

*LIGO Laboratory / LIGO Scientific Collaboration*

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**Advanced LIGO**

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**TwinCAT Library for  
Shutter Control**

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This is an internal working note  
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<b>Library</b>	
Title	ShutterControl
Version	1
TwinCAT version	2.11
Name space	–
Author	Alexa Staley, Daniel Sigg
Description	Controls the shutter controller
Error codes	1 — Trigger
Library dependencies	Error, DCPower, ReadADC, WriteADC, SaveRestore

<b>Shutter Controller Type</b> TYPE ShutterControlTypeEnum : (ShutterSimple, ShutterHardwareTrigger); END_TYPE	
Type name	ShutterControllerType
Description	Enumerates means used to trigger the shutter
Definition	ENUM
Element	Name: ShutterSimple Description: Simple Shutter
Element	Name: ShutterHardwareTrigger Description: Shutter triggered by hardware

<b>Shutter Controller State</b> TYPE ShutterControlStateEnum : (ShutterOpen, ShutterClosed); END_TYPE	
Type name	ShutterControlType
Description	Enumerates the state of the shutter controllers
Definition	ENUM
Element	Name: ShutterOpen Description: Shutter is open
Element	Name: ShutterClosed Description: Shutter is closed

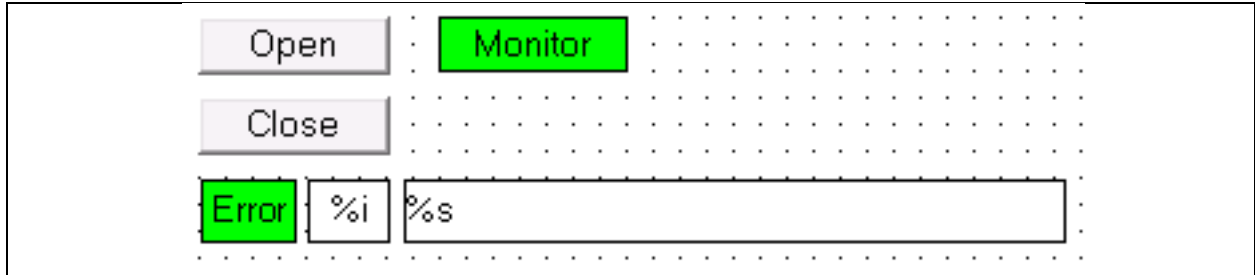
<b>Hardware Input Type</b> TYPE ShutterControlInStruct : STRUCT State:                BOOL; Trigger:              INT; END_STRUCT END_TYPE	
Type name	ShutterControlInStruct
Description	Structure of the hardware input that are wired up for the shutter control
Definition	STRUCT
Element	Name: State Type: BOOL Description: Binary inputs for shutter monitor

<b>Hardware Output Type</b> TYPE ShutterControlOutStruct : STRUCT Close:                BOOL; Open:                  BOOL; Threshold:              INT; END_STRUCT END_TYPE	
Type name	ShutterControlOutStruct
Description	Structure of the hardware output that are wired up for the shutter control
Definition	STRUCT
Element	Name: Close Type: BOOL Description: Close shutter
Element	Name: Open Type: BOOL Description: Open shutter
Element	Name: Threshold Type: INT Description: Threshold to open/close shutter

<b>User Interface Type</b> TYPE ShutterControlStruct : STRUCT Error:                ErrorStruct; Name:                STRING (40); ControllerType:      ShutterControlTypeEnum; State:               ShutterControlStateEnum; Open:                BOOL; Close:               BOOL; Threshold:           LREAL; Trigger:             DCPowerStruct; END_STRUCT END_TYPE	
Type name	ShutterControlStruct
Description	Structure of the user interface tags that are used to control the shutter control
Definition	STRUCT
Output Tag	Name: Error Type: ErrorStruct Description: For error handling
Output Tag	Name: Name Type: STRING Description: Location of the shutter
Input Tag	Name: ControllerType Type: ShutterControlTypeEnum Description: Type of shutter
Input Tag	Name: State Type: ShutterControlStateEnum Description: State of the shutter
Input Tag	Name: Close Type: BOOL Description: Close shutter when true
Input Tag	Name: Open Type: BOOL Description: Open shutter when true
Input Tag	Name: Threshold Type: LREAL Description: Threshold voltage for trigger PD
Output Tag	Name: Trigger Type: DCPowerStruct; Description: Trigger from PD

<b>Function Block</b> FUNCTION_BLOCK ShutterControlFB VAR_INPUT Request:                               SaveRestoreEnum; ShutterControlType:                ShutterControlTypeEnum := ShutterSimple; ShutterControlIn:                  ShutterControlInStruct; END_VAR VAR_OUTPUT ShutterControlOut:                 ShutterControlOutStruct; END_VAR VAR END_VAR VAR_IN_OUT ShutterControlInit:                ShutterControlStruct; ShutterControl:                    ShutterControlStruct; END_VAR	
Name	ShutterControlFB
Description	Controls the shutter control
Input argument	Name: Request Type: SaveRestoreEnum Description: Request save/restore/safemode or noop
Input argument	Name: ShutterControlType Type: ShutterControlTypeEnum Description: Set shutter controller type
Input argument	Name: ShutterControlIn Type: ShutterControlInStruct Description: Input hardware structure
Output argument	Name: ShutterControlOut Type: ShutterControlOutStruct Description: Output hardware structure
In/out argument	Name: ShutterControlInit Type: ShutterControlStruct Description: Save/restore variable in persistent memory
In/out argument	Name: ShutterControl Type: ShutterControlStruct Description: User Interface structure

<b>Visual</b>
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Name	ShutterControlVis
Description	Displays open and close buttons for the shutter and the shutter monitor
Placeholder	Name: ShutterControl Type: ShutterControlStruct Description: Shutter Control structure