DIgSILENT

POWERFACTORY

PowerFactory 2021

Technical Reference

Trigger

ElmTrigger

PF2021

POWER SYSTEM SOLUTIONS

MADE IN GERMANY

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Contents

1 General Description

1.1 Overview

The trigger model monitors the value of a signal. If certain trigger conditions are met the model will start a trigger event. This will produce a message in the output window, and in case that it is used in the *PowerFactory* monitoring system, force the triggered result files to store the data. An input clock signal starts the calculation. The input signals are read and checked at every rising edge of the signal connected to the clock input.

1.2 Trigger Conditions

1.2.1 General

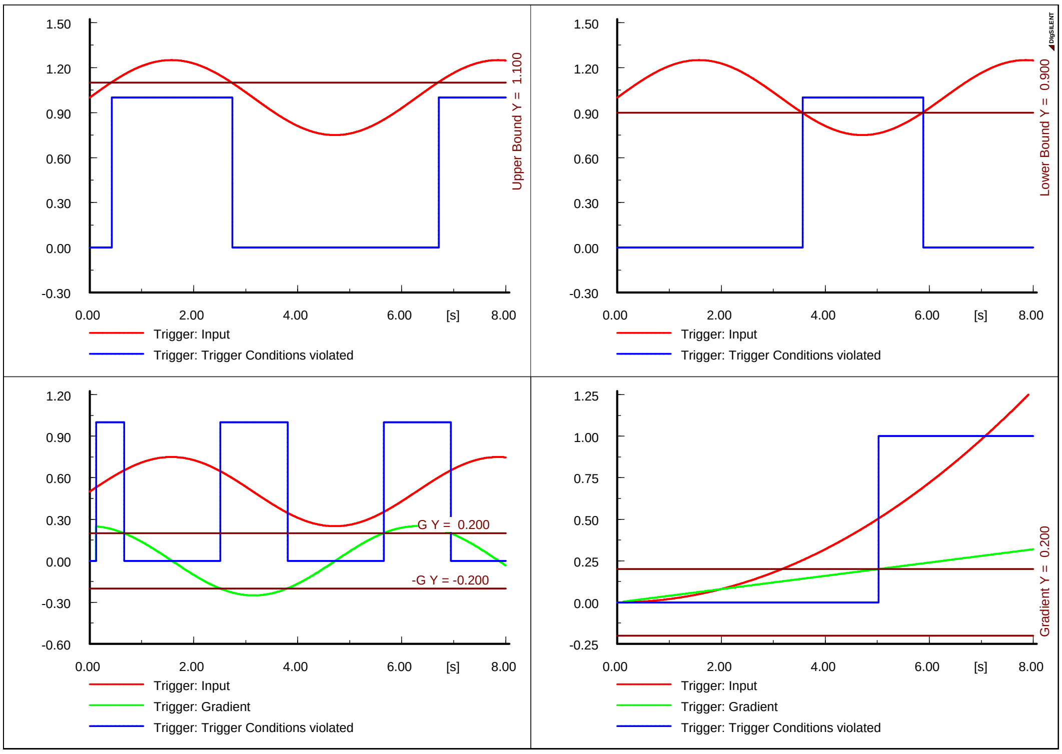

Figure 1.1: Trigger Conditions

There are three different trigger conditions for triggering. The trigger conditions are:

- Maximum
- Minimum
- Gradient

The following trigger settings are required for every type of trigger condition:

On Activates or deactivates a trigger condition.

Threshold Maximum or minimum value.

Set after... The trigger will become active if the condition is violated for more than *Set after...* measurements in succession. This parameter can be used to ignore short peaks or drops of the measured signal.

Reset after... The trigger will be reset if the condition is met again for more than *Reset after...* measurements in succession. Like the parameter *Reset after...* it can be used to ignore short peaks or drops of the measured signal.

If a three phase trigger was defined all trigger conditions are applied to all phases. If different trigger conditions for the several phases are needed the single phase trigger is to be used. Some calculations like the frequency measurement require a certain number of measurements after starting the acquisition until their result is valid. Therefore the trigger must ignore these initial measurements. Otherwise the trigger could create unwanted trigger events. The parameter *sleep* defines the number of measurements to ignore after starting.

1.2.2 Maximum and Minimum Threshold

These trigger conditions are violated if the measured signal exceeds (parameter *valmax*) or falls below (parameter *valmin*) the given thresholds.

1.2.3 Gradient

This trigger condition is violated if the magnitude of the calculated gradient exceeds a given threshold. Therefore there is only one threshold for rising or falling gradients. The time period for calculation is given by the number of measurements.

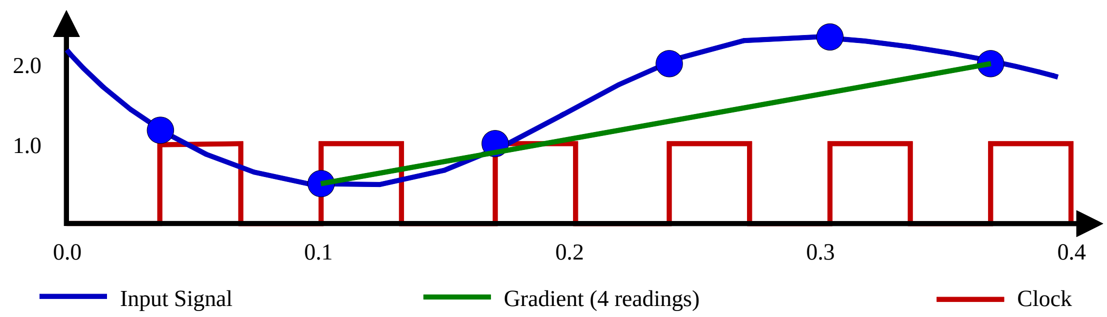

Figure 1.2: Calculation of Gradient

The *Number of Points for Calculation of Gradient* is used to set the timer period for calculating the gradient. The number of points is 4 in figure 1.2.

The time period used for calculation of the gradient is:

$$T_g = n_g \cdot f_c$$

Therefore the number of points results in:

$$n_g = \frac{T_g}{f_c}$$

The following variables have been used in the equations above:

- T_g : Time period for calculating gradient
- f_c : Clock Frequency
- n_g : Number of Points for Calculation of Gradient

In the current version it is not possible to enter the time in seconds. Therefore the clock period must not be changed during measurement. Changing the clock period during measurement will lead to a wrong calculation of the gradient. Therefore the model might not trigger properly.

1.3 Pre and Post-trigger Times

Usually the trigger is used to control result files for acquiring data. This option is enabled with the setting *Acquire Data* on the Basic Data page of the dialog box. If a trigger condition is violated (*viol*=1) the result file starts acquiring data for a given time period. *Pre, Post and Maximum Post-trigger* times are defined in the results object.

The recording time results in:

$$T_r = T_{pre} + T_{post}$$

The maximum recording time results in:

$$T_r = T_{pre} + T_{max}$$

where:

- T_r : Recording time in s
- T_{pre} : Pre-trigger time in s
- T_{post} : Post-trigger time in s
- T_{max} : Maximum post-trigger time in s

1.3.1 Example

Figure 1.3 shows a curve with a single trigger event. The trigger condition is violated at t=0 s. Data recording ends at:

$$t = 0s + 10s = 10s$$

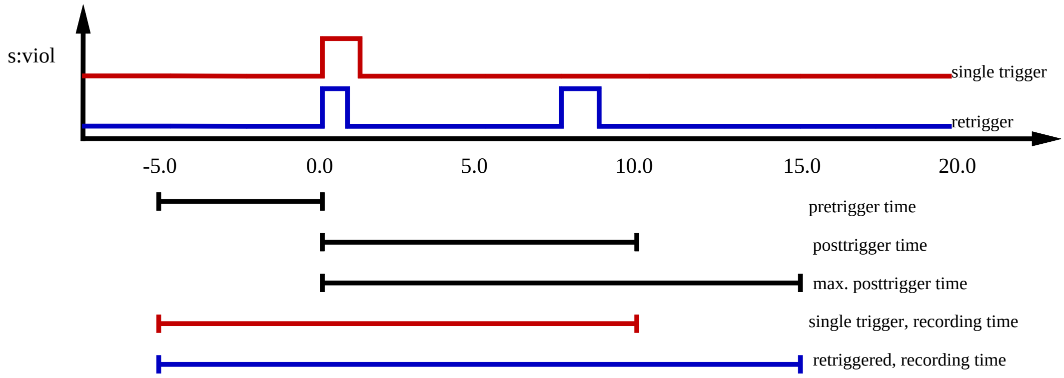

Figure 1.3: Pre and Post-triggering

In the lower curve a second trigger event occurs 8s after the first one. 8 s is within the post-trigger time (*retiggering*). Therefore data recording would end at:

$$t = 8s + 10s = 18s$$

18 s exceeds the maximum post-trigger time of 15 s, therefore the recording ends at 15 s.

2 Dynamic Simulation

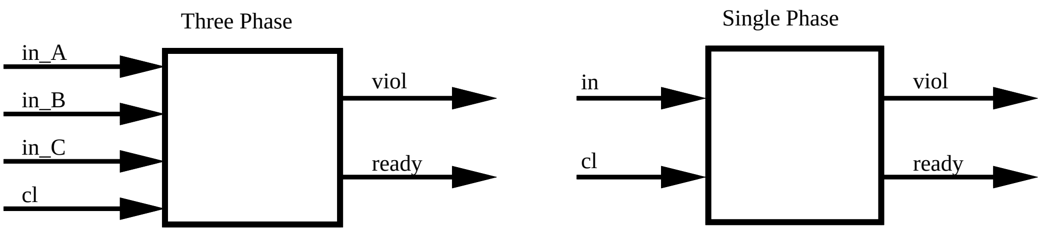

Figure 2.1: Input/Output Definitions

3 Example Configuration

The example is acquiring data using the *PowerFactory* monitor system. The interface to the data acquisition system is realized with the block named 'Acquisition'. The trigger (Trig) is monitoring the signal *y1* of the data acquisition interface. The clock is controlling the trigger.

The composite model named 'Main' is using the frame of figure 3.2. The model named 'Acquire' is the interface to the measurement system (in slot Acquisition). 'Clock' is the clock used for controlling the trigger and 'Trigger' is the model in the slot named 'Trig'.

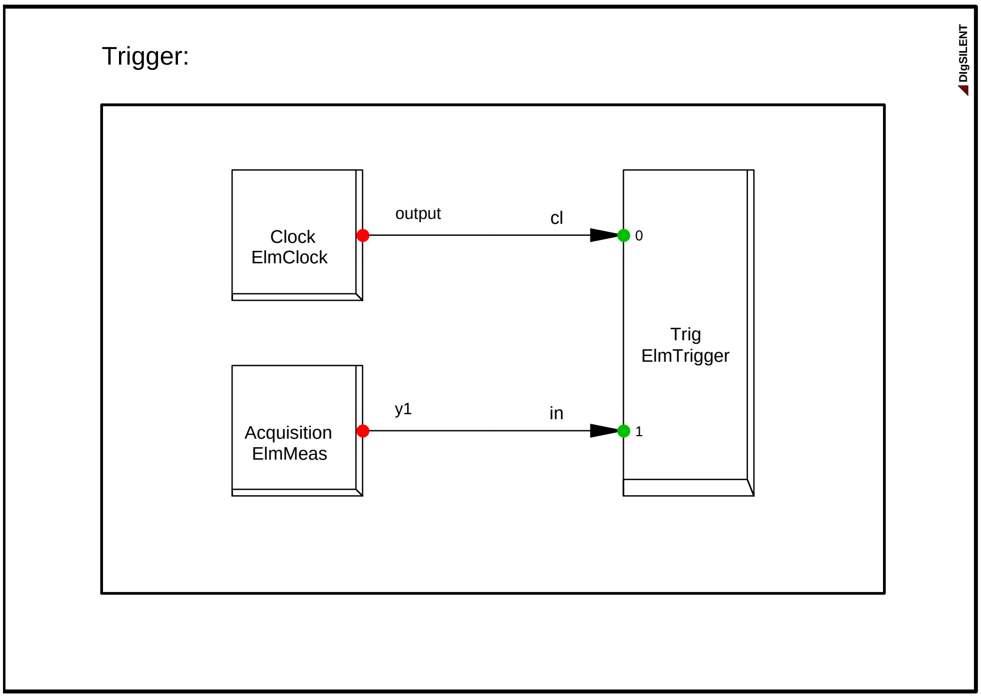

Figure 3.1: Block Diagram

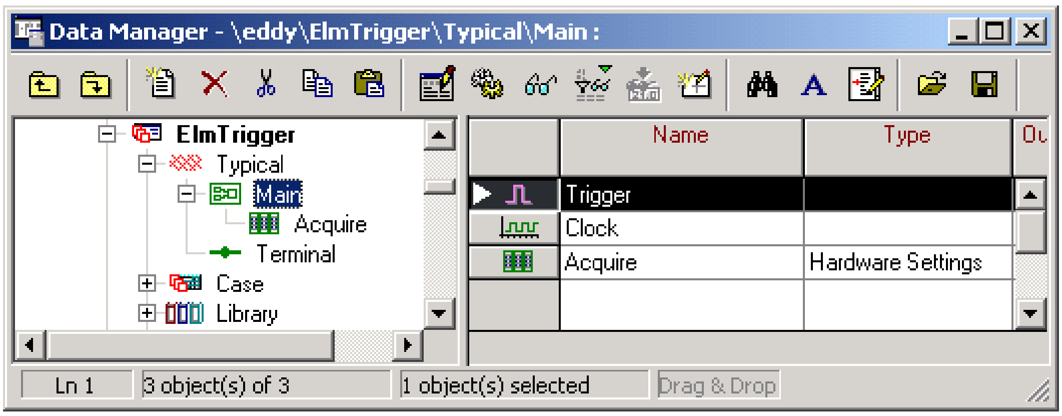

Figure 3.2: Project and Grid

A Parameter Definitions

Table A.1: Trigger Parameters

Parameter	Description	Unit
loc_name	Name	
outserv	Out of service	
nphase	Number of phases	
res	Acquire data	
sleep	Number of measured values after start until trigger gets active	
i_max	Maximum, On	
valmax	Maximum, Threshold	
npickmax	Maximum, Set after...	
ndropmax	Maximum, Reset after...	
i_min	Minimum, On	
valmin	Minimum, Threshold	
npickmin	Minimum, Set after...	
ndropmin	Minimum. Reset after...	
i_grd	Gradient On	
valgrd	Gradient Threshold	
npickgrd	Gradient, Set after...	
ndropgrd	Gradient Reset after...	
npts	Number of points for calculation of gradient	

B Signal Definitions

Table B.1: Input/Output signals

Name	Description	Unit	Type	Model
in_A	Input phase A		IN	RMS, EMT
in_B	Input phase B		IN	RMS, EMT
in_C	Input phase C		IN	RMS, EMT
in	Input (single phase trigger only)		IN	RMS, EMT
cl	Clock input		IN	RMS, EMT
viol	Output of trigger state ($! = 0 =>$ any of the trigger conditions violated)		OUT	RMS, EMT
ready	Ready signal		OUT	RMS, EMT

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