



FINN[®] USB Data Acquisition Specifications Manual



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1. Hardware/Software Requirements

- FINN[®] USB DAQ Device
- USB Cable
- An available USB port on the PC
- Personal Computer with Windows Installed
- .NET Framework v4.0 or newer. Most PCs with Windows 7 have this software installed already.
- Installation CD which contains: User Manual, FINN[®] USB DAQ Software and Device Driver.

2. Part Numbers

Part Number	Description
TCUSB-1 DAQ Tool	USB DAQ Tool – 1 channel
TCUSB-16 DAQ Tool	USB DAQ Tool – 16 channel

3. FINN[®] USB DAQ Installation

- Insert and open the Installation CD.
- Follow the instruction on the Drivers Installation Guide for you operating system.
- The custom drivers for the FINN USB DAQ is under a folder called 'FINN USB DAQ 2.0 Driver' in the installation CD.
- Please contact FINN Test Electronics if you have any issues.



4. FINN® USB DAQ Software Installation

- Insert the Installation CD into the PC CD-ROM Drive, if it is not inserted already.
- Go to **“My Computer”**
- Search for the CD-Drive that contains the Installation CD.
- Double click on the Installation CD.
- Double click on the folder **“FINN USB DAQ Software.”**
- Double click on the Setup File and the following screen will appear (Figure 1).
- Click on **“Next”** (Figure 1).

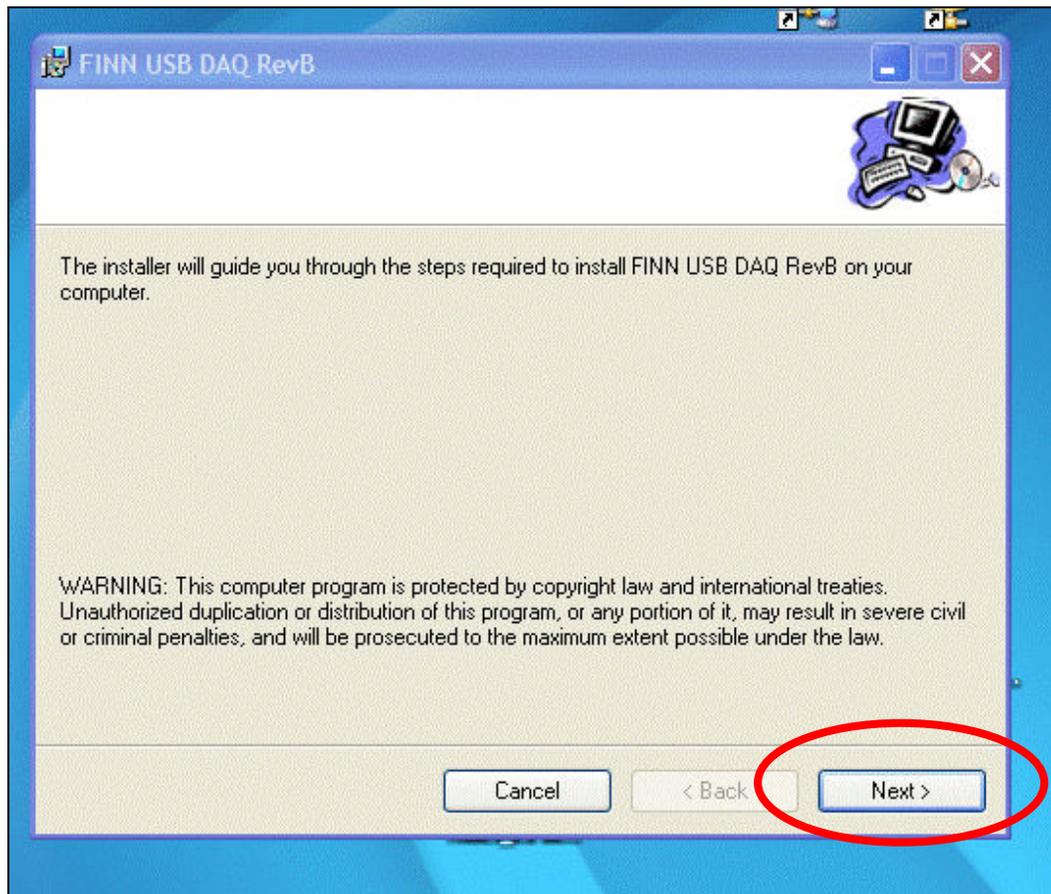


Figure 1

- The following screen will appear (Figure 2).
- Select "**Everyone**" (Figure 2).
- Click on "**Next**" (Figure 2).

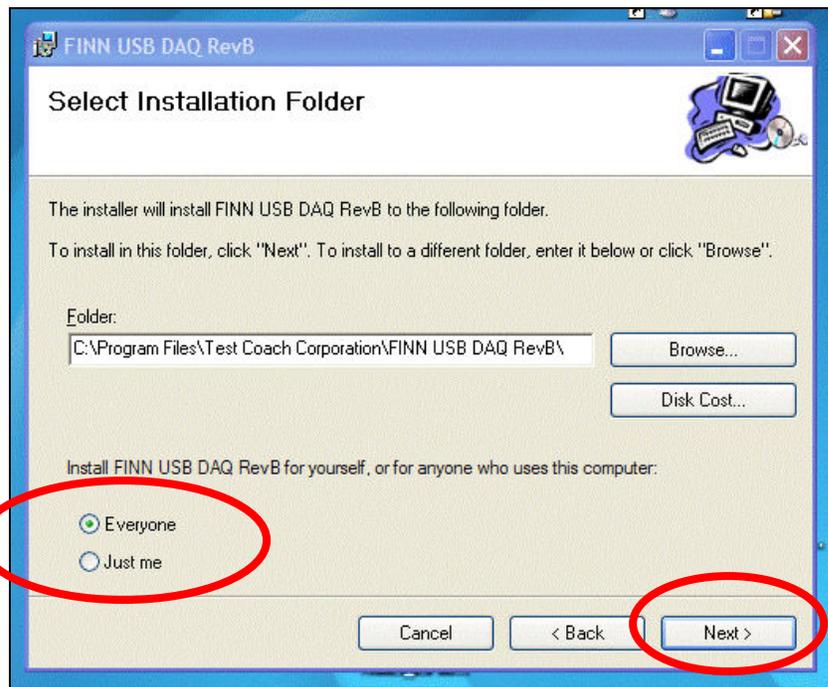


Figure 2

- The following screen will appear (Figure 10).
- Click on "**Next**" (Figure 10).

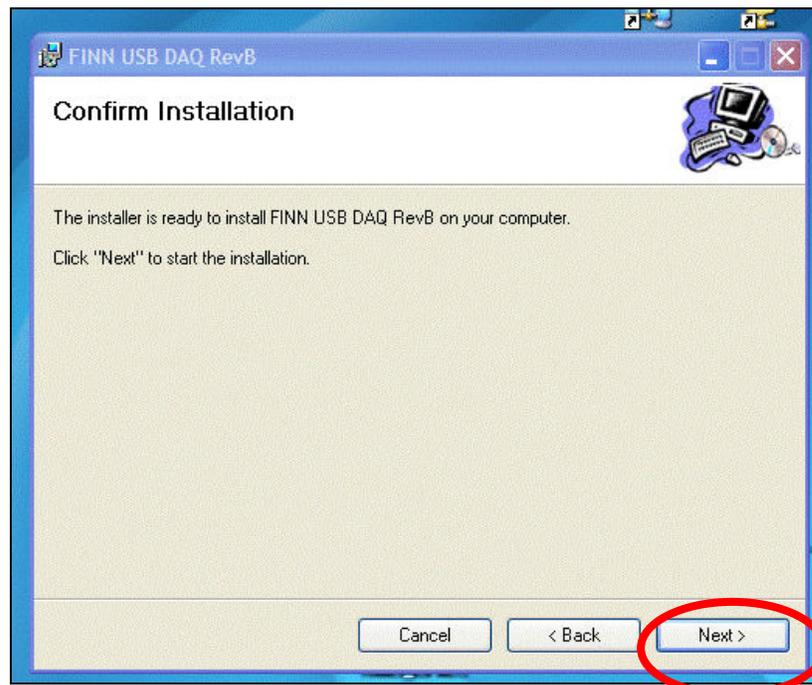


Figure 10

- The software will then be installed. It should take about two minutes depending on the computer speed (Figure 11).

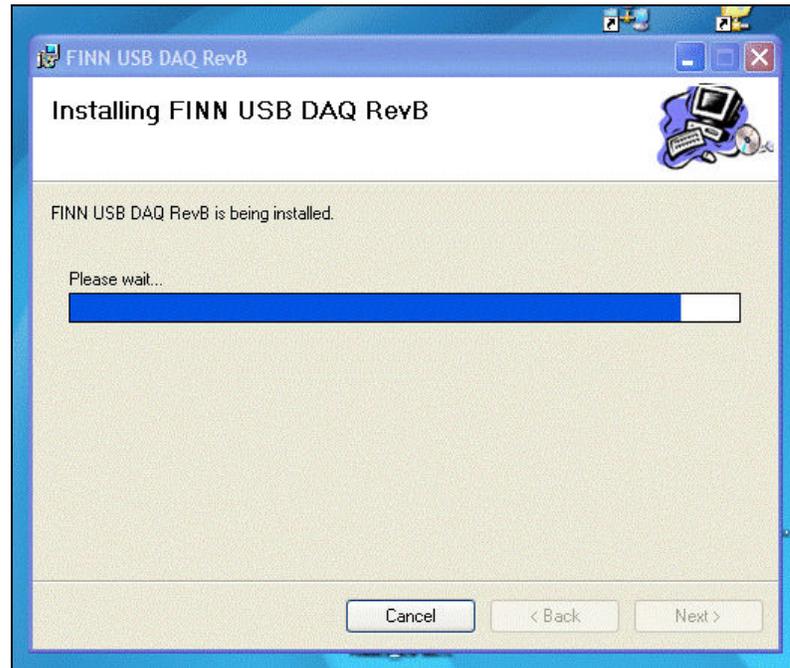


Figure 11

- The following screen will appear once the installation is finished (Figure 12).
- Click on "**C**lose" (Figure 12) and the screen will automatically close.

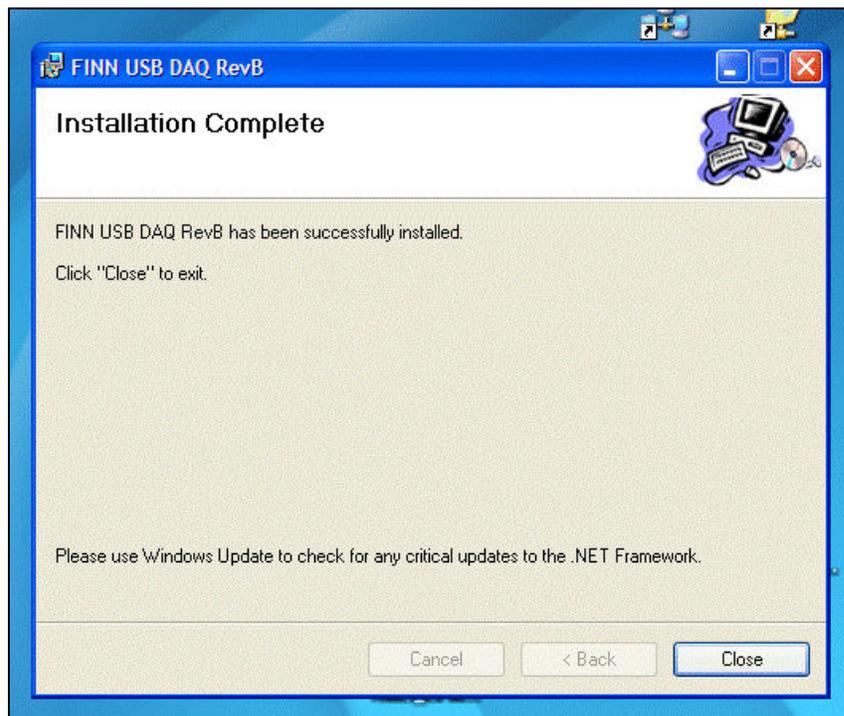


Figure 12

5. 1 Channel FINN[®] USB DAQ

5.1. Smart FINN[™]/Ultra FINN[™] Connections for the 1 Channel FINN[®] USB DAQ

The Ultra FINN[™] has 3 (three) pins: power (5.0V), ground and output. The Ultra FINN[™] Sleeve has 3 wire wrap tails that are spaced at 0.070 inches apart. Since the FINN[®] USB DAQ has a connector with 3 sockets spaced at 0.100 inches apart, an adaptor is needed in order to fit the Ultra FINN[™] into the FINN[®] USB DAQ connector. Please contact FINN Test Electronics for more information on this adaptor. Figure 13 shows a picture of an Ultra FINN[™] and Figure 14 shows the pin out of the Ultra FINN[™] Sleeve.

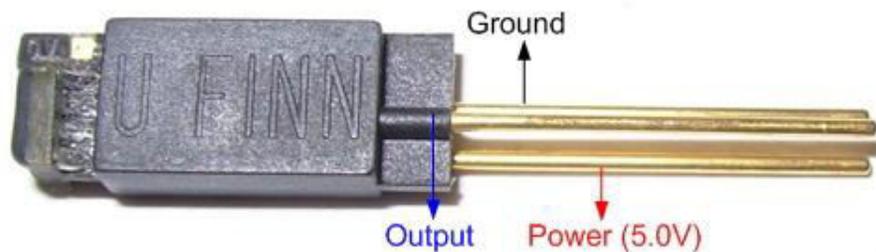


Figure 13

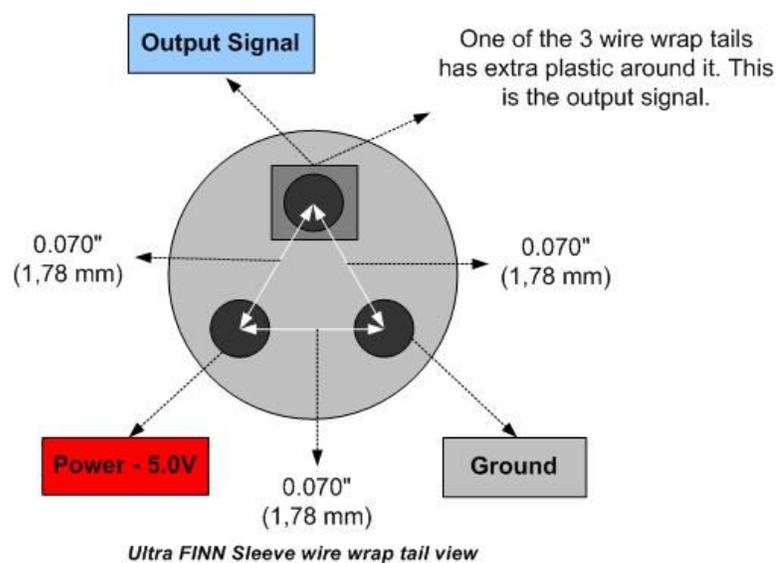


Figure 14

The Smart FINN™ has 3 (three) probes connected to the printed circuit board. Each probe has a small piece of colored heat shrink around it. The probe with the red heat shrink is the power probe (+5.0V), the probe with the black heat shrink is the ground probe, and the probe with the clear heat shrink is the output signal probe.

Figure 15 shows a Smart FINN™ (Vertical Configuration – P/N: TCxxSF-V) and the 3 probes with the heat shrink around them. For more detailed information on the Smart FINN™ please refer the datasheet which is located at www.FinnTestElectronics.com.

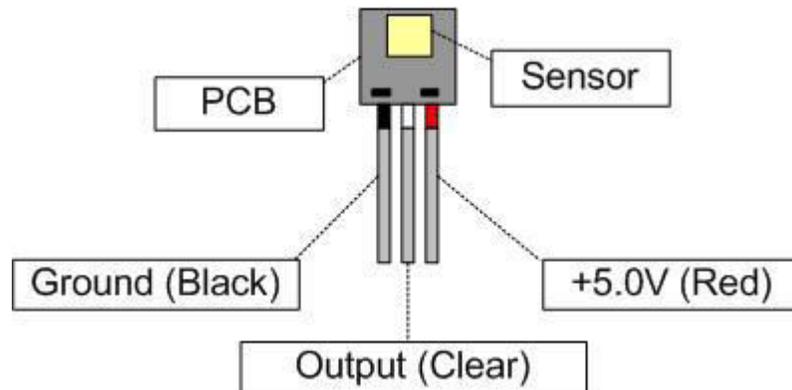


Figure 15

The FINN® USB DAQ Device has a connector with 3 sockets (0.100" sockets). The sockets are designed to fit the probes of a Vertical Smart FINN™ (P/N: TCxxSF-V). Each socket is colored coded: the black socket is ground, the red socket is power (+5.0V), and the clear socket is the input signal. Figure 16 shows the 1 Channel FINN® USB DAQ and the necessary hardware to connect to a computer.

If a Right Angle Smart FINN™ (P/N: TCxxSF-R) is being used with the FINN® USB DAQ, an adaptor is needed in order to fit the Right Angle Smart FINN™ into the FINN® USB DAQ socket. Please contact FINN Test Electronics for more information on this adaptor.

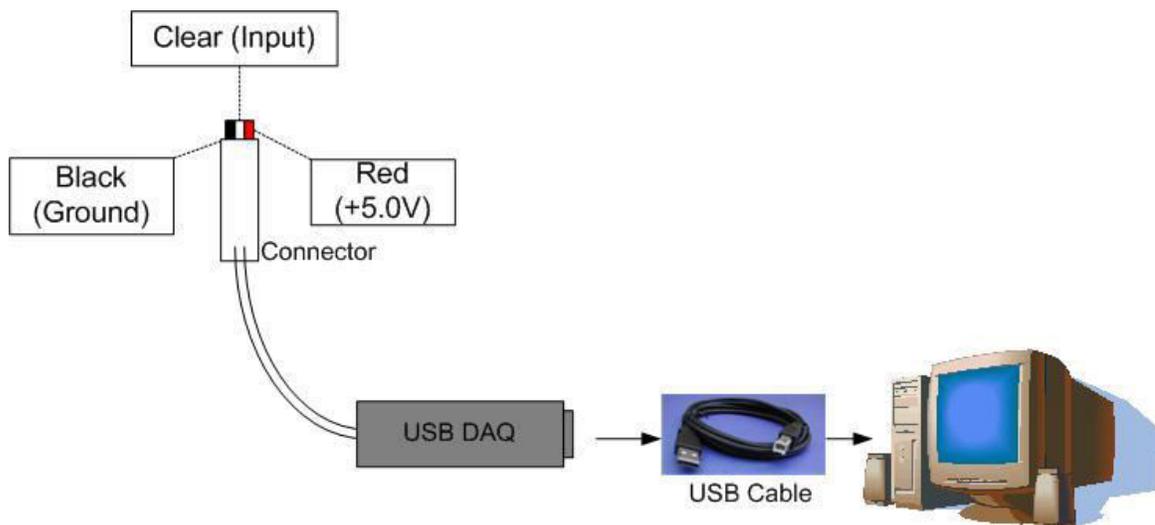


Figure 16

The 3 probes on the Smart FINN™ (or adapter) should be aligned with the sockets on connector of the 1 Channel FINN® USB DAQ.

- The red probe (5.0V) should be aligned with the red socket (5.0V) on the FINN® USB DAQ.
- The black probe (ground) should be aligned with the black socket (ground) on the FINN® USB DAQ.
- The clear probe (Output Signal) should be aligned with the clear socket (input signal) on the FINN® USB DAQ.

Figure 17 shows a Smart FINN™ (Vertical Configuration – P/N: TCSFxx-V) connected to the FINN® USB DAQ as described above. Instructions for software installation can be found in section 3 of this manual. For implementation of FINN® USB DAQ software, refer to section 6 of this manual.

If an external power supply (+5.0V DC) is used to power the Smart FINN™/Ultra FINN™, make sure the ground connections of the Smart FINN™/Ultra FINN™ and the FINN® USB DAQ are connected together. Otherwise, the readings will be incorrect.

Warnings:

- Make sure the power supply being used is stable and free of noise; otherwise there maybe some disturbance on the output signal of the Smart FINN™/Ultra FINN™.
- Incorrectly connecting the power and ground pins may cause damage to the Smart FINN™/Ultra FINN™ and the FINN® USB DAQ.
- Do not apply voltage larger than 5.0V or lower than 0.0V on the input socket of the FINN® USB DAQ as it may damage the USB device.

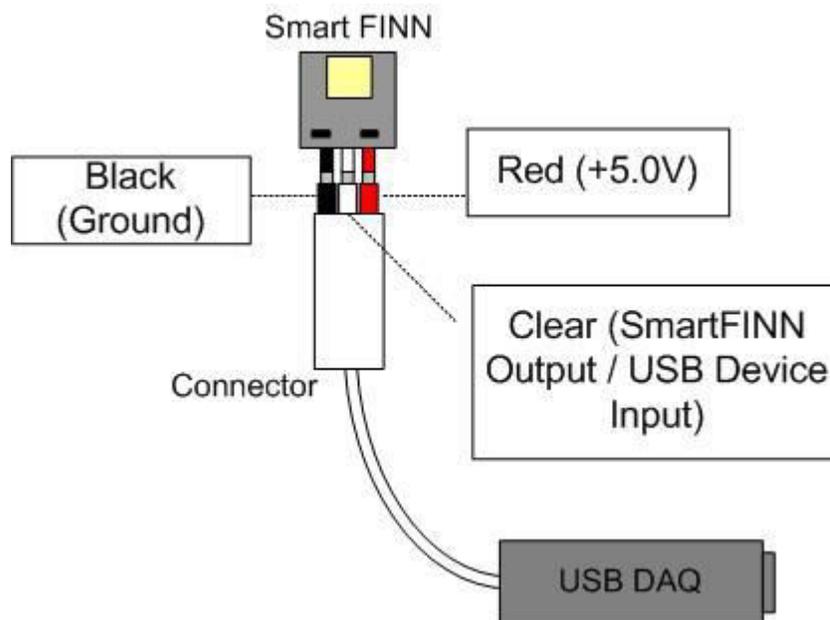


Figure 17

5.2. FINN[®] Connections for the 1 Channel FINN[®] USB DAQ

The FINN[®] has 2 (two) probes connected to the printed circuit board. One of the probes has a colored heat shrink around it. The color of the heat shrink varies according to the FINN[®] part number:

- Red FINN[®] (TC3001) has a red heat shrink
- Green FINN[®] (TC2901) has a green heat shrink
- Blue FINN[®] (TC2801) has a blue heat shrink
- Clear FINN[®] (TC8704) has a clear heat shrink

The probe with the heat shrink is the output signal probe, and the probe without any heat shrink is the ground probe. Figure 18 shows a Green FINN[®] with a vertical probe configuration (P/N: TC2901VP). For more detailed information on the FINN[®] please refer to the datasheet located at www.FINNTestElectronics.com.

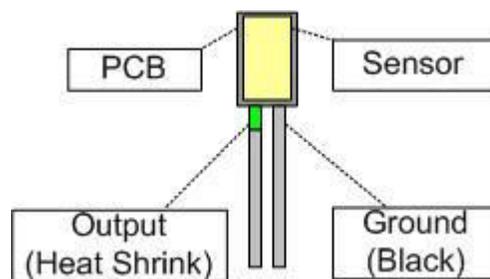


Figure 18

The FINN[®] USB DAQ has a connector with 3 sockets. Each socket is colored coded: the black socket is ground, the red socket is power (+5.0V), and the clear socket is the input signal.

Later on this manual, the software will be installed and the reading (DC voltage) of the FINN[®] connected to the FINN[®] USB DAQ will be shown on the computer screen.

Figure 19 shows the 1 Channel FINN[®] USB DAQ and the necessary hardware to connect to a computer.

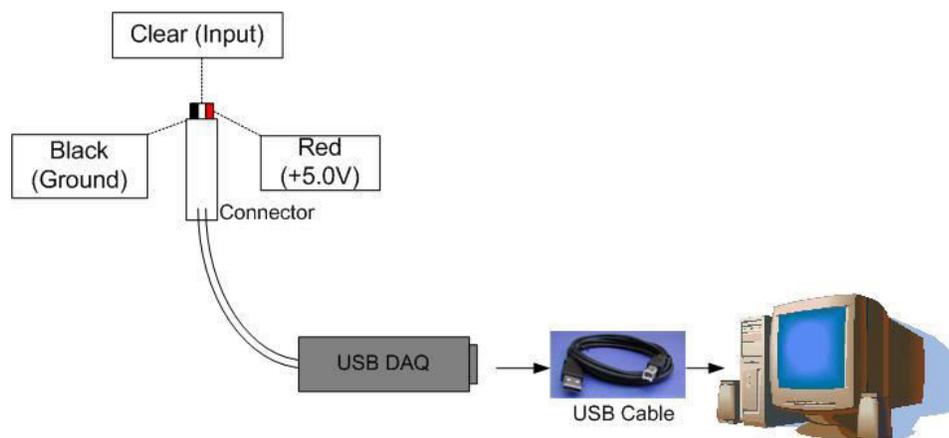


Figure 19

Since the FINN[®] does not require power; the red socket (5.0V) on the FINN[®] USB DAQ is not needed and should not be connected.

The probe on the FINN[®] with the heat shrink should be connected to the clear socket (input signal) on the FINN[®] USB DAQ. The probe on the FINN[®] without heat shrink (ground) should be connected to the black socket (ground) on the FINN[®] USB DAQ.

Figure 20 shows a Green FINN[®] with a vertical probe configuration (P/N: TC2901VP) connected to the FINN[®] USB DAQ. Instructions for software installation can be found in section 3 of this manual. For implementation of FINN[®] USB DAQ software, refer to section 6 of this manual.

Warning: Connecting the FINN[®] output signal and ground connections incorrectly will cause a negative voltage on the input socket of the FINN[®] USB DAQ, therefore causing the FINN[®] USB DAQ to give incorrect readings.

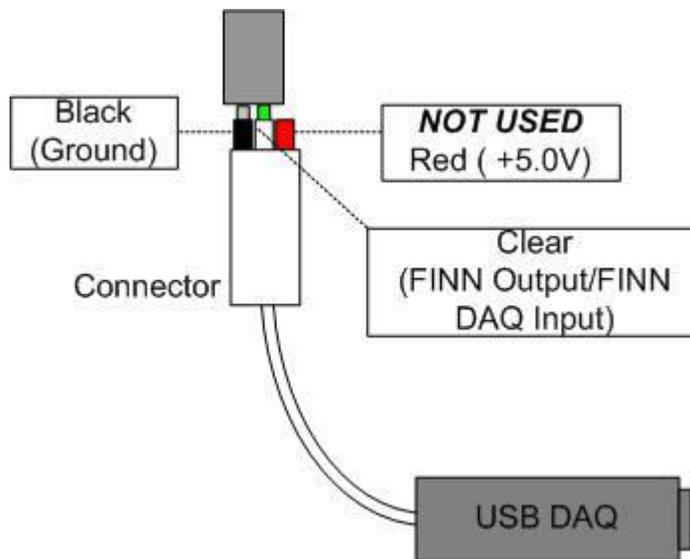


Figure 20

5.3. P-FINN™ Connections for the 1 Channel FINN® USB DAQ

The P-FINN™ has 4 (four) probes connected to the printed circuit boards. These probes have heat shrink around them which is used to identify the power, ground, output and bias pin.

- The probe with the red heat shrink is the power (5.0V).
- The probe with the black heat shrink is the ground.
- The probe with the clear output is the output signal
- The heat shrink on the bias probe, which is the probe in the middle of the board, is used to identify the color of the P-FINN. The Blue P-FINN has a blue heat shrink, the Green P-FINN has a green heat shrink, and the Red P-FINN does not have any heat shrink on the bias probe.

For more detailed information on the P-FINN™ product please refer to the datasheet located at www.FinnTestElectronics.com.

Since the FINN® USB DAQ device has a connector with 3 sockets spaced at 0.100 inches apart, an adaptor is needed in order to fit the P-FINN into the FINN® USB DAQ connector. Please contact FINN Test Electronics for more information on this adaptor.

Figure 21 shows a picture of a Red P-FINN™.



Figure 21

6. 16 Channel FINN[®] USB DAQ

6.1. 16 Channel FINN[®] USB DAQ Pinout

The 16 Channel version of the FINN[®] USB DAQ is capable of measuring the output signal of 16 FINN[®] products. The 16 Channel FINN[®] USB DAQ has two 10 pin (0.100 inches spacing) dual row headers inside the plastic casing. Each of these headers has 0.025" square posts which can be used to wire wrap.

There is a power (+5.0V) and ground connection on each header and the rest of the connections are the different channels of the device. Label "1" = channel number 1, "2" = channel 2, and so on. The two 5V connections on the header are tied together internally, and the two ground connections on the headers are also tied together internally.

Figure 22 shows the pinout of the two headers on the 16 Channel FINN[®] USB DAQ.

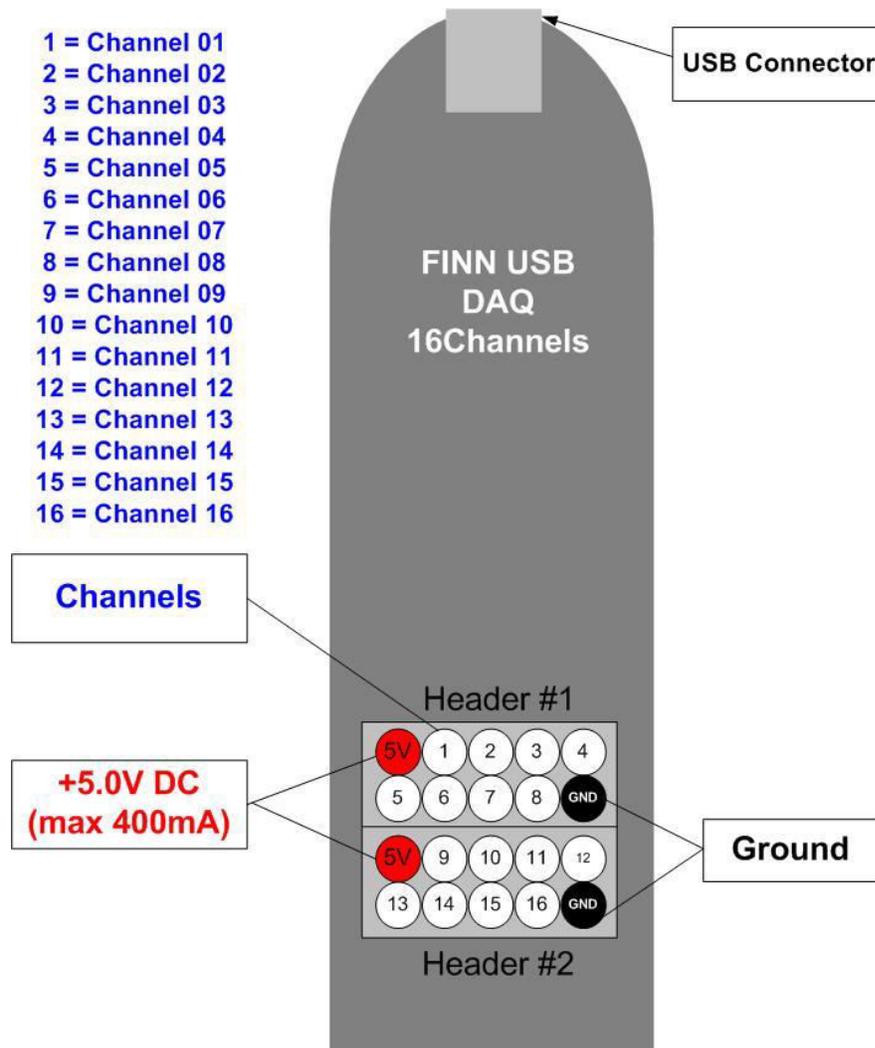


Figure 22

6.2. Smart FINN™ / Ultra FINN™ Connections for the 16 Channel FINN® USB DAQ

The Ultra FINN™ has 3 (three) pins: power (5.0V), ground and output. The Ultra FINN™ Sleeve has 3 wire wrap tails that are spaced at 0.070 inches apart. Since the FINN® USB DAQ has a connector with 3 sockets spaced at 0.100 inches apart; an adaptor is needed in order to fit the Ultra FINN™ into the FINN® USB DAQ connector. Please contact FINN Test Electronics for more information on this adaptor. Figure 23 shows a picture of an Ultra FINN™ and Figure 24 shows the pin out of the Ultra FINN™ Sleeve.

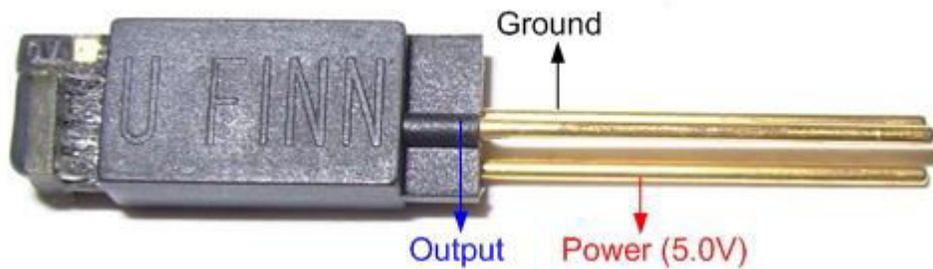


Figure 23

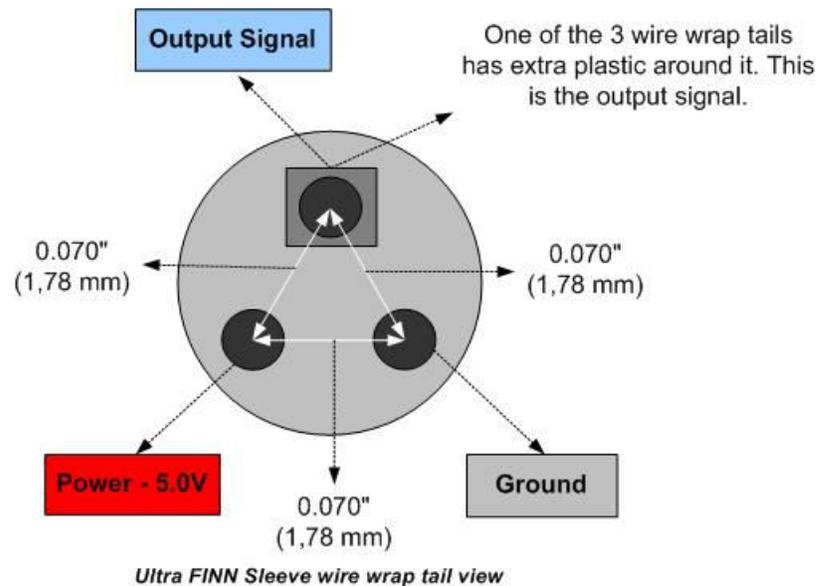


Figure 24

The Smart FINN™ has 3 (Three) probes soldered to the printed circuit board. Each probe has a small piece of colored heat shrink around it. The probe with a red heat shrink is the power probe (+5.0V), the probe with a black heat shrink is the ground probe, and the probe with a clear heat shrink is the output signal probe.

Figure 25 shows a Smart FINN™ with a Vertical Configuration (P/N: TCxxSF-V) and the 3 probes with the heat shrink around them. For more detailed information on the Smart FINN™ please refer the datasheet which is located at www.FINNTestElectronics.com.

The red probe on the Smart FINN™ (+5.0V) should be connected to the 5V pin on the header of the 16 Channel FINN® USB DAQ. The black probe (ground) should be connected to the ground pin on the 16 Channel FINN® USB DAQ. The clear probe (output signal) should be connected to any channel on the 16 Channel FINN® USB DAQ header. Make sure that only one Smart FINN™ output signal is connected to a channel. You may connect up to 16 Smart FINN™/Ultra FINN™ products on the 16 Channel FINN® USB DAQ.

The power (5V) and ground connections should be connected using a daisy chain configuration. FINN Test Electronics recommends daisy chaining a total of 4 connections per power/ground pin.

Please refer to section 9 of this manual for information on how to do a correct daisy chain using wire wrapping techniques. The output signal should NOT be connected using a daisy chain technique.

Instructions for software installation can be found in section 3 of this manual. For implementation of FINN® USB DAQ software, refer to section 6 of this manual.

Warning: Connecting power and ground incorrectly may damage the Smart FINN™/Ultra FINN™ and the FINN® USB device. Do not apply voltage larger than 5.0V or lower than 0.0V on the input socket of the FINN® USB Device since it may damage the device.

Warning: FINN Test Electronics recommends using an external power supply if more than 10 Ultra FINNs are being connected together on the FINN® USB DAQ device as they will draw over 350mA of current and most computers USB port can only supply up to 350mA of current.

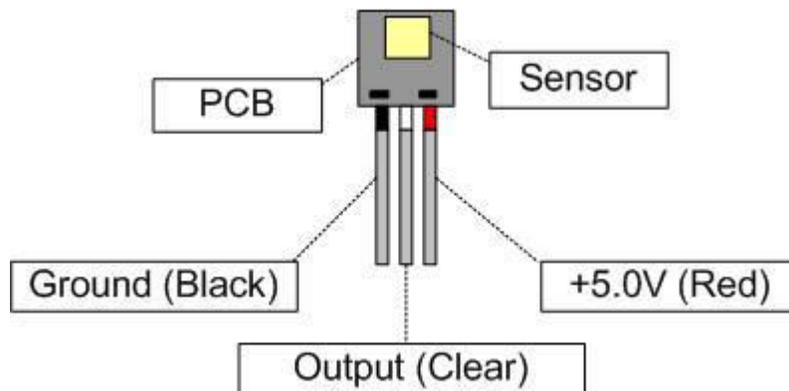


Figure 25

Figure 26 shows an example of 8 Smart FINNs™ connected to 16 Channel FINN® USB DAQ.

The Smart FINNs™ on the left side are connected to channels 1, 2, 3 and 4. There is a daisy chain configuration for the power (5V) and another daisy chain for the ground. The output signal of the Smart FINN™ should not be in a daisy chain configuration.

The Smart FINNs™ on the right side are connected to channels 13, 14, 15 and 16. There is a daisy chain configuration for the power (5V) and another daisy chain for the ground. The output signal of the Smart FINN™ should not be connected in a daisy chain configuration.

Channels 5, 6, 7, 8 and channels 9, 10, 11, 12 should be connected in the way configuration as described above.

Please refer to Section 9 for more information on wire wrapping and daisy chain.

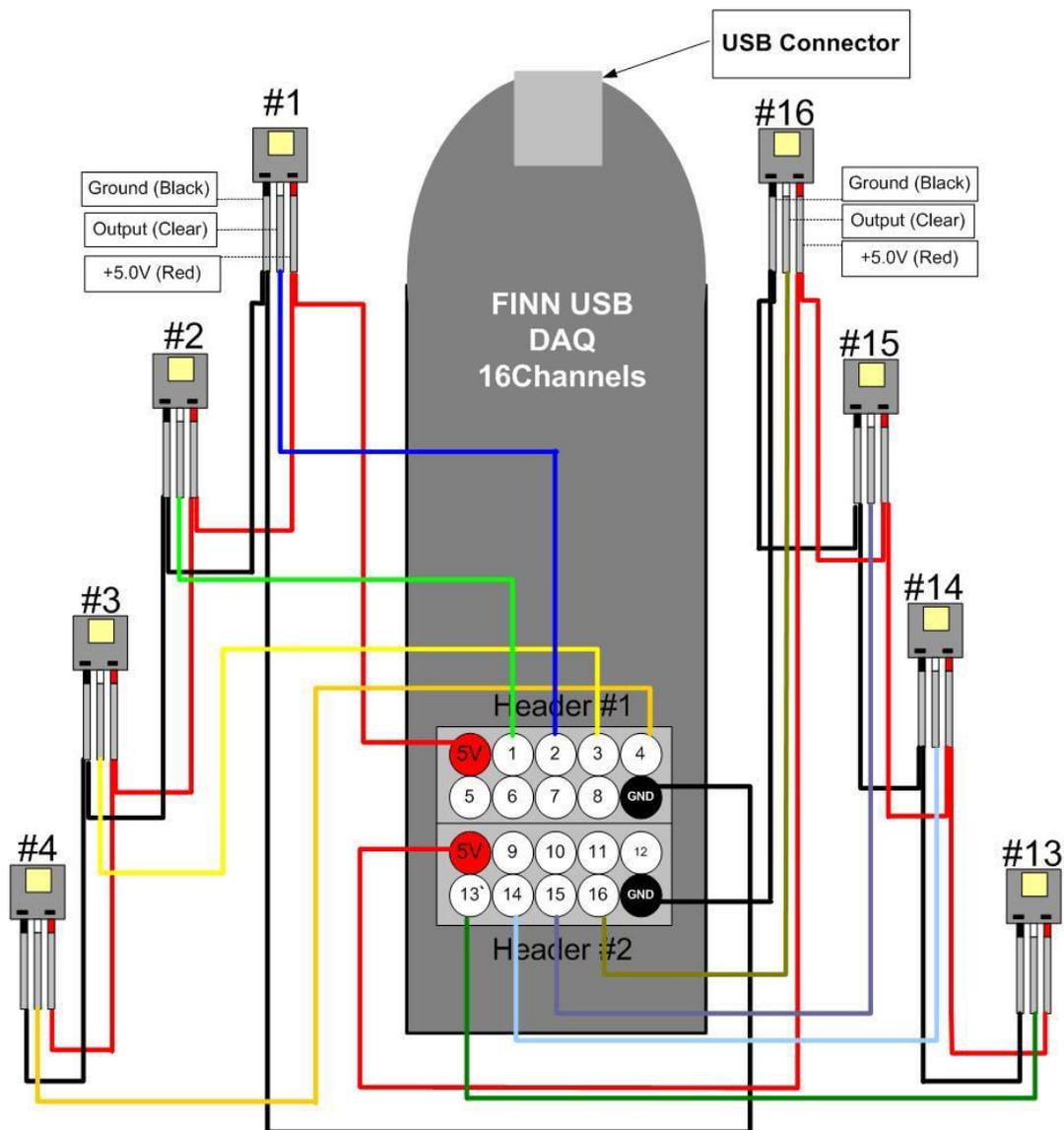


Figure 26

6.3. FINN[®] Connections for the 16 Channel FINN[®] USB DAQ

The FINN[®] has 2 (two) probes soldered to the printed circuit board. One of the probes has a colored heat shrink around it. The color of the heat shrink varies according the FINN[®] type:

- Red FINN[®] (TC3001) has a Red heat shrink
- Green FINN[®] (TC2901) has a Green heat shrink
- Blue FINN[®] (TC2801) has a Blue heat shrink
- Clear FINN[®] (TC8704) has a Clear heat shrink

The probe with the heat shrink is the output signal probe, and the probe without heat shrink is the ground probe.

Figure 27 shows a Green FINN[®] with a vertical probe configuration (TC2901VP). For more detailed information on the FINN[®] product please refer to the datasheet located at www.FinnTestElectronics.com.

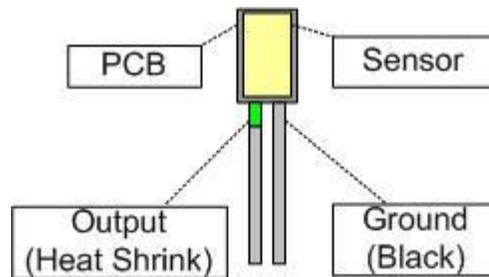


Figure 27

As the FINN[®] does not require power; the 5.0V connections on the headers of the 16 Channel FINN[®] USB DAQ are not needed.

The output probe (probe with heat shrink) should be connected to 1 of the 16 channels on the 16 Channel FINN[®] USB DAQ header. The ground probe (without any heat shrink) should be connected to the ground of the 16 Channel FINN[®] USB DAQ.

Make sure that only one FINN[®] output signal is connected to each channel. Up to 16 FINNs[®] may be connected to the 16 Channel FINN[®] USB DAQ.

When connecting multiple FINNs[®], make sure that the ground connection of each FINN[®] is connected to the ground connections on the 16 Channel FINN[®] USB DAQ.

If more than 4 FINNs are being connected to the 16 Channel FINN[®] USB DAQ, external hardware (connectors, headers, sockets, pins, etc) will be required to expand the ground connections on the 16 Channel FINN[®] USB DAQ. This is necessary due to the length of each wire wrap post. We recommend up to 2 wire wrap connections on each wire wrap post. Please refer to Section 9 for more information on wire wrapping and expansion headers.

Instructions for software installation can be found in section 3 of this manual. For implementation of FINN[®] USB DAQ software, refer to section 6 of this manual.

Warning: Connecting the FINN[®] output signal and ground connections incorrectly will cause a negative voltage on the output probe of the FINN[®], therefore causing the 16 Channel FINN[®] USB DAQ to give incorrect readings.

Figure 28 shows an example of 8 FINNs[®] connected to a 16 Channel FINN[®] USB DAQ.

The FINNs[®] on the left side are connected to channels 1, 2, 3 and 4. There is a daisy chain configuration for the ground. The output signal of the FINN[®] should not be in a daisy chain configuration.

The FINNs[®] on the right side are connected to channels 13, 14, 15 and 16. There is a daisy chain configuration for the Ground. The output signal of the FINN[®] should not be connected in a daisy chain configuration.

Channels 5, 6, 7, 8 and channels 9, 10, 11, 12 should be connected in the way configuration as described above.

Please refer to Section 9 for more information on wire wrapping and daisy chain.

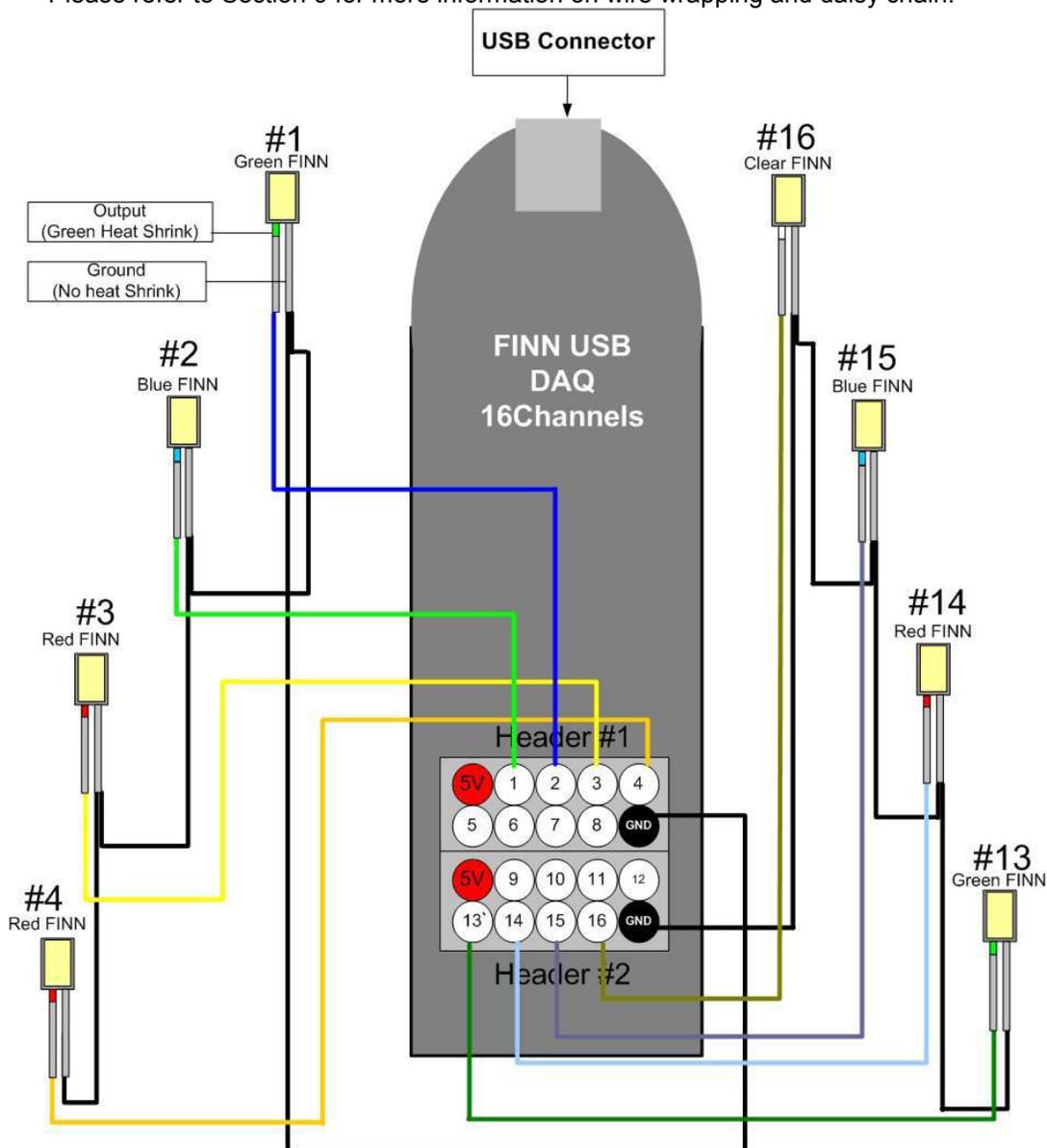


Figure 28

6.4. P-FINN™ Connections for the 16 Channel FINN® USB DAQ

The P-FINN™ has 4 (four) probes connected to the printed circuit boards. These probes have a colored heat shrink around them which is used to identify the power, ground, output and bias pin.

- The probe with the red heat shrink is the power (5.0V).
- The probe with the black heat shrink is the ground.
- The probe with the clear output is the output signal
- The heat shrink on the bias probe, which is the probe in the middle of the board, is used to identify the color of the P-FINN™. The Blue P-FINN™ has a blue heat shrink, the Green P-FINN has a green heat shrink, and the Red P-FINN™ does not have any heat shrink on the bias probe.

Figure 29 shows a Red P-FINN™ and the 4 probes with the heat shrink around them. For more detailed information on the P-FINN™ please refer the datasheet which is located at www.FinnTestElectronics.com.

The red probe on the P-FINN™ (+5.0V) should be connected to the 5V pin on the header of the 16 Channel FINN® USB DAQ. The black probe (ground) should be connected to the ground pin on the 16 Channel FINN® USB DAQ. The clear probe (output signal) should be connected to any channel pin on the 16 Channel FINN® USB DAQ header. The bias probe should not be connected to the USB DAQ as the current FINN® USB DAQ device does not support this feature of the P-FINN™.

Make sure that only one P-FINN™ output signal is connected to a channel. Up to 16 P-FINNs may be connected on the 16 Channel FINN® USB DAQ.

The power (5V) and ground connections should be connected using a daisy chain configuration. We recommend to daisy chain a total of 4 connections per power/ground pin.

Please refer to section 9 on this manual for information on how to do a correct daisy chain using wire wrapping techniques. The output signal should NOT be connected using a daisy chain technique.

Instructions for software installation can be found in section 3 of this manual. For implementation of FINN® USB DAQ software, refer to section 6 of this manual.

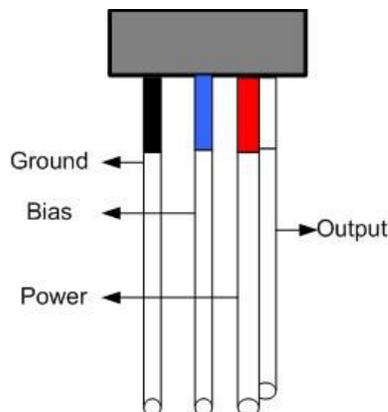


Figure 29

6.5. Connecting FINN[®] and Smart FINN[™] to the 16 Channel FINN[®] USB DAQ

Smart FINNs[™], FINNs[®], Ultra FINNs[™], and P-FINNs[™] can be connected at the same time on different channels of the 16 Channel FINN[®] USB DAQ. The output of the each product should be connected to separate channels. Figure 30 shows 4 Smart FINNs[™] and 4 FINNs[®] connected to the 16 Channel FINN[®] USB DAQ.

The Smart FINNs[™] on left are connected to channels 1, 2, 3, and 4. There is a daisy chain configuration for ground connections and another daisy chain configuration for the power (5V) connections. The output signal of the Smart FINN[™] should not be in a daisy chain configuration.

The FINN[®] on the right are connected to channel 13, 14, 15 and 16. There is a daisy chain configuration for ground connections. The output signal of the FINN[®] should not be in a daisy chain configuration.

The Smart FINNs[™] are connected to the 5V pins as they require power, but the FINNs[®] are NOT connected to the 5V pins, as they do not require power.

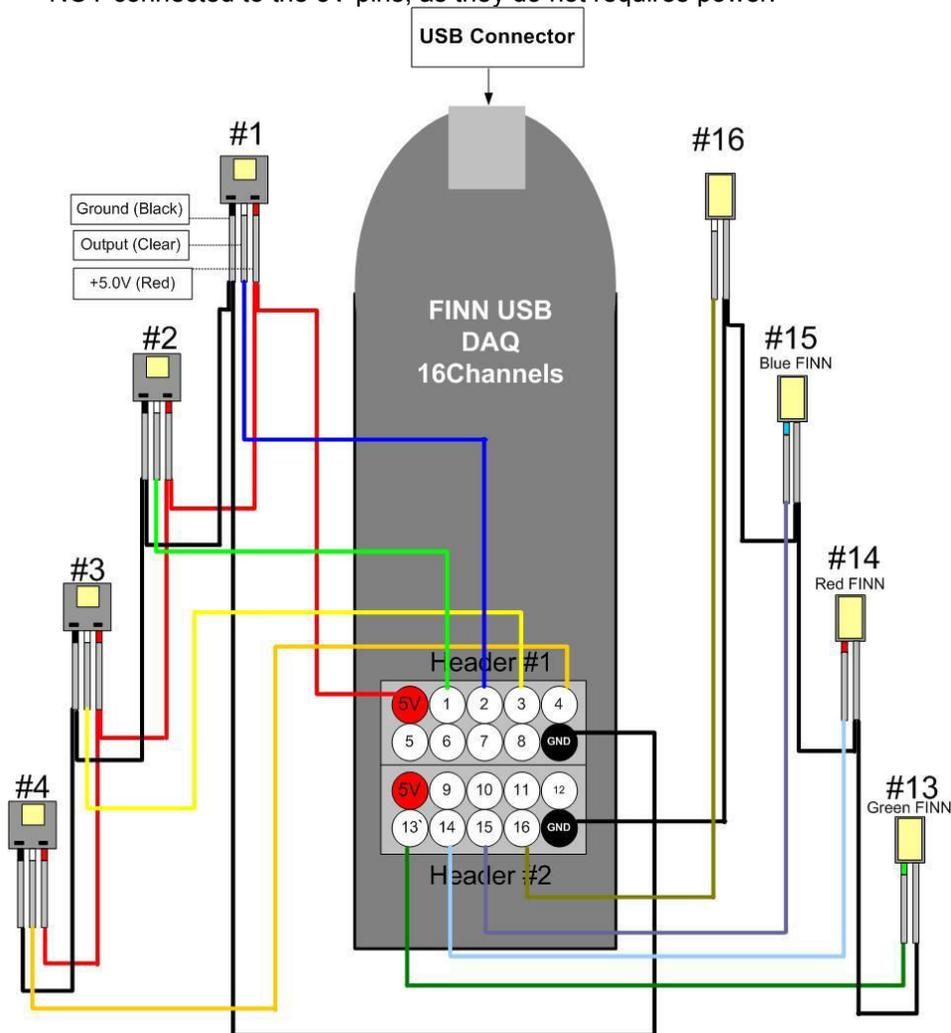


Figure 30

7. FINN[®] USB DAQ Software

Before starting using the software for the FINN[®] USB DAQ, make that the software is installed as described in section 3 of this manual. Also make that the USB driver is installed as described in section 2 of this manual.

To open the software, go to “START”, click on “All Programs”, click on the folder “FINN Test Electronics”, then click on “FINN USB DAQ RevD”, and click on the icon “FINN USB DAQ RevD”. The main screen of the software will appear (Figure 31).

After the main screen is loaded on the computer screen, choose the FINN[®] product that being used with the FINN[®] USB DAQ.



Figure 31

7.1. Smart FINN™ and Ultra FINN™ Software

Figure 32 shows the main screen of the Smart FINN™ software. The Smart FINN™ and the Ultra FINN™ software screens look very similar. However, the color of the 'LED Color Panel' varies since the Smart FINN™ and the Ultra FINN™ output slightly different frequencies.

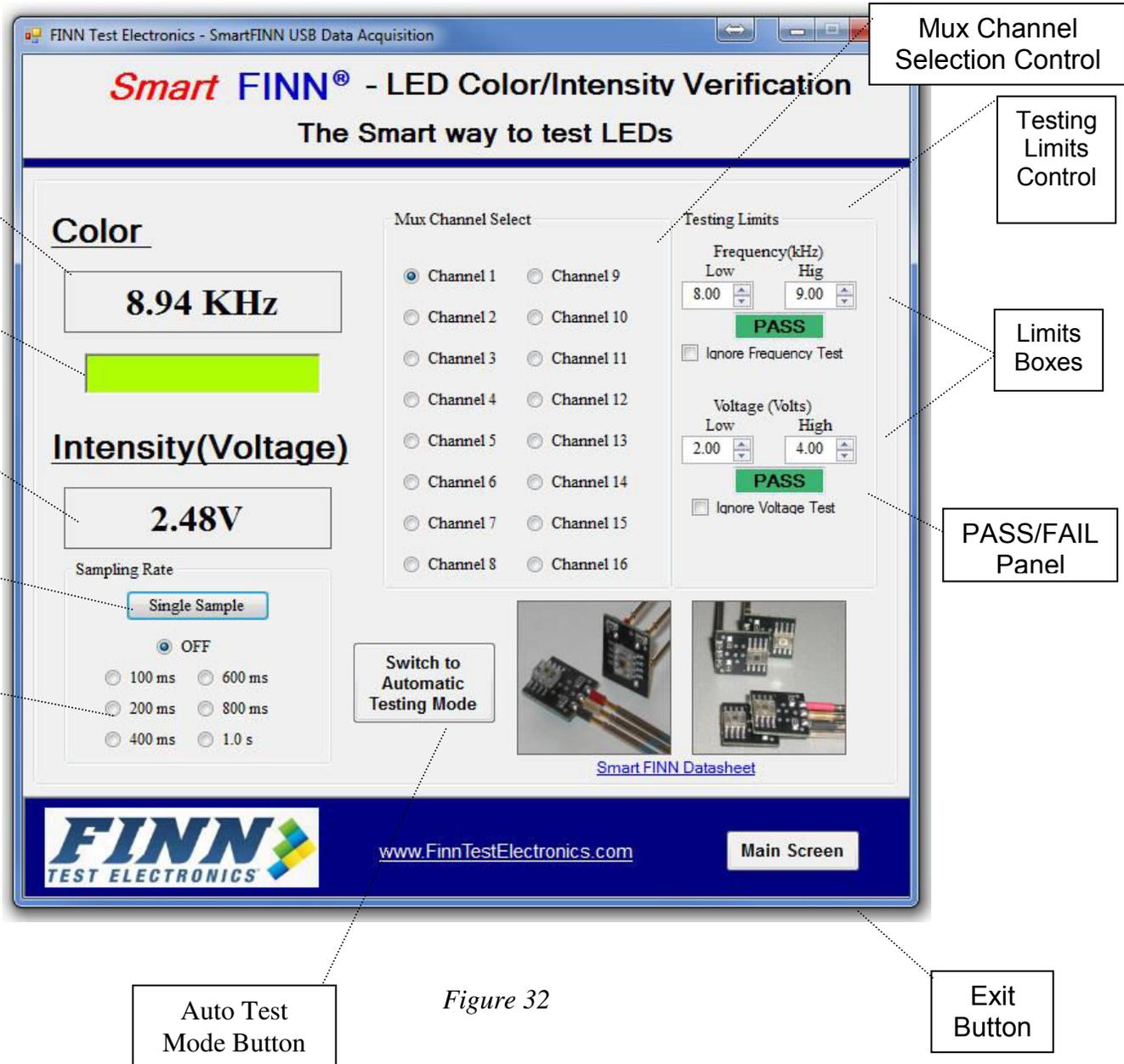


Figure 32

7.1.1. Frequency Box

The *Frequency Box* displays the frequency of the signal that is connected to the FINN[®] USB DAQ. If the frequency of this signal is lower than 2,100 Hz, the *Frequency Box* will display the reading in Hz. If the frequency of the signal is higher than 2,100 Hz, the *Frequency Box* will display the readings in kHz.

If the Smart FINN[™]/Ultra FINN[™] is not connected, the Frequency Box will display “Low Frequency.”

The Smart FINN[™] outputs frequency from 998 Hz up to 12.5 kHz, and the Ultra FINN[™] from 998Hz up to 13.5 kHz. The frequency changes according to the color of the light hitting the Smart FINN[™]/Ultra FINN[™] sensor.

7.1.2. LED Color Panel

The LED Color Panel will change colors as the readings on the Frequency Box change.

The color of the LED Color Panel is an approximation of the color of the light that is hitting the Smart FINN[™]/Ultra FINN[™] sensor.

The reading on the *Frequency Box* will change as the color of the light hitting the Smart FINN[™] sensor is changing.

Typical Smart FINN[™] frequency readings for common LED colors are:

- 7.0 kHz for a Blue LED → *Led Color Panel* turns Blue
- 8.5 kHz for a Green LED → *Led Color Panel* turns Green
- 9.1 kHz for a Yellow LED → *Led Color Panel* turns Yellow
- 10.6 kHz for a Amber LED → *Led Color Panel* turns Amber
- 11.7 kHz for a Red LED → *Led Color Panel* turns Red
- 998 Hz for Dark(not enough light hitting the sensor) → *Led Color Panel* turns Black
- 1,996 Hz for Bright(too much light hitting the sensor) → *Led Color Panel* turn Black

Typical Ultra FINN[™] frequency readings for common LED colors are:

- 5.9 kHz for a Blue LED → *Led Color Panel* turns Blue
- 7.9 kHz for a Green LED → *Led Color Panel* turns Green
- 9.4 kHz for a Yellow LED → *Led Color Panel* turns Yellow
- 11.2 kHz for a Amber LED → *Led Color Panel* turns Amber
- 12.2 kHz for a Red LED → *Led Color Panel* turns Red
- 998 Hz for Dark(not enough light hitting the sensor) → *Led Color Panel* turns Black
- 1.8-2.6 kHz for Bright(too much light hitting the sensor) → *Led Color Panel* turn Black

7.1.3. Voltage Box

The *Voltage Box* displays the DC average voltage of the signal connected to the FINN[®] USB DAQ. If this voltage is lower than 1.0V, the *Voltage Box* will display the voltage reading in mV (mili-volts). If the voltage reading is higher than 1.0V, the *Voltage Box* will display the voltage reading in V (Volts). The *Voltage Box* reading ranges from 0V to 5.0V.

The Smart FINN™ and the Ultra FINN™ output a frequency that changes as the color of the light hitting the sensor changes. The duty cycle of this frequency changes as the intensity of the light changes. The duty cycle will get bigger as the light intensity increases, and the duty cycle will get smaller as the light intensity decreases. The FINN® USB DAQ has a built in filter network with 10k resistor and 0.1uF capacitor. With this filter network, the FINN® USB DAQ will display the DC Average of the frequency on the *Voltage Box*. The readings on the *Voltage Box* will range from 0.2V (when the light is very dim) to 4.8V (when the light very is very bright) when using a Smart FINN™ or Ultra FINN™.

7.1.4. Sampling Rate Control

The *Sampling Rate Control* controls how often the reading on the *Frequency Box* and the *Voltage Box* is updated. In order to change the sampling rate, click on the button of the desired rate: OFF, 100ms, 200ms, 400ms, 600ms, 800ms, or 1.0 s.

- “OFF” → The readings will NOT be updated
- “100 ms” → The readings will be updated every 100m seconds
- “200 ms” → The readings will be updated every 200m seconds
- “400 ms” → The readings will be updated every 400m seconds
- “600 ms” → The readings will be updated every 600m seconds
- “800 ms” → The readings will be updated every 800m seconds
- “1.0 s” → The readings will be updated every 1.0 seconds

The *Single Sample* button will update the readings (Frequency and Voltage) each time the button is pressed. When the *Single Sample* button is pressed, the *Sampling Rate Control* will change to the “OFF” position.

7.1.5. Mux Channel Select Control

The *Mux Channel Select* is only enabled when the 16 Channel FINN® USB DAQ is attached to the PC and it is disabled when the 1 Channel device is attached.

The *Mux Channel Select* is used to switch among the 16 different channels of the 16 Channel FINN® USB DAQ. When a channel is selected, the readings (Frequency and Voltage) for that channel are displayed on the *Frequency Box* and *Voltage Box*. In order to change the channel the reading is taken from, just select the desired channel in the *Mux Channel Select*.

The channels on the *Mux Channel Select* are the same as the channel numbers on the two headers on the plastic casing of the 16 Channel FINN® USB DAQ. For example, to obtain the readings for the Smart FINN®/Ultra FINN connected to channel 4 on the header of the 16 Channel FINN® USB DAQ, select Channel 4 on the *Mux Channel Select*.

7.1.6. Testing Limits Control

The *Testing Limits Control* is used to set the limits for the frequency and the voltage readings. Once these limits are set, every time the readings are updated on the *Frequency Box* and *Voltage Box*, the software will check these readings against the limits in the limit boxes.

If the readings are outside the high and low limits, the *PASS/FAIL Panel* will turn red and will display *FAIL*. If the readings are within the low and high limits, the *PASS/FAIL Panel* will turn green and will display *PASS*.

Use the up/down arrow to change the limits for the frequency and the voltage. The limits for the Frequency are in KHz, and the limits for the voltage are in Volts. The *Ignore Test Limit* will disable the limit testing when checked.

7.1.7. Exit Button

The *EXIT* Button will close and exit the Smart FINN™ or the Ultra FINN™ screen and will return to the main screen of the FINN® USB DAQ Software.

7.1.8. Automatic Test Mode

The Automatic Test Mode button will switch to the automatic mode screen. This button is only enabled when the 16 Channel FINN® USB DAQ is attached to the PC, and it will be disabled for the 1 Channel FINN® USB DAQ. Figure 33 shows an Automatic Test Mode screen for the Smart FINN®. The Smart FINN® and Ultra FINN Automatic Test Mode screens are exactly the same.

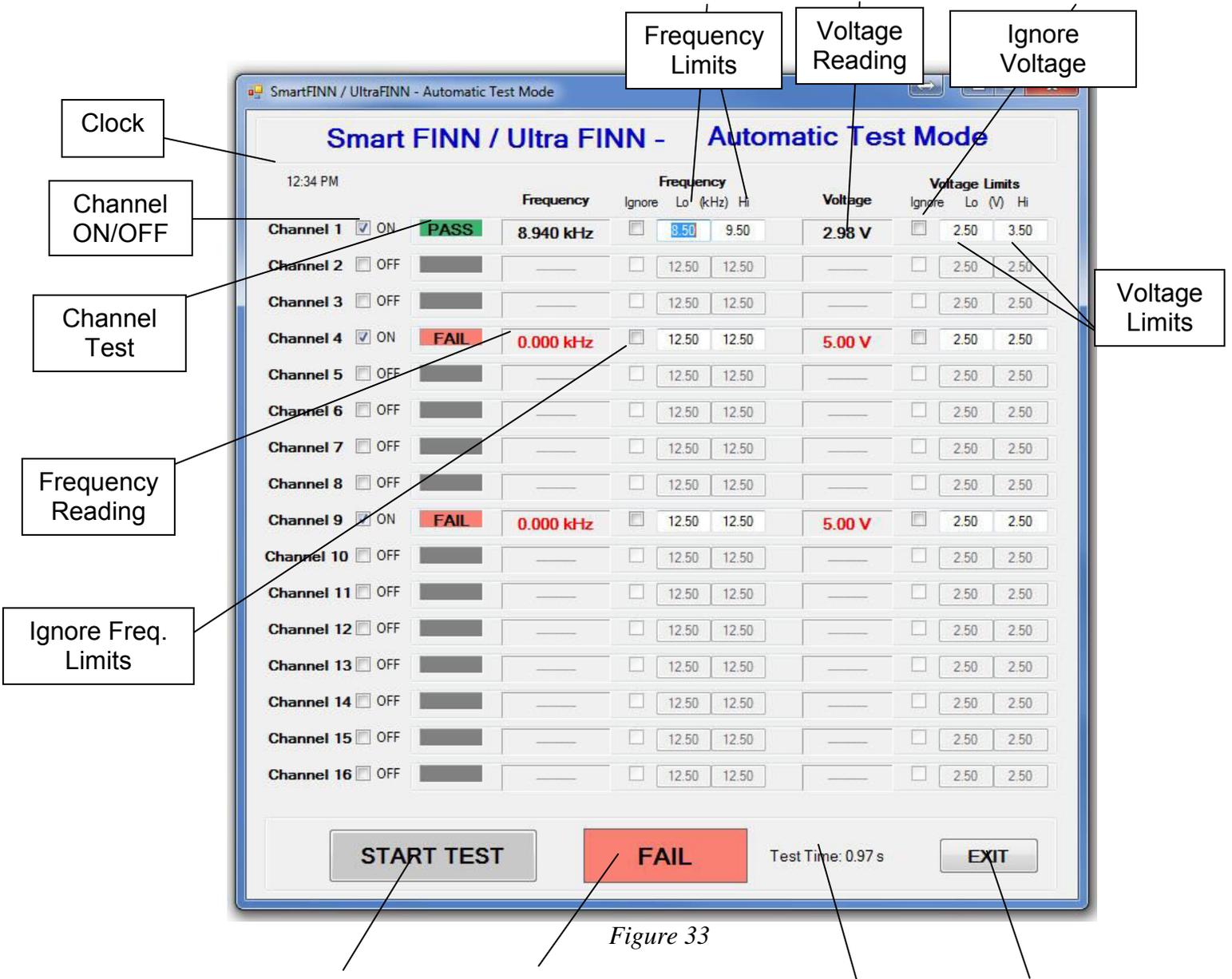


Figure 33



- **Channel ON/OFF**
Turns the frequency and voltage testing on and off for a specific channel.
- **Channel Test Result**
This box will display the test result (PASS/FAIL) for a specific channel.

- *Frequency Reading*

This box will display the frequency reading of a specific channel. The unit for the frequency reading is kHz.

- *Ignore Frequency Limits*

This box, when checked, will ignore the frequency test for a specific channel.

- *Frequency Limits*

These boxes are used to set the high and low limits for the frequency reading. The unit for the frequency limits is kHz.

- *Voltage Reading*

This box will display the voltage reading of a specific channel. The unit for the voltage reading is Volts.

- *Ignore Voltage Limits*

This box, when checked off, will ignore the voltage test of a specific channel.

- *Voltage Limits*

These boxes are used to set the high and low limits for the voltage reading. These limits must be entered in Volts.

- *Start Test*

This button will start testing the channels selected (ON) for test.

- *Overall Test Result*

This box will display the final test result for the channels that are selected (ON) for testing.

- *Total Test Time*

This box will display the duration of the test in seconds.

- *Exit*

This button will close the Automatic Test Mode screen and display the previous screen.

7.2. FINN® and P-FINN™ Software

The FINN® and the P-FINN™ software screens look very similar. However, the units of the voltage box and the testing limits are different as the FINN® outputs voltage from 0.0V to 550mV the P-FINN™ from 0 to 5.0V. Figure 34 shows the main screen of the FINN® software and Figure 35 show the main screen of the P-FINN™ software.

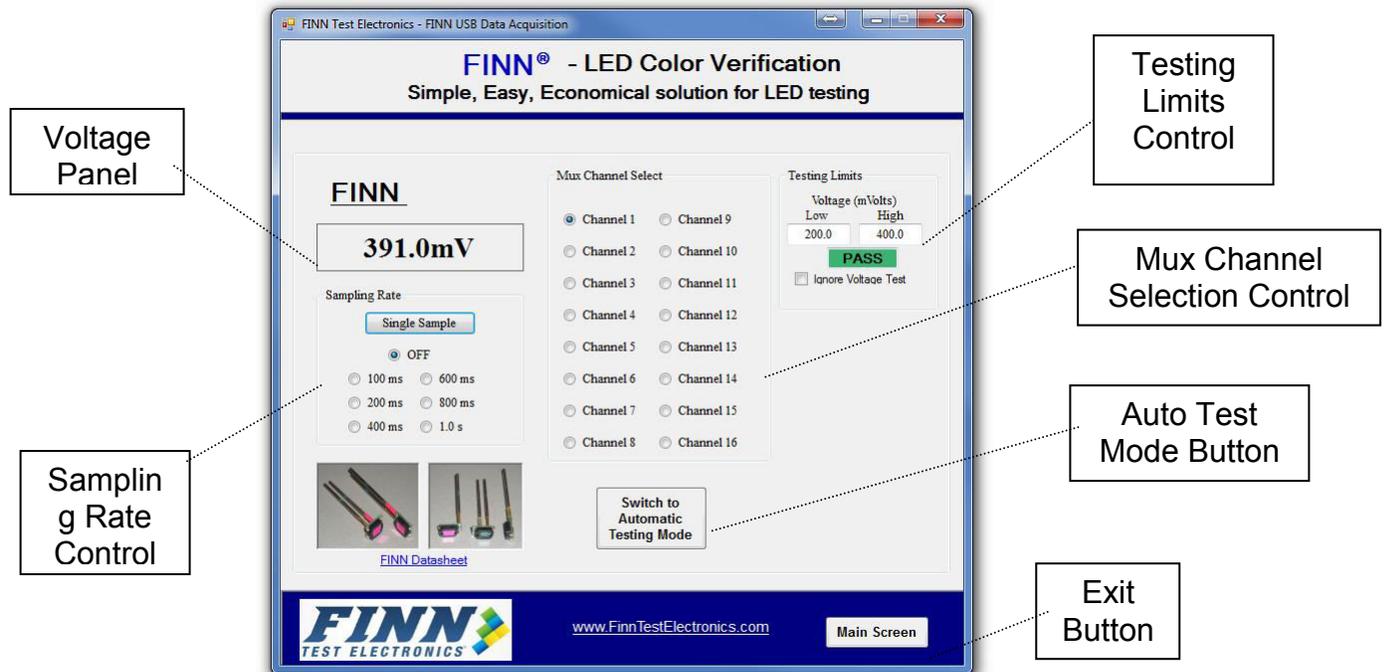


Figure 34

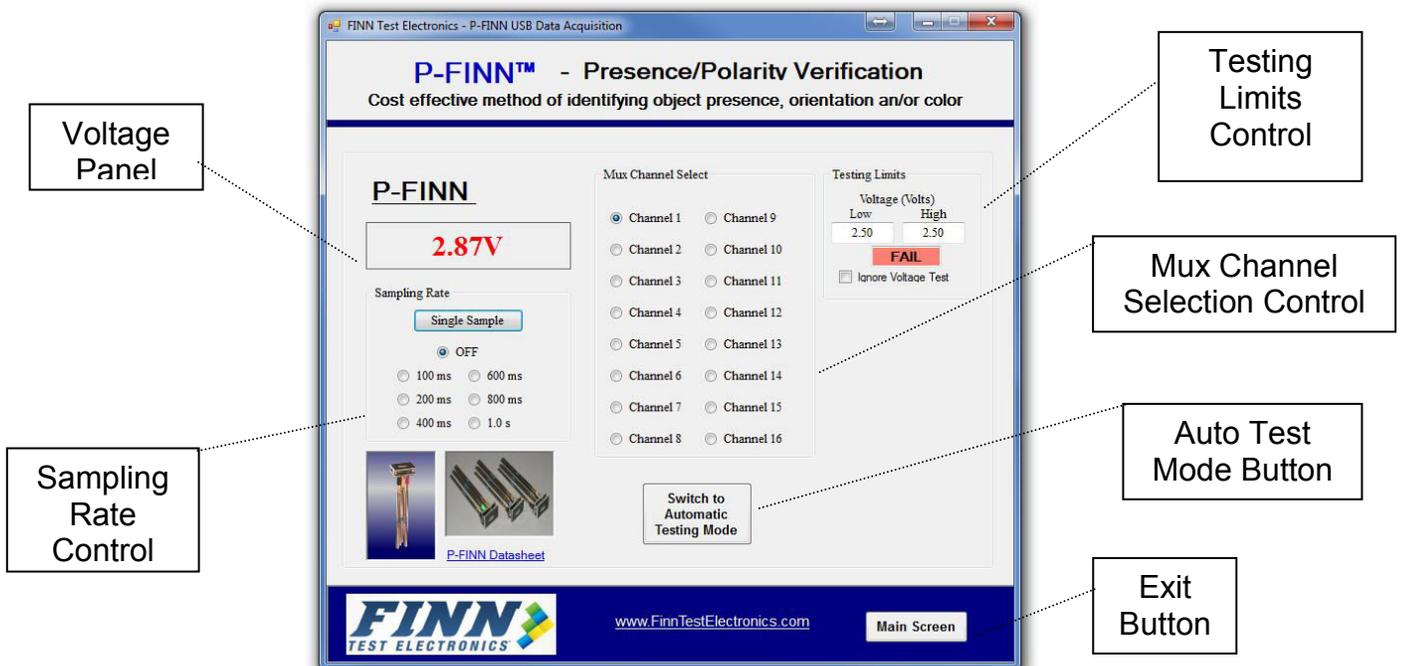


Figure 35

7.2.1. Voltage Box

The *Voltage Box* displays the voltage of the signal connected to the FINN[®] USB DAQ.

The FINN[®] outputs a voltage when the color of the light hitting the sensor matches the color type of FINN[®]. The FINN[®] outputs a voltage that ranges from 0mV to 500mV.

The P-FINN[™] outputs a voltage which is proportional to the reflection of the light hitting the target surface. The P-FINN[™] outputs a voltage from 0V to 5.0V.

The FINN[®] software displays the voltage reading in the Voltage Box in milli-volts, and the P-FINN software display the reading in Volts.

7.2.2. Sampling Rate Control

The *Sampling Rate Control* controls how often the reading on the *Voltage Box* is updated. In order to change the sampling rate, click on the button of the desired rate (OFF, 100ms, 200ms, 400ms, 600ms, 800ms, or 1.0 s).

- “OFF” → The readings will NOT be updated
- “100 ms” → The readings will be updated every 100m seconds
- “200 ms” → The readings will be updated every 200m seconds
- “400 ms” → The readings will be updated every 400m seconds
- “600 ms” → The readings will be updated every 600m seconds
- “800 ms” → The readings will be updated every 800m seconds
- “1.0 s” → The readings will be updated every 1.0 seconds

The *Single Sample* button will update the voltage reading each time the button is pressed. When the *Single Sample* button is pressed, the *Sampling Rate Control* will change to the “OFF” position.

7.2.3. Mux Channel Select Control

The *Mux Channel Select* is only enabled when the 16 Channel FINN[®] USB DAQ is attached to the PC and it is disabled when the 1 Channel device is attached.

The *Mux Channel Select* is used to switch among the 16 different channels of the 16 Channel FINN[®] USB DAQ. When a channel is selected, the voltage reading for that channel is displayed on the *Voltage Box*.

In order to change the channel the reading is taken from, just select the desired channel in the *Mux Channel Select*.

The channels on the *Mux Channel Select* are the same as the channel numbers on the two headers on the plastic casing of the 16 Channel FINN[®] USB DAQ. For example, to obtain the readings for the Smart FINN[®]/Ultra FINN connected to channel 4 on the header of the 16 Channel FINN[®] USB DAQ, select Channel 4 on the *Mux Channel Select*.

7.2.4. Testing Limits Control

The *Testing Limits* is used to set the limits for the voltage reading. Once these limits are set, every time the voltage reading is updated on the *Voltage Box*, the software will check the reading against the limits in the limit boxes.

If the reading is outside the high and low limits, the *PASS/FAIL Panel* will turn red and will display *FAIL*. If the reading is within the low and high limits, the *PASS/FAIL Panel* will turn green and will display *PASS*.

On the FINN[®] Software, the limits for the voltage are in mV and on the P-FINN software the limits are in Volts.

The *Ignore Test Limit* will disable the limit testing when checked.

The *Single Test* button will first update the reading on the *Voltage Box* every time it is pressed, and then it will check this reading against the limits entered. If the reading is within the limits, then the *PASS/FAIL Panel* will display *PASS* and turn green, otherwise it will display *FAIL* and turn red.

7.2.5. Exit Button

The *EXIT* Button will close and exit the FINN[®] or the P-FINN[™] screen and will return to the main screen of the FINN[®] USB DAQ Software.

7.2.6. Automatic Test Mode

The Automatic Test Mode button will switch to the automatic mode screen. This button is only enabled when the 16 Channel FINN[®] USB DAQ is attached to the PC, and it will be disabled for the 1 Channel FINN[®] USB DAQ.

Figure 36 shows an Automatic Test Mode screen for the FINN[®]. The main difference between the FINN[®] and the P-FINN Automatic Test Mode screen is the units of the voltage reading and the units of the voltage limits. The FINN[®] screen is displayed in milli-Volts, and the P-FINN[™] screen is displayed in Volts.

The screenshot shows the 'FINN - Automatic Test Mode' software window. At the top left, a clock displays '3:35 PM'. The main interface is a table with 16 channels. Each channel row includes a checkbox for 'ON/OFF', a 'PASS/FAIL' status panel, a 'Voltage Reading' field, and 'Limits Boxes' for 'Lo (mV)' and 'Hi'. Channel 1 is ON with a PASS result and a reading of 120.0 mV. Channel 8 is ON with a FAIL result and a reading of 0.0 mV. Channel 16 is ON with a FAIL result and a reading of 0.0 mV. At the bottom, a 'Test Time' of 0.52 s is shown, along with three buttons: 'START TEST', 'FAIL', and 'EXIT'. The 'FAIL' button is highlighted in red.

Channel	ON/OFF	Test Result	Voltage Reading	Lo (mV)	Hi
Channel 1	<input checked="" type="checkbox"/>	PASS	120.0 mV	100.0	200.0
Channel 2	<input type="checkbox"/>			200.0	400.0
Channel 3	<input type="checkbox"/>			200.0	400.0
Channel 4	<input type="checkbox"/>			200.0	400.0
Channel 5	<input type="checkbox"/>			200.0	400.0
Channel 6	<input type="checkbox"/>			200.0	400.0
Channel 7	<input type="checkbox"/>			200.0	400.0
Channel 8	<input checked="" type="checkbox"/>	FAIL	0.0 mV	200.0	400.0
Channel 9	<input type="checkbox"/>			200.0	400.0
Channel 10	<input type="checkbox"/>			200.0	400.0
Channel 11	<input type="checkbox"/>			200.0	400.0
Channel 12	<input checked="" type="checkbox"/>			200.0	400.0
Channel 13	<input type="checkbox"/>			200.0	400.0
Channel 14	<input type="checkbox"/>			200.0	400.0
Channel 15	<input type="checkbox"/>			200.0	400.0
Channel 16	<input checked="" type="checkbox"/>	FAIL	0.0 mV	200.0	400.0

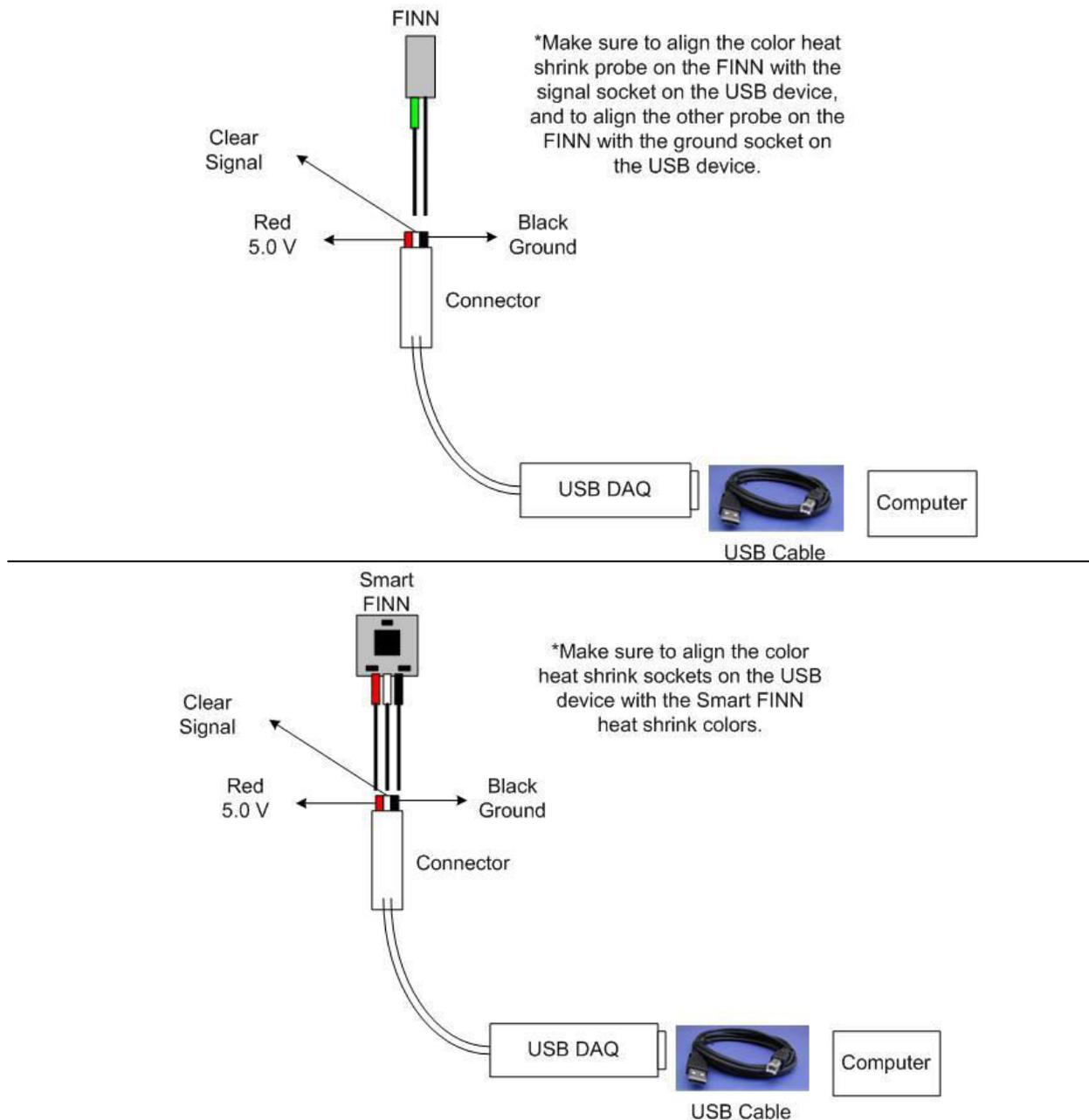
Callouts and their corresponding elements:

- Clock: 3:35 PM
- Channel ON/OFF: Channel 1 checkbox
- Channel Test Result: Channel 1 PASS status
- PASS/FAIL Panel: Channel 8 FAIL status
- Start Test Button: START TEST button
- Overall Test Result: FAIL button
- Total Test Time: Test Time: 0.52 s
- Limits Boxes: Lo (mV) and Hi input fields
- Voltage Reading: 120.0 mV field

Figure 36

- *Channel ON/OFF*
Turns the frequency and voltage testing on and off for a specific channel.
- *Channel Test Result*
This box will display the test result (PASS/FAIL) for a specific channel.
- *Voltage Reading*
This box will display the voltage reading of a specific channel. The unit for the voltage reading is Volts or mil-Volts.
- *Ignore Voltage Limits*
This box, when checked, will ignore the voltage test of a specific channel.
- *Voltage Limits*
These boxes are used to set the high and low limits for the voltage reading. These limits should be entered in Volts for the P-FINN™ software and in mili-Volts for the FINN® software.
- *Start Test*
This button will start testing the channels selected (ON) for test.
- *Overall Test Result*
This box will display the final test result for the channels that are selected (ON) for testing.
- *Total Test Time*
This box will display the duration of the test in seconds.
- *Exit*
This button will close the Automatic Test Mode screen and display the previous screen.

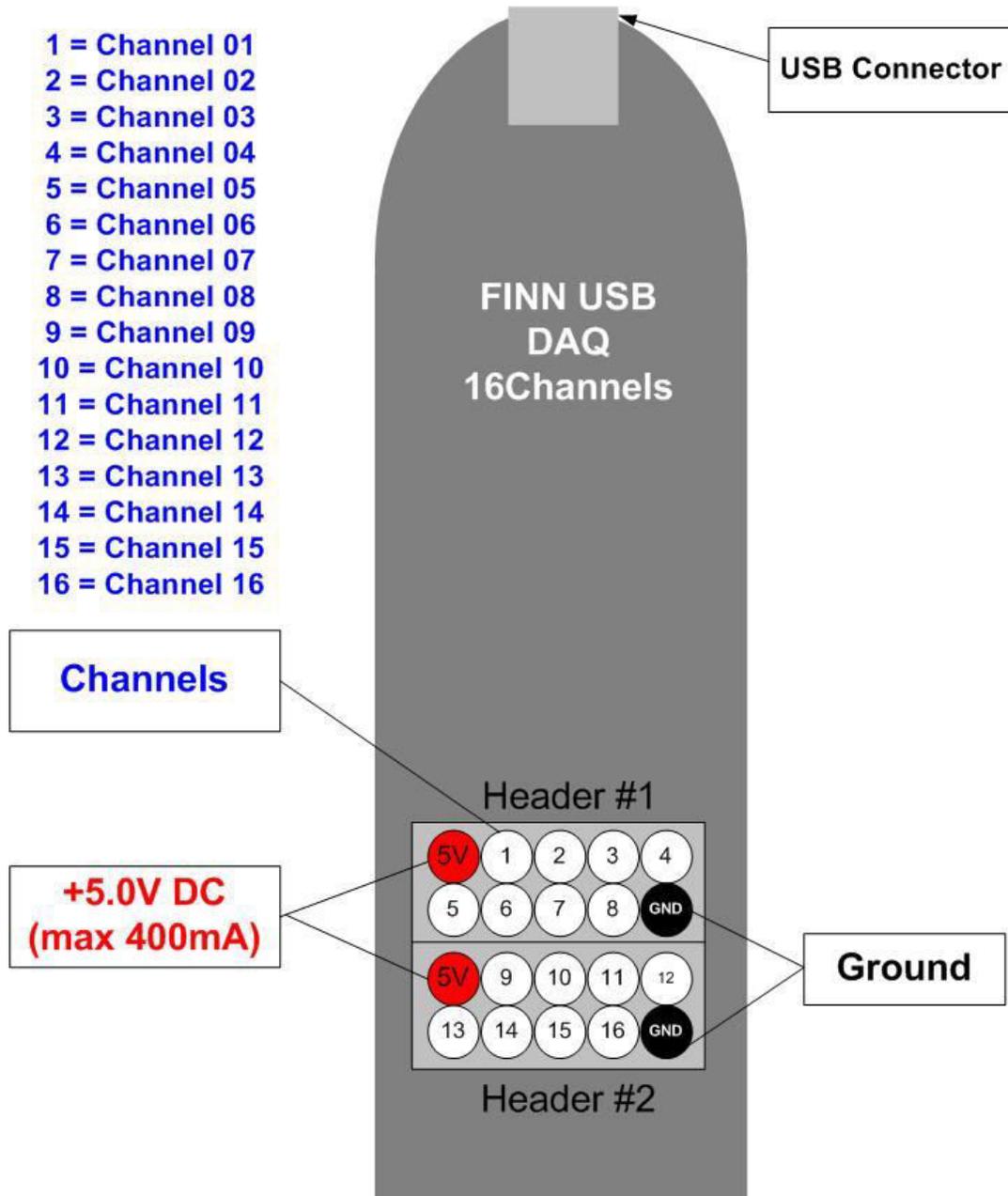
8. 1 Channel FINN[®] USB DAQ Connector



Warning: Connecting power and ground incorrectly may damage the FINN[®] USB DAQ and the FINN[®] Product that is connected to the socket.

Since the FINN[®] USB DAQ device has a connector with 3 sockets spaced at 0.100 inches apart, an adaptor is needed in order to fit the P-FINN[™] or the Ultra FINN[™] into the FINN[®] USB DAQ connector. Please contact FINN Test Electronics for more information on these adaptors.

9. 16 Channel FINN[®] USB DAQ Header Connections



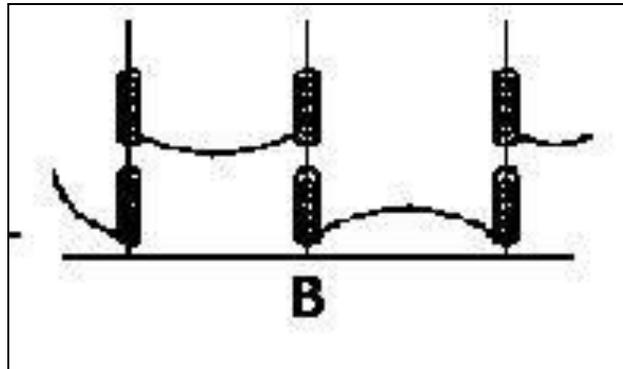
Warning: Connecting power and ground incorrectly may damage the FINN[®] USB DAQ and the FINN[®] Products that are connected to it.

Warning: FINN Test Electronics recommends using an external power supply if more than 10 Ultra FINN[™]s are connected together on the FINN[®] USB DAQ device as they will draw over 350mA of current and most computer USB ports can only supply up to 350mA of current.

10. Wire Wrapping and Daisy Chaining

10.1. Daisy Chain

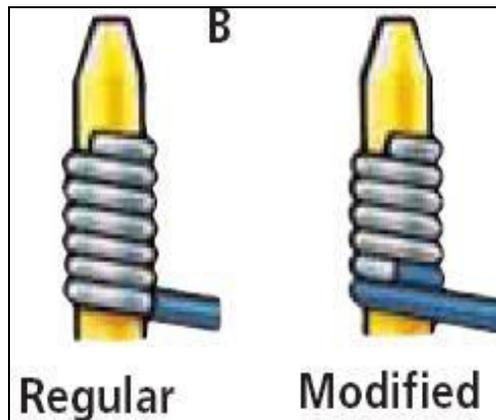
The picture below shows the correct way of making a daisy chain.



10.2. Wire Wrapping

The picture below shows the two types of wire wrapping techniques. The Modified Version will give extra insulation as there is one turn of insulated wire.

The table below shows the recommended number of wire wrap turns for different wire sizes. FINN Test Electronics recommends wire size 28 AWG.



STRIP FORCE CHART *					
AWG	Wire Size		Min. number of turns (Bare Wire)	Min. strip force	
	Dia. inches	Dia. mm		lbs.	gms
16	.051	1.30	4	15	6800
18	.0403	1.00	4	15	6800
20	.032	0.80	5	8	3600
22	.0253	0.65	5	8	3600
24	.0201	0.50	6	7	3200
26	.0159	0.40	7	6	2700
28	.0126	0.32	7	5	2200
30	.0100	0.25	7	3.3	1500

*Conforms to MIL-STD-1130B

11. DLL library - API Calls

Please contact FINN Test Electronics for information on the DLL library functions to interact the FINN® USB DAQ with MS Visual Basic and/or NI Lab View using the APIs.

12. Ordering Information

FINN™ parts may be ordered directly by calling 224-662-0383 or emailing to FINNsales@FINNTest.com. Customers located outside of the US who would prefer to place an order locally may contact one of the FINN™ distributors listed below.

12.1. Distributors:

France – Cotelec - www.cotelec.fr

Germany – Fixtest GmbH - www.fixtest.de

Japan - Newly Tsuchiyama Co., Ltd. - www.newly-t.com

Switzerland – SQC AG – www.sqc.ch

Distributor phone numbers and addresses may be accessed by clicking on the [Distributor List](#) located on the Contact US page at www.FINNTestElectronics.com.

13. Technical Support

Our product engineers are available to assist you with choosing the correct FINN™ product to fit your specific needs as well as to answer any technical questions you may have regarding installation and/or implementation.

Please contact us at:

Email: FINNSales@FINNTest.com

Phone: 224-662-0383

14. Revision History and Control

14.1. Rev D – January 2016

- Changes to logo and layout for manual only

14.2. Rev D - August 2012

- USB 2.0 and FTDI USB driver support for most Windows operating system

14.3. Rev C - April 2008

- Firmware updated to increase measurement accuracy

14.4. Rev B - November 2006

- FINN USB DAQ available in 16 channels

14.5. Rev A - March 2006

- Initial release