*LIGO Laboratory / LIGO Scientific Collaboration*

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TwinCAT Library for AOM Driver

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| **Library** | |
| Title | AomDriver |
| Version | 1 |
| TwinCAT version | 2.11 |
| Name space | – |
| Author | Daniel Sigg |
| Description | Controls the AM-modulated AOM driver, [E1900038](https://dcc.ligo.org/LIGO-E1900038).  The frequency difference mixer is using the same RF mixer circuit but without a divider and a VCO. It implements none of the extra frequency controls of the VCO neither.  The fixed ratio frequency source locks an OCXO to an RF signal using an internal PLL, in order to generate a clean higher order harmonics.  The RF power monitor has the calibration  The corresponding temperature readout has the calibration  The factor 1.10 is due to the voltage divider at the temperature readout.  The RF power levels can be alarmed when outside ±1dBm of nominal. |
| Error codes | 0x01 – Power supply voltages out-of-range  0x02 – Output RF power level out-of-range  0x04 – Excitation switch |
| Library dependencies: | Error, SaveRestore, ReadADC. WriteDAC |

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| **Hardware Input Type**  TYPE AomDriverInStruct :  STRUCT  OutputMon: INT;  OutputTemp: INT;  ModulationMon: INT;  Spare: INT;  ExcitationSwitch: BOOL;  PowerOk: BOOL;  END\_STRUCT  END\_TYPE | |
| Type name | AomDriverInStruct |
| Description | Structure of the hardware inputs that are wired up for the AOM driver |
| Definition | STRUCT |
| Element | Name: OutputMon  Type: INT  Description: Monitors the RF power after the output amplifier |
| Element | Name: OutputTemp  Type: INT  Description: Monitors the temperature of the output RF detector |
| Element | Name: ModulationMon  Type: INT  Description: Monitor for the modulation signal |
| Element | Name: Spare  Type: INT  Description: not used |
| Element | Name: ExcitationSwitch  Type: BOOL  Description: Monitors the excitation input enable |
| Element | Name: PowerOk  Type: BOOL  Description: Voltage monitor readback |

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| **Hardware Output Type**  TYPE AomDriverOutStruct :  STRUCT  ModulationBias: INT;  ExcitationEn: BOOL;  DewhiteSwitchAB: BOOL;  DewhiteSwitchA: BOOL;  END\_STRUCT  END\_TYPE | |
| Type name | AomDriverOutStruct |
| Description | Structure of the hardware outputs that are wired up for the AOM Driver |
| Definition | STRUCT |
| Element | Name: ModulationBias  Type: INT  Description: Set point for the modulation bias |
| Element | Name: ExcitationEn  Type: BOOL  Description: Enables the excitation input |
| Element | Name: DewhiteSwitchAB  Type: BOOL  Description: Enables the dewhitening switches A and B |
| Element | Name: DewhiteSwitchA  Type: BOOL  Description: Enables the dewhitening switch A |

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| **User Interface Type**  TYPE AomDriverDewehiteEnum :  AomDriverDewhiteNone, AomDriverDewhiteOne, AomDriverDewhiteTwo);  END\_TYPE | |
| Type name | AomDriverPowerEnum |
| Description | Enumerated type to describe the dewhitening switch state of the AOM driver |
| Definition | ENUM |
| Enum Tag | Name: AomDriverDewhiteNone  Short: NONE  Description: None of the dewhitening filters is on |
| Enum Tag | Name: AomDriverDewhiteOne  Short: A  Description: First dewhitening filter is on |
| Enum Tag | Name: AomDriverDewhiteTwo  Short A+B  Description: Both dewhitening filters are on |

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| **User Interface Type**  TYPE AomDriverStruct :  STRUCT  Error: ErrorStruct;  OutputMon: LREAL;  OuptutNom: LREAL;  OutputTemp: LREAL;  ModulationBias: LREAL;  ModulationMon: LREAL;  ExcitationSwitch: BOOL;  ExcitationEn: BOOL;  PowerOk: BOOL;  DewhiteSwitch: AomDriverDewhiteEnum;  END\_STRUCT  END\_TYPE | |
| Type name | AomDriverStruct |
| Description | Structure of the user interface tags that are used to control the low noise VCO |
| Definition | STRUCT |
| Output Tag | Name: Error  Type: ErrorStruct  Description: For error handler |
| Output Tag | Name: OutputMon  Type: LREAL  Description: Monitors the RF power after the output amplifier dBm |
| Input Tag | Name: OutputNom  Type: LREAL  Description: Nominal value for the RF power at the output amplifier in dBm |
| Output Tag | Name: OutputTemp  Type: LREAL  Description: Monitors the temperature of the output RF detector in C |
| Input Tag | Name: ModulationBias  Type: LREAL  Description: Set point for the modulation bias in V |
| Output Tag | Name: ModulationMon  Type: LREAL  Description: Monitor for the modulation signal in V |
| Input Tag | Name: ExcitationEn  Type: BOOL  Description: Enables the excitation input |
| Output Tag | Name: ExcitationSwitch  Type: BOOL  Description: Monitors the excitation input enable |
| Output Tag | Name: PowerOk  Type: BOOL  Description: Voltage monitor readback |
| Input Tag | Name: DewhiteSwitch  Type: AomDriverDewhiteEnum  Description: State of dewhitening filter stages |

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| **Function Block**  FUNCTION\_BLOCK AomDriverFB  VAR\_INPUT  Request: SaveRestoreEnum;  AomDriverIn: AomDriverInStruct;  END\_VAR  VAR\_OUTPUT  AomDriverOut: AomDriverOutStruct;  END\_VAR  VAR\_IN\_OUT  AomDriverInit: AomDriverStruct;  AomDriver: AomDriverStruct;  END\_VAR | |
| Name | AomDriverFB |
| Description | Controls the AOM driver. One function block for each AOM driver chassis needs to be instantiated. |
| Input argument | Name: Request  Type: SaveRestoreEnum  Description: Save restore command |
| Input argument | Name: AomDriverIn  Type: AomDriverInStruct  Description: Input hardware structure |
| Output argument | Name: AomDriverOut  Type: AomDriverOutStruct  Description: Output hardware structure |
| In/out argument | Name: AomDriverInit  Type: AomDriverStruct  Description: Save/restore variables in persistent memory |
| In/out argument | Name: AomDriver  Type: AomDriverStruct  Description: User Interface structure |