

*LIGO Laboratory / LIGO Scientific Collaboration*

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**TwinCAT Library for  
Fast Shutter Control**

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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	FastShutterControl
Version	1
TwinCAT version	2.11
Name space	–
Author	Daniel Sigg
Description	Controls the fast shutter controller See also <a href="#">T1400687</a> .
Error codes	1 — Fault (fault in driver circuit) 2 — Not ready (shutter HV capacitors are not charged) 4 — Not open (unblock requested, but shutter is closed) 8 — Not closed (block requested, but shutter open)
Library dependencies	ShutterControl, Error, DCPower, ReadADC, WriteADC, SaveRestore

<b>Shutter Controller Mode</b> TYPE ShutterControlModeEnum : (ShutterUnblock, ShutterBlock); END_TYPE	
Type name	ShutterControllerModeEnum
Description	Enumerates over shutter modes
Definition	ENUM
Element	Name: ShutterUnblock Description: Unblock the fast shutter
Element	Name: ShutterBlock Description: Block the fast shutter

<b>Hardware Input Type</b> TYPE FastShutterControlInStruct : STRUCT HvReadyMon:        BOOL; StatusMon:        BOOL; FaultMon:        BOOL; END_STRUCT END_TYPE	
Type name	FastShutterControlInStruct
Description	Structure of the hardware input that are wired up for the fast shutter control
Definition	STRUCT
Element	Name: HvReadyMon Type: BOOL Description: Binary input for fast shutter HV readiness
Element	Name: StatusMon Type: BOOL Description: Binary input for fast shutter state (close/open)
Element	Name: FaultMon Type: BOOL Description: Binary input for fast shutter controller fault

<b>Hardware Output Type</b> TYPE FastShutterControlOutStruct : STRUCT UpDrive:          BOOL; DownDrive:       BOOL; END_STRUCT END_TYPE	
Type name	FastShutterControlOutStruct
Description	Structure of the hardware output that are wired up for the shutter control
Definition	STRUCT
Element	Name: UpDrive Type: BOOL Description: Fast shutter moves to blocking position
Element	Name: DownDrive Type: BOOL Description: Fast shutter moves to unblocking position

<b>User Interface Type</b> TYPE FastShutterControlStruct : STRUCT Error:                ErrorStruct; Ready:               BOOL; State:               ShutterControlStateEnum; Mode:               ShutterControlModeEnum; ForceOpen:          BOOL; END_STRUCT END_TYPE	
Type name	FastShutterControlStruct
Description	Structure of the user interface tags that are used to control the fast shutter control
Definition	STRUCT
Output Tag	Name: Error Type: ErrorStruct Description: For error handling
Output Tag	Name: Ready Type: BOOL Description: Shutter is ready for operation (HV caps are charged)
Output Tag	Name: State Type: ShutterControlStateEnum Description: State of the shutter
Input Tag	Name: Mode Type: ShutterControlModeEnum Description: Requested shutter mode (block or unblock)
Input Tag	Name: ForceOpen Type: BOOL Description: Force open when shutter is stuck

<b>Function Block</b> FUNCTION_BLOCK FastShutterControlFB VAR_INPUT Request:                    SaveRestoreEnum; ShutterControl:            ShutterControlStruct FastShutterControlln:      FastShutterControllnStruct; END_VAR VAR_OUTPUT FastShutterControlOut:     FastShutterControlOutStruct; END_VAR VAR_IN_OUT FastShutterControllnit:     FastShutterControlStruct; FastShutterControl:        FastShutterControlStruct; END_VAR	
Name	FastShutterControlFB
Description	Controls the fast shutter
Input argument	Name: Request Type: SaveRestoreEnum Description: Request save/restore/safemode or noop
Input argument	Name: ShutterControl Type: ShutterControlStruct Description: shutter controller for trigger logic
Input argument	Name: FastShutterControlln Type: FastShutterControllnStruct Description: Input hardware structure
Output argument	Name: FastShutterControlOut Type: FastShutterControlOutStruct Description: Output hardware structure
In/out argument	Name: FastShutterControllnit Type: FastShutterControlStruct Description: Save/restore variable in persistent memory
In/out argument	Name: FastShutterControl Type: FastShutterControlStruct Description: User Interface structure for fast shutter