TwinCAT3 Motion Control Library for Synapticon drives

October 23, 2025

Contents

1 Data Structures (DUTs)

These data structures define the custom data types used throughout the library to organize axis data, PDO mappings, and status information.

1.1 E_CiA402State

An enumeration that defines the possible states of the CiA 402 drive state machine.

Value	Name	Description
0	UnknownState	Default or uninitialized state
1	NotReadyToSwitchOn	Drive initialization is not complete
2	SwitchOnDisabled	Drive is initialized but power is disabled
3	ReadyToSwitchOn	Drive is ready to have voltage applied
4	SwitchedOn	Main power is applied, but the drive is not yet operational
5	OperationEnabled	The drive is fully operational and will execute motion commands
6	QuickStopActive	A Quick Stop command is active
7	FaultReactionActive	The drive is in the process of reacting to a fault
8	Fault	A fault has occurred

1.2 PDO Structures

These structures define the layout of the Process Data Objects (PDOs) for cyclic communication with the drive.

1.2.1 ST_Axis_Inputs_PDO (Drive to PLC)

Represents the data received from the drive in each scan cycle.

Parameter	Type	Description
Statusword	UN_Statusword	The 16-bit status word from the drive.
ModeOfOperationDisplay	SINT	The currently active mode of operation reported by the drive (SDO 16#6061)
ActualPosition	DINT	The raw position value from the drive's encoder (SDO 16#6064)
ActualVelocity	DINT	The raw velocity value from the drive (SDO 16#606C)
ActualTorque	INT	The raw torque value from the drive (SDO 16#6077)

1.2.2 ST_Axis_Outputs_PDO (PLC to Drive)

Represents the data sent to the drive in each scan cycle.

Parameter	Type	Description
Controlword	UN_Controlword	The 16-bit control word sent to the drive
ModeOfOperation	SINT	The commanded mode of operation (SDO 16#6060)
TargetTorque	INT	The target torque value (SDO 16#6071)
TargetPosition	DINT	The target position value (SDO 16#607A)
TargetVelocity	DINT	The target velocity value (SDO 16#60FF)
TorqueOffset	INT	A torque offset value (SDO 16#60B2)
TuningCommand	WORD	A command for drive tuning purposes

1.3 UN_Statusword & UN_Controlword

These UNION types allow accessing the 16-bit Statusword and Controlword either as a single WORD or as a structure of individual BITs for easier manipulation and reading.

1.3.1 ST_Statusword_Bits

Bit	Name	Description
0	rtso	Ready to Switch On
1	so	Switched On
2	oe	Operation Enabled.
3	f	Fault - the primary drive fault indicator
4	ve	Voltage Enabled
5	qs	Quick Stop (0 = Active, 1 = Not Active)
6	sod	Switch On Disabled
7	w	Warning
8	ms1	Manufacturer Specific
9	rm	Remote (Controlword is being processed)
10	tr	Target Reached
11	ila	Internal Limit Active
12	oms1	Operation Mode Specific (e.g., Homing Attained, Set-point Acknowledge)
13	oms2	Operation Mode Specific (e.g., Homing Error, Following Error)
14	ms2	Manufacturer Specific
15	ms3	Manufacturer Specific

1.3.2 ST_Controlword_Bits

Bit	Name	Description
0	so	Switch On
1	ev	Enable Voltage
2	qs	Quick Stop (0 = Execute Quick Stop, 1 = Normal)
3	eo	Enable Operation
4	oms1	Operation Mode Specific (e.g., Start Homing, New Set-point in PP)
5	oms2	Operation Mode Specific (e.g., Change Setpoint Immediately in PP)
6	oms3	Operation Mode Specific (e.g., Relative move in PP)
7	fr	Fault Reset (rising edge)
8	h	Halt (0 = Execute Motion, 1 = Halt Motion)
9	oms4	Operation Mode Specific
10	re	Reserved (must be 0)
11	ms1	Manufacturer Specific
12	ms2	Manufacturer Specific
13	ms3	Manufacturer Specific
14	ms4	Manufacturer Specific
15	ms5	Manufacturer Specific

1.4 ST_AxisRef

This is the main data structure for an axis, bundling all necessary information together. An instance of this structure is passed to almost all function blocks.

Parameter	Type	Description
Inputs	ST_Axis_Inputs_PDO	Structure holding all data received from the drive (TxPDOs) - linked via AT %I*
Outputs	ST_Axis_Outputs_PDO	Structure holding all data sent to the drive (RxPDOs) - linked via AT %Q*
fScaleFactorPosition	LREAL	Scaling factor to convert raw encoder counts to user units (e.g., degrees). 'UserUnits / EncoderCount'
fScaleFactorVelocity	LREAL	Scaling factor to convert raw drive velocity units to user units (e.g., RPM)
fScaleFactorTorque	LREAL	Scaling factor to convert raw drive torque units to user units (e.g., permill)
bPowerEnabled	BOOL	Status flag, set by MC_Power, indicating the drive is in 'OperationEnabled'
bError	BOOL	General error flag, set by MC_ReadStatus or MC_Power, indicating a drive fault
eCurrentState	E_CiA402State	The current decoded drive state, set by MC_ReadStatus
sNetID	T_AmsNetId	The AMS Net ID of the EtherCAT master, required for SDO communication
nSlaveAddr	UINT	The EtherCAT address of the slave drive, required for SDO communication

2 Function Blocks (FBs)

2.1 General & Status Blocks

2.1.1 MC_ReadStatus

Continuously reads and decodes the drive's status word and other PDO inputs. It provides scaled, human-readable values and the current drive state. When a drive fault is detected, it automatically attempts to read a descriptive error message from SDO 16#203F.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	If TRUE, the block is active and reads status
Axis	ST_AxisRef	VAR_IN_OUT	The axis data structure to read from and update
Valid	BOOL	VAR_OUTPUT	TRUE if the block is enabled and outputs are valid
AxisState	E_CiA402State	VAR_OUTPUT	The current decoded CiA 402 state of the drive
ErrorStop	BOOL	VAR_OUTPUT	TRUE if the drive is in a 'Fault' or 'FaultReactionActive' state
ModeOfOperationDisplay	SINT	VAR_OUTPUT	The mode of operation currently reported by the drive
ActualPosition	LREAL	VAR_OUTPUT	The scaled current position of the axis in user-defined units
ActualTorque	INT	VAR_OUTPUT	The raw current torque value from the drive
ActualVelocity	LREAL	VAR_OUTPUT	The scaled current velocity of the axis in user-defined units
ErrorDescription	STRING(80)	VAR_OUTPUT	If a fault occurs, contains the error message read from SDO 16#203*F*
SDOReadActive	BOOL	VAR_OUTPUT	TRUE if the SDO read for the error description is in progress
SDOReadComplete	BOOL	VAR_OUTPUT	TRUE if the SDO read for the error description completed successfully
SDOReadFailed	BOOL	VAR_OUTPUT	TRUE if the SDO read for the error description failed

2.1.2 MC_Power

Manages the CiA 402 state machine to correctly power up, enable, and power down the drive. It follows the required state transitions. If a drive fault occurs, this block detects it, enters a fault state, and attempts to read the drive's error code from SDO 16#603F. It does not automatically reset faults.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	Master enable. If TRUE, the block attempts to reach the state defined by 'EnableOperation'. If FALSE, it attempts to power down the drive
EnableOperation	BOOL	VAR_INPUT	If 'Enable' is TRUE, this input defines the target state: 'TRUE' for 'OperationEnabled', 'FALSE' for 'SwitchedOn'
DisableBlock	BOOL	VAR_INPUT	If TRUE, the FB's logic is completely bypassed
Axis	ST_AxisRef	VAR_IN_OUT	The axis data structure to control
Status	BOOL	VAR_OUTPUT	TRUE if the drive is in the 'OperationEnabled' state
Busy	BOOL	VAR_OUTPUT	TRUE while the state machine is transitioning between states
Active	BOOL	VAR_OUTPUT	TRUE if the block is enabled and not disabled by 'DisableBlock'
Error	BOOL	VAR_OUTPUT	TRUE if a drive fault is detected or an internal timeout occurs
ErrorID	UDINT	VAR_OUTPUT	Contains the drive error code from SDO 16#603*F* or an FB-internal error code
SDOReadActive	BOOL	VAR_OUTPUT	TRUE if SDO read for error code is currently in progress
SDOReadComplete	BOOL	VAR_OUTPUT	TRUE if SDO read for error code completed successfully in the last fault
SDOReadFailed	BOOL	VAR_OUTPUT	TRUE if SDO read for error code failed in the last fault
SdoCommErrorCode	UDINT	VAR_OUTPUT	Specific error code from the underlying SDO read block if communication fails
CurrentStep	STRING(50)	VAR_OUTPUT	For debugging, shows the internal state of the state machine

2.1.3 MC_Reset

Provides a simple mechanism for sending a fault reset command to the drive.

Parameter	Type	Direction	Description
Execute	BOOL	VAR_INPUT	A rising edge triggers the fault reset command (sets Controlword Bit 7)
Axis	ST_AxisRef	VAR_IN_OUT	The axis to reset
Done	BOOL	VAR_OUTPUT	TRUE when the drive is no longer in a fault state after the command
Busy	BOOL	VAR_OUTPUT	TRUE while the reset command is active
Error	BOOL	VAR_OUTPUT	TRUE if the reset command fails (e.g., drive was not in fault, or fault persists)

2.1.4 MC_Halt

Commands or releases the Halt bit (Bit 8) in the drive's control word.

Parameter	Type	Direction	Description
Execute	BOOL	VAR_INPUT	If TRUE, Halt is commanded (CW Bit 8 = 1). If FALSE, Halt is released (CW Bit 8 = 0)
Axis	ST_AxisRef	VAR_IN_OUT	The axis to control
Active	BOOL	VAR_OUTPUT	TRUE if Halt is being actively commanded
Error	BOOL	VAR_OUTPUT	TRUE if trying to Halt from an invalid state (e.g., not Operation Enabled)

2.2 SDO & Configuration Blocks

2.2.1 MC_SdoRead

A general-purpose function block for performing acyclic SDO read operations.

Parameter	Type	Direction	Description
Execute	BOOL	VAR_INPUT	Rising edge starts the read operation
Index	WORD	VAR_INPUT	The SDO Index to read
Subindex	BYTE	VAR_INPUT	The SDO Subindex to read
pDstBuf	POINTER TO BYTE	VAR_INPUT	Pointer to the destination buffer to store read data
cbBufLen	UINT	VAR_INPUT	The size of the destination buffer in bytes
Timeout	TIME	VAR_INPUT	SDO communication timeout
Axis	ST_AxisRef	VAR_IN_OUT	The axis to communicate with
Done	BOOL	VAR_OUTPUT	TRUE when the read completes successfully
Busy	BOOL	VAR_OUTPUT	TRUE while the read is in progress
Error	BOOL	VAR_OUTPUT	TRUE if an error occurred during the operation
ErrorID	UDINT	VAR_OUTPUT	Error code from the SDO communication if Error is TRUE
LengthRead	UDINT	VAR_OUTPUT	Actual number of bytes read
OutputAsLWORD	LWORD	VAR_OUTPUT	Raw preview of the first 8 bytes read

2.2.2 MC_SdoWrite

A general-purpose function block for performing acyclic SDO write operations.

Parameter	Type	Direction	Description
Execute	BOOL	VAR_INPUT	Rising edge starts the write operation
Index	WORD	VAR_INPUT	The SDO Index to write to
Subindex	BYTE	VAR_INPUT	The SDO Subindex to write to
pSrcBuf	POINTER TO BYTE	VAR_INPUT	Pointer to the source buffer with data to write
cbSrcLen	UINT	VAR_INPUT	The length of the data in the source buffer in bytes
Timeout	TIME	VAR_INPUT	SDO communication timeout
Axis	ST_AxisRef	VAR_IN_OUT	The axis to communicate with
Done	BOOL	VAR_OUTPUT	TRUE when the write completes successfully
Busy	BOOL	VAR_OUTPUT	TRUE while the write is in progress
Error	BOOL	VAR_OUTPUT	TRUE if an error occurred during the operation
ErrorID	UDINT	VAR_OUTPUT	Error code from the SDO communication if Error is TRUE

2.2.3 MC_ConfigurePPSdo

Configures parameters for Profile Position (PP) mode.

Parameter	Type	Direction	Description
WriteSDO	BOOL	VAR_INPUT	Rising edge starts the configuration sequence
Velocity	UDINT	VAR_INPUT	Profile Velocity value for SDO 16#6081
Acceleration	UDINT	VAR_INPUT	Profile Acceleration value for SDO 16#6083
Deceleration	UDINT	VAR_INPUT	Profile Deceleration value for SDO 16#6084
PositionWindow	UDINT	VAR_INPUT	Position Window value for SDO 16#6067
Axis	ST_AxisRef	VAR_IN_OUT	The axis to configure
Done	BOOL	VAR_OUTPUT	TRUE when all SDO writes are complete
Busy	BOOL	VAR_OUTPUT	TRUE while the configuration sequence is in progress
Error	BOOL	VAR_OUTPUT	TRUE if any SDO write fails
ErrorID	UDINT	VAR_OUTPUT	The error code from the failed SDO write

2.2.4 MC_ConfigurePVSdo

Configures parameters for Profile Velocity (PV) mode.

Parameter	Type	Direction	Description
WriteSDO	BOOL	VAR_INPUT	Rising edge starts the configuration sequence
Acceleration	UDINT	VAR_INPUT	Profile Acceleration value for SDO 16#6083
Deceleration	UDINT	VAR_INPUT	Profile Deceleration value for SDO 16#6084
VelocityWindow	UINT	VAR_INPUT	Velocity Window value for SDO 16#606D
Axis	ST_AxisRef	VAR_IN_OUT	The axis to configure
Done	BOOL	VAR_OUTPUT	TRUE when all SDO writes are complete
Busy	BOOL	VAR_OUTPUT	TRUE while the configuration sequence is in progress
Error	BOOL	VAR_OUTPUT	TRUE if any SDO write fails
ErrorID	UDINT	VAR_OUTPUT	The error code from the failed SDO write

2.2.5 MC_ConfigurePTSdo

Configures parameters for Profile Torque (PT) mode.

Parameter	Type	Direction	Description
WriteSDO	BOOL	VAR_INPUT	Rising edge starts the configuration sequence
TorqueSlope	UDINT	VAR_INPUT	Torque Slope value for SDO 16#6087
QuickStopDecel	UDINT	VAR_INPUT	Quick Stop Deceleration value for SDO 16#6085
Axis	ST_AxisRef	VAR_IN_OUT	The axis to configure
Done	BOOL	VAR_OUTPUT	TRUE when all SDO writes are complete
Busy	BOOL	VAR_OUTPUT	TRUE while the configuration sequence is in progress
Error	BOOL	VAR_OUTPUT	TRUE if any SDO write fails
ErrorID	UDINT	VAR_OUTPUT	The error code from the failed SDO write

2.2.6 MC_SaveConfig

Saves the current drive parameters to non-volatile memory by writing the signature ‘0x65766173‘ (’save’) to SDO 16#1010, Subindex 1.

Parameter	Type	Direction	Description
Execute	BOOL	VAR_INPUT	Rising edge starts the save operation
Axis	ST_AxisRef	VAR_IN_OUT	The axis to save parameters on
Done	BOOL	VAR_OUTPUT	TRUE when the save command completes successfully
Busy	BOOL	VAR_OUTPUT	TRUE while the save operation is in progress
Error	BOOL	VAR_OUTPUT	TRUE if the save operation fails
ErrorID	UDINT	VAR_OUTPUT	Error code from the failed SDO write

2.3 Utility Blocks

2.3.1 MC_Inc2UsrDefUnit

A simple utility block to convert a raw encoder value (‘DINT‘) into a floating-point user-defined unit (‘LREAL‘) using a provided scaling ratio.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	If TRUE, the block performs the conversion
fScalingRatio	LREAL	VAR_INPUT	The conversion factor (UserUnits per EncoderCount)
Axis	ST_AxisRef	VAR_IN_OUT	The axis structure to read ‘Actual-Position‘ from
Active	BOOL	VAR_OUTPUT	TRUE if the block is enabled and active
EncoderValue_In	DINT	VAR_OUTPUT	Echo of the raw encoder value read from the axis
UserDefinedUnit_Out	LREAL	VAR_OUTPUT	The converted position in user-defined units

2.4 Motion Blocks

2.4.1 MC_Homing

Manages the homing procedure. On ‘Execute‘, it sets the desired homing method via SDO (16#6098), commands **Homing Mode (Mode 6)**, and starts the procedure using Controlword bit 4. It monitors for completion or errors and supports re-triggering.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	Enables management of Homing Mode
Execute	BOOL	VAR_INPUT	Rising edge starts the homing procedure
HomingMethod	SINT	VAR_INPUT	The homing method number to use (for SDO 16#6098)
SDOWriteTimeout	TIME	VAR_INPUT	Timeout for the SDO write of the homing method
Axis	ST_AxisRef	VAR_IN_OUT	The axis to home
HomingModeActive	BOOL	VAR_OUTPUT	TRUE if the drive confirms it is in Homing Mode
Busy	BOOL	VAR_OUTPUT	TRUE while setting mode, writing SDO, or the homing procedure is active
Done	BOOL	VAR_OUTPUT	One-cycle pulse when homing is successfully completed
Error	BOOL	VAR_OUTPUT	TRUE if a drive fault, homing error, or SDO error occurs
ErrorID	UDINT	VAR_OUTPUT	Specific error code

2.4.2 MC_MovePP

Executes an absolute or relative move in **Profile Position (PP) mode (Mode 1)**. It uses the drive’s internal profile generator. Parameters must be pre-configured.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	Enables management of Profile Position mode
Execute	BOOL	VAR_INPUT	Rising edge starts/re-triggers the move
Position	LREAL	VAR_INPUT	The target position or relative distance in user-defined units
IsRelative	BOOL	VAR_INPUT	If TRUE, ‘Position‘ is a relative distance; otherwise, it’s absolute
ChangeSetpointImmediately	BOOL	VAR_INPUT	If TRUE, sets CW bit 5 to interrupt the current move
Axis	ST_AxisRef	VAR_IN_OUT	The axis to move
PPModeActive	BOOL	VAR_OUTPUT	TRUE while setting mode, writing SDO, or the homing procedure is active
Busy	BOOL	VAR_OUTPUT	One-cycle pulse when homing is successfully completed
Done	BOOL	VAR_OUTPUT	TRUE if a drive fault, homing error, or SDO error occurs
Error	BOOL	VAR_OUTPUT	TRUE if error bit active

2.4.3 MC_MovePV

Commands a velocity in **Profile Velocity (PV) mode (Mode 3)** using the drive's internal ramps.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	Enables management of Profile Velocity mode
Execute	BOOL	VAR_INPUT	If TRUE, ramps to 'TargetVelocity'. If FALSE, ramps to zero
TargetVelocity	LREAL	VAR_INPUT	The target velocity in user-defined units
Axis	ST_AxisRef	VAR_IN_OUT	The axis to move
PVModeActive	BOOL	VAR_OUTPUT	TRUE if drive is in PV mode
InVelocity	BOOL	VAR_OUTPUT	Pulse when target velocity is reached (equivalent to 'Done')
Busy	BOOL	VAR_OUTPUT	TRUE while ramping to the target velocity
Error	BOOL	VAR_OUTPUT	TRUE if a drive fault occurs

2.4.4 MC_MovePT

Commands a torque in **Profile Torque (PT) mode (Mode 4)** using the drive's internal torque slope.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	Enables management of Profile Torque mode
Execute	BOOL	VAR_INPUT	If TRUE, applies 'TargetTorque'. If FALSE, applies zero torque
TargetTorque	LREAL	VAR_INPUT	The target torque in user-defined units (e.g., permill)
Axis	ST_AxisRef	VAR_IN_OUT	The axis to command
PTModeActive	BOOL	VAR_OUTPUT	TRUE if drive is in PT mode
InTorque	BOOL	VAR_OUTPUT	Pulse when target torque is reached (equivalent to 'Done')
Busy	BOOL	VAR_OUTPUT	Pulse when target torque is reached (equivalent to Done)
Error	BOOL	VAR_OUTPUT	TRUE if a drive fault occurs

2.4.5 MC_MoveAbsoluteCSP

Commands a direct absolute target position to the drive in **Cyclic Synchronous Position (CSP) mode (Mode 8)**. This block does not perform any ramp or profile generation.

Parameter	Type	Direction	Description
EnableCSPMode	BOOL	VAR_INPUT	TRUE: Command CSP mode and enable target position output. FALSE: Command default mode.
TargetPosition	LREAL	VAR_INPUT	Desired absolute target position in user-defined units.
Axis	ST_AxisRef	VAR_IN_OUT	The axis structure
CSPModeActive	BOOL	VAR_OUTPUT	TRUE if drive confirms it's in CSP mode (reads 0x6061)
Error	BOOL	VAR_OUTPUT	TRUE if drive faults or critical configuration error
ErrorID	UDINT	VAR_OUTPUT	Specific error code

2.4.6 MC_MoveRelativeCSP

Commands a direct relative position offset to the drive in **Cyclic Synchronous Position (CSP) mode (Mode 8)**. The target position is calculated once on the rising edge of 'Enable'.

Parameter	Type	Direction	Description
EnableCSPMode	BOOL	VAR_INPUT	TRUE: Command CSP mode and enable target position output. FALSE: Command default mode and set target to actual.
Axis	ST_AxisRef	VAR_IN_OUT	The axis structure
Distance	LREAL	VAR_IN_OUT	Desired relative offset from current position, in user units. Will be reset to 0.0 after being processed.
CSPModeActive	BOOL	VAR_OUTPUT	TRUE if drive confirms it's in CSP mode (reads 0x6061)
Error	BOOL	VAR_OUTPUT	TRUE if drive faults or critical configuration error
ErrorID	UDINT	VAR_OUTPUT	Specific error code

2.4.7 MC_MoveVelocityCSV

Commands a direct target velocity to the drive in **Cyclic Synchronous Velocity (CSV) mode (Mode 9)**. This block does not perform any ramp generation.

Parameter	Type	Direction	Description
EnableCSVMode	BOOL	VAR_INPUT	TRUE: Command CSV mode and enable target velocity output. FALSE: Command default mode and set target velocity to 0.
TargetVelocity	LREAL	VAR_INPUT	Desired target velocity in user-defined units.
Axis	ST_AxisRef	VAR_IN_OUT	The axis structure
CSVModeActive	BOOL	VAR_OUTPUT	TRUE if drive confirms it's in CSV mode (reads 0x6061)
Error	BOOL	VAR_OUTPUT	TRUE if drive faults or critical configuration error
ErrorID	UDINT	VAR_OUTPUT	Specific error code

2.4.8 MC_MoveTorqueCST

Commands a direct target torque to the drive in **Cyclic Synchronous Torque (CST) mode (Mode 10)**. This block does not perform any ramp generation.

Parameter	Type	Direction	Description
EnableCSTMode	BOOL	VAR_INPUT	TRUE: Command CST mode and enable target torque output. FALSE: Command default mode and set target torque to 0.
TargetTorque	LREAL	VAR_INPUT	Desired target torque in user-defined units.
Axis	ST_AxisRef	VAR_IN_OUT	The axis structure
CSTModeActive	BOOL	VAR_OUTPUT	TRUE if drive confirms it's in CST mode (reads 0x6061)
Error	BOOL	VAR_OUTPUT	TRUE if drive faults or critical configuration error
ErrorID	UDINT	VAR_OUTPUT	Specific error code

Table 1: MC_MoveTorqueCST Parameters

2.4.9 MC_MoveAbsoluteCSP_Trap

Generates a trapezoidal position profile within the PLC and sends continuous target position updates to the drive in **Cyclic Synchronous Position (CSP) mode (Mode 8)**.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	Enables management of CSP mode
Execute	BOOL	VAR_INPUT	Rising edge starts/re-triggers the move
TargetPosition_User	LREAL	VAR_INPUT	(Absolute) Target position in user units
ProfileVelocity_User	LREAL	VAR_INPUT	Profile velocity in user_units/sec
ProfileAccel_User/Decel	LREAL	VAR_INPUT	Profile acceleration/deceleration in user_units/sec²
PositionWindow_User	LREAL	VAR_INPUT	Tolerance window for reaching the target in user units
CycleTime	LREAL	VAR_INPUT	PLC task cycle time in seconds
Axis	ST_AxisRef	VAR_IN_OUT	The axis to move
CSPModeActive	BOOL	VAR_OUTPUT	TRUE if drive is in CSP mode
Busy	BOOL	VAR_OUTPUT	TRUE while profile is executing
Done	BOOL	VAR_OUTPUT	One-cycle pulse when target is reached
Error	BOOL	VAR_OUTPUT	TRUE if a drive fault occurs
CurrentProfilePosition_User	LREAL	VAR_OUTPUT	Live calculated position of the profile
CurrentProfileVelocity_User	LREAL	VAR_OUTPUT	Live calculated velocity of the profile

2.4.10 MC_MoveRelativeCSP_Trap

This block behaves identically to MC_MoveAbsoluteCSP_Trap, except its primary position input is a relative distance.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	Enables management of CSP mode
Execute	BOOL	VAR_INPUT	Rising edge starts/re-triggers the move
Distance_User	LREAL	VAR_INPUT	(Relative) Relative distance to move in user units
ProfileVelocity_User	LREAL	VAR_INPUT	Profile velocity in user_units/sec
ProfileAccel_User/Decel	LREAL	VAR_INPUT	Profile acceleration/deceleration in user_units/sec²
PositionWindow_User	LREAL	VAR_INPUT	Tolerance window for reaching the target in user units
CycleTime	LREAL	VAR_INPUT	PLC task cycle time in seconds
Axis	ST_AxisRef	VAR_IN_OUT	The axis to move
CSPModeActive	BOOL	VAR_OUTPUT	TRUE if drive is in CSP mode
Busy	BOOL	VAR_OUTPUT	TRUE while profile is executing
Done	BOOL	VAR_OUTPUT	One-cycle pulse when target is reached
Error	BOOL	VAR_OUTPUT	TRUE if a drive fault occurs
CurrentProfilePosition_User	LREAL	VAR_OUTPUT	Live calculated position of the profile
CurrentProfileVelocity_User	LREAL	VAR_OUTPUT	Live calculated velocity of the profile

2.4.11 MC_MoveVelocityCSV_Trap

Generates a velocity ramp (acceleration/deceleration) and sends continuous target velocity updates to the drive in **Cyclic Synchronous Velocity (CSV) mode (Mode 9)**.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	Enables management of CSV mode.
Execute	BOOL	VAR_INPUT	If TRUE, ramps to TargetVelocity_User. If FALSE, ramps to zero
TargetVelocity_User	LREAL	VAR_INPUT	Target velocity in user_units/sec
ProfileAccel_User/Decel	LREAL	VAR_INPUT	Ramp rate in user_units/sec²
VelocityWindow_User	LREAL	VAR_INPUT	Tolerance window for reaching target velocity
CycleTime	LREAL	VAR_INPUT	PLC task cycle time in seconds
Axis	ST_AxisRef	VAR_IN_OUT	The axis to move
CSVModeActive	BOOL	VAR_OUTPUT	TRUE if drive is in CSV mode
InVelocity	BOOL	VAR_OUTPUT	Pulse when target velocity is reached (equivalent to ‘Done‘)
Busy	BOOL	VAR_OUTPUT	TRUE while profile is executing
Error	BOOL	VAR_OUTPUT	TRUE if a drive fault occurs

2.4.12 MC_MoveTorqueCST_Trap

Generates a torque ramp and sends continuous target torque updates to the drive in **Cyclic Synchronous Torque (CST) mode (Mode 10)**.

Parameter	Type	Direction	Description
Enable	BOOL	VAR_INPUT	Enables management of CST mode
Execute	BOOL	VAR_INPUT	If TRUE, ramps to Target-Torque_User and if FALSE, ramps to zero
TargetTorque_User	LREAL	VAR_INPUT	Target torque in user units (e.g., per-mill)
ProfileAccel_User/Decel	LREAL	VAR_INPUT	Torque ramp rate in user_units/sec²
TorqueWindow_User	LREAL	VAR_INPUT	Tolerance window for reaching target torque
CycleTime	LREAL	VAR_INPUT	PLC task cycle time in seconds
Axis	ST_AxisRef	VAR_IN_OUT	The axis to command
CSTModeActive	BOOL	VAR_OUTPUT	TRUE if drive is in CST mode
InTorque	BOOL	VAR_OUTPUT	Pulse when target torque is reached (equivalent to ‘Done‘)
Busy	BOOL	VAR_OUTPUT	TRUE while profile is executing
Error	BOOL	VAR_OUTPUT	TRUE if a drive fault occurs