

*LIGO Laboratory / LIGO Scientific Collaboration*

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TwinCAT Library for  
Delay Line

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Distribution of this document:  
LIGO Scientific Collaboration

This is an internal working note  
of the LIGO Laboratory.

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<b>Library</b>	
Title	DelayLinePhaseShifter
Version	1
TwinCAT version	2.11
Name space	–
Author	Alexa Staley, Daniel Sigg
Description	The delay line shifter delays an input signal by a selectable amount. This amount can be controlled by a step or phase slider. The delay can be between 0ns and 30.762ns.
Error Codes	0x01 – Invalid frequency
Library dependencies	Error

<b>Hardware Output Type</b> TYPE DelayLogicOutStruct : STRUCT DelayStep:                  INT; LacthEn:                  BOOL; END_STRUCT END_TYPE	
Type name	DelayLogicOutStruct
Description	Structure of the hardware output that are wired up for the delay line
Definition	STRUCT
Element	Name: DelayStep Type: INT Description: The delay line step slider
Element	Name: LatchEn Type: BOOL Description: Enables latch

<b>User Interface Type</b> TYPE DelayLogicStruct : STRUCT FreqMhz:                LREAL; PhaseDeg:              LREAL; DelayNs:               LREAL; DelayStep:              INT; Error:                  ErrorStruct; END_STRUCT END_TYPE	
Type name	DelayLogicStruct
Description	Structure of the user interface tags that are used to control the delay line
Definition	STRUCT
Output Tag	Name: Error Type: ErrorStruct Description: For error handling
Input Tag	Name: FreqMhz Type: LREAL Description: Input frequency in MHz
In/out Tag	Name: PhaseDeg Type: LREAL Description: Input phase in degrees
In/out Tag	Name: DelayNs Type: LREAL Description: Delay of input signal in nanoseconds
In/out Tag	Name: DelayStep Type: INT Description: Delay between 0ns and 31.9375ns can be added in steps

<b>Function Block</b> FUNCTION_BLOCK DelayLogicFB VAR_INPUT Request:                 SaveRestoreEnum; END_VAR VAR_OUTPUT DelayLogicOut:         DelayLogicOutStruct; END_VAR VAR_IN_OUT DelayLogicInit:         DelayLogicStruct; DelayLogic:             DelayLogicStruct; END_VAR	
Name	DelayLogicFB
Description	Controls the delay line
Input argument	Name: Request Type: SaveRestoreEnum Description: Request save/restore/safemode or noop
Output argument	Name: DelayLogicOut Type: DelayLogicOutStruct Description: Output hardware structure
In/out argument	Name: DelayLogicInit Type: DelayLogicStruct Description: Save/restore variable in persistent memory
In/out argument	Name: DelayLogic Type: DelayLogicStruct Description: User Interface structure

<b>Visual</b>	
Phase	◀ [Slider] ▶
Delay	%3.3f ns
Steps	◀ [Slider] ▶
Error	%i %s
Name	DelayLogicVis
Description	Displays phase, steps, and delay
Placeholder	Name: DelayLogic Type: DelayLogicStruct Description: Delay Line structure