, HV210 and HV160.

Additional features of the evaluation software include user defined data fields. These fields allow the user to enter in test conditions while data acquisition is paused. These entered values are recorded in the trace file so the user can easily coordinate the test data with the conditions of the test.

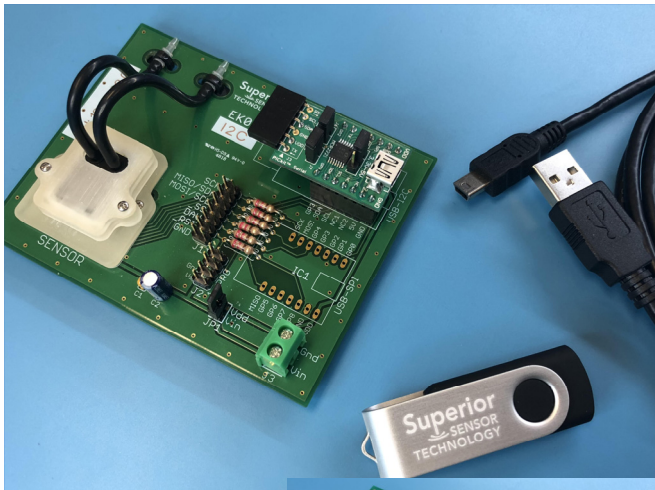
### Evaluation Software



### 2. Contents

The following items are included in evaluation kit.

- Included Sensors
  - HV210 (1 ea, pre-mounted on evaluation board)
  - HV110 (1 ea)
  - HV120 (1 ea)
- Evaluation Hardware



*I<sup>2</sup>C Interface (above)*

*SPI Interface (right)*

The type of interface that your board has been configured with is indicated in the label space below the label "EK01".



### ▪ Screw Driver Set



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## 3. Setup

### Outline

- Install Software
- Install Pneumatic Set
- Connect USB Cable
- Run Program

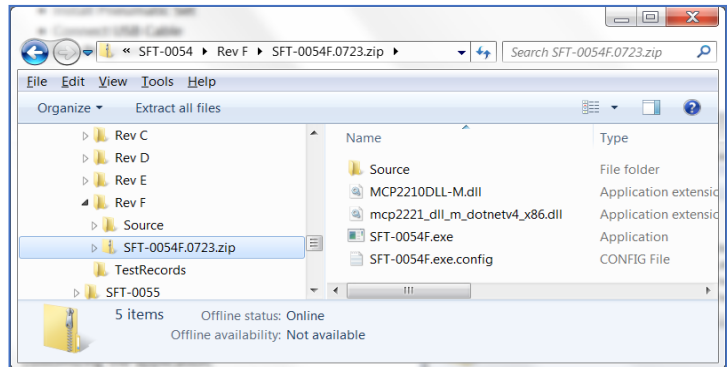
### Software Installation

The memory stick contents include the evaluation executable and the associated DLL's (MCP2210DLL-M and MCP2221\_dll\_m\_dotnetv4\_x86).

A zip file **SFT-0054F.0723.zip** includes the executable and required files for running the application.

No specific installation is required, just transfer the contents of the zip file to a directory of your choice and double click on the executable. **NOTE: ALL FILES (OTHER THAN THE SOURCE DIRECTORY) ARE REQUIRED FOR THE APPLICATION TO RUN.**

Source code is also provided for those having interest in customizing the application.

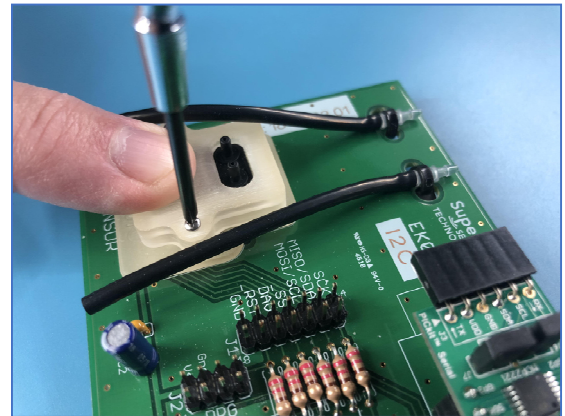


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## Sensor Installation/Removal

A pressure sensor comes pre-installed in the evaluation board. Any of the included sensors may be installed using the following instructions.

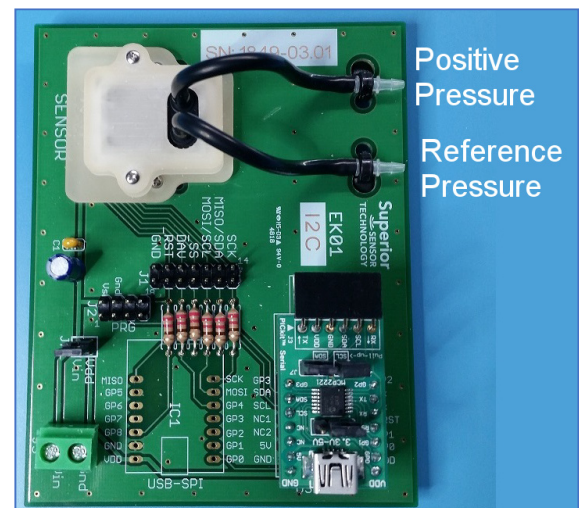
Install a sensor by removing the sensor fixture cover, removing the existing sensor, and placing the sensor into the fixture. While holding down the sensor and cover in place, screw the sensor cover down with both screws. It is not necessary to tighten the screws more than to a point where they seat since the sensor holder has integrated spring contacts.



## Installing the Pneumatic Set

The black silicon tubing attaches to the pressure sensor ports (as shown). The tubes are connected to a 1/16" coupling for convenient pneumatic connection.

The positive and reference pressure sources are illustrated in the photo to the right (*I<sup>2</sup>C Interface shown*).



## Connecting the USB Cable

Connect the USB cable as normal. The hardware should be recognized and automatically load the HID software.

**NOTE: IT HAS BEEN FOUND THAT THE INTERFACE ADAPTER HAS A CAPACITANCE LOAD ON THE USB POWER SUPPLY THAT IS IN EXCESS OF THE SPECIFIED 10UF LIMIT. THIS CAPACITANCE IN CONJUNCTION WITH THE SENSOR ON-BOARD CAPACITANCE CAN CAUSE THE USB DEVICE TO BE UNRECOGNIZED WHEN PLUGGED IN. THIS BEHAVIOR WILL DEPEND ON THE SPECIFIC USB CHIPSET USED IN THE TARGET COMPUTER. IF THIS IS THE CASE WITH YOUR INSTALLATION, IT IS SUGGESTED TO REMOVE JUMPER JP1 (POWER CONNECTION TO THE SENSOR), PLUG IN THE USB CABLE, THEN RE-INSTALL JP1. THIS WILL BRING THE CAPACITANCE LOAD UP IN SEQUENCE.**

## Running the Acquisition Application

Double click the application SFT-0054F-Evaluation-SPI-I2C.exe to start the application. Again note, the provided DLL's must be in the same directory as the application.

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## 4. Software Usage

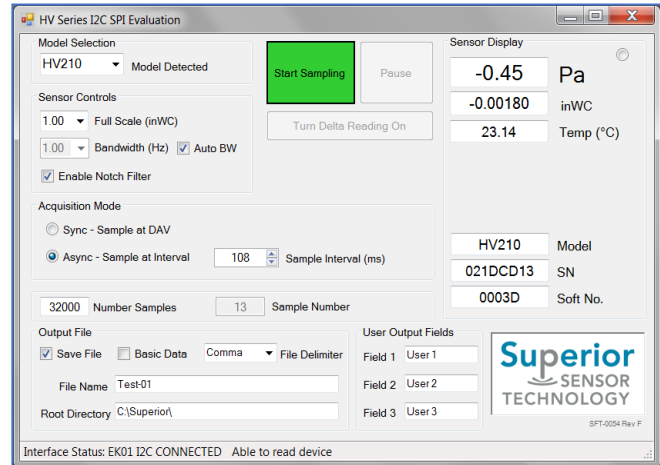
The application is divided into three interface groups, a command button set, and a pressure display region. In general, the application will only enable the controls which are available depending on the current state of the application. This is intended to help limit usage ambiguity by limiting the controls to only those available.

### Model Selection Group

The Model Selection group selects the specific sensor model being evaluated. The sensor model will appear in the Model Selection control upon being detected. If the sensor is not automatically detected, please select the appropriate sensor model so that the appropriate range and bandwidth information is communicated to the sensor.

### Sensor Controls Group

The Sensor Controls group manages the byte sent to the sensor for setting the sensor Mode Register (see Control Registers section in DS-0001). This control manages the sensor full scale range, bandwidth and notch filter enable/disable.



### Acquisition Mode Group

The Acquisition Mode group manages the byte sent to the sensor for setting the Rate Control Register as well as the specific data acquisition mode used by the Evaluation Software. This group also has the control for setting the total number of samples to be acquired.

The Sync/Async radio buttons control the data acquisition mode of the evaluation application. When the Sync button is set, the application will wait until the DAV line is set high (indicating new data available) before acquiring the next sensor output reading. If the Async button is set, the application will time the data acquisition according to the Sample Interval up/down box.

The DAV Divisor up/down box sets the value sent to the sensor for setting the Rate Control Register. This control is available in the Sync acquisition mode.

The Sample Interval up/down box controls the sample interval. This feature is available in the Async acquisition mode.

The Number Samples control box sets the number of samples to be acquired before automatically stopping the acquisition.

### Output File Group

The Output File group allows the user to enable the saving of a trace file during acquisition, and specifying both the root directory and file name of the trace file.

The Basic Data check box is for outputting only very basic pressure response information in the trace file. This can be used for applications requiring only single column output data.

A File Delimiter combo box is available to select either comma or semicolon delimited data trace file. The default is a comma delimited file.

The acquisition application automatically appends a ".csv" extension on the file name so no extension is necessary.

### Interface Status

The Interface Status Label tells the user if the interface has been detected. It also indicates the ability to read the part. If there are no interfaces detected, the software will poll for an interface at one second intervals. The dll does not support multiple devices connected to the computer. Therefore, no more than one interface should be plugged into the computer at any given time, otherwise the software will not function properly.

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## File User Fields Group

The File User Fields group allows the user to add user comments (or test conditions) to the trace file. The usage case for the fields would be to pause the data acquisition while the test conditions are being changed, enter in the desired information into the user fields (three fields available) such as pressure, temperature and other comment, then resume the data acquisition. Since the user data fields are recorded in the trace file, it is easier to correlate the test conditions to the sensor output for analysis.

## Sensor Display – Model, SN, Soft No.

The Sensor Display area contains the output of the sensor’s pressure reading along with the detected type of sensor, its serial number, and the version of software running on it.

## Control Buttons

- Start Sampling - Starts the sampling of data from the sensor using the current application settings.
- Pause - Pauses the data acquisition, and allows the operator to change application settings. The pause button reverts to a Resume button for the resumption of data acquisition. Since the application controls can be changed when paused, a single trace file can have multiple full scale ranges, bandwidths or acquisition modes. *NOTE: SINCE A CHANGE IN THE SENSOR CONTROL REGISTERS TAKES ONE ACQUISITION CYCLE TO TAKE EFFECT, THE FIRST DATA ACQUISITION VALUE IS IGNORED AFTER RESUMING SAMPLING, AND THE TRACE WILL SHOW THE SECOND SAMPLE ONWARD.*
- Stop - Stops the data acquisition, then closes the trace file if enabled.
- Delta Reading Off/On - The Delta Reading button causes the application to re-reference the sensor output by capturing the current display value, and subtracting it from subsequent readings. When Delta Reading is enabled, the reference values are also displayed for convenience. Pressing the Delta Reading button a second time will cause the application to revert to normal displaying of the acquired data.

## 5. Other Considerations

### Alternate Power Supply

If it is desirable to use an external supply, the supply voltage can be applied to pins 1 and 2 of J3. In this case, remove jumper JP1 to isolate the external supply from the supply on the evaluation hardware.

### Measuring Device Current

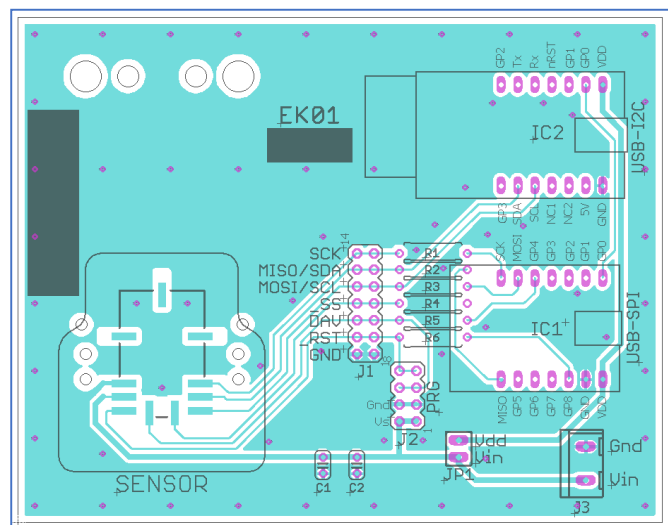
Sensor current can be measured by removing JP1, and inserting a current meter across the pins of JP1. *NOTE: This method of supply current measurement is only available when using power from the USB interface.*

### IR Sensitivity

The black silicon tubing was selected to block the visible light from entering the ports. The light sensitivity of silicon piezoresistive pressure sensors is quite commonly known. Due to the high dynamic range of the sensor, light entering the ports while running the sensor on the bench can be observed. The black tubing is designed to mitigate this effect for bench testing.

## 6. Sensor Specifics

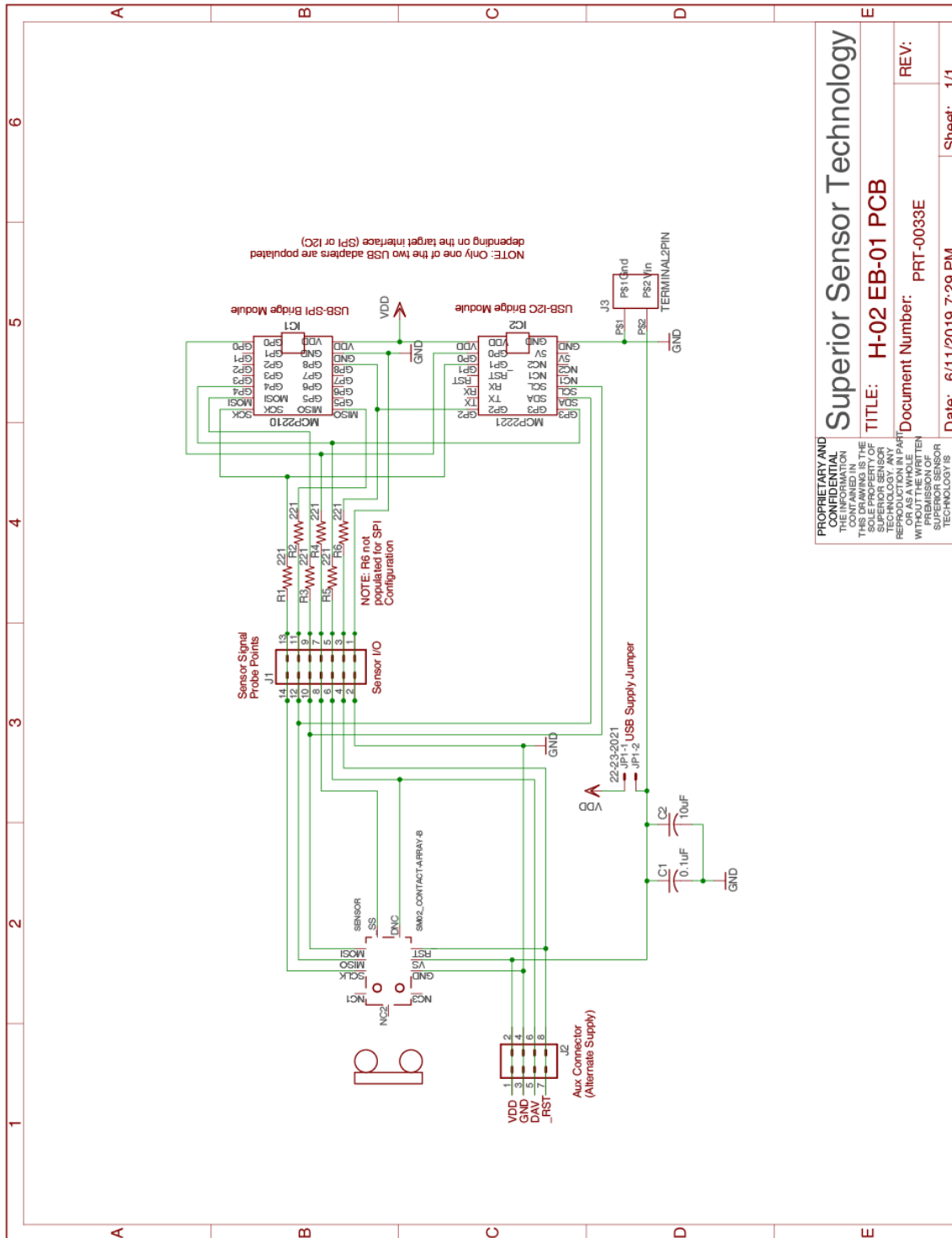
Refer to DS-0001 (included on the memory stick) for a system overview, interface details as well as technical specifications of the installed sensor.



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## 7. Attachments

### Att-01 Interface Adapter Schematic



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