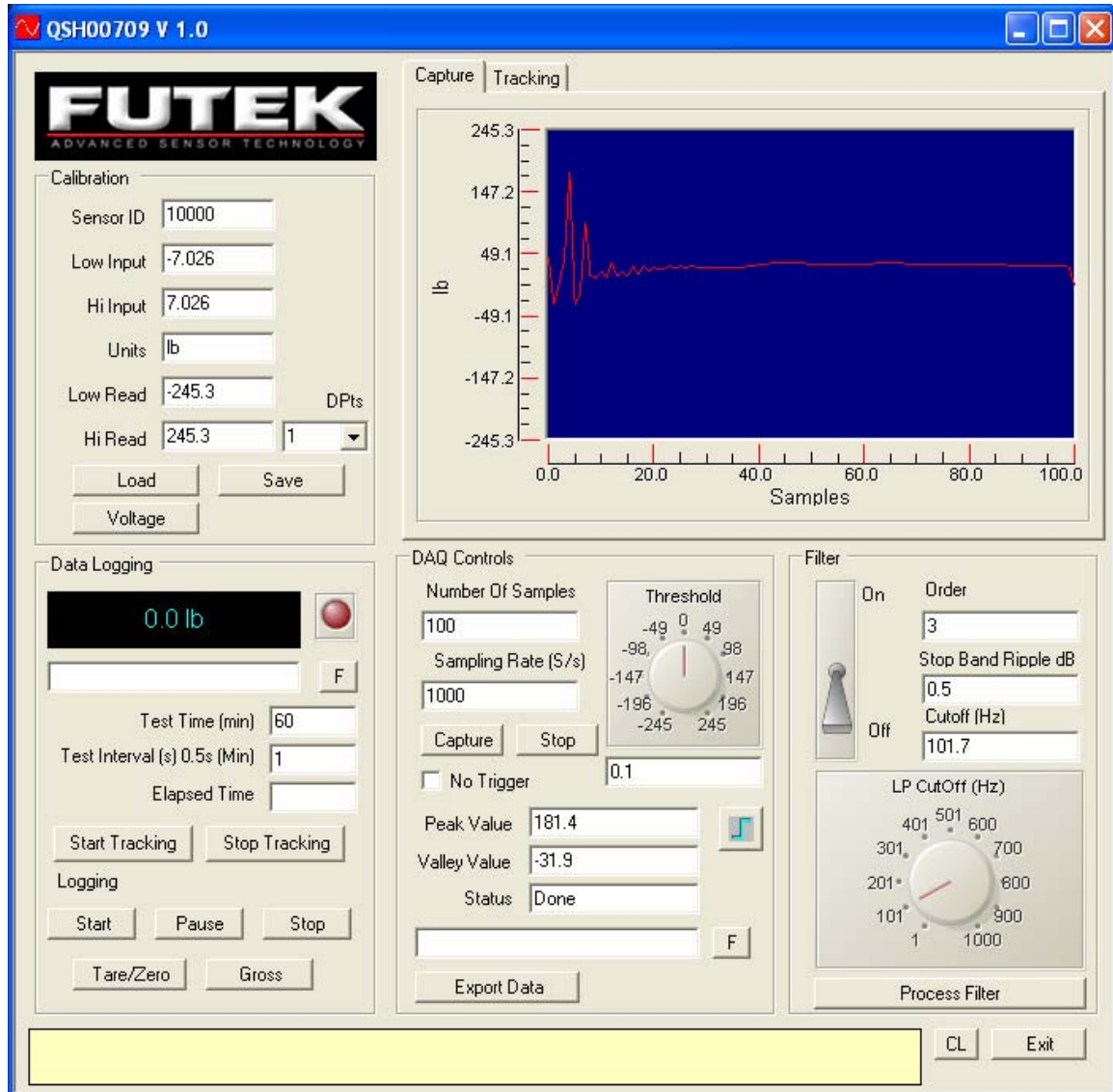# QSH00709 – DATA ACQUISITION SOFTWARE V 1.0
FUTEK ADVANCES SENSOR TECHNOLOGY

Overview:

Multi-use data acquisition software for single channel data logging and capture.

Features:

1. Scaled or voltage data capturing.
2. Adjustable sampling frequency and counts.
3. Optional trigger (Computer speed dependent).
4. Optional adjustable Chevysev LP IIR filter.
5. Continuos or timed data logging capabilities.
6. Exportation of data logging or capture (Excel compatible ASCII format)

Calibration

Calibration is used to scale sensor or voltage source to any desirable engineering units. Simply enter required information to scale sensor and save to data file.

Sensor ID – Serial number or identification

Example:
You are using a load cell rated at 1000 lbs.

Step 1:
Connect load cell and press **"Start Tracking"** under data logging.

Step 2:
At Zero Load Press **"Tare/Zero"**

Step 3:
Enter *Low Input = "0"* and *Low Read = "0"*

Step 4:
Put 1000 lb load on load cell.
Enter *Hi Input = (Voltage Reading)* and *Hi Read = "1000"*

Step 5:
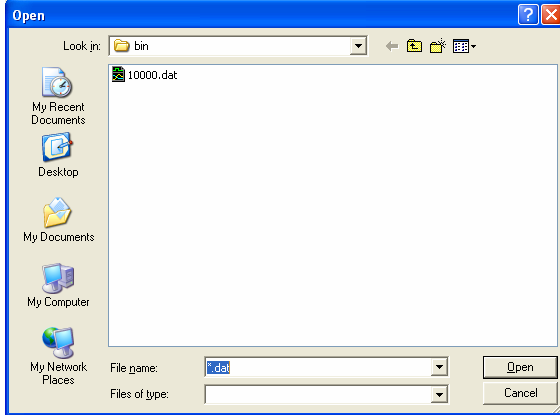Enter Units and desired decimal points under **"DPts"**

Step 6:
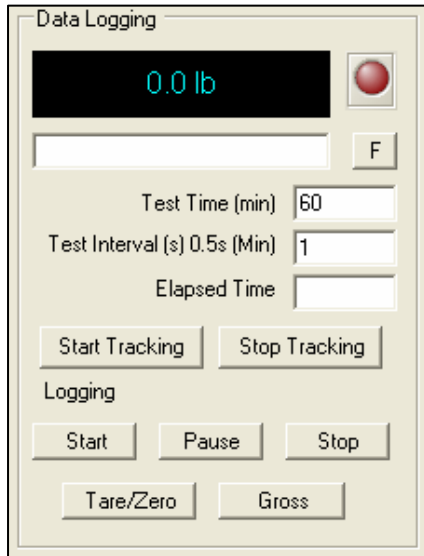Press **"Save"**

To Show Scaled Voltage

Step 1:
Press **"Load"** and choose appropriate file. *(File will be saved under Sensor ID)*

Step 2:
Press **"Start Tracking"** to see scaled data. You can always press **"Voltage"** to revert back to voltage mode or scaled mode.

Data Logging

Data logging is used for continuos or timed data acquisition. This type of data acquisition is solely based on computer speed and available resources since program is continuously looping and acquiring data from the DAQ system. Typical rates are from 150-200 readings per second.

Controls Buttons and Data Entry Text Boxes

"F" – Opens up file dialog window. Used to point to path where you want your data logging file to be stored. Note that there is no default extension, but normally you would enter "*.txt" or "*.csv" so you can load your data into your spread sheet program.

"Test Time (min)" – Total for desired test in minutes.

"Test Interval" – This is the data capturing period. The minimum is a reading every 0.5 seconds.

"Elapsed Time" – Shows status of test.

"Start Tracking" – This button must be pressed before any data logging test, it initiates the data acquisition.

"Stop Tracking" – This button stops tracking mode.

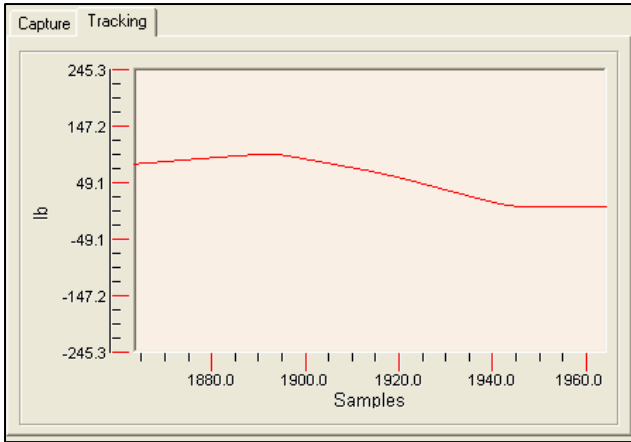**"Start"** – Starts timed data logging test.

"Pause" – Pauses timed data logging test.

"Stop" – Stops test completely and resets timers.
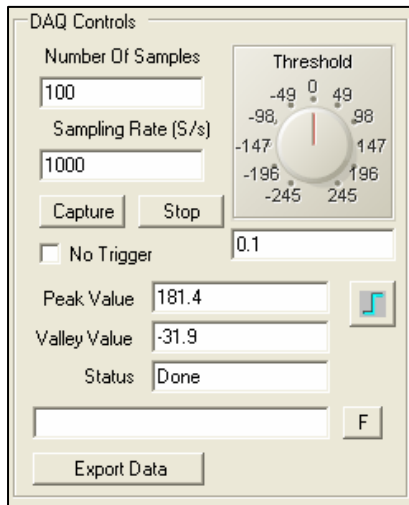
"Tare/Zero" – Nulls out any offsets in the readings. Works for voltage and scaled modes.

"Gross" – Undoes any taring or zeroing.

Clicking on **"Tracking"** tab will show tracking graph to monitor data logging in a graphical representation.

DAQ Controls

DAQ controls performs the high speed data acquisition.

Controls Buttons and Data Entry Text Boxes

"Number of Samples" – Enter required number of samples for acquisition.

"Sampling Rate" – Enter sampling rate as the number of samples per second.

Note – Total sampling time equals = Number Of Samples / Sampling Rate
Highest Sampling rate allowed is 50000 samples per second.

"Threshold" – Choose trigger threshold using knob or enter in text box below knob. The threshold is equivalent to the current units that are scaled.

"Capture" – Initiates a capture cycle. The program will wait until trigger conditions are met.

"Stop" – Stops capture Sequence"

"No Trigger" – Disables triggering and immediately initiates a cycle based on given parameters.

**"Peak Value"** – Displays the highest value in capture sequence.

"Valley Value" – Displays the lowest value in capture sequence.

"F" – Opens up file dialog window. Used to point to path where you want your data capture file to be stored.   Note that there is no default extension, but normally you would enter "*.txt" or "*.csv" so you can load your data into your spread sheet program.

"Export Data" – Exports captured data points to chosen file. The data points are affected by filter setting, choose so accordingly.

This button allows user to choose between rising or falling edge trigger.
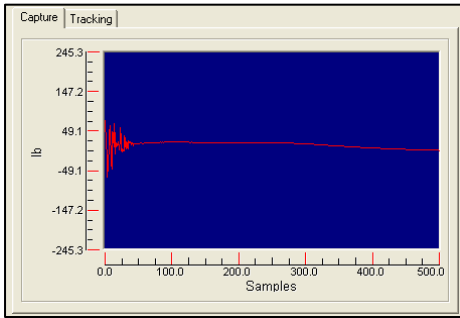
Clicking on **"Capture"** tab will show graph displaying captured data. The graph is scaled as Samples versus Amplitude in voltage or engineering units.
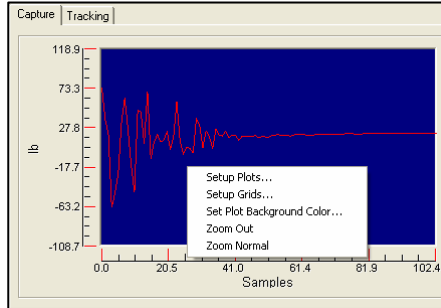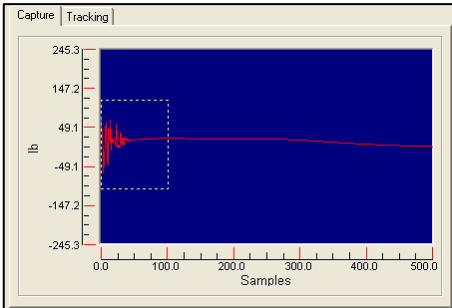
By placing mouse on graph you can drag an rectangular area in which to "Zoom". By placing mouse and "Right Click" you can show the displayed menu to reset plot or "Zoom Out"

Filter

The filter processes data captured using the "DAQ Controls". It is fully adjustable and can be turned off on request using "On-Off" toggle switch.

Note: Data logging is not affected by this filter, data logging is already processed by a 100 point moving average filter using rectangular window.

"Order" – Sets filter order. Keep filter order within reasonable limits. Higher order will increase processing time. (Typical 1 – 10th order)
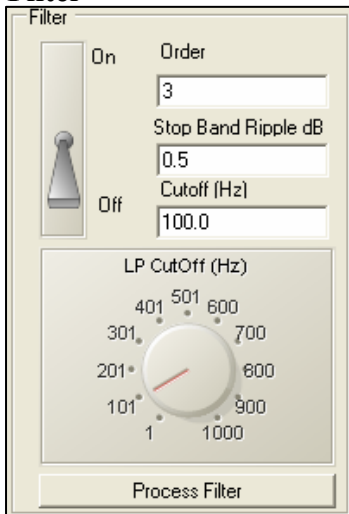
"Stop Band Ripple dB" – Adjusts allowable stop band ripple.

"Cutoff (Hz)" – Adjust cutoff frequency for filter. Cutoff frequency must be at less than half the sampling frequency. An error message will appear as follows. Knob can also be used to enter cutoff frequency. *Note that cutoff frequencies higher than 1000 hz are supported by entering in data in text box.*

All cutoff frequencies must be less than half of the sampling frequency.

If Sampling frequency is set at 15000 hz, this means that cutoff frequency must be less than 7500 hz. *(Fco < Fs / 2) Where Fco = CutOff and Fs = Sampling Frequency.*

"Process Filter" – Re-filters data according to cutoff frequency.

Errors

| All cutoff frequencies must be less than half of the sampling frequency. | CL | Exit |

Solution: Increase sampling frequency or reduce cutoff frequency to less than half the sampling frequency.

| Invalid board number | CL | Exit |

Solution: Check USB connection. Re-Run Insta-Cal. Allow enough time for USB to configure and load unit.

| Invalid data type for Form1.ChebyshevLowpassFilter1
Property Name: CutoffFrequency | CL | Exit |

Solution: Type in valid numerical value for Cutoff Frequency

| Input value is null
Property Name: YValues | CL | Exit |

Solution: No valid data in memory buffer, capture some readings

This window shows any errors that may occur in the program.

"CL" – Clears error window.

"Exit" – Exist the program.

Software Installation Procedure (WinXP)

1. Load CD into PC loading tray. The above screen should appear.
2. Proceed with .NET Framework Installation by selecting and clicking on menu options.
3. Proceed with XP-DB822603. (Windows will alert you if installation is not necessary)
4. Proceed with MCC Install Cal and restart computer when prompted.
5. Plug USB cable to QSH00709 unit, please allow a few minutes for USB configuration to proceed and install itself.
6. After Installing MCC Install Cal Proceed to
   /Start Menu/Programs/Measurement Computing/Install Cal
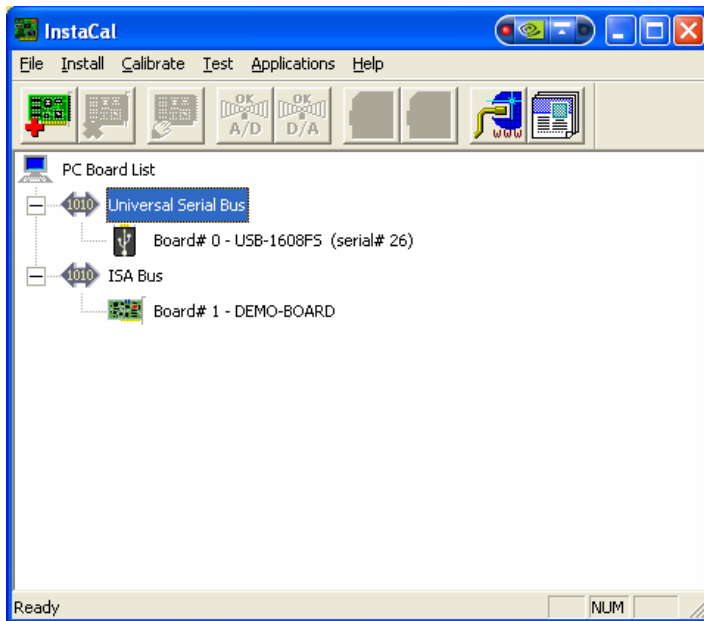
7. The "Install-Cal" program should automatically configure the DAQ board (USB-1608FS) to Board # 0. Make sure board is under number 0 or program will not operate correctly.
8. Close "Install-Cal" and proceed with QSH00709 Software installation.

Note: Installation procedures will require "Installation" access to windows.   Please see your IT administrator if permissions to install are required.

!!!Important!!!

1. *Make sure USB is fully configured and connected before connecting 12V adapter to load cell power source. Use supplied adapter or equivalent.*
2. *USB must be able to supply 500mA of current. If using USB hub makes sure it is self powered hub type, not bus powered.*
3. *Make sure windows has the latest updates. If using Windows 2000, make sure the latest service packs are installed.*
4. *Program may not operate under windows 98 or Me.*
5. *Do not short out Pins A and B at sensor connection or damage will occur.*
6. *Please observe all load cell recommended overload specification to prevent damage.*

Contact:
Futek Advanced Sensor Technology
10 Thomas
Irvine, CA 92691
www.futek.com
800-23-Futek or 959-465-0900

SPECIFICATIONS

Analog input specifications

Parameter	Conditions	Specification
A/D converter type		16-bit successive Approximation type
Number of channels		8 single-ended
Input configuration		Individual A/D per channel
Sampling method		Simultaneous
Absolute maximum input voltage	*CHx IN to GND.*	*±15 V max*
Input impedance		100 MOhm, min
Input ranges	Software selectable	±10 V, ±5 V, ±2 V, ±1 V
Sampling rate	Scan to PC memory	0.6 S/s to 50 kS/s, software programmable
	Burst scan to 32 k sample FIFO	20 S/s to 50 kS/s, software programmable
Throughput	Software paced	500 S/s all channels
	Scan to PC memory (Note 1)	= (100 kS/s) / (# of channels), max of 50 kS/s for any channel
	Burst scan to 32 k sample FIFO	= (200 kS/s) / (# of channels), max of 50 kS/s for any channel
Gain queue		Software configurable. Eight elements, one gain element per channel.
Resolution		16 bits
No missing codes		*15 bits*
Crosstalk	Signal DC-25 KHz	-80 dB
CAL output	User calibration source	0.625 V, 1.25 V, 2.5 V, 5.0 V, software selectable
CAL output accuracy (Note 2)		±0.5% typ, ±1.0% max
CAL current		±5 mA max
Trigger source	Software selectable	External digital: TRIG_IN

Note 1: Maximum throughput scanning to PC memory is machine dependent. While the majority of XP equipped PC's we tested allowed acquisition at the maximum rates, a few would not. The lowest maximum rate we observed on an XP equipped PC during multi-channel testing was 95 kS/s, aggregate. The rates specified are for Windows XP only. Maximum rates on operating systems that predate XP may be less and must be determined through testing on your machine.

Note 2: Actual values used for calibration are measured and stored in EEPROM.

Table 4-4. Calibrated absolute accuracy

Range	Accuracy (mV)
±10 V	5.66
±5 V	2.98
±2 V	1.31
±1 V	0.68

Power

Parameter	Conditions	Specification
Supply current	USB enumeration	< 100 mA
Supply current (Note 6)	Continuous mode	150 mA
+5 V USB power available (Note 7)	▪ Connected to self-powered hub ▪ Connected to externally-powered root port hub	4.5 V min, 5.25 V max
Output current (Note 8)		350 mA max

Note 6: This is the total current requirement for the USB-1608FS which includes up to 10 mA for the status LED.

Note 7: "Self-powered hub" refers to a USB hub with an external power supply. Self-powered hubs allow a connected USB device to draw up to 500 mA. "Root port hubs" reside in the PC's USB host Controller. The USB port(s) on your PC are root port hubs. All externally-powered root port hubs (desktop PC's) provide up to 500 mA of current for a USB device. Battery-powered root port hubs provide 100 mA or 500 mA, depending upon the manufacturer. A laptop PC that is not connected to an external power adapter is an example of a battery-powered root port hub. If your laptop PC is constrained to the 100 mA maximum, you need to purchase a self-powered hub.

Note 8: This refers to the total amount of current that can be sourced from the USB +5 V and digital outputs.

General

Device type	USB 2.0 (full-speed)
Device compatibility	USB 1.1, USB 2.0

Environmental

Operating temperature range	0 to 70 °C
Storage temperature range	-40 to 70 °C
Humidity	0 to 90% non-condensing