

*LIGO Laboratory / LIGO Scientific Collaboration*

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**TwinCAT Library for  
Common Mode Servo Board**

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<b>Library</b>	
Title	CommonMode
Version	1
TwinCAT version	2.11
Name space	–
Author	Alexa Staley, Daniel Sigg
Description	Controls the common mode servos <a href="#">D1200177-v1</a> .
Error code	None
Library dependencies	ReadADC, WriteADC, Error

Hardware Input Type	
TYPE CommonModelnStruct :	
STRUCT	
SumMon: INT;	
SplitMon: INT;	
FastMon: INT;	
SlowfbMon: INT;	
SlowMon: INT;	
FastLimit: BOOL;	
Ok: BOOL;	
END_STRUCT	
END_TYPE	
Type name	CommonModelnStruct
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

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

**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

<b>Function Block</b> FUNCTION_BLOCK CommonModeFB VAR_INPUT CommonModeIn:       CommonModeInStruct; END_VAR VAR_OUTPUT CommonModeOut:     CommonModeInStruct; END_VAR VAR_IN_OUT CommonMode:        CommonModeStruct; END_VAR VAR END_VAR	
Name	CommonModeFB
Description	Controls the common mode servo.
Input argument	Name: CommonModeIn Type: CommonModeInStruct Description: Input hardware structure
Output argument	Name: CommonModeOut Type: CommonModeOutStruct Description: Output hardware structure
In/out argument	Name: CommonMode Type: CommonModeStruct Description: User Interface structure

Visual			
Input Mon	%3.4f V	Common Offset	%3.4f V
Split Mon	%3.4f V	Slow Offset	%3.4f V
Fast Mon	%3.4f V	Slow Output Offset	%3.4f V
Slow FB Mon	%3.4f V		
Slow Mon	%3.4f V		
		◀   ▶	%i BOOST
GAIN IN1	◀   ▶		%i
GAIN IN2	◀   ▶		%i
GAIN FAST	◀   ▶		%i
Input 1 Enable	Fast Enable	Slow Polarity	OK
Input 1 Polarity	Fast Polarity	Slow Comp.	
Input 2 Enable	Fast Exc. Enable	Slow Boost	
Input 2 Polarity	Fast/Slow Exc	Slow Filter	
Output switch	Fast Option		
Com. Comp.	Slow Option	Fast Limiter	
Com. Exc. Enable	Slow Bypass	Fast Limit	Limit Reset
Com. Option	Slow 5V Offset	Limit Count	%i
Com. Filter	Slow Ofs. Enable		
Error	%i	%s	
Name	CommonModeVis		
Description	Displays sliders, monitors, alarms, and buttons for the common mode servos		
Placeholder	Name: CommonMode Type: CommonModeStruct Description: Common mode structure		