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LIGO-E1300778-v1 *advanced LIGO* 10/15/2013

TwinCAT Library for Laser Power

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| **Library** | |
| 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 |

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| **User Interface Type**  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 |

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| **User Interface Type**  TYPE LaserPowerInStruct :  STRUCT  RSIn: RotationStageInStruct;  END\_STRUCT;  END\_TYPE; | |
| Type Name | LaserPowerInStruct |
| Description | Structure used in the user interface |
| Definition | STRUCT |
| Output Tag | Name: RSIn  Type: RotationStageInStruct  Description: Input structure |

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| **User Interface Type**  TYPE LaserPowerOutStruct :  STRUCT  RSOut: RotationStageOutStruct;  END\_STRUCT;  END\_TYPE; | |
| Type Name | LaserPowerInStruct |
| Description | Structure used in the user interface |
| Definition | STRUCT |
| Output Tag | Name: RSOut  Type: RotationStageOutStruct  Description: Output structure |

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| **User Interface Type**  TYPE LaserPowerStruct :  STRUCT  A: LREAL;  B: LREAL;  C: LREAL;  D: LREAL;  Power\_In: LREAL;  Power\_Request: LREAL;  Angle\_Calc: LREAL;  Angle\_Request: LREAL;  Power\_Calc: LREAL;  Command: UDINT := Command\_None;  Abort: BOOL := FALSE;  Status: STRING :=’OK’;  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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| **User Interface Type**  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: |

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| **User Interface Type**  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: |

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| **Function Block**  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; | |
| 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 |

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| **Function Block**  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; | |
| 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  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: |