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LIGO- E1200626-v2 Advanced LIGO 9/4/2013

TwinCAT Library for   
Common Mode Servo Board

Alexa Staley, Daniel Sigg

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| **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 |

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| **Library** | |
| Title | CommonMode |
| Version | 2 |
| TwinCAT version | 2.11 |
| Name space | – |
| Author | Alexa Staley, Daniel Sigg |
| Description | Controls the common mode servos [D1200177-v1](https://dcc.ligo.org/DocDB/0086/E1200177/001/D1200177-v1.pdf). |
| Error code | 01—Power supply voltages out-of-range |
| Library dependencies | ReadADC, WriteADC, Error, SaveRestore |

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| **Hardware Input Type**  TYPE CommonModeInStruct :  STRUCT  SumMon: INT;  SplitMon: INT;  FastMon: INT;  SlowfbMon: INT;  SlowMon: INT;  FastLimit: BOOL;  Ok: BOOL;  END\_STRUCT  END\_TYPE | |
| Type name | CommonModeInStruct |
| Description | Structure of the hardware inputs that are wired up for the common mode servos |
| Definition | STRUCT |
| Element | Name: SumMon  Type: INT  Description: Input monitor |
| Element | Name: SplitMon  Type: INT  Description: Monitor at split |
| Element | Name: FastMon  Type: INT  Description: Fast monitor |
| Element | Name: SlowfbMon  Type: INT  Description: Slow path feedback monitor |
| Element | Name: SlowMon  Type: INT  Description: Slow monitor |
| Element | Name: FastLimit  Type: BOOL  Description: Fast path limit monitor readback |
| Element | Name: Ok  Type: BOOL  Description: Voltage monitor readback |

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| **Hardware Output Type**  TYPE CommonModeOutStruct:  STRUCT  ComOfs: INT;  SlowOfs: INT;  SlowoutOfs: INT;  In1Gain: INT;  In2Gain: INT;  ComBoost: INT;  FastGain: INT;  In1En: BOOL;  In2En: BOOL;  OutSw: BOOL;  ComComp: BOOL;  ComExcEn: BOOL;  ComOpt: BOOL;  SlowPol: BOOL;  ComFilter: BOOL;  FastEn: BOOL;  FastPol: BOOL;  SlowOpt: BOOL;  SlowBypass: BOOL;  SlowOfs5V: BOOL;  SlowOfsEn: BOOL;  SlowComp: BOOL;  SlowBoost: BOOL;  SlowFilter: BOOL;  FastLimiter: BOOL;  FastExcEn: BOOL;  FastOpt: BOOL;  SlowExcEn: BOOL;  In1Pol: BOOL;  In2Pol: BOOL;  LatchEn: BOOL;  END\_STRUCT  END\_TYPE | |
| Type name | CommonModeOutStruct |
| Description | Structure of the hardware output that are wired up for the common mode servos |
| Definition | STRUCT |
| Element | Name: ComOfs  Type: INT  Description: Common path offset adjust |
| Element | Name: SlowOfs  Type: INT  Description: Slow path offset adjust |
| Element | Name: SlowoutOfs  Type: INT  Description: Slow path output offset |
| Element | Name: In1Gain  Type: INT  Description: Gain slider input 1 |
| Element | Name: In2Gain  Type: INT  Description: Gain slider input 2 |
| Element | Name: ComBoost  Type: INT  Description: Number of boost stages |
| Element | Name: FastGain  Type: INT  Description: Gain slider fast path |
| Element | Name: In1En  Type: BOOL  Description: Input 1 enable |
| Element | Name: In2En  Type: BOOL  Description: Input 2 enable |
| Element | Name: OutSw  Type: BOOL  Description: Output 1 switch |
| Element | Name: ComComp  Type: BOOL  Description: Compensation enable |
| Element | Name: CompExcEn  Type: BOOL  Description: Excitation A enable |
| Element | Name: ComOpt  Type: BOOL  Description: Option A enable |
| Element | Name: SlowPol  Type: BOOL  Description: Polarity slow path |
| Element | Name: ComFilter  Type: BOOL  Description: Common filter enable |
| Element | Name: FastEn  Type: BOOL  Description: Fast path enable |
| Element | Name: FastPol  Type: BOOL  Description: Fast path polarity |
| Element | Name: SlowOpt  Type: BOOL  Description: Slow path option enable |
| Element | Name: SlowBypass  Type: BOOL  Description: Bypass enable |
| Element | Name: SlowOfs5V  Type: BOOL  Description: Slow output offset +5V fixed |
| Element | Name: SlowOfsEn  Type: BOOL  Description: Slow output offset enable |
| Element | Name: SlowComp  Type: BOOL  Description: Slow path compensation enable |
| Element | Name: SlowBoost  Type: BOOL  Description: Slow path boost enable |
| Element | Name: SlowFilter  Type: BOOL  Description: Slow path filter enable |
| Element | Name: FastLimiter  Type: BOOL  Description: Fast path limiter enable |
| Element | Name: FastExcEn  Type: BOOL  Description: Excitation B enable |
| Element | Name: FastOpt  Type: BOOL  Description: Option B enable |
| Element | Name: SlowExcEn  Type: BOOL  Description: Excitation slow path |
| Element | Name: In1Pol  Type: BOOL  Description: Polarity input 1 |
| Element | Name: In2Pol  Type: BOOL  Description: Polarity input 2 |
| Element | Name: LatchEn  Type: BOOL  Description: Latch enable |

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| **User Interface Type**  TYPE CommonModeStruct :  STRUCT  Error: ErrorStruct;  SumMon: LREAL;  SplitMon: LREAL;  FastMon: LREAL;  SlowfbMon: LREAL;  SlowMon: LREAL;  FastLimit: BOOL;  Ok: BOOL;  ComOfs: LREAL;  SlowOfs: LREAL;  SlowoutOfs: LREAL;  In1Gain: INT;  In2Gain: INT;  ComBoost: INT;  FastGain: INT;  In1En: BOOL;  In2En: BOOL;  OutSw: BOOL;  ComComp: BOOL;  ComExcEn: BOOL;  ComOpt: BOOL;  SlowPol: BOOL;  ComFilter: BOOL;  FastEn: BOOL;  FastPol: BOOL;  SlowOpt: BOOL;  SlowBypass: BOOL;  SlowOfs5V: BOOL;  SlowOfsEn: BOOL;  SlowComp: BOOL;  SlowBoost: BOOL;  SlowFilter: BOOL;  FastLimiter: BOOL;  FastExcEn: BOOL;  FastOpt: BOOL;  SlowExcEn: BOOL;  In1Pol: BOOL;  In2Pol: BOOL;  LacthEn: BOOL;  LimitCount: DINT;  LimitRest: BOOL;  END\_STRUCT  END\_TYPE | |
| Type name | CommonModeStruct |
| Description | Structure of the user interface tags that are used to control the common mode servo |
| Definition | STRUCT |
| Output Tag | Name: Error  Type: ErrorStruct  Description: For error handling |
| Output Tag | Name: SumMon  Type: LREAL  Description: Input monitor |
| Output Tag | Name: SplitMon  Type: LREAL  Description: Monitor at split |
| Output Tag | Name: FastMon  Type: LREAL  Description: Fast monitor |
| Output Tag | Name: SlowfbMon  Type: LREAL  Description: Slow path feedback monitor |
| Output Tag | Name: SlowMon  Type: LREAL  Description: Slow monitor |
| Output Tag | Name: FastLimit  Type: BOOL  Description: Fast path limits reached |
| Output Tag | Name: OK  Type: BOOL  Description: Voltages are within range |
| Input Tag | Name: ComOfs  Type: LREAL  Description: Common path offset adjust |
| Input Tag | Name: SlowOfs  Type: LREAL  Description: Slow path offset adjust |
| Input Tag | Name: SlowoutOfs  Type: LREAL  Description: Slow path output offset |
| In/out Tag | Name: In1Gain  Type: INT  Description: Gain slider input 1 |
| In/out Tag | Name: In2Gain  Type: INT  Description: Gain slider input 2 |
| Input Tag | Name: ComBoost  Type: INT  Description: Number of boost stages |
| Input Tag | Name: FastGain  Type: INT  Description: Gain slider fast path |
| Input Tag | Name: In1En  Type: BOOL  Description: Input 1 enable |
| Input Tag | Name: In2En  Type: BOOL  Description: Input 2 enable |
| Input Tag | Name: OutSw  Type: BOOL  Description: Output 1 switch |
| Input Tag | Name: ComComp  Type: BOOL  Description: Compensation enable |
| Input Tag | Name: CompExcEn  Type: BOOL  Description: Excitation A enable |
| Input Tag | Name: ComOpt  Type: BOOL  Description: Option A enable |
| Input Tag | Name: SlowPol  Type: BOOL  Description: Polarity slow path |
| Input Tag | Name: ComFilter  Type: BOOL  Description: Common filter enable |
| Input Tag | Name: FastEn  Type: BOOL  Description: Fast path enable |
| Input Tag | Name: FastPol  Type: BOOL  Description: Fast path polarity |
| Input Tag | Name: SlowOpt  Type: BOOL  Description: Slow path option enable |
| Input Tag | Name: SlowBypass  Type: BOOL  Description: Bypass enable |
| Input Tag | Name: SlowOfs5V  Type: BOOL  Description: Slow output offset +5V fixed |
| Input Tag | Name: SlowOfsEn  Type: BOOL  Description: Slow output offset enable |
| Input Tag | Name: SlowComp  Type: BOOL  Description: Slow path compensation enable |
| Input Tag | Name: SlowBoost  Type: BOOL  Description: Slow path boost enable |
| Input Tag | Name: SlowFilter  Type: BOOL  Description: Slow path filter enable |
| Input Tag | Name: FastLimiter  Type: BOOL  Description: Fast path limiter enable |
| Input Tag | Name: FastExcEn  Type: BOOL  Description: Excitation B enable |
| Input Tag | Name: FastOpt  Type: BOOL  Description: Option B enable |
| Input Tag | Name: SlowExcEn  Type: BOOL  Description: Excitation slow path |
| Input Tag | Name: In1Pol  Type: BOOL  Description: Polarity input 1 |
| Input Tag | Name: In2Pol  Type: BOOL  Description: Polarity input 2 |
| Input Tag | Name: LatchEn  Type: BOOL  Description: Latch enable |
| Output Tag | Name: LimitCount  Type: DINT  Description: Counts the number of times the fast limit is reached in one second |
| Input Tag | Name: LimitReset  Type: BOOL  Description: Resets the limit count |

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| **Function Block**  FUNCTION\_BLOCK CommonModeFB  VAR\_INPUT  Request: SaveRestoreEnum;  CommonModeIn: CommonModeInStruct;  END\_VAR  VAR\_OUTPUT  CommonModeOut: CommonModeInStruct;  END\_VAR  VAR\_IN\_OUT  CommonModeInit: CommonModeStruct;  CommonMode: CommonModeStruct;  END\_VAR  VAR  END\_VAR | |
| Name | CommonModeFB |
| Description | Controls the common mode servo. |
| Input argument | Name: Request  Type: SaveRestoreEnum  Description: Request for save/restore/safemode or noop |
| Input argument | Name: CommonModeIn  Type: CommonModeInStruct  Description: Input hardware structure |
| Output argument | Name: CommonModeOut  Type: CommonModeOutStruct  Description: Output hardware structure |
| In/out argument | Name: CommonModeInit  Type: CommonModeStruct  Description: Save/restor variable in persistent memory |
| In/out argument | Name: CommonMode  Type: CommonModeStruct  Description: User Interface structure |

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| **Visual** | |
| Name | CommonModeVis |
| Description | Displays sliders, monitors, alarms, and buttons for the common mode servos |
| Placeholder | Name: CommonMode  Type: CommonModeStruct  Description: Common mode structure |