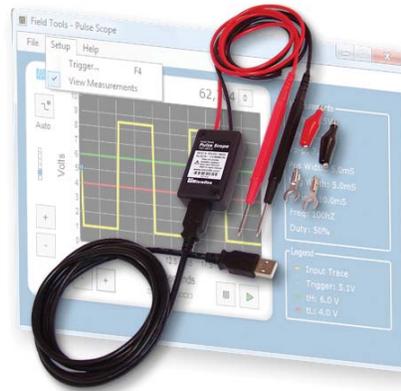Field Tools
Pulse Scope™

101-0012

Installation Operation & Specifications Manual

General Description

Pulse Scope is a USB oscilloscope designed to aid field service technicians and engineers with troubleshooting pulse or frequency related equipment. Use Pulse Scope to test PLC digital inputs and outputs, flow meters with pulsed outputs, speed sensors, and more. Pulse Scope's simplicity and portability allows you to quickly visualize and measure waveform features. Actually seeing the waveform can help locate possible voltage level or pulse width issues making your system more reliable.

- Can be set to wait and capture a single pulse event with long delays between events (Single Sweep)
- Quickly measure max voltage, minimum voltage, peak-peak voltage, positive width, negative width, period, frequency, and duty cycle
- Count pulse events over extended time periods with a maximum count of over 4 billion pulses
- Trigger on rising or falling pulse edge to increase measurement accuracy

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Safety Considerations

⚠ Warning - Non Isolated Input

Pulse Scope does not provide electrical isolation between the USB port and the pulse input leads. USB ground and the pulse input black lead are at the internally connected. Connecting to a signal at a different ground potential than the USB ground could damage equipment.

⚠ Observe Input Voltage Limits & Polarity

Exceeding the pulse input voltage levels, or connecting in reverse polarity may permanently damage the device. Pulse Scope is designed for low voltage pulses less than 30 volts peak to peak.

Connecting Pulse Scope to your computer

Pulse Scope uses the Human Interface Device (HID) class driver. The HID driver is included as a part of the Windows operating system and no third party device driver is required. When you connect the Pulse Scope to your computers USB port, your computer will automatically detect it and configure the necessary software. Power for Pulse Scope is taken from the USB port and no external power source is necessary.

Software Requirements

- Windows**®** 7, Vista, or XP
- Windows .NET Framework 2
- 3MB Disk Space
- USB 2.0 Port
- CD/DVD Drive to install the software

Software Setup

To install the Pulse Scope software run setup.exe from the CD and follow the on-screen prompts. The setup utility (setup.exe) will auto-run when the CD is inserted in your CD drive if this feature is enabled on your computer. The required .NET framework will also be installed if it is not already installed on your computer.
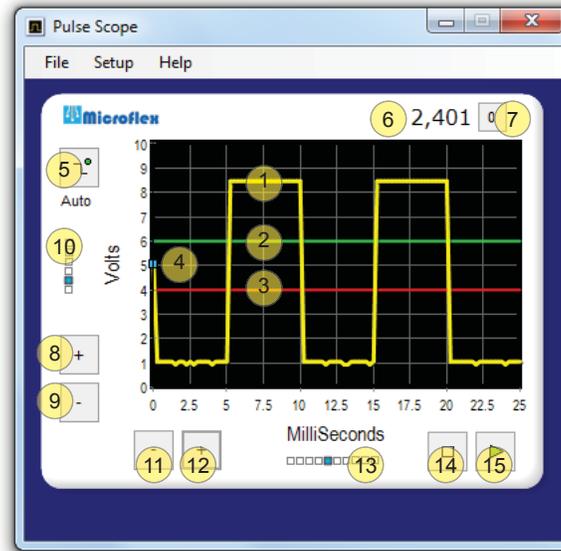
Running the Software

With Pulse Scope connected to a USB port, run the software by either clicking on the Pulse Scope icon on your desktop or by choosing it from **Start > All Programs > Microflex > Pulse Scope**.

Pulse Scope Icon

Program Features

1. The yellow line is the measured value plotted with time as the horizontal scale and volts as the vertical scale.

2. The green line is for visualization of how the measured pulse would relate to an upper trigger level of a device that the pulse connects to. Measured pulse voltages should be higher than the green line to ensure that the device the pulse is driving will see a high logic level. The actual value is set using the **Setup > Trigger** menu or by pressing F4. See the Trigger Settings section in this manual for details.

3. The red line is for visualization of how a measured pulse would relate to the lower trigger level of the device that the pulse connects to. Measured pulse voltages should fall lower than the red line to ensure that the device the pulse is driving will see a low logic level. The actual value is set using the **Setup > Trigger** menu or by pressing F4. See the Trigger Settings section in this manual for details.

4. The pulse scope internal trigger voltage level. Input voltages must cross this voltage before the measured pulse edge can be synchronized. Also, the pulse count (item 6) will increment as the pulse edge crosses the trigger voltage. The value is determined by a comparison of the upper and lower trigger levels (green and red lines).

5. Selects, and shows, which pulse edge (rising or falling) to use for synchronization. A green dot will appear on the button when the input is synced.

6. Displays the total number of pulses counted since the last count reset. When the trigger edge is set to rising, the count is incriminated when the input voltage increases past the trigger voltage. When the trigger edge is set to falling, the count is incriminated when the input voltage falls below the trigger voltage.

3

7	Resets the pulse counter.
8	Increases the voltage scale.
9	Decreases the voltage scale.
10	Indicates the active volts scale in reference to the available scales.
11	Decreases the time scale and reduced the time between voltage samples.
12	Increases the time scale and increases the time between voltage samples.
13	Indicates the active time scale in reference to the available scales.
14	Stop acquiring data.
15	Run or start acquiring data.

Trigger Settings

To change the trigger settings choose **Setup > Trigger** from the top pull-down menu or press F4 to open the Trigger Settings dialog.

Auto Acquire

In auto acquire mode Pulse Scope will look for a pulse edge to sync the frame. If a trigger edge is not detected after a short delay, a frame of data (100 voltage samples taken at the active sample rate) will be acquired. Auto is best when the time between pulses is short enough that a new trigger edge can be detected without sync loss. If there is a long delay between pulse edges, try using the normal acquire mode for a more stable sync.
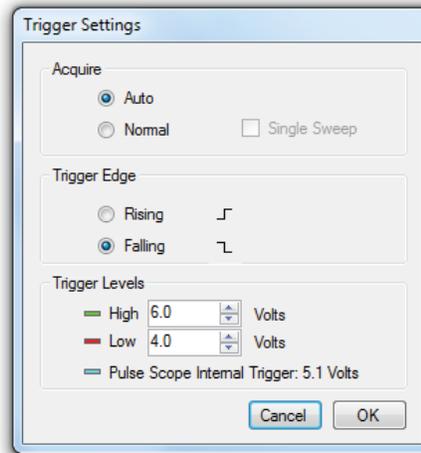
Normal Acquire

In normal acquire mode Pulse Scope will not start acquiring data until a trigger edge is detected. Normal is best when there is a long delay between pulse edges because the Pulse Scope will wait for the pulse event before acquiring the frame.

Normal + Single Sweep Acquire

Single sweep is only available when normal is selected. It functions the same as normal but stops acquiring after one sweep. To acquire a frame press the run button.

4

Trigger Edge

Selects whether to trigger or sync the frame when the pulse voltage is increasing (Rising) or when the pulse voltage is decreasing (Falling).

Trigger Levels

The voltages to use for trigger levels (green and red lines) should be taken from the data sheet or manual for the pulse or digital input that the pulsing device will connect to. Using the actual values that your equipment uses will provide an accurate visual representation to reveal if the pulse displayed by Pulse Scope will cross the trigger levels used by your digital or pulse input. If High and Low are set to the same voltage, the red line will be drawn over the green line and only red will be visible.

If these values are unknown, choose a voltage that is approximately between the maximum and minimum measured voltages (Vmax and Vmin).

The Pulse Scope Internal Trigger level is automatically selected to be between the High and Low voltage levels. Pulse scope only has a few values it can use for the internal trigger and determined from the High and Low settings.

View Measurements

To view the pulse measurements choose **Setup > View Measurements** from the top pull-down menu. Choosing this menu item again will hide the measurements.
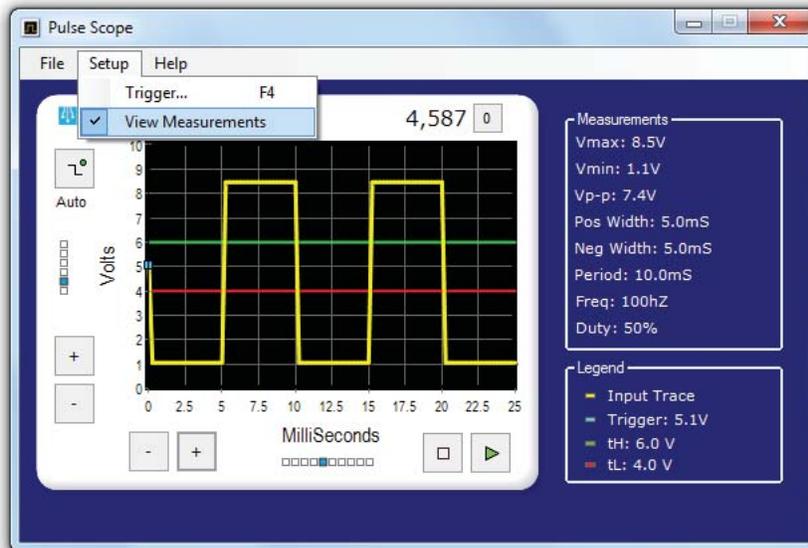
Getting Started

With the Pulse Scope connected to a USB port and the software running, connect the black lead to the (-) side and the red lead to the (+) side of the signal you would like to measure. It is important to remember that Pulse Scope does not provide isolation between the USB port and input leads. Consider this when you connect the black lead to your equipment. In most cases you can connect the black lead to the power supply return or ground.
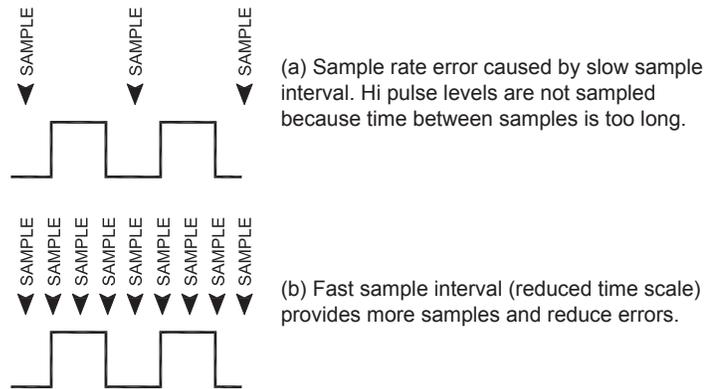
Start with the default scales and trigger settings then adjust the scales to fit the measured waveform on the chart. Make sure there are no errors due to slow sample rates be reducing the time scale (see *Sample Rate Errors* below) as a quick check before taking measurements.

When viewing measurements – some measurements will only show when the pulse is synced and at least two pulses are visible.

Sample Rate Errors

Pulse Scope builds a visual representation of the measured waveform by taking voltage readings of the input signal at evenly spaced sample intervals - 100 samples per frame. The sample interval depends on the time scale. If the sample interval is too slow, it is possible for the Pulse Scope to provide a waveform that is not representative of the true waveform. Reducing the time scale will decrease the time between samples (sample interval).

In the illustration below (a), the sample interval is too slow for the waveform. The two pulses fall between samples causing a sample rate error. Always reduce the time scale (faster sample interval) to make sure there are no sample rate errors before taking measurements (b).

SAMPLE ▼　　SAMPLE ▼　　SAMPLE ▼

(a) Sample rate error caused by slow sample interval. Hi pulse levels are not sampled because time between samples is too long.

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(b) Fast sample interval (reduced time scale) provides more samples and reduce errors.

Pulse Scope Specifications

USB

Connector ....USB-A
Standard Cable Length .... 6 Feet (2 Meters)
Compatibility .... USB 2.0

Scope Input

Leads ....3 Feet (1 Meter) High Flexibility Test Lead Wire
Termination ......Configurable (Alligator Clips, Spade Terminals, or Probes)
Input Voltage Range ....0 to 30 Volts
Input Frequency Range .... DC to 10Khz
Resolution 8-bits
Accuracy .... ±5% of Scale
Input Impedance .... >500KΩ
Volt Scales 5V, 10V, 15V, 20V, 25V, 30V
Time Scales;

Time Scale	Sample Interval	Frame Width
1	10uS	1mS
2	25uS	2.5mS
3	50uS	5mS
4	100uS	10mS
5	250uS	25mS
6	500uS	50mS
7	1mS	100mS
8	2.5mS	250mS
9	5mS	500mS
10	10mS	1S

Pulse Counter

Maximum Count.. 4.2 billion
Pulse Count Rate... 0 to 100K pulses per second

Enclosure

Molded ABS Plastic
Weight (including USB cable) .... 5 ounces
Pulse Scope Dimensions ....1.38" x 2.36" x 0.8"

Environmental

Operating Temperature ....-30ºC to 50ºC (-22ºF to 122ºF)
Storage Temperature ....-40ºC to 70ºC (-40ºF to 158ºF)
Humidity ....0 to 95% (non-condensing)

Limited Warranty

Microflex, LLC warrants this unit against defects in materials and workmanship for a period of one year from the date of shipment. Microflex, LLC will, at its option, repair or replace equipment that proves to be defective during the warranty period. This warranty includes parts and labor.

A Return Authorization (RA) number must be obtained from the factory and clearly marked on the outside of the package before equipment will be accepted for warranty work.

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