

## Dranetz HDPQ Waveshape Triggering and Distorted Loads

### INTRODUCTION

Certain loads with high harmonics or electronic switching content can distort the voltage (and current) waveforms. Such waveform distortion can include harmonics, inter-harmonics, voltage fluctuations, and/or electronic notching from SCR and other switching loads.

The ability to capture changes in the Voltage (V) and Current (I) waveshapes and V & I transients are a powerful capability of the Dranetz HDPQ family and are unique to Dranetz products. However, when monitoring changing distorted loads, the instruments can continually trigger when not properly configured, resulting in large data files with numerous Waveshape events.

This TechTip describes how the Dranetz Waveshape trigger methods work and how to best configure the Dranetz HDPQ instruments to monitor distorted loads.

### DRANETZ WAVESHAPES TRIGGER METHODS

Most Dranetz products, including the Dranetz HDPQ family, have two waveshape trigger methods - Waveshape Difference Trigger and RMS Deviation Trigger. They are similar, and both compare the present V or I (50/60Hz) waveshape to the previous waveshape, and trigger on the difference between them. However, they use different triggering methods.

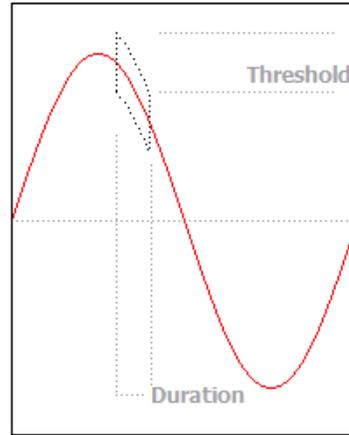
The Waveshape Trigger method breaks the present 50/60Hz cycle into smaller windows in time and compares each window to the same part of the previous cycle.

The RMS Deviation Trigger uses the entire cycle and does a sample by sample subtraction of the previous 50/60Hz cycle from the present cycle.

Being the most commonly used, and the more complex waveshape trigger method, this TechTip focuses on the Waveshape Difference trigger and how to best configure the instruments for your application.

### HOW THE WAVESHAPES DIFFERENCE TRIGGER WORKS

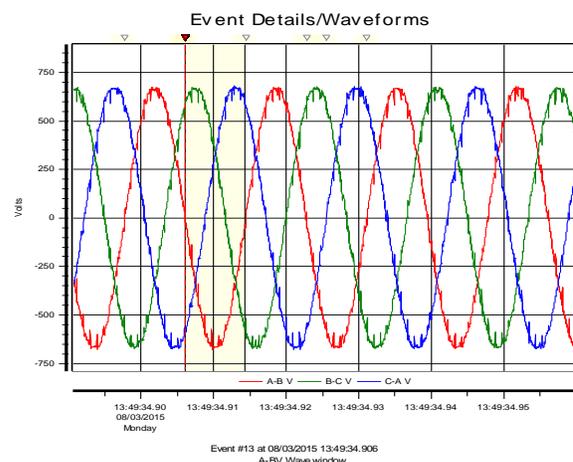
The Waveshape Difference trigger uses a “floating window” algorithm for waveshape fault detection. This window can be visualized as sliding along a waveform from left to right, precisely one cycle behind the present waveshape. See below:



This method breaks down the present (50/60Hz) AC cycle into user-defined windows of time (Window Duration) that represent a percentage of the overall waveform. Each window is compared to the same window in time of the previous waveform, and if the difference (magnitude) exceeds the user's limits, an event is recorded. In the figure above, the duration (width of the window) is 10% (1.67ms @60Hz, 2ms @50Hz). This means that the waveform is broken down into 10 consecutive windows, with each representing 10% of the overall waveform. If the duration were 50%, the waveform would be broken down into 2 windows, with each representing 50% (8.3ms @60Hz, 10ms @50Hz) of the overall waveform.

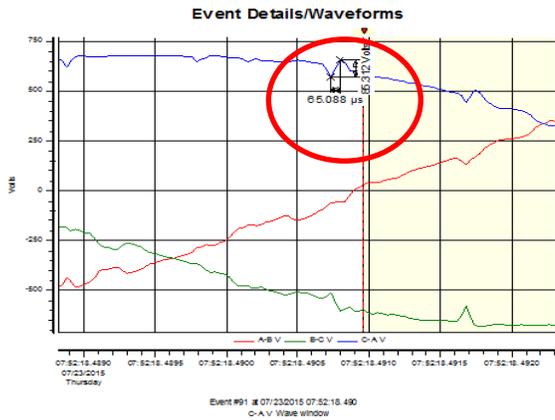
### WAVESHAPES TRIGGER EXAMPLE

The figure below shows distorted voltage waveforms in our Dran-View 7 software that were recorded by a Dranetz HDPQ instrument using waveshape triggers.



- #10769 06/17/2015 01:57:42.485 CV Wave window
- #10770 06/17/2015 01:57:43.084 AV Wave window
- #10771 06/17/2015 01:57:43.084 BV Wave window
- #10772 06/17/2015 01:57:43.084 CV Wave window
- #10773 06/17/2015 01:57:43.092 AV Wave window
- #10774 06/17/2015 01:57:43.092 BV Wave window
- #10775 06/17/2015 01:57:43.092 CV Wave window
- #10776 06/17/2015 01:57:43.101 AV Wave window
- #10777 06/17/2015 01:57:43.101 CV Wave window

As shown below, Dran-View 7 can zoom-in on the actual triggered data illustrating the amount of distortion. You can measure the magnitude and duration of the distortion by using Dran-View’s delta X, Y feature. Notice the value of 66.3Vpk-pk. This voltage value exceeded the Waveshape magnitude threshold and is just one instance where the threshold was exceeded in this file.

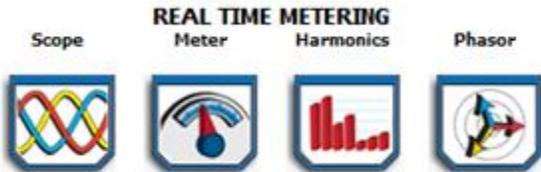


Below are the instruments Wave Window threshold settings shown in Dran-View’s Instrument Configuration menu - The Wave Window Magnitude threshold of 48.0 V is being continually triggered.

**WAVE Window Mag:** 48.0 48.0 48.0 0.00  
**WAVE Window Dur:** 10.0 10.0 10.0 0.00

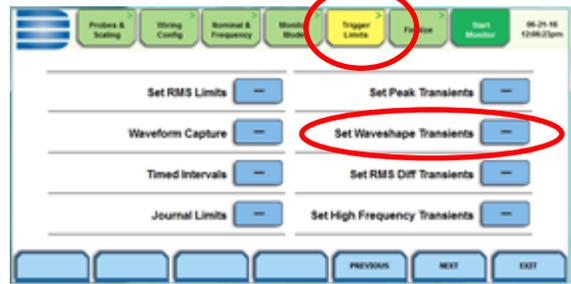
**IDENTIFYING BEFORE MONITORING**

It’s important to properly adjust the instrument settings *before* placing the Dranetz HDPQ into service to avoid continual Waveshape triggering. Users can identify the correct waveshape magnitude settings by using the Real Time Scope mode located on the Dranetz HDPQ’s Home screen.

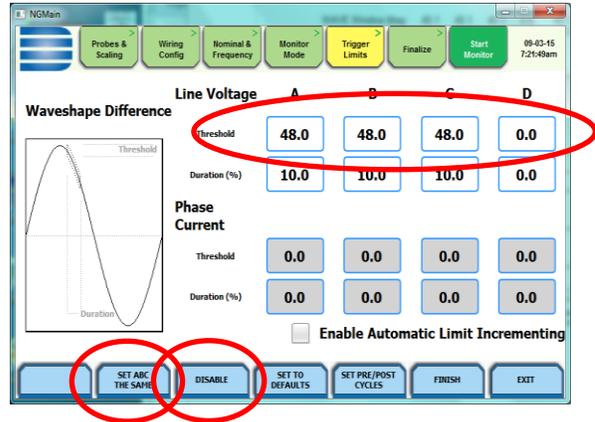


If the voltage waveforms exhibit significant distortion, you can disable the Waveshape triggers if they are not needed, or you can increase the Waveshape Magnitude thresholds to prevent continual triggering. *If the waveforms look normal with clean sinusoidal voltage waveforms, then the default setting can be used.*

**DRANETZ HDPQ WAVESHAPe TRIGGER SETUP ADJUSTMENTS**  
 While in the HDPQ Wizard setup press the “Trigger Limits” tab or continue through the setup wizard by pressing “Next” until you reach this tab, Select “Set Waveshape Transients” to change the Magnitude Limits.



Adjust the Waveshape Threshold magnitudes by selecting the Channel A threshold and increasing the setting. You can set all three individually or use the “Set ABC the SAME” button at the bottom.



The user can also disable the Waveshape trigger if not needed by pressing the “Disable” button at the bottom.

**TO CONTACT DRANETZ**

- Call 1-800-372-6832 (US and Canada) or 1-732-287-3680 for Technical or Sales support
- To submit a support request online, please visit: <https://www.dranetz.com/technical-support-request/>