



*LIGO Laboratory / LIGO Scientific Collaboration*

LIGO-E1300778-v1

*advanced LIGO*

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**TwinCAT Library for Laser Power**

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LIGO Scientific Collaboration

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of the LIGO Laboratory.

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<b>Library</b>	
Title	Laser Power
Version	1
TwinCAT version	V2.11.0
Name space	
Author	Daniel Sigg
Description	Monitors the laser power
Error Code	1 — Position warning 2 — Position error 4 — Encoder counter underflow 8 — Encoder counter overflow 16 — Encoder extrapolation stall 32 — Encoder sync error 64 — Motor sync error 128 — Motor warning 256 — Motor error
Library Dependencies	Error, SaveRestore, RotationStage

<b>User Interface Type</b>	
TYPE CommandEnum : (Command_None, Command_SearchForHome, Command_GoToPower, Command_GoToMinPwr, Command_GoToAngle) END_TYPE;	
Type Name	CommandEnum
Description	States all the commands
Definition	ENUM
Element	Name: Command_None Description: Do nothing
Element	Name: Command_SearchForHome Description: Searches of home
Element	Name: Command_GoToPower Description: Sets laser to nominal power
Element	Name: Command_GoToMinPwr Description: Sets laser to minimum power
Element	Name: Command_GoToAngle Description: Go to angle

<b>User Interface Type</b>
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END_STRUCT; END_TYPE;	
Type Name	LaserPowerStruct
Description	Structure used in the user interface
Definition	STRUCT
Output Tag	Name: A Type: LREAL Description: Input power coefficient
Output Tag	Name: B Type: LREAL Description: Minimum power angle
Output Tag	Name: C Type: LREAL Description: Minimum power
Output Tag	Name: D Type: LREAL Description: ??
Output Tag	Name: Power_In Type: LREAL Description: Input power
Input Tag	Name: Power_Request Type: LREAL Description: Requested power
Output Tag	Name: Angle_Calc Type: LREAL Description: Angle calculated for requested power
Input Tag	Name: Angle_Request Type: LREAL Description: Requested angle
Output Tag	Name: Power_Calc Type: LREAL Description: Power calculated for requested angle
Output Tag	Name: Command Type: UDINT Description: Requested command
Input Tag	Name: Abort Type: BOOL Description: Abort move
Output Tag	Name: Status Type: STRING

	Description: Readback status
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<b>User Interface Type</b>	
TYPE FiberPolCorrMsgOutStruct :	
STRUCT	
D:	ARRAY [0...255] of BYTE;
ID:	INT;
TimeLo:	UDINT;
TimeHi:	UDINT;
END_STRUCT;	
END_TYPE;	
Type Name	FiberPolCorrMsgOutStruct
Description	Structure used in the user interface
Definition	STRUCT
Output Tag	Name: D Type: ARRAY [0...255] OF BYTE Description:
Output Tag	Name: ID Type: INT Description:
Output Tag	Name: TimeLo Type: UDINT Description:
Output Tag	Name: TimeHi Type: UDINT Description:

<b>User Interface Type</b>	
TYPE StateEnum : (State_Init, State_Polling, State_SearchForHome_Starting_1, State_SearchForHome_Starting_2, State_SearchForHome_Moving, State_SettingCounterValue_1, State_SettingCounterValue_2, State_AbsoluteMove_Starting_1, State_AbsoluteMove_Starting_2, State_AbsoluteMove_Moving)	
END_TYPE;	
Type Name	StateEnum
Description	All the states
Definition	ENUM
Element	Name: State_Init Description: Initialize
Element	Name: State_Polling Description:

Element	Name: State_SearchForHome_Starting_1 Description:
Element	Name: State_SearchForHome_Starting_2 Description:
Element	Name: State_SearchForHome_Moving Description:
Element	Name: State_SettingCounterValue_1 Description:
Element	Name: State_SettingCounterValue_2 Description:
Element	Name: State_AbsoluteMoving_Starting_1 Description:
Element	Name: State_AbsoluteMoving_Starting_2 Description:
Element	Name: State_AbsolutelyMoving_Move Description:

<p><b>Function Block</b></p> <pre> TYPE LaserPowerFB: VAR_INPUT     Request:          SaveRestoreEnum;     LaserPowerIn:    LaserPowerInStruct; END_VAR; VAR_OUTPUT     LaserPowerOut:   LaserPowerOutStruct; END_VAR; VAR_IN_OUT     LaserPower:      LaserPowerStruct;     LaserPowerInit:  LaserPowerStruct; END_VAR; END_TYPE;                 </pre>	
Type Name	LaserPowerFB
Description	Function block used to monitor the laser power
Definition	Function Block
Input Argument	Name: Request Type: SaveRestoreEnum Description: Request for save/restore/safe mode or noop
Input Argument	Name: LaserPowerIn

	Type: LaserPowerInStruct Description: Input structure
Output Argument	Name: LaserPowerOut Type: LaserPowerOutStruct Description: Output structure
In/out Argument	Name: LaserPower Type: LaserPowerStruct Description: User interface structure
In/out Argument	Name: LaserPowerInit Type: LaserPowerStruct Description: Save/restore variable in persistent memory

<p><b>Function Block</b>                  TYPE PowerAngleCalcFB:                  VAR_OUTPUT                      Angle_Calc:        LREAL;                      Power_Calc:        LREAL;                  END_VAR;                  VAR_IN_OUT                      Power_Request:    LREAL;                      Angle_Request:    LREAL;                      Power_In:        LREAL;                      A:                LREAL;                      B:                LREAL;                      C:                LREAL;                      D:                LREAL;                  END_VAR;                  END_TYPE;</p>	
Type Name	PowerAngleCalcFB
Description	Function block used to monitor the angle and power of the laser
Definition	Function Block
Output Argument	Name: Angle_Calc Type: LREAL Description:
Output Argument	Name: Power_Calc Type: LREAL Description
Out/in Argument	Name: Power_Request Type: LREAL Description: Requested power
Output Argument	Name: Angle_Request

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	Type: LREAL Description: Request angle
Output Argument	Name: Power_In Type: LREAL Description: Power in
Output Argument	Name: A Type: LREAL Description:
Output Argument	Name: B Type: LREAL Description:
Output Argument	Name: C Type: LREAL Description:
Output Argument	Name: D Type: LREAL Description: