

## TECH NOTE :: ClipX Automatic mean

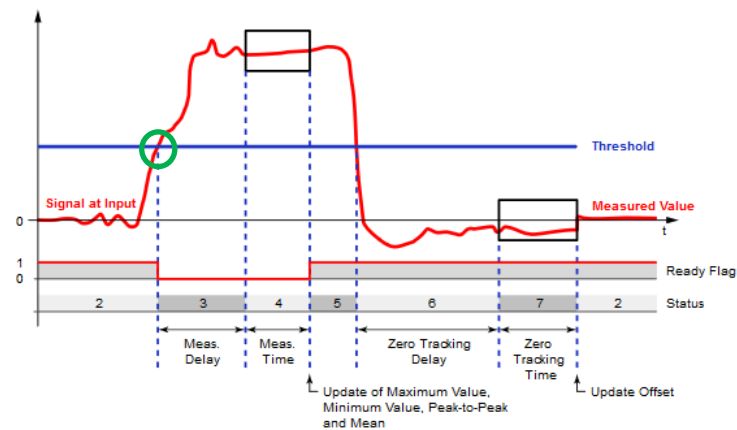
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 Status: HBM: Public

### Brief description

This is an instruction for using the 'Automatic Mean' function of the ClipX. The calculation filters an easily usable signal from a severely fluctuating or noisy signal by using a specific segment of the signal curve to compute a mean value. This enables you to reduce the impact of overlaid interference. You can also define a range in which the signal is averaged and used as the zero value for further measurements. The offset created by this function only applies to this function block.

There are two ways to start the measuring and the zeroing:

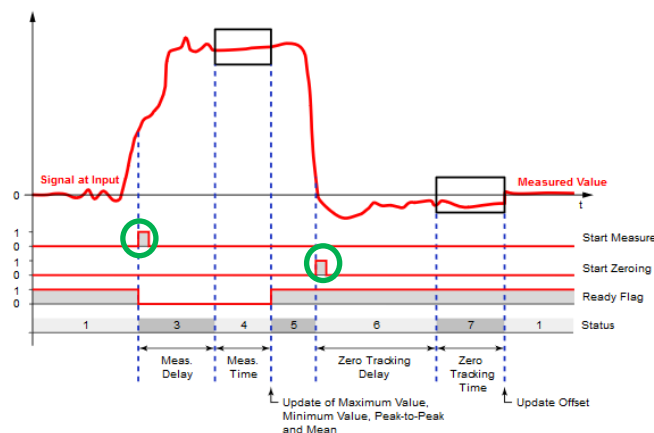
- Using a limit switch



Above: Measuring

Bottom right: Zeroing

- Using a digital signal (flag)



Above: Measuring

Bottom right: Zeroing

You can also combine the methods, i.e. start measuring a mean value, min/max etc. by way of a limit value and start zero measurement by a digital signal.

## Operation

In this section is described how an automatic mean calculation, zeroing or both simultaneously are done using a limit switch and/or a digital signal as start/stop.

At first in the menu 'Calculated Channels' a new channel of type 'Automatic Mean' is added.

#1
Automatic mean
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Sources	Function Parameters	Outputs
Input: 0	Measurement Delay: 1 ms	Measured Value: --
Threshold: 0	Measurement Time: 1 ms	Maximum Value: --
Enable by: 1	Start on: High level	Minimum Value: --
Start Measure with: 0	Zero Tracking Delay: 1 ms	Peak-to-Peak: --
<span style="border: 1px solid red; padding: 2px;">START MEASURE</span>	Zero Tracking Time: 1 ms	Mean: --
Start Zeroing with: 0		Offset: --
<span style="border: 1px solid red; padding: 2px;">START ZEROING</span>		Ready Flag: --
<span style="border: 1px solid red; padding: 2px;">↓ DOWN</span>		Status: --
		<span style="border: 1px solid red; padding: 2px; color: white;">DELETE</span>

## Sources

- As input the signal that should be measured is selected (here: brutto gross signal)

Enable by: This input acts like a on-off-switch for the whole function block. If '0' is selected the measuring is not able to start. So to be able to measure '1' has to be selected. Switching this from '1' to '0' causes a reset for the outputs of the function block. So you can also link a digital signal to this input.

### Setting the start signals:

Like it is described in the brief description there is the opportunity to start the function as soon as the input signal increases a threshold or trigger the start by a digital signal. This can be chosen the same for both but also different.

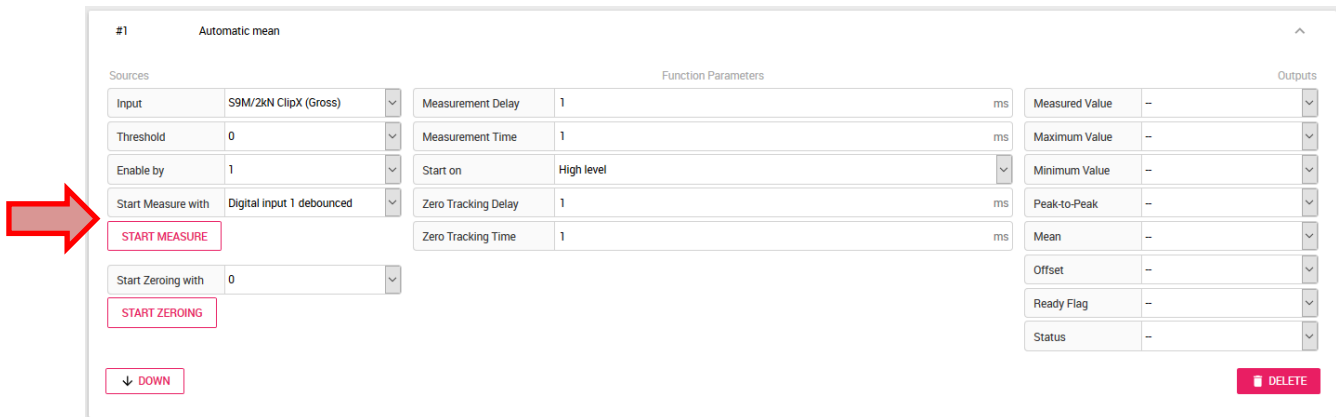
There are the following options:

#### 1. Measuring and zeroing with a limit switch:

- Create the desired threshold as a User-defined constant (Calculated Channels further down in the menu)
- Set this constant as 'Threshold' in the function block

2. Measuring with a digital signal and temporally following zeroing:

- Select the desired digital input at 'Start Measure with' (here: Digital Input 1 debounced)
- Take care if it should started at high or low level (Function Parameters)

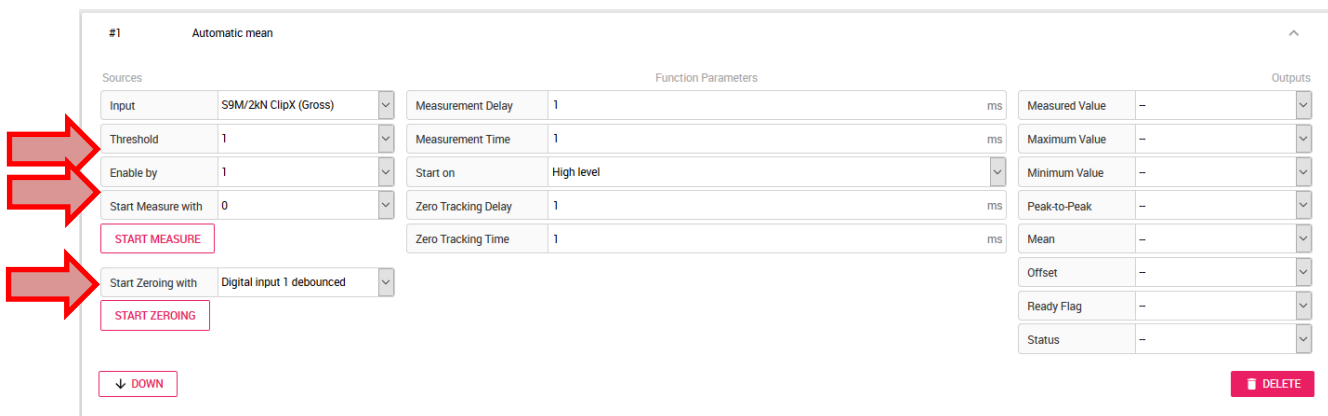


#1 Automatic mean

Sources		Function Parameters			Outputs	
Input	S9M/2kN ClipX (Gross)	Measurement Delay	1	ms	Measured Value	-
Threshold	0	Measurement Time	1	ms	Maximum Value	-
Enable by	1	Start on	High level		Minimum Value	-
Start Measure with	Digital input 1 debounced	Zero Tracking Delay	1	ms	Peak-to-Peak	-
<b>START MEASURE</b>		Zero Tracking Time	1	ms	Mean	-
Start Zeroing with	0				Offset	-
<b>START ZEROING</b>					Ready Flag	-
<b>DOWN</b>					Status	-
					<b>DELETE</b>	

3. Zeroing with digital signal and measure with limit switch:

- Like at '2.': Select a digital signal at 'Start Zeroing with' (here: Digital Input 1 debounced)
- Like at '1.': Create a limit switch for the measurement (preferably greater than zero, since zero measurement takes place beforehand and, due to noise and the following exceeding and undershooting of the limit value, the measuring process is stopped when the delay is set)
- Take care if it should started at high or low level (Function Parameters)

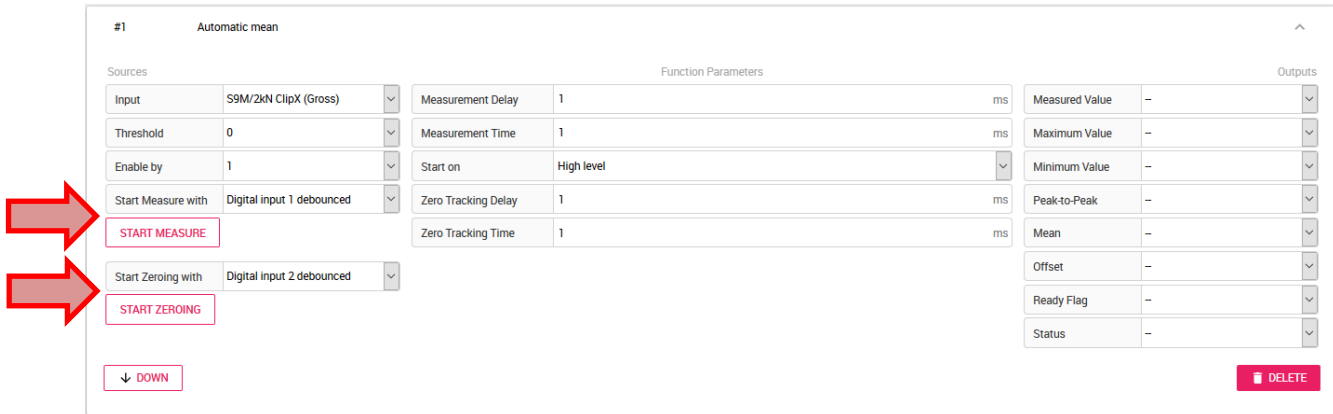


#1 Automatic mean

Sources		Function Parameters			Outputs	
Input	S9M/2kN ClipX (Gross)	Measurement Delay	1	ms	Measured Value	-
Threshold	1	Measurement Time	1	ms	Maximum Value	-
Enable by	1	Start on	High level		Minimum Value	-
Start Measure with	0	Zero Tracking Delay	1	ms	Peak-to-Peak	-
<b>START MEASURE</b>		Zero Tracking Time	1	ms	Mean	-
Start Zeroing with	Digital input 1 debounced				Offset	-
<b>START ZEROING</b>					Ready Flag	-
<b>DOWN</b>					Status	-
					<b>DELETE</b>	

4. Measuring and zeroing with separate digital signals:

- Select a digital signal at "Start Measure with" and "Start Zeroing with" (here: "Digital input 1 debounced" and "Digital input 2 debounced")
- Take care if it should started at high or low level (Function Parameters)
- In this case the threshold doesn't matter because it is, as soon as a digital signal is selected as start signal, ignored by the function



#1 Automatic mean

Sources		Function Parameters			Outputs	
Input	S9M/2kN ClipX (Gross)	Measurement Delay	1	ms	Measured Value	-
Threshold	0	Measurement Time	1	ms	Maximum Value	-
Enable by	1	Start on	High level		Minimum Value	-
Start Measure with	Digital input 1 debounced	Zero Tracking Delay	1	ms	Peak-to-Peck	-
<b>START MEASURE</b>		Zero Tracking Time	1	ms	Mean	-
Start Zeroing with	Digital input 2 debounced				Offset	-
<b>START ZEROING</b>					Ready Flag	-
<b>DOWN</b>					Status	-
					<b>DELETE</b>	

## Function parameter

#1 Automatic mean		Function Parameters		Outputs	
Input	S9M/2kN ClipX (Gross)	Measurement Delay	1 ms	Measured Value	-
Threshold	0	Measurement Time	1 ms	Maximum Value	-
Enable by	1	Start on	High level	Minimum Value	-
Start Measure with	0	Zero Tracking Delay	1 ms	Peak-to-Peak	-
<b>START MEASURE</b>		Zero Tracking Time	1 ms	Mean	-
Start Zeroing with	0			Offset	-
<b>START ZEROING</b>				Ready Flag	-
<b>DOWN</b>				Status	-
				<b>DELETE</b>	

### 1. Measurement Delay [ms]:

Here the time is entered which the function block waits until the start of the measurement from the triggering of the start signal (no matter if limit switch or digital signal).

### 2. Measurement Time [ms]:

This is the duration for the measuring. The larger the time interval here, the more meaningful is the mean value.

### 3. Start on:

Like described in the chapter 'Sources', this setting decides if the start is triggered by high level or low level of the digital signal.

### 4. Zero Tracking Delay [ms]:

Here the time is entered which the function block waits until the start of the zeroing from the end of the measuring or the triggering of the start signal.

### 5. Zero Tracking Time [ms]:

This is the duration for the zeroing. The larger the time interval here, the more meaningful is the mean value.

**Hint:** If only measuring or zeroing should be done, select the other time to 0ms.

## Outputs

#1 Automatic mean
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Sources

Input	S9M/2kN ClipX (Gross)		Measurement Delay	1	ms
Threshold	0		Measurement Time	1	ms
Enable by	1		Start on	High level	
Start Measure with	0		Zero Tracking Delay	1	ms
			Zero Tracking Time	1	ms
Start Zeroing with	0				

Function Parameters

Measured Value	--		Maximum Value	--	
Minimum Value	--		Peak-to-Peak	--	
Mean	--		Offset	--	
Ready Flag	--		Status	--	

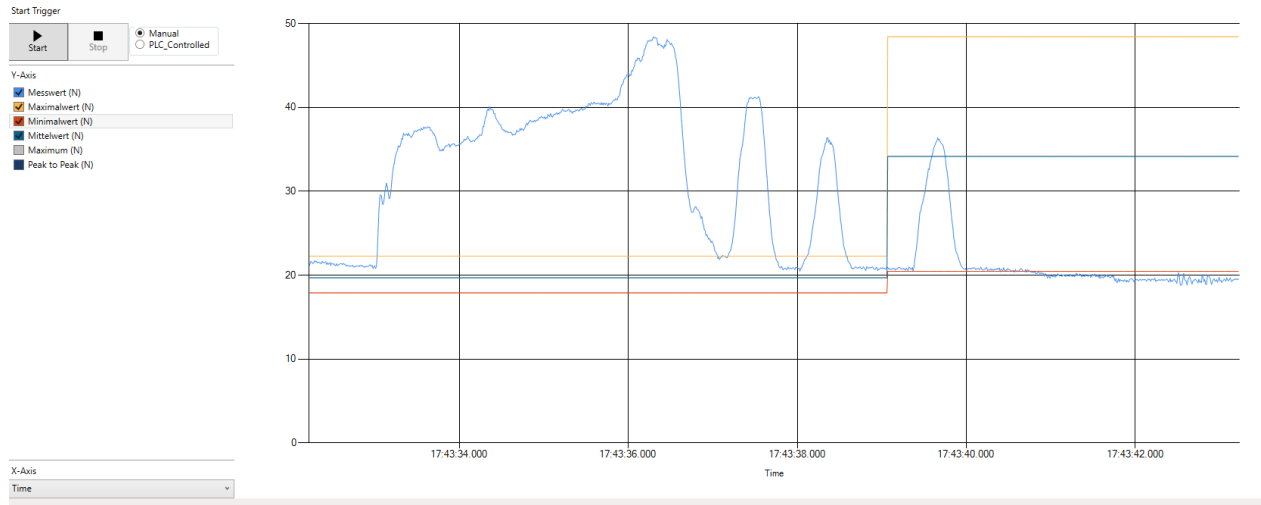
1. Measured Value: Shows the current measured value. If a zeroing was already done which caused a offset, this value won't be similar to the gross signal.
2. Maximum Value: Shows the maximum value of the measurement.
3. Minimum Value: Shows the minimum value of the measurement.
4. Peak-to-Peak: Shows the peak-to-peak value of the measurement.
5. Mean: Shows the mean value of the measurement.
6. Offset: Shows the offset that is calculated during the zeroing.
7. Ready-Flag: Shows '1' if the function is ready for the measuring an. If it's '0' a measurement is in process.
8. Status: The Status contains an identifier for the current status of the calculation – see diagram and table below.

Value	Explanation
1, 2	Wait for start of measurement or exceeding of limit value.
3	Wait for the end of the delay measurement.
4	Status during measuring time. When the measurement is complete, the maximum, minimum, peak-to-peak and mean values are updated.
5	Wait for start of zero measurement or undershooting of limit value.
6	Wait for the end of the zero measurement delay.
7	Status during zero measurement. When the zero measurement is complete, the offset is updated.

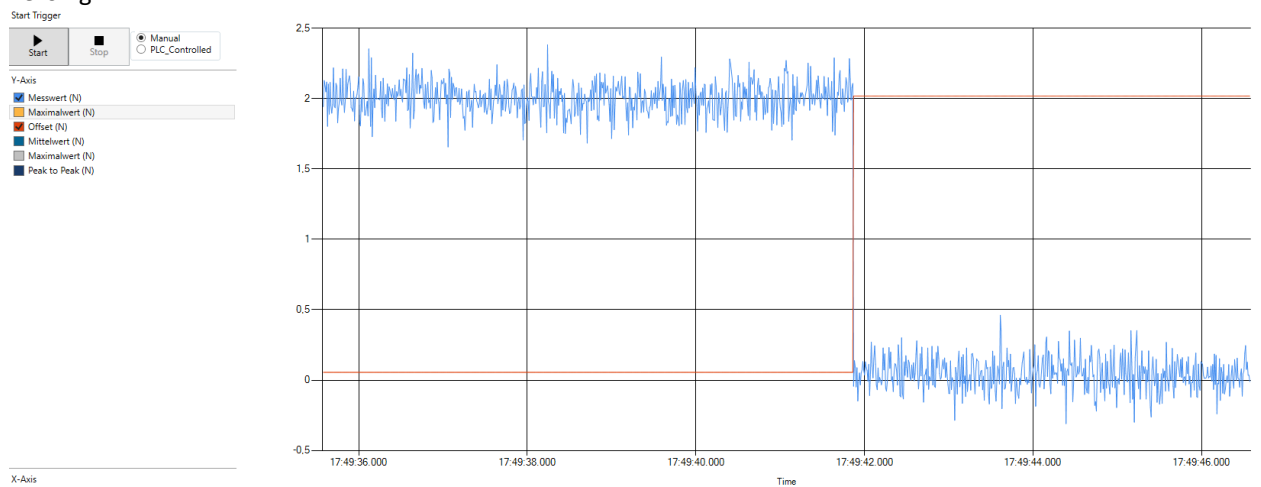
➔ Status „0“ signalizes, that 'Enable by' is not activated

### Example: Measuring and zeroing

#### Measuring:



#### Zeroing:



**Hint:** For the measurement the tool 'ClipX Dataviewer 2' was used.



## Evaluation

All outputs can be used for evaluation. Therefore there is the possibility to transmit the outputs to another device (e.g. PLC) via fieldbus or to generate a digital signal if an output exceeds a determined threshold via a limit switch.

## Disclaimer

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