

**Frequency–Flow–Contact–Event–Counter and
Ambient Temperature sensor to USB Output
Model LFS108E**

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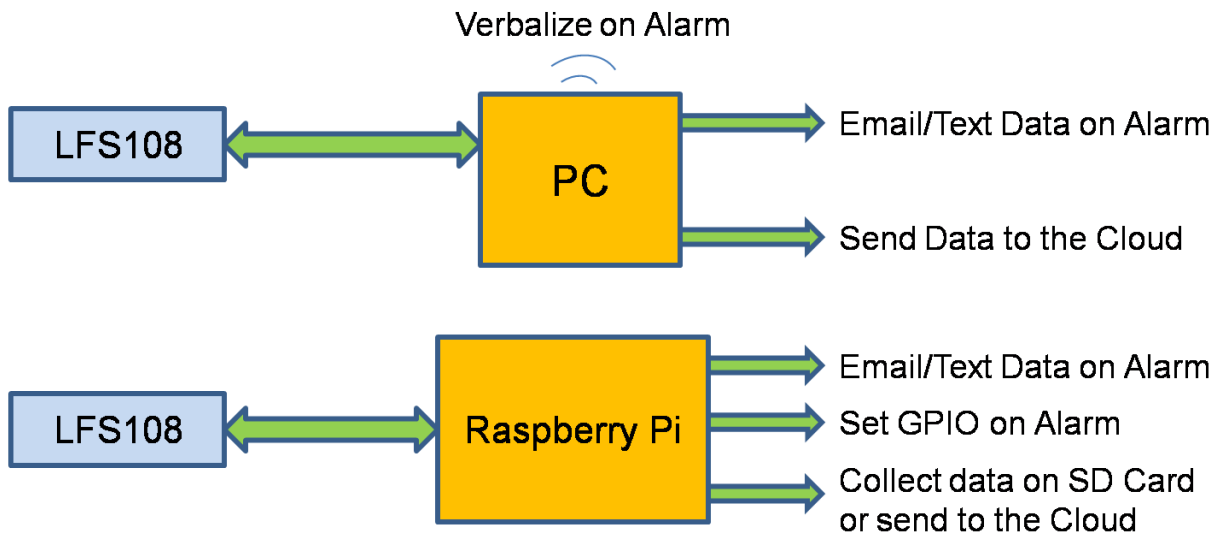
Quick Start

To quickly setup and start your board, follow the steps below:

- Download the software (LFS108E.zip) from the website to your desktop.
- Unzip the file. Run setup.exe to install the software.
- Connect the board to your Frequency/Flow input. See Figure 1.
- Connect the board to your PC USB port via USB cable provided.
- The PC should recognize the board and install the USB drivers. Otherwise, go to Device Manager/Ports to install the USB driver which is located on your desktop.
- Now you can run the PC software and communicate with the board.

Other Options

If you are not using a PC, you can connect the board to a Raspberry Pi computer board. Communicate with the board using the sample Python code provided. You can collect data from the board, or send data to the cloud, email data on alarm, etc.



1- Introduction

LFS108E is a Frequency-Flow-Contact-Event-Counter and ambient temperature sensor to USB output. First, install the application software. Simply download the software from the web site LookingForSolutions.com. Save the zipped file (LFS108E.zip) onto your desktop. Unzip the file. Run setup.exe to install the software. The software will place a shortcut of the program on the desktop. Save the USB driver directory (from the zipped file) on the desktop.

Second, connect the board to your PC USB port with the cable provided. The PC will recognize the board and will start installing the USB drivers. You can view the COM port by going to the Device Manager/Ports. You can also install the USB drivers from the Device Manager/Port/Driver/Update Driver and point the PC to the USB driver directory on the desktop. Now you can run the software from the shortcut on the desktop.

Figure 1 shows how to connect frequency / flow input (5V Square Wave), or switch contact to the board terminal block. **Please check the polarity and the voltage level of your signal before connecting to the board terminal block. Applying a voltage larger than 5V could damage the board.** Figure 2 shows the main screen for frequency input. You can set the COM port and the Chart Speed (Time interval per data point) from the drop down menus. Click the Start button. The program asks for the name of data file to be saved. You can name your data file (Filename.txt or Filename.csv) and the location where you want to save it. Click the Save (or Cancel) button. The program will start reading and displaying the frequency or Contact input and ambient temperature from the board and provides a line graph of the two parameters. It also shows the model number of the board (LFS108E) and the running Elapsed time.

The program keeps track of the Maximum and Minimum values of the frequency and the ambient temperature since the start of the session which can be reset individually by pressing the corresponding Reset button. The frequency and the temperature can be displayed in different engineering units by pressing the engineering unit button. You can display High & Low alarm lines over the two line graphs.

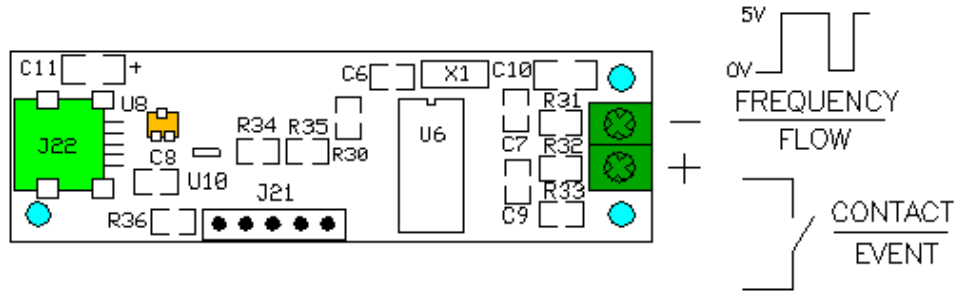


Figure 1 – Wiring connection to the board

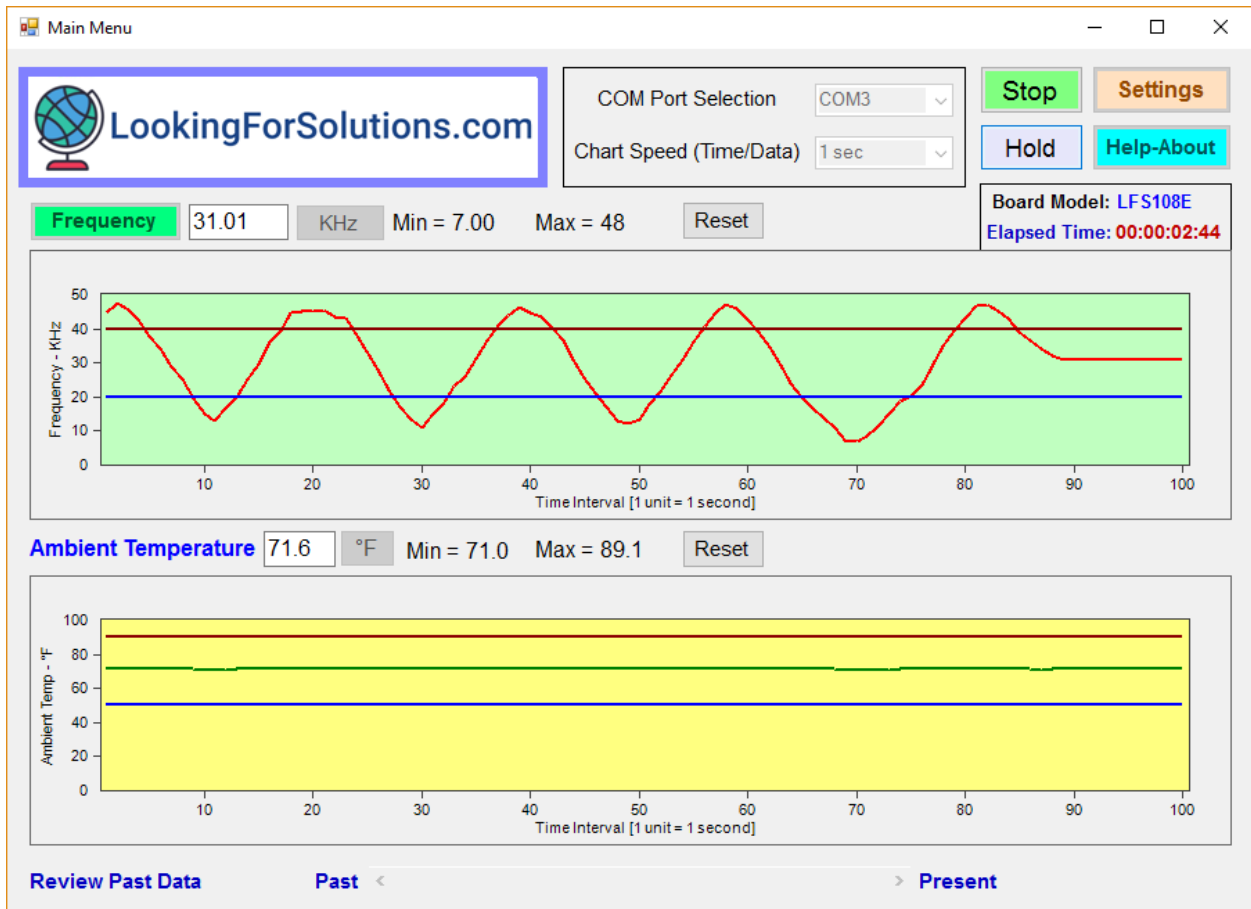


Figure 2 – Main Screen, Frequency Input – Real Time

Review Past Data - Clicking the Hold or Stop button will stop the monitoring. You can now review the past data by scrolling through the line graphs back and forth in time as shown in

Figure 3. Clicking the Hold button temporarily will stop the monitoring, you can continue by clicking the Go (Same) button. Clicking the Stop button will stop the monitoring permanently. You will need to start a new monitoring session by clicking the Start button.

When saving a data file (.txt or .csv), the program opens a file and saves up to 20,000 sets of data with date/time stamping, before closing the file and opening a new one.

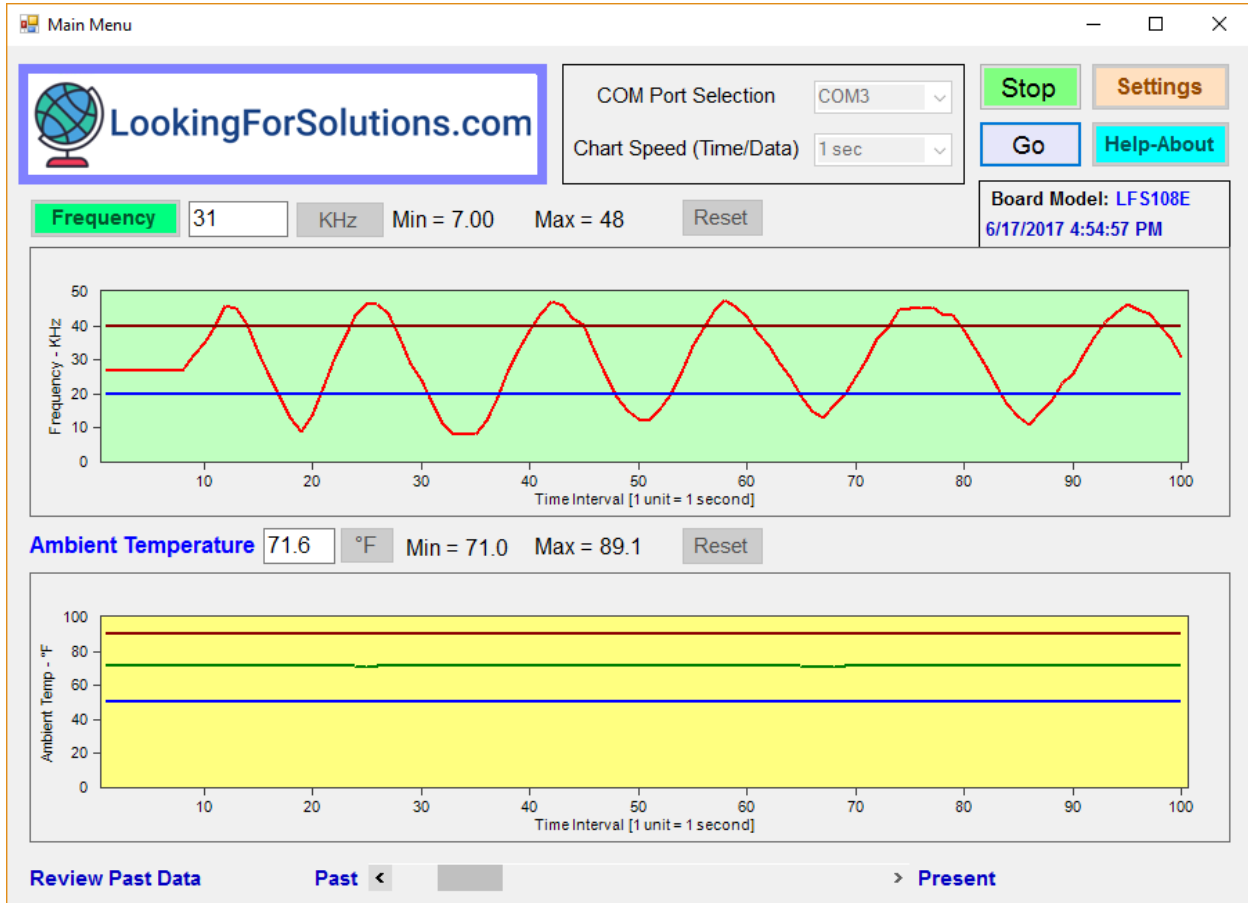


Figure 3 – Main Screen – Review Past Data

Flow Measurement – You can measure flow rate and volume flow (Totalize) by measuring the frequency output of a paddlewheel flow sensor and the K factor. You can reset the totalize value at any time by clicking the Reset button. Figure 4 shows the main screen of flow measurement and ambient temperature. Figure 5 shows a typical flow measurement application.



Figure 4 – Main Screen, Flow Measurement – Real Time

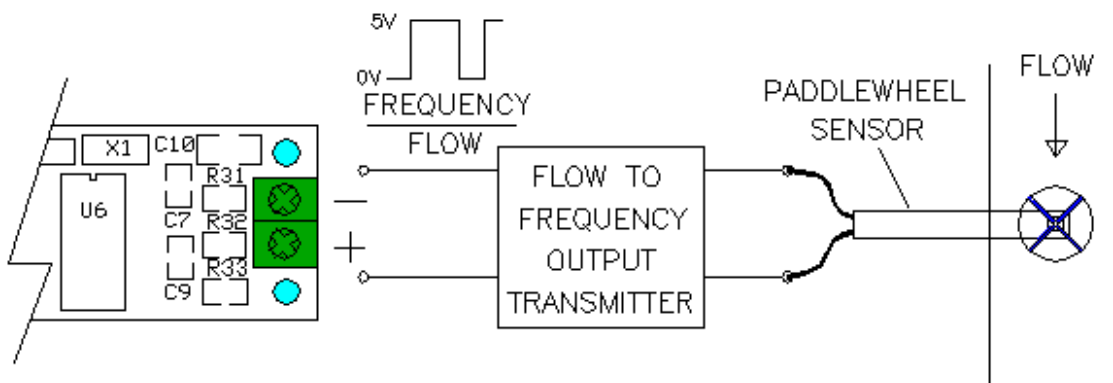


Figure 5 – Typical Flow Measurement Application

Contact / Event – You can measure and record as a time stamped event - digital inputs, mechanical or electrical contact closures from external sensing devices. Event trigger can be set as Rising Edge, Falling Edge, or Change State in the settings menu. Figure 6 shows a typical Contact/Event measurement application. Figure 7 shows the contact/event main screen.

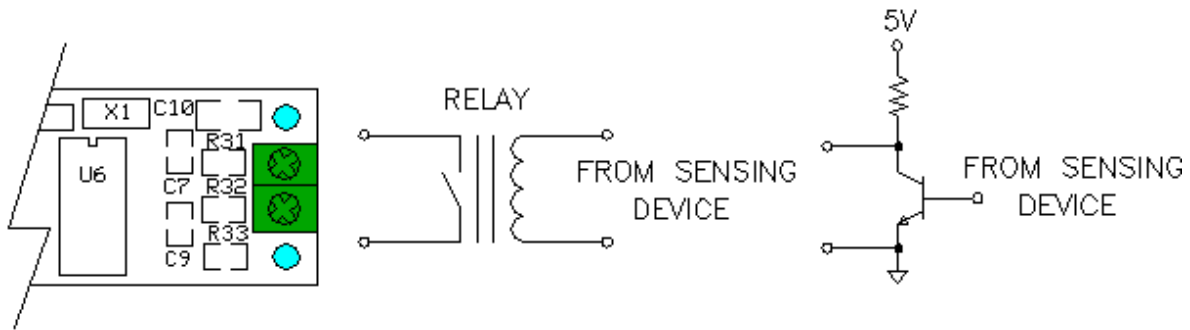


Figure 6 – Typical Contact / Event measurement application

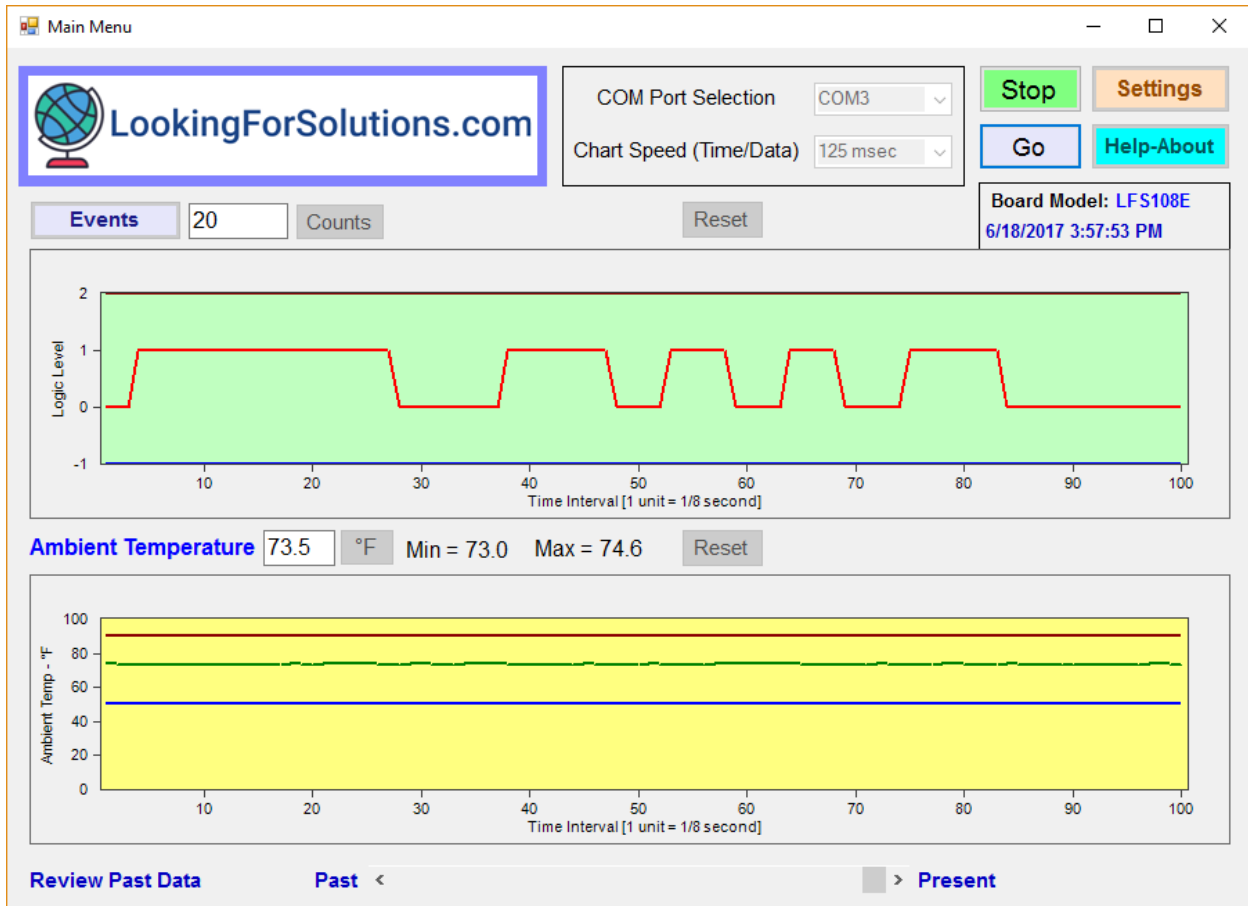


Figure 7 – Main Screen, Contact/Event – Real Time

Counter – You can use the board as a counter counting and logging input pulses. You can reset the count at any time by clicking the Reset button. Figure 8 shows the counter main screen.

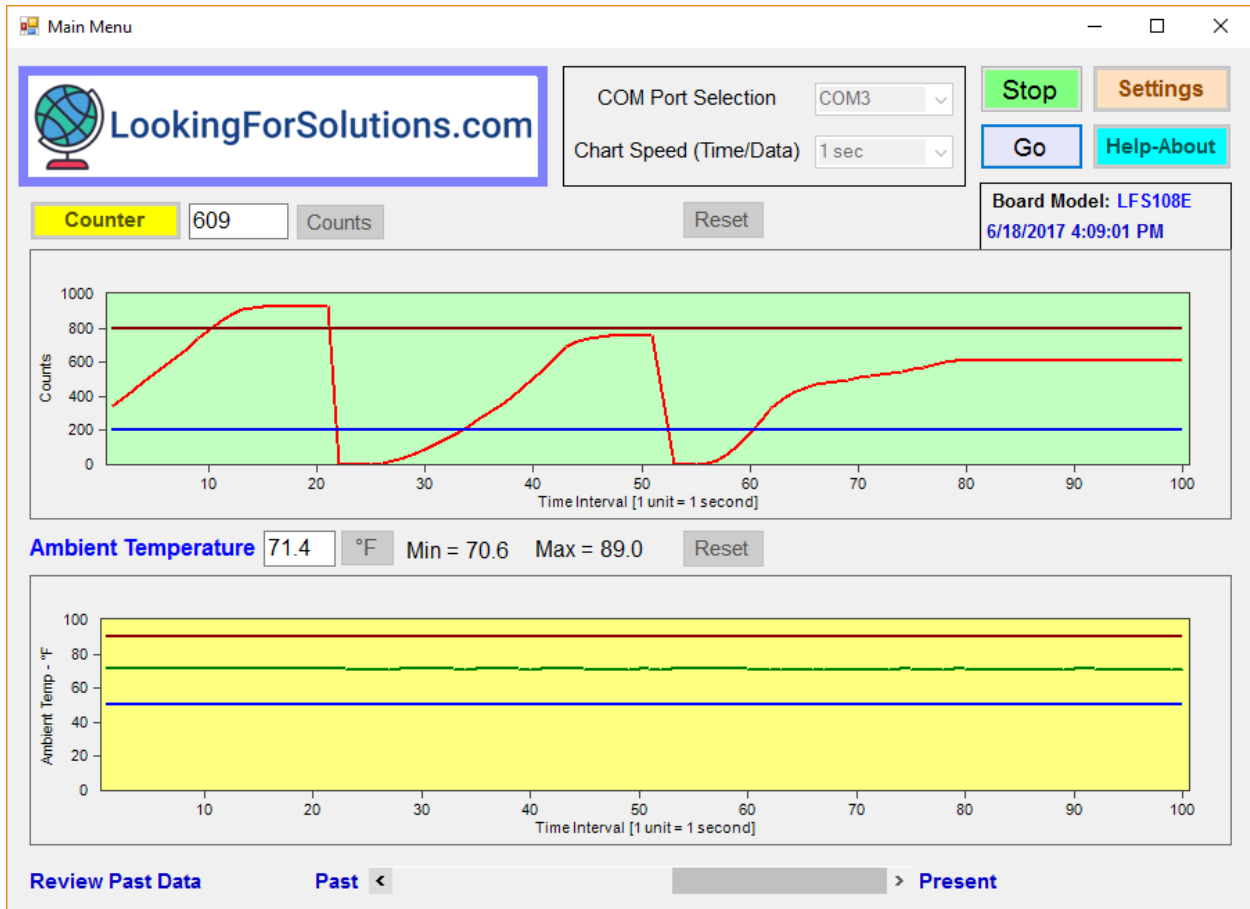


Figure 8 – Main Screen, Counter – Real Time

Help-About - Clicking the Help-About button will open a new window showing the board picture, firmware version, hardware version, serial number, and the PC software version as shown in Figure 9.

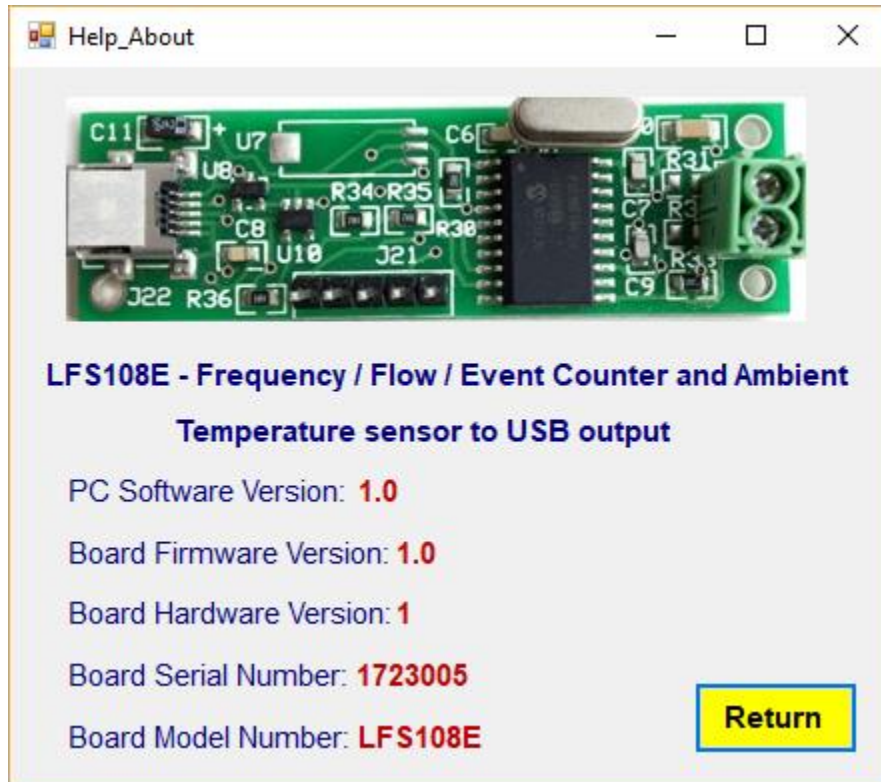


Figure 9 – Typical Help-About Screen

2- Settings Menu

Figure 10 shows the Settings Menu. Here is a list of functions you can perform:

- Re-scale the Frequency/ Flow/ Counter Y-Axis.
- Re-scale the Ambient Temperature Y-Axis.
- Set High and Low Alarm set points for Frequency/ Flow/ Counter
- Set High and Low Alarm set points for Ambient Temperature.
- Calibrate the board for Frequency and Ambient Temperature
- Record (Save) data to a file on alarm conditions.
- Send an email on alarm conditions. Send a test email.
- Send Text Message on alarm condition. Send a test Text Message.
- Send data to the Cloud – IoT (Thingspeak.com)

- Verbalize on alarm condition

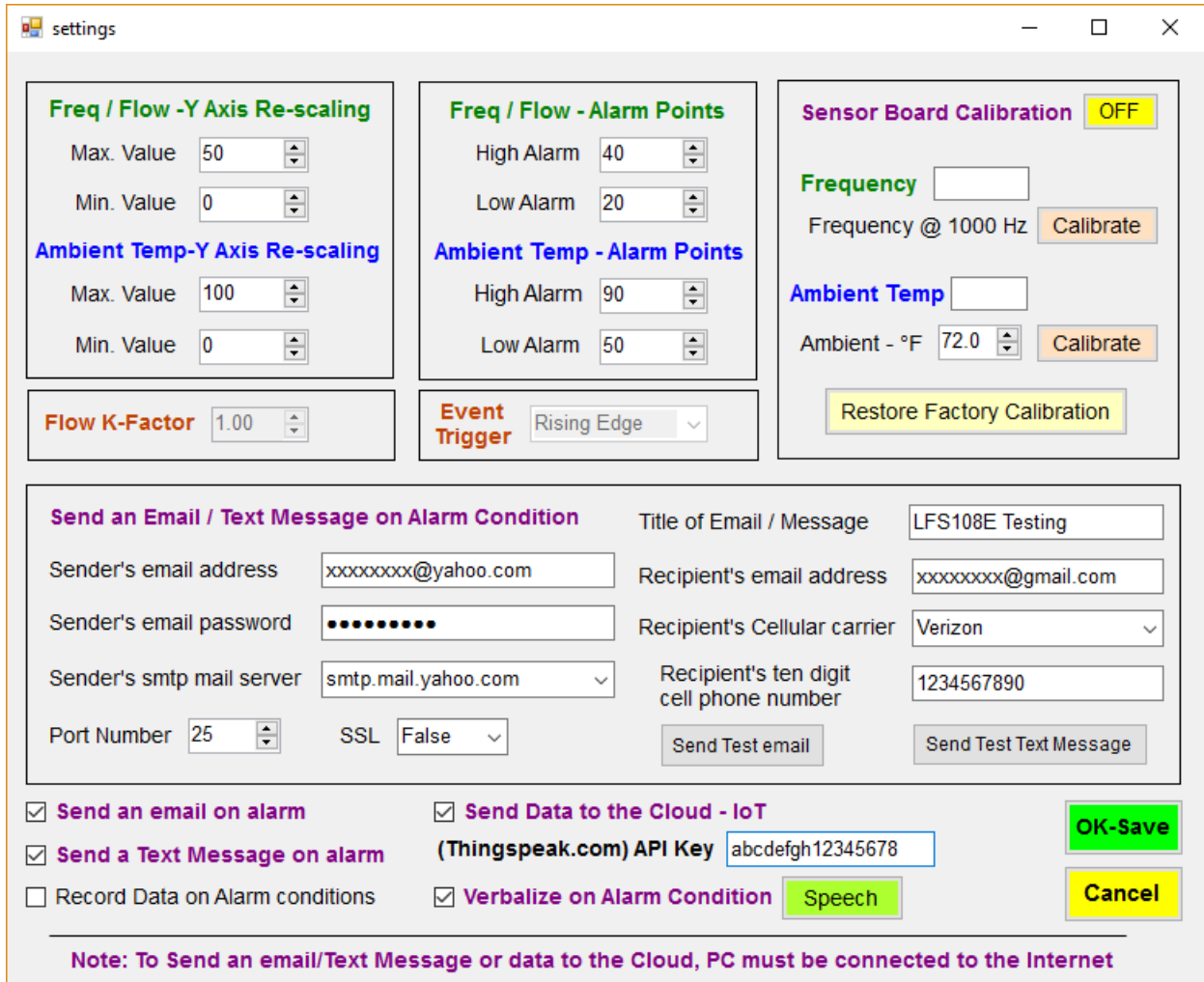


Figure 10 – Settings Menu

2.1- Sensor Board Calibration

You need to turn ON the calibration function by clicking the OFF button. The Frequency and Ambient Temperature values will be displayed in the text boxes.

Frequency – You can calibrate the board for frequency at 1000 Hz. Apply a 5V square waveform (0-5V) from a frequency generator set at 1000 Hz. Click the Calibrate button. You will see a window popup “Frequency Cal OK” to confirm the calibration.

Ambient Temperature – You can calibrate the board for ambient temperature at one point. Set the calibration point in °F based on a known ambient temperature. Click the Calibrate button. You will see a windows popup “Temp Cal OK” to confirm the calibration.

2.2- Record Data on Alarm conditions

If you select this Checkbox, the program only saves data to a file when there is an alarm condition due to Frequency/ Flow/ Counter or ambient temperature.

2.3- Send an email on alarm condition

If you select this Checkbox, the software application will send an email every time there is an alarm condition. Check “Send an email on alarm” checkbox and fill in the following items:

- Sender’s email address and password.
- Sender’s smtp mail server. Either select from the drop down list menu, or type in your specific mail server if it is not in the list.
- Port number and the SSL. It is already set for gmail & yahoo accounts.
- Message title and the Recipient’s email address.

You can send a test email to make sure it is functional. Click OK-Save button to save settings and exit.

2.4- Sending Text Message on alarm condition

The software can send a text message to a cell phone every time there is an alarm condition. Check “Send a Text message on alarm” checkbox and fill in the following additional items:

- Recipient’s Cellular Carrier
- Recipient’s cell phone number.

You can send a test Text Message to make sure it is functional. Click OK-Save button to save settings and exit.

2.5- Send Data to the Cloud – IoT (Thingspeak.com)

The software can send the frequency/ flow/ contact/ counter and ambient temperature data to Thingspeak.com web site for data storage and data visualization.

You need to create an account with Thingspeak.com. After login process, create a new Channel. The Channel can be either Public or Private. Fill in the Channel settings such as Name, Description, Field 1 (Frequency-Flow), and Field 2 (Ambient Temperature). Go to API key tab and look for “Write API Key”. Copy the API key code.

Go back to the settings menu software. Check off the “Send Data to the Cloud - IoT” checkbox and enter (Paste) the API key in the text box. Click OK and go back to the main menu. Make sure the Chart speed selection is to 30 seconds before starting the session.

Thingspeak.com provides many features such as data visualization and export, MATLAB analysis and Tweet alerts. Figure 11 shows a typical Thingspeak.com screen.

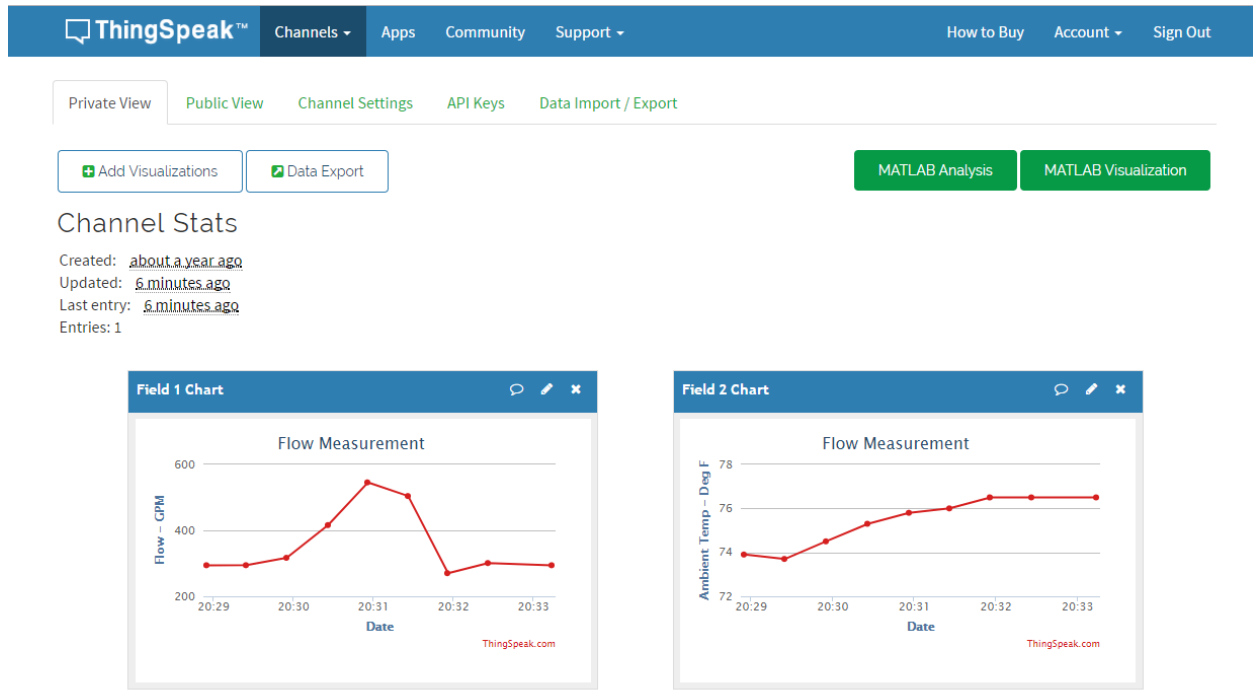


Figure 11 – Typical Thingspeak.com Screen

2.6- Verbalize on Alarm conditions

The software can announce a message when either the frequency/ flow/ counter or ambient temperature goes into an alarm condition. Check “Verbalize on Alarm conditions” checkbox and click on the Speech button will open a new window that shows the default alarm messages. You can either use the default messages or make your own messages. You can click Test Voice Message button to test the voice function. Figure 12 shows the Speech window screen.

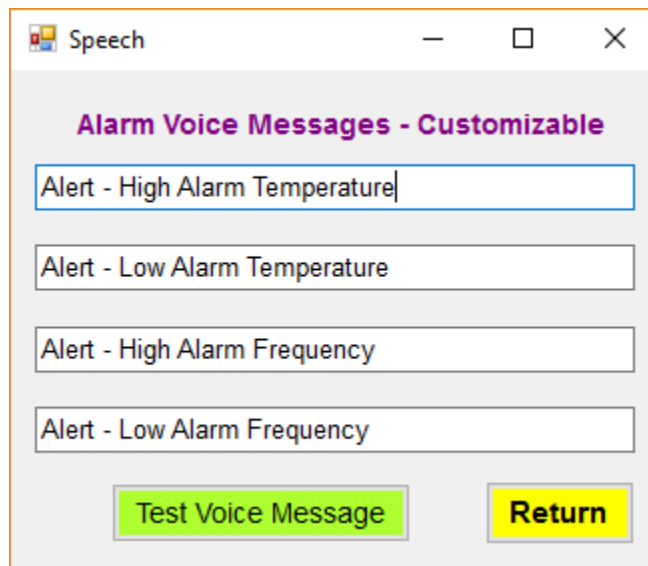


Figure 12 – Speech Screen

3- Saving Data to the Storage Cloud

You can save the frequency/ flow/ contact/ counter and ambient temperature data to any storage cloud service such as Google Drive, One Drive, Dropbox, etc. as follows:

- Install the storage cloud service app on your PC as well as your smart phone or Tablet.
- Run our PC application, and Start the data monitoring/logging session.
- Create a data file under the cloud storage folder (Google Drive, One Drive, etc.), name the data file, and click Save.

Your data file is now created in the cloud storage folder. After closing the data file, you can review the data from your smart phone or tablet.

4- Specifications

Frequency

Range	2 Hz to 200 KHz
Accuracy	0.5% of Rdg or 0.1 Hz whichever is larger
Resolution	0.1 Hz
Engineering Units	Hz, KHz, RPM
Signal Input	5V Square waveform (0-5V)

Flow

K – Factor	Set via Settings Menu
Totalize	Up to 99,999,999 – Reset via Reset Button
Engineering Units	GPM, GPS, LPM, LPS
Signal Input	5V Square waveform (0-5V)

Contact-Event

Contact Voltage	5V Square waveform (0-5V) or No voltage
Minimum Pulse width	200 msec
Event Trigger	Rising Edge, Falling Edge, Change State

Counter

Maximum Input Frequency	200 Hz
Maximum count	16,777,000

Ambient Temperature

Range	-15 to 85 °C (5 to 185 °F)
Accuracy	1.4 °C (2.5 °F)
Resolution	0.1 Degree

Sampling Time 125 msec, 0.5 sec, 1 sec, 5 sec, 10 sec, 30 sec

Recording Interval 125 msec, 0.5 sec, 1 sec, 5 sec, 10 sec, 30 sec

Recorded value Average value of incoming data at 2 samples/sec

Initial Warm up Period 2 minutes

PC Software Windows 7, 8, 10

Maximum data file 20,000 sets of data per file

Review Past Data on screen 250,000 sets of data

Serial Communication	19,200 BPS, 8 bit, 1 Stop bit, No Parity
Power	USB 2.0
Dimensions	2.35 x 0.70 inches (59.7 x 17.8mm)
Export Classification	EAR99

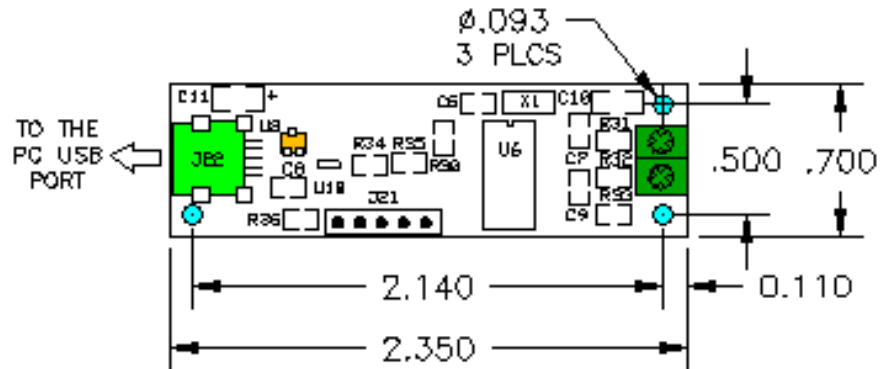


Figure 13 - General Dimensions, LFS108E

5- PC Commands

The following is a list of PC commands used to communicate with the board (CR means Carriage Return):

GETID<CR> - Read the Board ID (Model number)

GETSN<CR> - Read the Board Serial Number yywwxxx

GET1<CR> - Read the Ambient Temperature from the board. It provides the temperature in degree F times 10. For example if the temperature is 72.5 °F, it will send 725.

GET6<CR> - Read the Frequency / Event / Counter from the board. It provides the value times 10. For example if the frequency is 435.7 Hz, it will send 4357.

FRQEVNT<CR> - Change the board from Frequency mode to Event mode.

FRQCNT<CR> - Change the board from Frequency mode to Counter mode.

RSTCNT<CR> - Reset the counter value to zero (Counter Mode).

CHGFRQ<CR> - Change the board back to Frequency mode.

6- Troubleshooting

Here is a list of items you need to be aware of if you get into problems:

- During the software installation, the Windows operating system may indicate “Unknown Publisher” or un-trustworthy source, please ignore and install the software. Our software has a Digital Signature and comes from a trusted source.
- Make sure the PC does not go to sleep mode, otherwise you will lose USB communication to the board. Make sure the PC sound is enabled to be able to use the verbalization (Speech) feature.
- Make sure your PC is connected to the internet if you are planning to use features like sending emails, text messages, or data to the cloud.
- Check your antivirus program for any blocking of the application to the internet.
- Check your wireless router for any blocking of the application to the internet.
- Please check the polarity and the voltage level of your signal before connecting to the board terminal block.

Yahoo and Gmail accounts have additional security features that does not allow a third party app (Like our app) access the account. In order to access the account from our app, additional steps need to be taken as follows:

Yahoo Accounts:

You need to login to your Yahoo account and under Account Security add our app (LFS104A) and generate a Password. Then use that Password in our app for the account Password in the settings menu. Leave Port number as 25.

Gmail Accounts:

Sign into your Google account. Under Security, there is a section called “Less secure app access”. You need to turn this ON. This allows you to access your Gmail account from our app. Leave Port number as 25.

7- Third Party Software & Devices

You can interface and communicate with our products from [National Instruments Labview](#) software platform. We provide sample program for your evaluation. Figure 14 shows a typical Labview screen.

You can interface and communicate with our products from single computer boards such as [Raspberry Pi](#). We provide sample Python program for your evaluation.

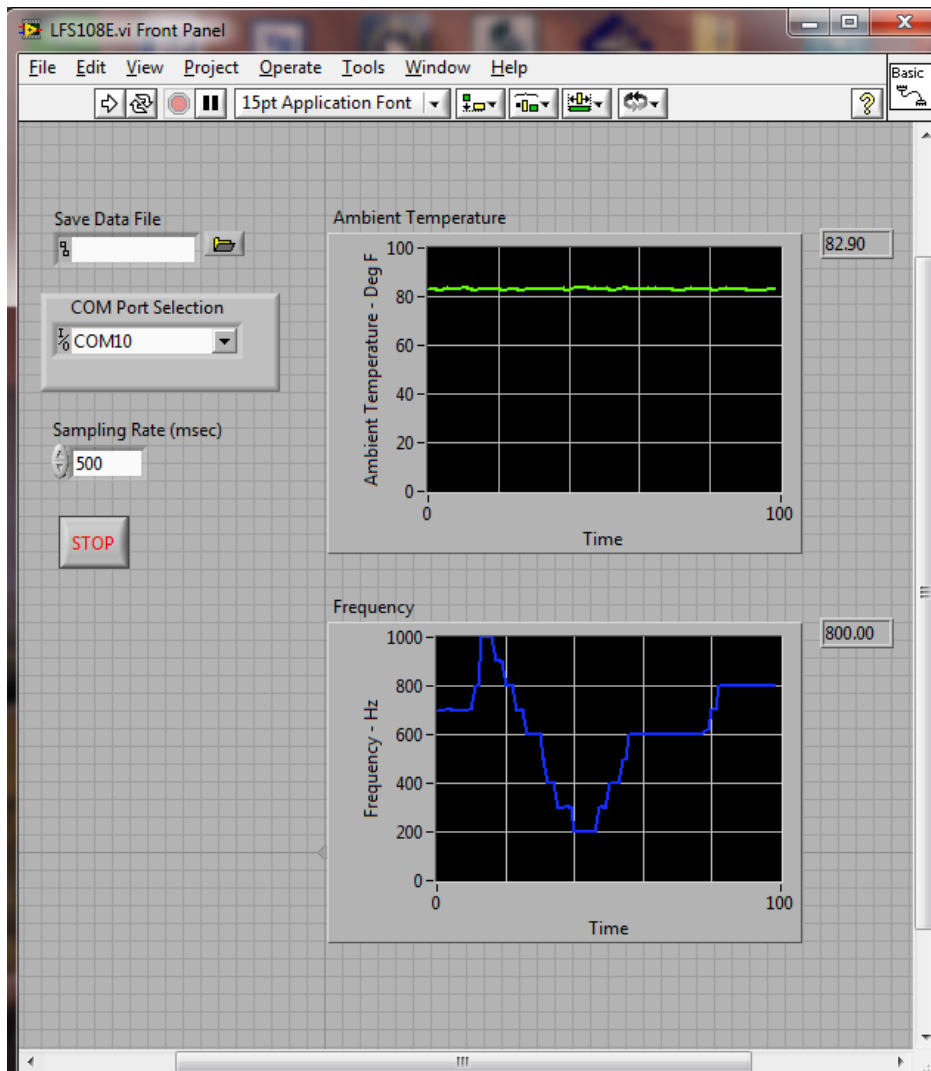


Figure 14 – Typical Labview screen