

LIGO Laboratory / LIGO Scientific Collaboration

LIGO-E1600256-v1

Advanced LIGO

8/10/2016

TwinCAT Library for
PZT Shutter

Daniel Sigg

Distribution of this document:
LIGO Scientific Collaboration

This is an internal working note
of the LIGO Laboratory.

California Institute of Technology
LIGO Project – MS 18-34
1200 E. California Blvd.
Pasadena, CA 91125
Phone (626) 395-2129
Fax (626) 304-9834
E-mail: info@ligo.caltech.edu

Massachusetts Institute of Technology
LIGO Project – NW22-295
185 Albany St
Cambridge, MA 02139
Phone (617) 253-4824
Fax (617) 253-7014
E-mail: info@ligo.mit.edu

LIGO Hanford Observatory
P.O. Box 159
Richland WA 99352
Phone 509-372-8106
Fax 509-372-8137

LIGO Livingston Observatory
P.O. Box 940
Livingston, LA 70754
Phone 225-686-3100
Fax 225-686-7189

<http://www.ligo.caltech.edu/>

Library	
Title	PztShutter
Version	1
TwinCAT version	2.11
Name space	–
Author	Daniel Sigg
Description	Monitors the PZT shutter controller The PZT shutter is a 5V step down to 0 upon lock loss on one of the OMC PZTs.
Error codes	1 — Limits (PZT not at 5V)
Library dependencies	Error, ReadADC, WriteADC, SaveRestore

Shutter State TYPE PztStateEnum : (PztStateUnknown, (* Unknown *) PztStateOpen, (* Open *) PztStateClosed (* Closed *)); END_TYPE	
Type name	PztStateEnum
Description	Enumerates over shutter states
Definition	ENUM
Element	Name: PztStateUnknown Description: Unknown state
Element	Name: PztStateOpen Description: PZT at 5V (nominal OMC lock position)
Element	Name: PztStateClosed Description: PZT at 0V (OMC should be unlocked)

Limits Check TYPE PztLimitsEnum : (PztLimitsNone, (* None *) PztLimitsLow, (* Low *) PztLimitsHigh, (* High *) PztLimitsHiLo (* HiLo *)); END_TYPE	
Type name	PztLimitsEnum
Description	Enumerates over available limit checks
Definition	ENUM
Element	Name: PztLimitsNone Description: No checks are performed
Element	Name: PztLimitsLow Description: Check that value is above lower limit
Element	Name: PztLimitsHigh Description: Check that value is below higher limit
Element	Name: PztLimitsHiLo Description: Check that value is within the limits

Hardware Input Type TYPE PztShutterInStruct : STRUCT Volts: INT; END_STRUCT END_TYPE	
Type name	PztShutterInStruct
Description	Structure of the hardware input that are wired up for the PZT readbacks
Definition	STRUCT
Element	Name: Volts Type: INT Description: Voltage readback of PZT

User Interface Type TYPE PztShutterStruct : STRUCT Error: ErrorStruct; Volts: LREAL; State: PztStateEnum; Low: LREAL; High: LREAL; Limits: PztLimitsEnum; Range: BOOL; Count: UDINT; Null: LREAL; Trig: 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: Volts Type: LREAL Description: PZT readback voltage
Output Tag	Name: State Type: PztStateEnum Description: PZT shutter status

Input Tag	Name: Low Type: LREAL Description: Low limit
Input Tag	Name: High Type: LREAL Description: High limit
Input Tag	Name: Limits Type: PztLimitsEnum Description: Selected limits to check
Output Tag	Name: Range Type: BOOL Description: Shutter is not in high state (out of range)
Output Tag	Name: Count Type: UDINT Description: Counts number of limit violation
Input Tag	Name: Null Type: LREAL Description: Null threshold for PZT (abs value)
Output Tag	Name: Trig Type: BOOL Description: Shutter triggered (0V state)

Function Block FUNCTION_BLOCK PztShutterControlFB VAR_INPUT Request: SaveRestoreEnum; PztShutterIn: PztShutterInStruct; END_VAR VAR_IN_OUT PztShutterInit: PztShutterStruct; PztShutter: PztShutterStruct; END_VAR VAR_CONSTANT LowThreshold: LREAL := 4.5; HighThreshold: LREAL := 5.5; NullThreshold: LREAL := 0.5; END_VAR	
Name	PztShutterControlFB
Description	Monitors the PZT shutter
Input argument	Name: Request Type: SaveRestoreEnum Description: Request save/restore/safemode or noop
Input argument	Name: PztShutterIn Type: PztShutterInStruct Description: Input hardware structure
In/out argument	Name: PztShutterInit Type: PztShutterStruct Description: Save/restore variable in persistent memory
In/out argument	Name: PztShutter Type: PztShutterStruct Description: User Interface structure for fast shutter
Constant	Name: LowThreshold Type: LREAL Value: 4.5 Description: Hardcoded low limit for PZT shutter
Constant	Name: HighThreshold Type: LREAL Value: 5.5 Description: Hardcoded high limit for PZT shutter
Constant	Name: NullThreshold Value: 0.5 Description: Hardcoded null limit for PZT shutter