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TwinCAT Library for
Common Mode Servo Board

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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\_STRUCTEND\_TYPE |
| Type name | CommonModeInStruct |
| Description | Structure of the hardware inputs that are wired up for the common mode servos |
| Definition | STRUCT |
| Element | Name: SumMonType: INTDescription: Input monitor |
| Element | Name: SplitMonType: INTDescription: Monitor at split |
| Element | Name: FastMonType: INTDescription: Fast monitor |
| Element | Name: SlowfbMonType: INTDescription: Slow path feedback monitor |
| Element | Name: SlowMonType: INTDescription: Slow monitor |
| Element | Name: FastLimitType: BOOLDescription: Fast path limit monitor readback |
| Element | Name: OkType: BOOLDescription: 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\_STRUCTEND\_TYPE |
| Type name | CommonModeOutStruct |
| Description | Structure of the hardware output that are wired up for the common mode servos |
| Definition | STRUCT |
| Element | Name: ComOfsType: INTDescription: Common path offset adjust |
| Element | Name: SlowOfsType: INTDescription: Slow path offset adjust |
| Element | Name: SlowoutOfsType: INTDescription: Slow path output offset |
| Element | Name: In1GainType: INTDescription: Gain slider input 1 |
| Element | Name: In2GainType: INTDescription: Gain slider input 2 |
| Element | Name: ComBoostType: INTDescription: Number of boost stages |
| Element | Name: FastGainType: INTDescription: Gain slider fast path |
| Element | Name: In1EnType: BOOLDescription: Input 1 enable |
| Element | Name: In2EnType: BOOLDescription: Input 2 enable |
| Element | Name: OutSwType: BOOLDescription: Output 1 switch |
| Element | Name: ComCompType: BOOLDescription: Compensation enable |
| Element | Name: CompExcEnType: BOOLDescription: Excitation A enable |
| Element | Name: ComOptType: BOOLDescription: Option A enable |
| Element | Name: SlowPolType: BOOLDescription: Polarity slow path |
| Element | Name: ComFilterType: BOOLDescription: Common filter enable |
| Element | Name: FastEnType: BOOLDescription: Fast path enable |
| Element | Name: FastPolType: BOOLDescription: Fast path polarity |
| Element | Name: SlowOptType: BOOLDescription: Slow path option enable |
| Element | Name: SlowBypassType: BOOLDescription: Bypass enable |
| Element | Name: SlowOfs5VType: BOOLDescription: Slow output offset +5V fixed |
| Element | Name: SlowOfsEnType: BOOLDescription: Slow output offset enable |
| Element | Name: SlowCompType: BOOLDescription: Slow path compensation enable |
| Element | Name: SlowBoostType: BOOLDescription: Slow path boost enable |
| Element | Name: SlowFilterType: BOOLDescription: Slow path filter enable |
| Element | Name: FastLimiterType: BOOLDescription: Fast path limiter enable |
| Element | Name: FastExcEnType: BOOLDescription: Excitation B enable |
| Element | Name: FastOptType: BOOLDescription: Option B enable |
| Element | Name: SlowExcEnType: BOOLDescription: Excitation slow path |
| Element | Name: In1PolType: BOOLDescription: Polarity input 1 |
| Element | Name: In2PolType: BOOLDescription: Polarity input 2 |
| Element | Name: LatchEnType: BOOLDescription: 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\_STRUCTEND\_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: ErrorType: ErrorStructDescription: For error handling |
| Output Tag | Name: SumMonType: LREALDescription: Input monitor |
| Output Tag | Name: SplitMonType: LREALDescription: Monitor at split |
| Output Tag | Name: FastMonType: LREALDescription: Fast monitor |
| Output Tag | Name: SlowfbMonType: LREALDescription: Slow path feedback monitor |
| Output Tag | Name: SlowMonType: LREALDescription: Slow monitor |
| Output Tag | Name: FastLimitType: BOOLDescription: Fast path limits reached |
| Output Tag | Name: OKType: BOOLDescription: Voltages are within range |
| Input Tag | Name: ComOfsType: LREALDescription: Common path offset adjust |
| Input Tag | Name: SlowOfsType: LREALDescription: Slow path offset adjust |
| Input Tag | Name: SlowoutOfsType: LREALDescription: Slow path output offset |
| In/out Tag | Name: In1GainType: INTDescription: Gain slider input 1 |
| In/out Tag | Name: In2GainType: INTDescription: Gain slider input 2 |
| Input Tag | Name: ComBoostType: INTDescription: Number of boost stages |
| Input Tag | Name: FastGainType: INTDescription: Gain slider fast path |
| Input Tag | Name: In1EnType: BOOLDescription: Input 1 enable |
| Input Tag | Name: In2EnType: BOOLDescription: Input 2 enable |
| Input Tag | Name: OutSwType: BOOLDescription: Output 1 switch |
| Input Tag | Name: ComCompType: BOOLDescription: Compensation enable |
| Input Tag | Name: CompExcEnType: BOOLDescription: Excitation A enable |
| Input Tag | Name: ComOptType: BOOLDescription: Option A enable |
| Input Tag | Name: SlowPolType: BOOLDescription: Polarity slow path |
| Input Tag | Name: ComFilterType: BOOLDescription: Common filter enable |
| Input Tag | Name: FastEnType: BOOLDescription: Fast path enable |
| Input Tag | Name: FastPolType: BOOLDescription: Fast path polarity |
| Input Tag | Name: SlowOptType: BOOLDescription: Slow path option enable |
| Input Tag | Name: SlowBypassType: BOOLDescription: Bypass enable |
| Input Tag | Name: SlowOfs5VType: BOOLDescription: Slow output offset +5V fixed |
| Input Tag | Name: SlowOfsEnType: BOOLDescription: Slow output offset enable |
| Input Tag | Name: SlowCompType: BOOLDescription: Slow path compensation enable |
| Input Tag | Name: SlowBoostType: BOOLDescription: Slow path boost enable |
| Input Tag | Name: SlowFilterType: BOOLDescription: Slow path filter enable |
| Input Tag | Name: FastLimiterType: BOOLDescription: Fast path limiter enable |
| Input Tag | Name: FastExcEnType: BOOLDescription: Excitation B enable |
| Input Tag | Name: FastOptType: BOOLDescription: Option B enable |
| Input Tag | Name: SlowExcEnType: BOOLDescription: Excitation slow path |
| Input Tag | Name: In1PolType: BOOLDescription: Polarity input 1 |
| Input Tag | Name: In2PolType: BOOLDescription: Polarity input 2 |
| Input Tag | Name: LatchEnType: BOOLDescription: Latch enable |
| Output Tag | Name: LimitCountType: DINTDescription: Counts the number of times the fast limit is reached in one second |
| Input Tag | Name: LimitResetType: BOOLDescription: Resets the limit count |

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| **Function Block**FUNCTION\_BLOCK CommonModeFBVAR\_INPUT Request: SaveRestoreEnum; CommonModeIn: CommonModeInStruct;END\_VARVAR\_OUTPUTCommonModeOut: CommonModeInStruct;END\_VARVAR\_IN\_OUT CommonModeInit: CommonModeStruct; CommonMode: CommonModeStruct;END\_VARVAREND\_VAR |
| Name | CommonModeFB |
| Description | Controls the common mode servo.  |
| Input argument | Name: RequestType: SaveRestoreEnumDescription: Request for save/restore/safemode or noop |
| Input argument | Name: CommonModeInType: CommonModeInStructDescription: Input hardware structure |
| Output argument | Name: CommonModeOutType: CommonModeOutStructDescription: Output hardware structure |
| In/out argument | Name: CommonModeInitType: CommonModeStructDescription: Save/restor variable in persistent memory |
| In/out argument | Name: CommonModeType: CommonModeStructDescription: User Interface structure |

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