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TwinCAT Library for Laser Power

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of the LIGO Laboratory.

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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 warning2 — Position error4 — Encoder counter underflow8 — Encoder counter overflow16 — Encoder extrapolation stall32 — Encoder sync error64 — Motor sync error128 — Motor warning256 — 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\_NoneDescription: Do nothing |
| Element | Name: Command\_SearchForHomeDescription: Searches of home |
| Element | Name: Command\_GoToPowerDescription: Sets laser to nominal power |
| Element | Name: Command\_GoToMinPwrDescription: Sets laser to minimum power |
| Element | Name: Command\_GoToAngleDescription: 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: RSInType: RotationStageInStructDescription: 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: RSOutType: RotationStageOutStructDescription: 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: AType: LREALDescription: Input power coefficient |
| Output Tag | Name: BType: LREALDescription: Minimum power angle |
| Output Tag | Name: CType: LREALDescription: Minimum power |
| Output Tag | Name: DType: LREALDescription: ?? |
| Output Tag | Name: Power\_InType: LREALDescription: Input power |
| Input Tag | Name: Power\_RequestType: LREALDescription: Requested power |
| Output Tag | Name: Angle\_CalcType: LREALDescription: Angle calculated for requested power |
| Input Tag | Name: Angle\_RequestType: LREALDescription: Requested angle |
| Output Tag | Name: Power\_CalcType: LREALDescription: Power calculated for requested angle |
| Output Tag | Name: CommandType: UDINTDescription: Requested command |
| Input Tag | Name: AbortType: BOOLDescription: Abort move  |
| Output Tag | Name: StatusType: STRINGDescription: 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: DType: ARRAY [0…255} OF BYTEDescription:  |
| Output Tag | Name: IDType: INTDescription:  |
| Output Tag | Name: TimeLoType: UDINTDescription:  |
| Output Tag | Name: TimeHiType: UDINTDescription:  |

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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\_InitDescription: Initialize |
| Element | Name: State\_PollingDescription:  |
| Element | Name: State\_SearchForHome\_Starting\_1Description: |
| Element | Name: State\_SearchForHome\_Starting\_2Description: |
| Element | Name: State\_SearchForHome\_MovingDescription: |
| Element | Name: State\_SettingCounterValue\_1Description: |
| Element | Name: State\_SettingCounterValue\_2Description: |
| Element | Name: State\_AbsoluteMoving\_Starting\_1Description: |
| Element | Name: State\_AbsoluteMoving\_Starting\_2Description: |
| Element | Name: State\_AbsolutelyMoving\_MoveDescription: |

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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: RequestType: SaveRestoreEnumDescription: Request for save/restore/safe mode or noop |
| Input Argument | Name: LaserPowerInType: LaserPowerInStructDescription: Input structure |
| Output Argument | Name: LaserPowerOutType: LaserPowerOutStructDescription: Output structure |
| In/out Argument | Name: LaserPowerType: LaserPowerStructDescription: User interface structure |
| In/out Argument | Name: LaserPowerInitType: LaserPowerStructDescription: 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\_CalcType: LREALDescription:  |
| Output Argument | Name: Power\_CalcType: LREALDescription |
| Out/in Argument | Name: Power\_RequestType: LREALDescription: Requested power |
| Output Argument | Name: Angle\_RequestType: LREALDescription: Request angle |
| Output Argument | Name: Power\_InType: LREALDescription: Power in |
| Output Argument | Name: AType: LREALDescription:  |
| Output Argument | Name: BType: LREALDescription:  |
| Output Argument | Name: CType: LREALDescription:  |
| Output Argument | Name: DType: LREALDescription:  |