

## TECH NOTE :: ClipX Tolerance-window

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### Brief description

This is an instruction for creating a tolerance-window in the ClipX that can be used for a component or performance test for example. Several of those tolerance-window analyses can be used at the same time. In principle it is possible to define the limits of the tolerance-window as well as the start and stop condition static or flexible by using variable signals, a PLC or a PC software. Those parameters can be changed to the runtime, whereby a “dynamic” measurement window is made.

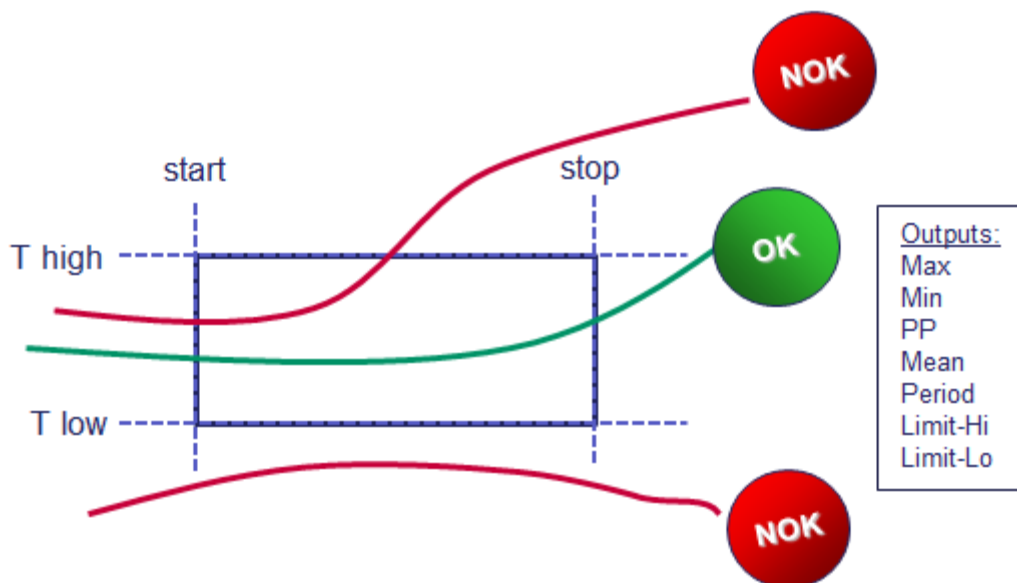
In this particular example a tolerance-window is triggered by a sine signal during a force measurement. When the values of the sine become positive the window is started. When they become negative the measurement is stopped.

The upper and lower limit of the window is each defined with a constant; however a variable value is possible, too. If the upper or lower limit is crossed during a run, a flag for signalization is set. Furthermore it is possible to display the various measurement values within a window.

The conditions, that the signal passes the tolerance-window without errors:

- The signal must run from the left into the window and exit to the right
- The signal must be between maximum and minimum during the entrance and the exit of the tolerance-window
- The signal must not exceed or fall below the specified maximum / minimum level during the measurement

All those values and flags can be further processed through the analog/digital interfaces as well as through Ethernet and field bus. That way the testing tasks can be automatized.

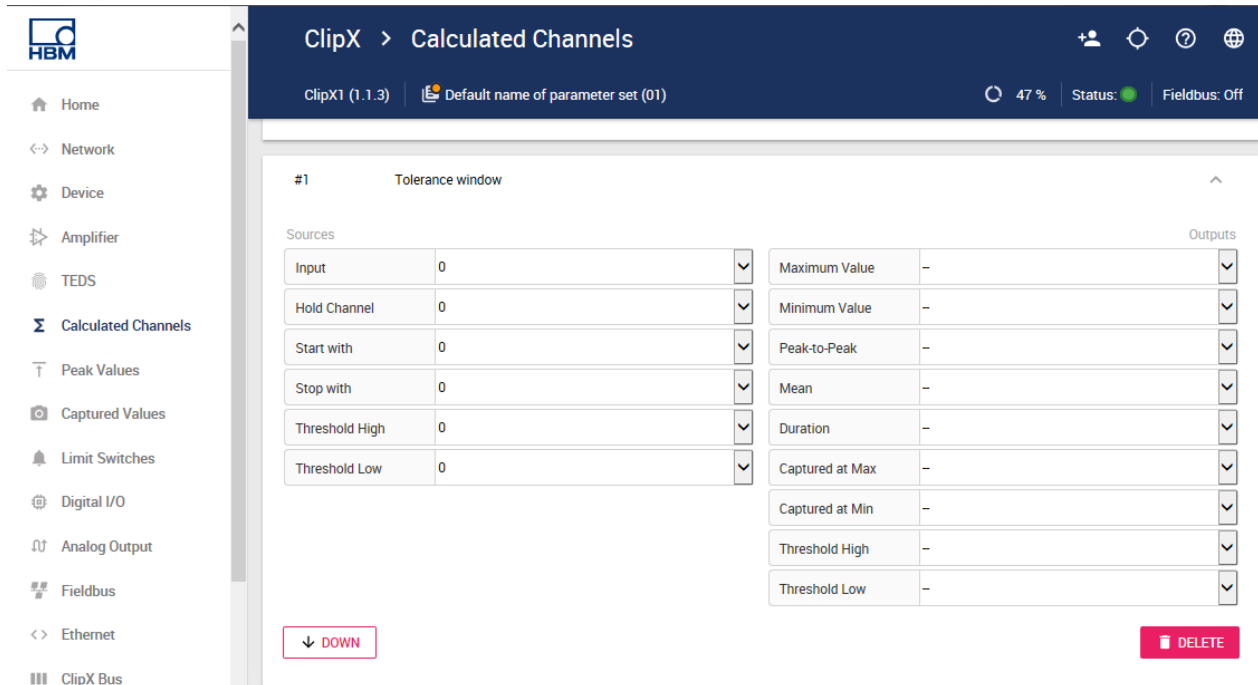


*Run through a tolerance-window*

## Tolerance-window

### 1. Create a tolerance-window

- Select the menu item ‘Calculated Channels’
- Create a new function block of the type ‘tolerance-window’



Now we have to make some setting regarding the sources (the outputs will be discussed later):

- **Input:** Select here the signal that you want to check with the tolerance window
- **Start with:** Here a digital signal is needed, which activates the start. We will realize this signal later with a trigger
- **Stop with:** Just as ‘Start with’, a trigger signal is used here, which stops the measurement
- **Threshold High:** Select the upper limit for your tolerance-window, i.e. the maximum level the signal should not exceed
- **Threshold Low:** Analog to ‘Threshold High’, the minimum level of the tolerance-window is set here

In our example, we perform a force measurement using a HBM S9M sensor. Here, the tolerance window should extend from 10N to 20N.

The preliminary settings in the ClipX tolerance-window look like this:

Sources		Outputs	
Input	S9M/1kN ClipX (Gross)	Maximum Value	-
Hold Channel	0	Minimum Value	-
Start with	0	Peak-to-Peak	-
Stop with	0	Mean	-
Threshold High	20 (F_high)	Duration	-
Threshold Low	10 (F_low)	Captured at Max	-
		Captured at Min	-
		Threshold High	-
		Threshold Low	-

Buttons: DOWN, DELETE

## 2. Create the sine-signal

- Now create (still in the menu item 'Calculated Channels') a new function block of the type 'signal generator'
- Select a Calculated Channel (here: Calculated Channel 1) as output and make the following settings

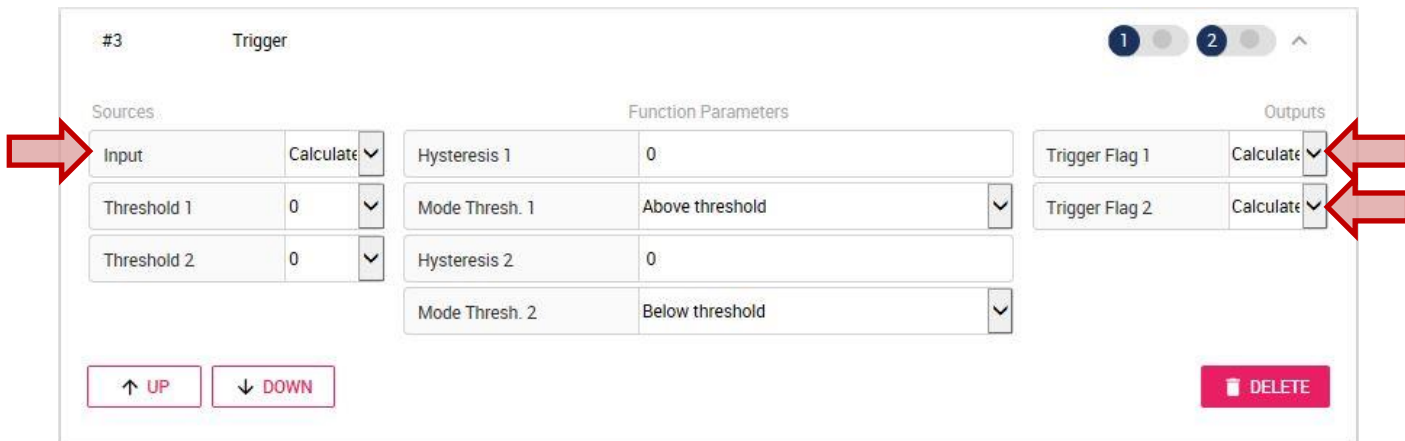
Source	Function Parameters	Output
Start/Stop with: 1	Start on: High level	y: Calculate
	Function: Sine	
	Frequency: 0.1 Hz	
	Amplitude: 1	
	Offset: 0	

Buttons: UP, DOWN, DELETE

Since the window is always half the period of the sine active and the following half inactive, follows with the frequency of 0.1Hz an active/inactive time of  $T/2 = 5s$ . Of course, this time can be changed arbitrarily via the frequency.

### 3. Create the trigger

- Create a new function block of the type ‘trigger’
- As input, select the Calculated Channel you selected as output for the signal generator
- Set both thresholds to zero, so the trigger is activated as soon as the sine changes from negative to positive (start) or from positive to negative (end)
- Select as output two Calculated Channels (here: Trigger Flag 1 → Calculated Channel Flag 1, Trigger Flag 2 → Calculated Channel Flag 2)
- The settings can be seen in the graphic below



### 4. Settings of the tolerance-window

Now you can define the missing sources of the tolerance-window:

- **Start with:** Select here the Calculated Channel to which you have set trigger flag 1
- **Stop with:** Select here the Calculated Channel of trigger flag 2

These changes can be seen in the picture on the following page.

Different values of a measurement within the window can be displayed and processed:  
 Maximum, minimum, peak to peak value, mean value, period, upper and lower limit exceeded.

### 5. Mapping an exceedance of limit value on digital output

To evaluate as effective as possible whether a process has run OK or NOK, a digital signal is generated once a limit within the window is crossed. This digital signal can be further processed on one of the digital outputs of the ClipX.

Therefore assign e.g. 'Threshold High' to a Calculated Channel

Sources		Outputs	
Input	S9M/1kN ClipX (Gross)	Maximum Value	-
Hold Channel	0	Minimum Value	-
Start with	Calculated Channel Flag 1	Peak-to-Peak	-
Stop with	Calculated Channel Flag 2	Mean	-
Threshold High	20 (F_high)	Duration	-
Threshold Low	10 (F_low)	Captured at Max	-
		Captured at Min	-
		Threshold High	Calculated Channel Flag 3
		Threshold Low	Calculated Channel Flag 4

- Now change to 'Digital I/O' in the menu
- Now select 'Digital Flags' at 'Digital Output 1'

**Digital output 1**  
No bits enabled

Invert      Delay: 0 ms

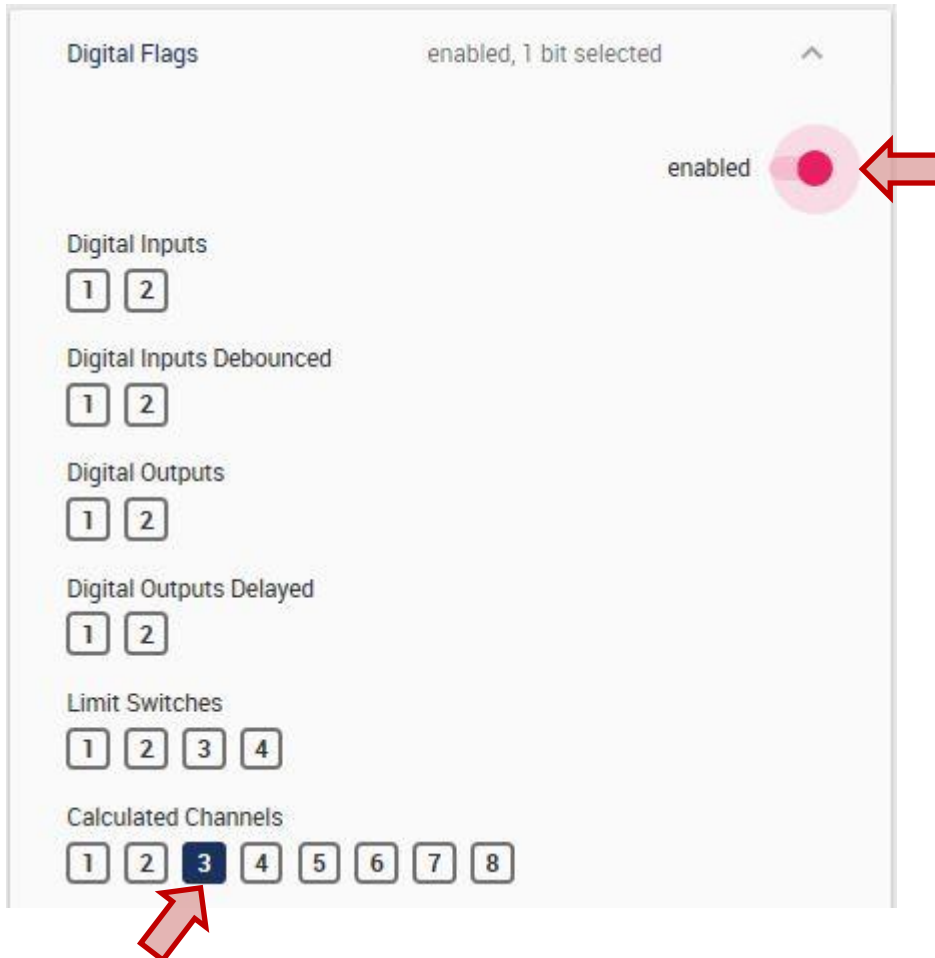
Measurement Status: disabled, no bits selected

System Status: disabled, no bits selected

**Digital Flags: disabled, no bits selected**

Parameter Set Number: disabled, no bits selected

Select the Calculated Channel you assigned to Threshold High and activate the flag:



Note: Of course it is also possible to make use of a ProfiBus, ProfiNet or Ethercat interface for further processing.

## Disclaimer

These examples are for illustrative purposes only. They cannot be used as the basis for any warranty or liability claims.