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LIGO-E1300786-v1

advanced LIGO

10/15/2013

TwinCAT Library for Rotation Stage

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Library	
Title	RotationStage
Version	1
TwinCAT version	V2.11.0
Name space	
Author	Daniel Sigg
Description	This library controls the rotation stage
Error Code	None
Library Dependencies	None

User Interface Type	
<pre> TYPE ET_EL6742START_TYPE : (E_START_TYPE_IDLE E_START_TYPE_ABSOLUTE E_START_TYPE_ENDLESS_PLUS E_START_TYPE_ENDLESS_MINUS E_START_TYPE_ENDLESS_ADDITIVE E_START_TYPE_MODULO_SHORT E_START_TYPE_MODULO_SHORT_EXT E_START_TYPE_MODULO_PLUS E_START_TYPE_MODULO_PLUS_EXT E_START_TYPE_MODULO_MINUS E_START_TYPE_MODULO_MINUS_EXT E_START_TYPE_MODULO_CURRENT E_START_TYPE_MODULO_CURRENT_EXT E_START_TYPE_CALIBRATION_PLC_CAM E_START_TYPE_CALIBRATION_HW_SYNC E_START_TYPE_CALIBRATION_MANUAL E_START_TYPE_CALIBRATION_AUTO E_START_TYPE_CALIBRATION_CLEAR) END_TYPE; </pre>	
Type Name	TYPE ET_EL6742START_TYPE
Description	Status of rotation position, module, and calibration
Definition	ENUM
Element	Name: E_START_TYPE_IDLE Description: No travel command is being executed
Element	Name: E_START_TYPE_ABSOLUTE Description: Absolute target position

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Element	Name: E_START_TYPE_RELATIVE Description: Target position relative to the start position
Element	Name: E_START_TYPE_ENDLESS_PLUS Description: Endless driving in position direction of rotation
Element	Name: E_START_TYPE_ENDLESS_MINUS Description: Endless driving in minus direction of rotation
Element	Name: E_START_TYPE_ENDLESS_ADDITIVE Description: New target position relative/additive to the last target position
Element	Name: E_START_TYPE_MODULO_SHORT Description: Shortest distance to the next modulo position
Element	Name: E_START_TYPE_MODULO_SHORT_EXT Description: Shortest distance to the next modulo position w/o modulo window
Element	Name: E_START_TYPE_MODULO_PLUS Description: Drive in positive direction of rotation to the next modulo position
Element	Name: E_START_TYPE_MODULO_PLUS_EXT Description: Drive in position direction of rotation to the next modulo position w/o modulo window
Element	Name: E_START_TYPE_MODULO_MINUS Description: Drive in negative direction of rotation to the next modulo position
Element	Name: E_START_TYPE_MODULO_MINUS_EXT Description: Drive in negative direction of rotation to the next modulo position w/o modulo window
Element	Name: E_START_TYPE_MODULO_CURRENT Description: Drive in the last implemented direction of rotation to the next modulo position
Element	Name: E_START_TYPE_MODULO_CURRENT_EXT Description: Drive in the last implemented direction of rotation to the next modulo position w/o modulo window
Element	Name: E_START_TYPE_CALIBRATION_PLC_CAM Description: Calibration w/ PLC camera
Element	Name: E_START_TYPE_CALIBRATION_HW_SYNC Description: Calibration with cam and C-track
Element	Name: E_START_TYPE_CALIBRATION_MANUAL Description: Set calibration manually
Element	Name: E_START_TYPE_CALIBRATION_AUTO Description: Set calibration automatically
Element	Name: E_START_TYPE_CALIBRATION_CLEAR Description: Clear calibration manually

User Interface Type

TYPE RotationStageInStruct :

STRUCT

```

    Busy:                BOOL;
    In_Target:           BOOL;
    Warning:             BOOL;
    Error:               BOOL;
    Calibrated:         BOOL;
    Accelerate:         BOOL;
    Decelerate:         BOOL;
    Act_Position:       DINT;
    Act_Velocity:       INT;
    Act_Drive_Time:     UDINT;
    Enc_Latch_Ext_Valid:  BOOL;
    Enc_Set_Count_Done:  BOOL;
    Enc_Count_Underflow:  BOOL;
    Enc_Count_Overflow:  BOOL;
    Enc_Extrap_Stall:    BOOL;
    Enc_InputA_Status:   BOOL;
    Enc_InputB_Status:   BOOL;
    Enc_Ext_Latch_Status:  BOOL;
    Enc_Sync_Error:     BOOL;
    Enc_TxPDO_Toggle:    BOOL;
    Enc_Count_Value:    DINT;
    Enc_Latch_Value:    DINT;
    Mtr_Ready:          BOOL;
    Mtr_Warning:        BOOL;
    Mtr_Error:          BOOL;
    Mtr_Moving_Pos:     BOOL;
    Mtr_Moving_Neg:     BOOL;
    Mtr_Torque_Reduced:  BOOL;
    Mtr_Dig_Input1:     BOOL;
    Mtr_Dig_Input2:     BOOL;
    Mtr_Sync_Error:     BOOL;
    Mtr_TxPDO_Toggle:    BOOL;
    Interlock:          BOOL;

```

END_STRUCT;

END_TYPE;

Type Name	RotationStageInStruct
Description	Rotation stage input structure
Definition	STRUCT

User Interface Type

TYPE RotationStageOutStruct :

STRUCT

```

Execute:          BOOL;
Stop:            BOOL;
Target_Position: DINT;
Velocity:        INT;
Start_Type:      ET_EL6742START_TYPE;
Accelerate:      UNIT;
Decelerate:      UNIT;
Enc_Enable_Latch_Ext_Pos: BOOL;
Enc_Set_Count:   BOOL;
Enc_Ext_Latch_Ext_Neg:  BOOL;
Enc_Set_Count_Value: DINT;
Enc_Latch_Value: DINT;
Mtr_Enable:      BOOL;
Mtr_Reset:       BOOL;
Mtr_Torque_Reduced:  BOOL;

```

END_STRUCT;

END_TYPE;

Type Name	RotationStageOutStruct
Description	Rotation stage output structure
Definition	STRUCT

User Interface Type

TYPE RotationStageStruct :

STRUCT

```

Busy:            BOOL;
In_Target:       BOOL;
Warning:         BOOL;
Error:           BOOL;
Calibrated:      BOOL;
Accelerate:      BOOL;
Decelerate:      BOOL;
Act_Position:    DINT;
Act_Velocity:    INT;
Act_Drive_Time:  UDINT;
Enc_Latch_Ext_Valid:  BOOL;
Enc_Set_Count_Done:  BOOL;

```

Enc_Count_Underflow:	BOOL;
Enc_Count_Overflow:	BOOL;
Enc_Extrap_Stall:	BOOL;
Enc_InputA_Status:	BOOL;
Enc_InputB_Status:	BOOL;
Enc_Ext_Latch_Status:	BOOL;
Enc_Sync_Error:	BOOL;
Enc_TxPDO_Toggle:	BOOL;
Enc_Count_Value:	DINT;
Enc_Latch_Value:	DINT;
Mtr_Read_To_Enable:	BOOL;
Mtr_Ready:	BOOL;
Mtr_Warning:	BOOL;
Mtr_Error:	BOOL;
Mtr_Moving_Pos:	BOOL;
Mtr_Moving_Neg:	BOOL;
Mtr_Torque_Reduced:	BOOL;
Mtr_Dig_Input1:	BOOL;
Mtr_Dig_Input2:	BOOL;
Mtr_Sync_Error:	BOOL;
Mtr_TxPDO_Toggle:	BOOL;
Execute:	BOOL;
Stop:	BOOL;
Target_Position:	DINT;
Velocity:	INT;
Start_Type:	ET_EL6742START_TYPE;
Acceleration:	UNIT;
Deceleration:	UNIT;
Enc_Enable_Latch_Ext_Pos:	BOOL;
Enc_Set_Count:	BOOL;
Enc_Ext_Latch_Ext_Neg:	BOOL;
Enc_Set_Count_Value:	DINT;
Enc_Latch_Value:	DINT;
Mtr_Enable:	BOOL;
Mtr_Reset:	BOOL;
Target_Postion_Deg:	REAL;
Enc_Count_Value_Deg:	REAL;
Counts_Per_Deg:	UDINT;
Interlock:	BOOL;
END_STRUCT;	
END_TYPE;	
Type Name	RotationStageStruct
Description	Structure used in the user interface

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Definition	STRUCT
Tag	Name: Busy Type: BOOL Description: Current active travel
Tag	Name: In_Target Type: BOOL Description: In target indicator
Tag	Name: Warning Type: BOOL Description: Warning indicator
Tag	Name: Error Type: BOOL Description: Error indicator
Tag	Name: Calibrated Type: BOOL Description: Motor is calibrated
Tag	Name: Accelerate Type: BOOL Description: Acceleration state
Tag	Name: Decelerate Type: BOOL Description: Deceleration stage
Tag	Name: Act_Postion Type: DINT Description: Actual position
Tag	Name: Act_Velocity Type: INT Description: Actual velocity
Tag	Name: Act_Drive_Time Type: UDINT Description: Command time information
Tag	Name: Enc_Latch_Ext_Valid Type: BOOL Description: Encoder latch
Tag	Name: Enc_Set_Count_Done Type: BOOL Description: Encoder counter
Tag	Name: Enc_Count_Underflow Type: BOOL Description: Counter underflow

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Tag	Name: Enc_Count_Overflow Type: BOOL Description: Counter overflow
Tag	Name: Enc_Extrap_Stall Type: BOOL Description: Extrapolated counter
Tag	Name: Enc_InputA_Status Type: BOOL Description: Status of encoder A
Tag	Name: Enc_InputB_Status Type: BOOL Description: Status of encoder B
Tag	Name: Enc_Ext_Latch_Status Type: BOOL Description: External latch
Tag	Name: Enc_Sync_Error Type: BOOL Description: Sync error
Tag	Name: Enc_TxPDO_Toggle Type: BOOL Description: TxPDO toggle is toggled by the slave when the data of the associated TxPDO is updated
Tag	Name: Enc_Count_Value Type: BOOL Description: Counter value
Tag	Name: Enc_Latch_Value Type: BOOL Description: Latch value

Tag	Name: Mtr_Read_to_Enable Type: BOOL Description: Ready to enable
Tag	Name: Mtr_Ready Type: BOOL Description: Motor ready
Tag	Name: Mtr_Warning Type: BOOL Description: Warning has occurred
Tag	Name: Mtr_Error Type: BOOL

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	Description: Error has occurred
Tag	Name: Mtr_Moving_Pos Type: BOOL Description: Positive motion
Tag	Name: Mtr_Moving_Neg Type: BOOL Description: Negative motion
Tag	Name: Mtr_Torque_Reduced Type: BOOL Description: Reduced torque active
Tag	Name: Mtr_Dig_Input1 Type: BOOL Description: Digital Input 1
Tag	Name: Mtr_Dig_input2 Type: BOOL Description: Digital Input 2
Tag	Name: Mtr_Sync_Error Type: BOOL Description: Sync error
Tag	Name: Mtr_TxPDO_Toggle Type: BOOL Description: TxPDO toggle
Tag	Name: Execute Type: BOOL Description: Execute
Tag	Name: Stop Type: BOOL Description: Emergency stop
Tag	Name: Target_Position Type: DINT Description: Target position
Tag	Name: Velocity Type: INT Description: Set velocity 0.01% of max
Tag	Name: Start_Type Type: ET_EL6742START_TYPE Description:
Tag	Name: Acceleration Type: UNIT Description: Acceleration time

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Tag	Name: Deceleration Type: UNIT Description: Deceleration time
Tag	Name: Enc_Enable_Latch_Ext_Pos Type: BOOL Description: Latch positive edge
Tag	Name: Enc_Set_count Type: BOOL Description: Set counter
Tag	Name: Enc_Enable_Latch_Ext_Neg Type: BOOL Description: Latch negative edge
Tag	Name: Enc_Set_Count_Value Type: DINT Description: Counter value
Tag	Name: Mtr_Enable Type: BOOL Description: Motor enable
Tag	Name: Mtr_Reset Type: BOOL Description: Reset motor
Tag	Name: Mtr_Reduce_Torque Type: BOOL Description: Reduce torque current
Tag	Name: Type: BOOL Description:
Tag	Name: Target_Position_Deg Type: REAL Description: Target position in degrees
Tag	Name: Enc_Count_Value_Deg Type: REAL Description: Counter value in degrees
Tag	Name: Counts_Per_Deg Type: UDINT Description: Encoder counts per degree
Tag	Name: Interlock Type: BOOL Description: Interlock readout

Function Block TYPE RotationStageFB: VAR_INPUT RotationStageIn: RotationStageInStruct; END_VAR; VAR_OUTPUT RotationStageOut: RotationStageOutStruct; END_VAR; VAR_IN_OUT RotationStage: RotationStageStruct; END_VAR; END_TYPE;	
Type Name	RotationStageFB
Description	Function block used to monitor the PSL environment
Definition	Function Block
Input Argument	Name: RotationStageIn Type: RotationStageInStruct Description: Input structure
Output Argument	Name: RotationStageOut Type: RotationStageOutStruct Description: Output Structure
In/out Argument	Name: RotationStage Type: RotationStageStruct Description: User interface structure