YASKAWA AMERICA INC.

SigmaLogic AOI v2.0.0

User Guide

Contents

MCFG_Yaskawa v2.0.0

Motion Axis Configuration & Status

This AOI handles all the 'packing' and 'unpacking' of motion command tag data into the Ethernet instances for communication between the PLC and SigmaLogic axis. It is the only REQUIRED AOI to ensure functionality.

All essential axis information can be found at this AOI including axis Position, Speed, Torque, Error Codes and Software/Firmware versions.

Internally, this AOI monitors a 'Heatbeat' input data point from the attached SigmaLogic axis. This heartbeat signal is internally reflected by the MCFG_Yaskawa AOI to the output instance and can be monitored by the application code. The SigmaLogic monitors the reflected signal from the PLC and the servo will be held in a disabled state if it is not present. The duty cycle of the heartbeat signal is approx. 0.5 sec ON and 0.5 sec OFF.

Feedrate override can be adjusted between 1-200% of the programmed speed for the selected move. If left at default of 0 and never changed, the actual feedrate will be set at 100%. Once the override is set between 1 and 200, the setting will always be active. For MAJ_Yaskawa command (Motion Axis Jog), changes to feedrate override will take effect immediately. For all other commanded moves, changes will take effect at the beginning of the next move.

Starting in v2.0.x new outputs were added for MotionIdle and HomingIdle. These outputs are available for interlocking purposes and indicate when the SigmaLogic axis is ready to start new motion (execute the next Motion or Homing AOI).

Available Languages

📄 Relay Ladder
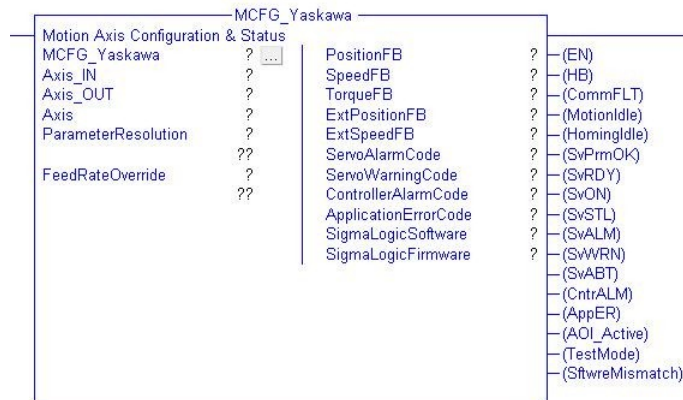
📄 Function Block
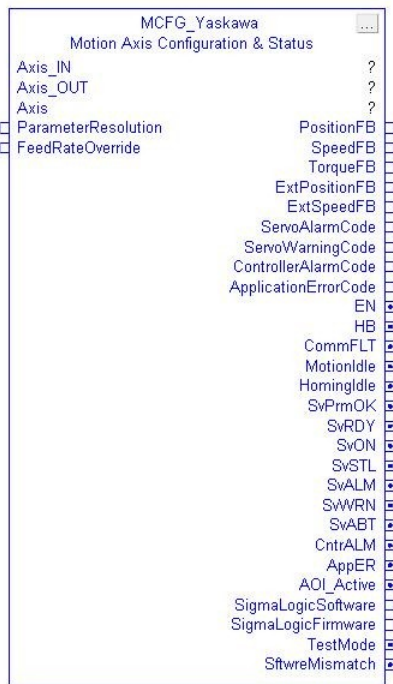
📄 Structured Text

MCFG_Yaskawa(MCFG_Yaskawa,Axis_IN,Axis_OUT,Axis,ParameterResolution,FeedRateOverride);

Parameters

Required	Name	Data Type	Usage	Description
x	MCFG_Yaskawa	MCFG_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis_IN	AB:ETHERNET_MODULE_DINT 256Bytes:I:0	InOut	
x	Axis_OUT	AB:ETHERNET_MODULE_DINT 256Bytes:O:0	InOut	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	ParameterResolution	INT	Input	Desired decimal places for Real Numbers
x	FeedRateOverride	INT	Input	Speed Override: 1% - 200% (100% = programmed speed)
	PositionFB	REAL	Output	Actual Position Feedback
	SpeedFB	REAL	Output	Actual Speed Feedback
	TorqueFB	REAL	Output	Actual Torque Feedback
	ExtPositionFB	REAL	Output	Actual Position Feedback of the External Encoder
	ExtSpeedFB	REAL	Output	Actual Speed Feedback of the External Encoder
	ServoAlarmCode	INT	Output	Servo Alarm Code
	ServoWarningCode	INT	Output	Servo Warning Code

	ControllerAlarmCode	DINT	Output	Controller Alarm Code
	ApplicationErrorCode	INT	Output	Application Function Block Error Code
	EN	BOOL	Output	
	HB	BOOL	Output	Heartbeat pulse from SigmaLogic axis.
	CommFLT	BOOL	Output	Communication Fault. Heartbeat was lost.
	MotionIdle	BOOL	Output	Indicates that the Axis is ready to accept a new motion command
	HomingIdle	BOOL	Output	Indicates that the Axis is ready to accept a new homing command
	SvPrmOK	BOOL	Output	Servo parameters have been successfully downloaded and confirmed.
	SvRDY	BOOL	Output	Servo Ready
	SvON	BOOL	Output	Servo On
	SvSTL	BOOL	Output	Servo is at StandStill according to the PLCopen Motion State Model and has finished executing any motion commands. Use this output in combination with MotionIdle and/or HomingIdle to interlock when a new motion command can be started.
	SvALM	BOOL	Output	Servo Alarm
	SvWRN	BOOL	Output	Servo Warning
	SvABT	BOOL	Output	Servo Move Aborted
	CntrALM	BOOL	Output	Controller Alarm is present
	AppER	BOOL	Output	An Application error is present
	AOI_Active	BOOL	Output	An Axis AOI is Active
	SigmaLogicSoftware	DINT	Output	Software version of Embedded Code installed in the SigmaLogic controller.
	SigmaLogicFirmware	DINT	Output	Firmware version installed in the SigmaLogic Controller
	TestMode	BOOL	Output	Test Mode set by Configuration Utility is Active. PLC control is blocked
	SftwreMismatch	BOOL	Output	A mismatch between the AOI version and the SigmaLogic Software version has been detected. Check the compatibility table at www.yaskawa.com/sigmalogic.

MAB_Yaskawa v2.0.0

Motion Axis Blend

This AOI provides for a 2-speed move to an absolute position. Each position of the move has parameters for Accel, Decel, Speed and Absolute Position Target. Blend1_Position is the absolute point at which the speed will begin changing to Blend2_Speed using Blend2_Accel and Blend2_Decel.

Caution:
Because the position settings represent an absolute location, a reversal in motion could occur. Use caution when entering these values.

Available Languages

📄 Relay Ladder
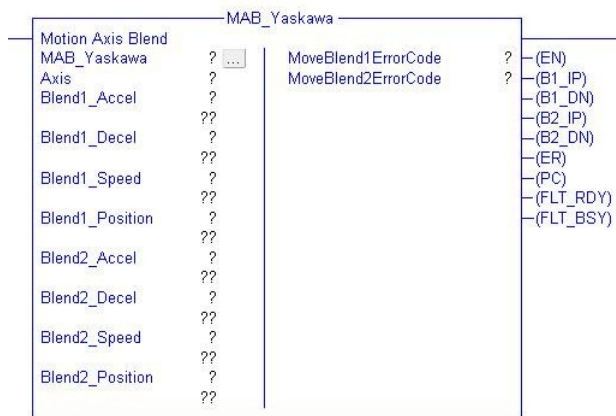
📊 Function Block
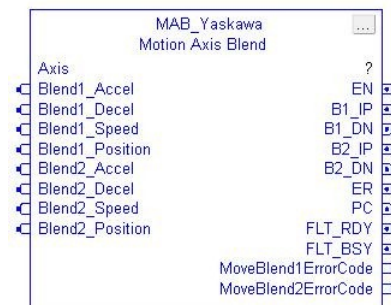
📄 Structured Text

MAB_Yaskawa(MAB_Yaskawa,Axis,Blend1_Accel,Blend1_Decel,Blend1_Speed,Blend1_Position,Blend2_Accel,Blend2_Decel,Blend2_Speed,Blend2_Position);

Parameters

Required	Name	Data Type	Usage	Description
x	MAB_Yaskawa	MAB_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	Blend1_Accel	REAL	Input	Acceleration for the 1st section [unit/s/s]
x	Blend1_Decel	REAL	Input	Deceleration for the 1st section [unit/s/s]
x	Blend1_Speed	REAL	Input	Commanded Speed for the 1st section [unit/s]
x	Blend1_Position	REAL	Input	Absolute position for the section change point (+/- [unit])
x	Blend2_Accel	REAL	Input	Acceleration for the 2nd section [unit/s/s]
x	Blend2_Decel	REAL	Input	Deceleration for the 2nd section [unit/s/s]
x	Blend2_Speed	REAL	Input	Commanded Speed for the 2nd section [unit/s]
x	Blend2_Position	REAL	Input	Final absolute position (+/- [unit])
	EN	BOOL	Output	The AOI Is Active
	B1_IP	BOOL	Output	Indication that 1st section is in process
	B1_DN	BOOL	Output	Indication that 1st section is completed
	B2_IP	BOOL	Output	Indication that 2nd section is in process
	B2_DN	BOOL	Output	Indication that 2nd section is completed
	ER	BOOL	Output	There has been an Error in motion reported from the SigmaLogic servo axis
	PC	BOOL	Output	The Axis has reached the end position (Process Complete)
	FLT_RDY	BOOL	Output	The Servo is Not Ready
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis
	MoveBlend1ErrorCode	INT	Output	1st section Move Error Code
	MoveBlend2ErrorCode	INT	Output	2nd section Move Error Code

MAB_Yaskawa Timing Diagram
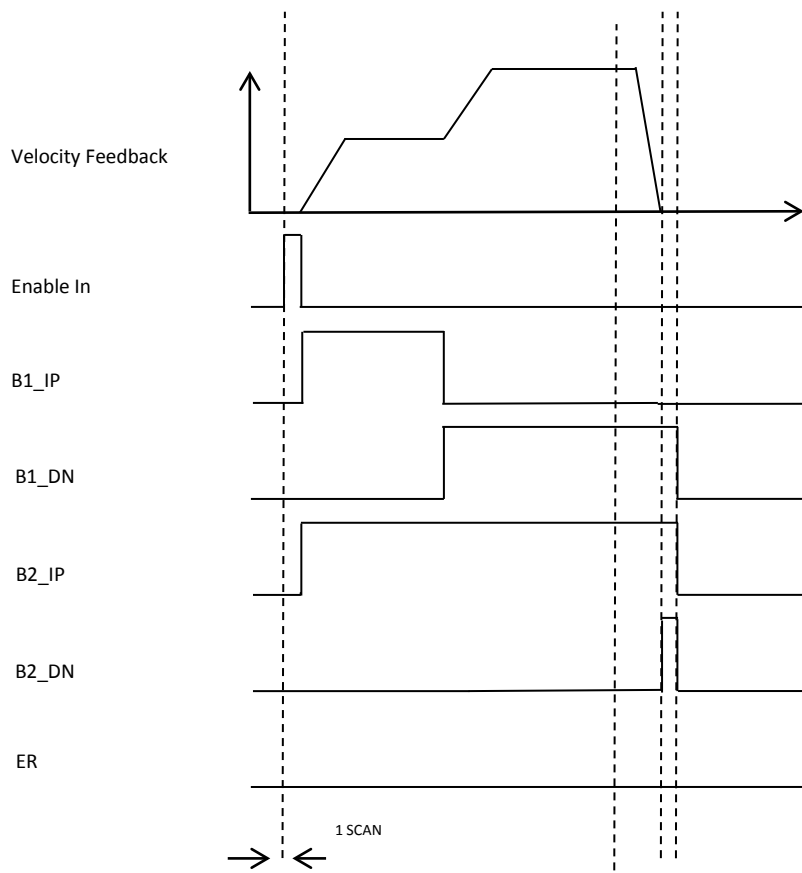
MAFR_Yaskawa v2.0.0

Motion Axis Fault Reset

This AOI resets servo faults on the rising edge of the EnableIN input. The proper sequence to reset faults that occur during motion is:

1. Release the AOI in-progress (set EnableIN input to FALSE)
2. Activate MAS_Yaskawa - Motion Axis Stop. Release when Done.
3. Activate MSF_Yaskawa - Motion Servo OFF (Optional. Not all faults require the servo to be disabled prior to reset). Release when Done.
4. Activate MAFR_Yaskawa to reset the faults. Release when Done.

Available Languages

Relay Ladder

Function Block

Structured Text

MAFR_Yaskawa(MAFR_Yaskawa,Axis);

Parameters

Required	Name	Data Type	Usage	Description
X	MAFR_Yaskawa	MAFR_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
X	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
	EN	BOOL	Output	The AOI is Active
	DN	BOOL	Output	Fault Reset Complete (Faults Cleared OK)
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis

MAG_Yaskawa v2.0.0

Motion Axis Gear

This AOI moves a servo axis in direct proportion to the external encoder at a specified gear ratio. If desired, Superimposed moves may be enabled and executed on top of the gearing motion to adjust the servo position with respect to the external encoder. Acceleration and deceleration is performed at a fixed rate and not over any particular external encoder travel distance. The distance traveled during acceleration will depend on the rate/ratio specified and the current speed of the external encoder. Gear ratio is specified as Slave_Counts/Master_Counts where the values are both DINTs.

Available Languages

📄 Relay Ladder
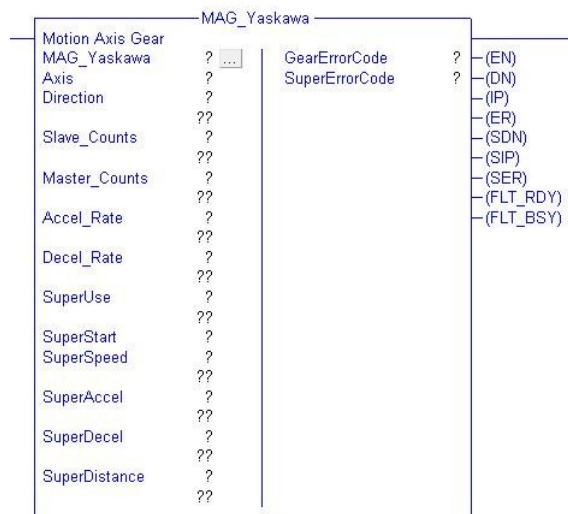
📘 Function Block

📄 Structured Text

MAG_Yaskawa(MAG_Yaskawa,Axis,Direction,Slave_Counts,Master_Counts,Accel_Rate,Decel_Rate,SuperUse,SuperStart,SuperSpeed,SuperAccel,SuperDecel,SuperDistance);

Parameters

Required	Name	Data Type	Usage	Description
x	MAG_Yaskawa	MAG_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	Direction	INT	Input	0 = slave axis moves in the same direction as the master axis 1 = slave axis moves in the opposite direction of the master axis. 2 = slave axis reverses from its current or previous direction 3 = slave axis continues in its current or previous direction
x	Slave_Counts	DINT	Input	Gear Ratio Numerator
x	Master_Counts	DINT	Input	Gear Ratio Denominator
x	Accel_Rate	REAL	Input	Acceleration for the Gearing IN [unit/s/s]
x	Decel_Rate	REAL	Input	Deceleration for the Gearing OUT [unit/s/s]
x	SuperUse	INT	Input	0 = Do Not Use Superimpose on Gear 1 = Use SuperImpose on Gear
x	SuperStart	BOOL	Input	Signal (pulse) that Starts the SuperImposed Move
x	SuperSpeed	REAL	Input	Commanded Speed for the SuperImposed Move [unit/s]
x	SuperAccel	REAL	Input	Acceleration for the SuperImposed Move [unit/s/s]
x	SuperDecel	REAL	Input	Deceleration for the SuperImposed Move [unit/s/s]
x	SuperDistance	REAL	Input	Distance (Relative) for the SuperImposed Move [unit/s/s]
	EN	BOOL	Output	The AOI is Active
	DN	BOOL	Output	Servo and External Gearing in Sync.
	IP	BOOL	Output	Gearing is In Process
	ER	BOOL	Output	Gearing Motion Error
	SDN	BOOL	Output	SuperImposed Move is Finished
	SIP	BOOL	Output	SuperImposed Move is In Process
	SER	BOOL	Output	SuperImposed Move Error
	FLT_RDY	BOOL	Output	The Servo is Not Ready
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis
	GearErrorCode	INT	Output	Gearing Error Code
	SuperErrorCode	INT	Output	Move Superimposed Error Code

MAH_Yaskawa v2.0.0

Motion Axis Home

This AOI moves a servo axis to a home position by various methods. Timeouts are not directly included in this AOI and should be implemented in user code. Supported Homing Methods include:

- Type 0: Set Position Only

- Type 1: To Hard Stop w/wo encoder C-Channel.

- Type 2: To Overtravel (P-OT, N-OT) w/wo encoder C-Channel

- Type 3: To Flag w/wo encoder C-Channel (Flag can also be one of the Controller Digital Inputs)

    o CN1 Inputs: SI0...SI6 = Flag 81...Flag 87

    o CN13 Inputs: DI_00... DI_07 = Flag 65...Flag72

- Type 4: To encoder C-Channel only

Type 0: Set Position Only

'Set Position Only' can occur whether the servo is enabled or disabled. Position will be immediately set to the specified value.

Type 1: Home to Hard Stop

Home to Hard Stop without the C-Pulse moves the servo under a Torque Limit until the hard stop is reached according to the following sequence:

- Backoff move is always performed in the opposite direction of the search Direction. Always use a Positive Value for BackoffDistance.
- TorqueLimit is set and the axis moves to the hard stop in the specified Direction under max Speed limit.
- When hard stop is reached, Offset move is performed according to the value set in OffsetDistance and OffsetSpeed. Direction will always be opposite to the searching direction.
- Position is defined as the SetPosition.
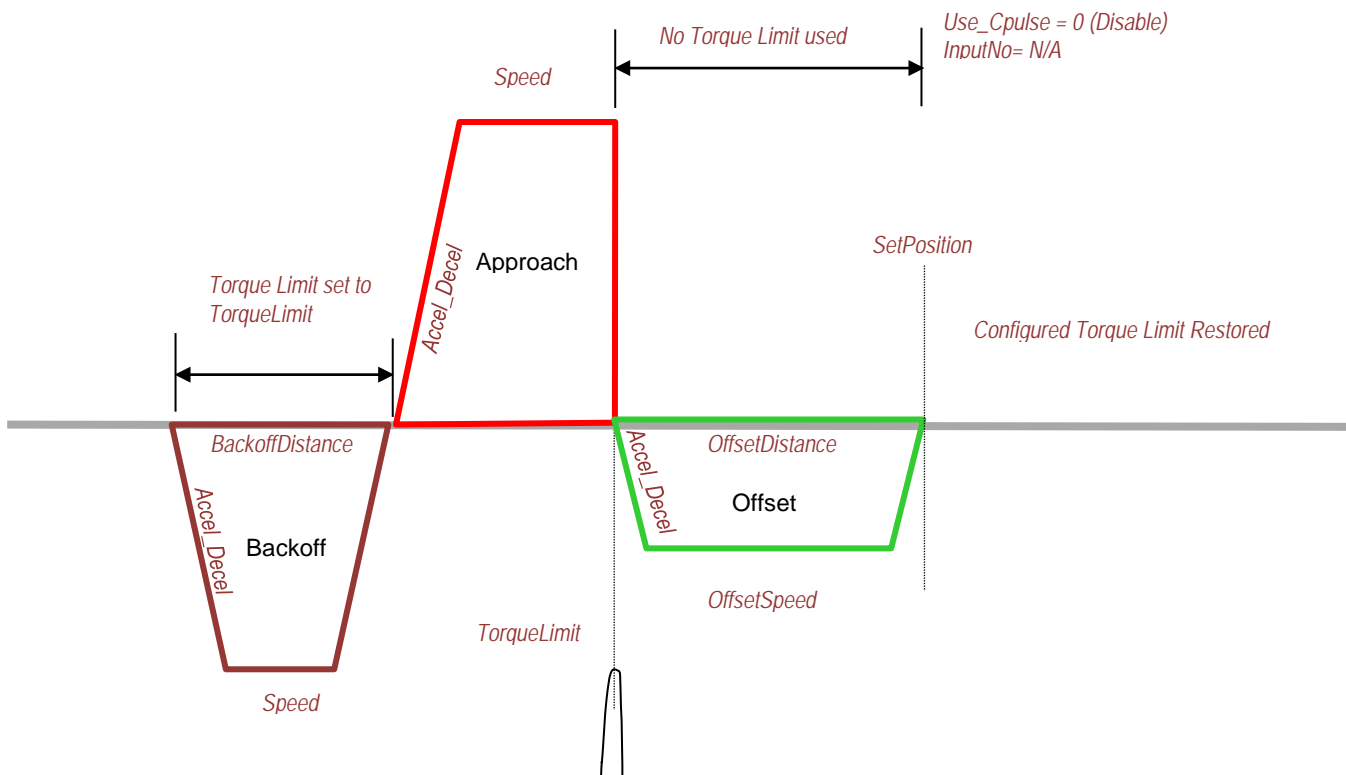
Home to Hard Stop with C-Pulse moves the servo under a Torque Limit until the hard stop is reached according to the following sequence:

- Backoff move is always performed in the opposite direction of the search Direction. Always use a Positive Value for BackoffDistance.
- TorqueLimit is set and the axis moves to the hard stop in the specified Direction under max Speed limit.
- When hard stop is reached the axis will begin to search for the Encoder C-Pulse in the opposite direction.
- When C-pulse is found the Offset move is performed according to the value set in OffsetDistance and OffsetSpeed.
- Position is defined as the SetPosition.
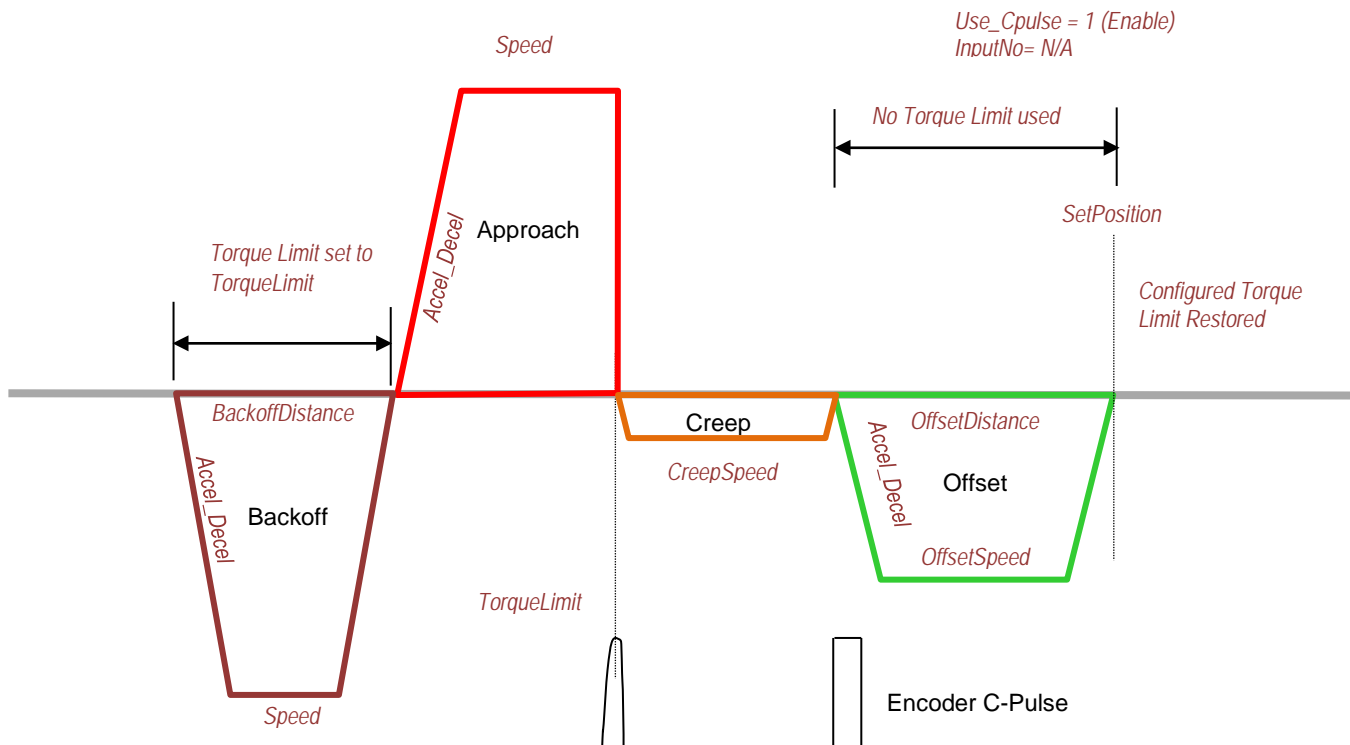
Type 2 and Type 3: Home to OverTravel and Home to Flag

Home to Overtravel (P-OT, N-OT) or Flag without C-Channel performs the following sequence:

- Initial search (Approach) in specified Direction.
- TorqueLimit is active.
- When Overtravel switch or Flag is found, move the BackoffDistance. Always use a Positive Value for BackoffDistance. Direction will be automatically opposite of search direction.
- Final search is performed (Creep) in the specified Direction using CreepSpeed.
- When Overtravel switch or Flag is found again, Offset move is performed according to the value set in OffsetDistance and OffsetSpeed. Direction will be automatically opposite of search direction.
- Position is defined as the SetPosition.

HomeType = 3 (Flag)
Direction = 0 (Forward) or 1 (Reverse)

Use_Cpulse = 0 (disable)
InputNo = Flag Number

SetPosition

OffsetSpeed

OffsetDistance

Previous Torque Limit Restored

Accel_Decel

Backoff

BackoffDistance

Accel_Decel

Offset

Accel_Decel

Creep

CreepSpeed

Accel_Decel

Approach

Speed

Flag

Flag

TorqueLimit in effect
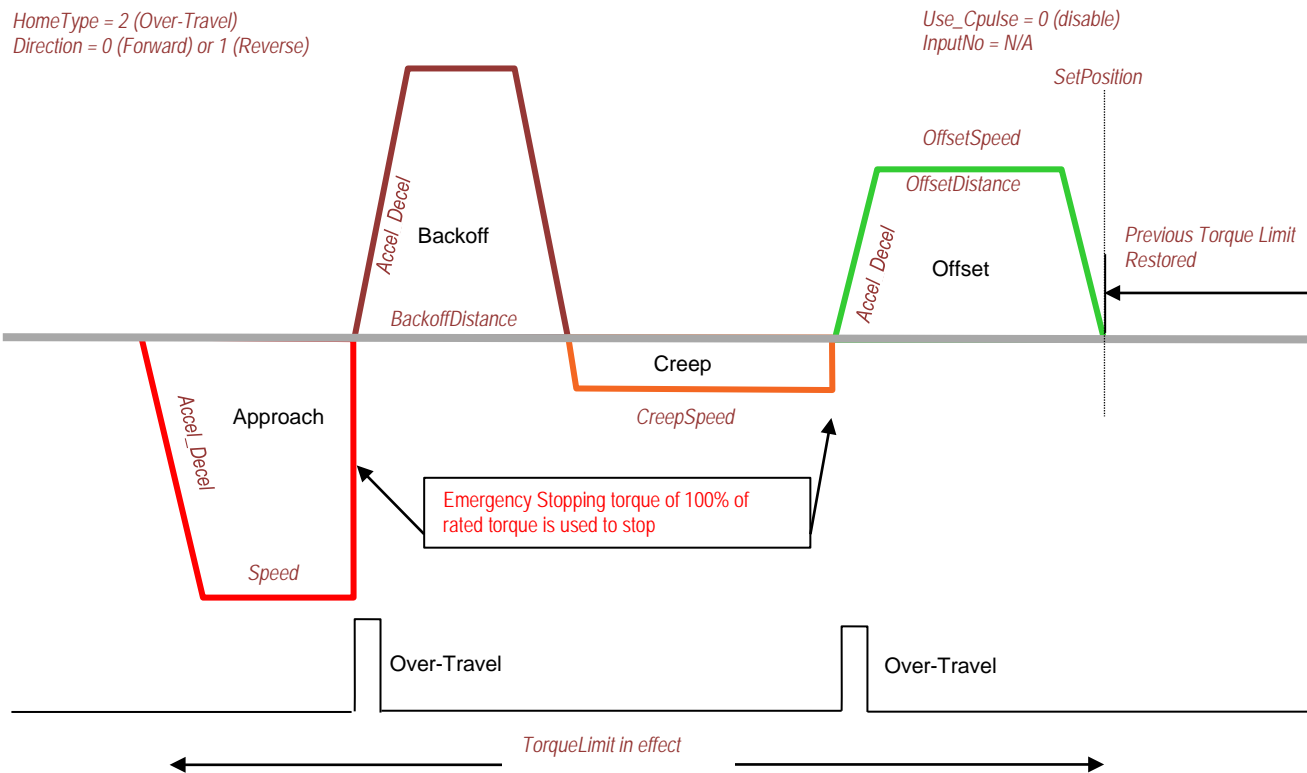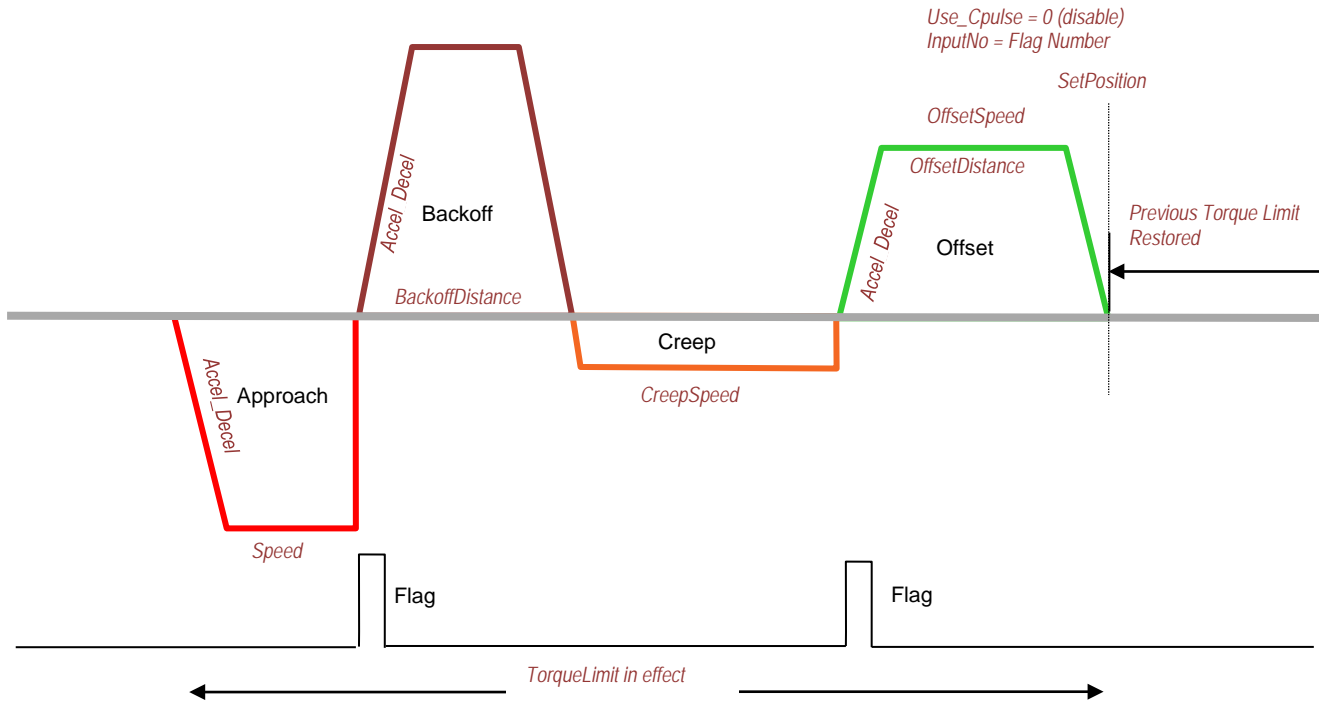
Home to Overtravel (P-OT, N-OT) or Flag with C-Channel performs the following sequence:

- Initial search (Approach) in specified Direction.
- Torque-Limit is active
- When Overtravel switch or Flag is found, move the BackoffDistance. Always use a Positive Value for Backoff-Distance. Direction will be automatically opposite of search direction.
- Final search is performed (Creep) in the specified Direction using Creep-Speed
- When C-Channel is found, Offset move is performed according to the value set in OffsetDistance and OffsetSpeed. Direction will be automatically opposite of search direction.
- Position is defined as the SetPosition.

HomeType = 3 (Flag)
Direction = 0 (Forward) or 1 (Reverse)

The servo will move one revolution at most in search of the C-pulse

Use_Cpulse = 1 (enable)
InputNo = Flag Number

SetPosition

OffsetSpeed

OffsetDistance

Accel_Decel

Backoff

Offset

Previous Torque Limit Restored

BackoffDistance

Accel_Decel

Creep

Accel_Decel

Approach

CreepSpeed

Speed

Flag

Encoder C-pulse

TorqueLimit in effect
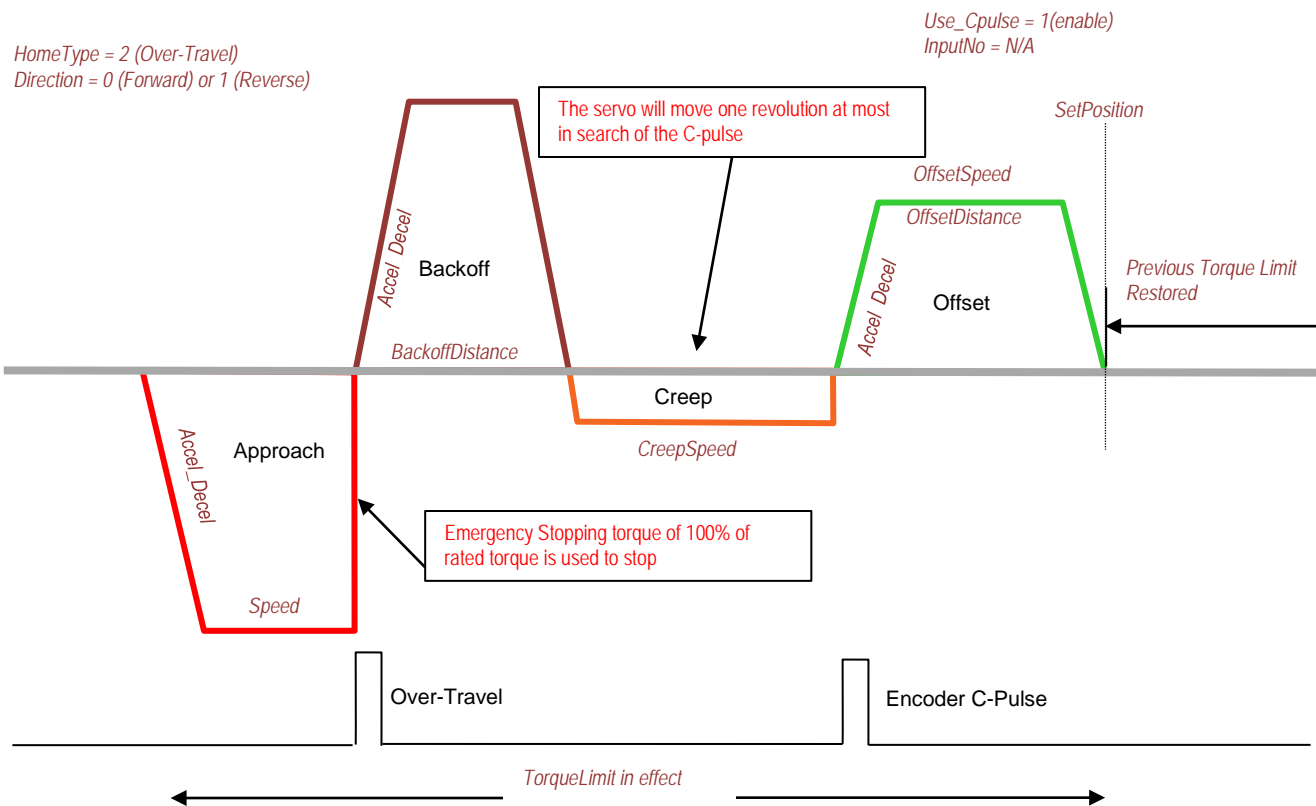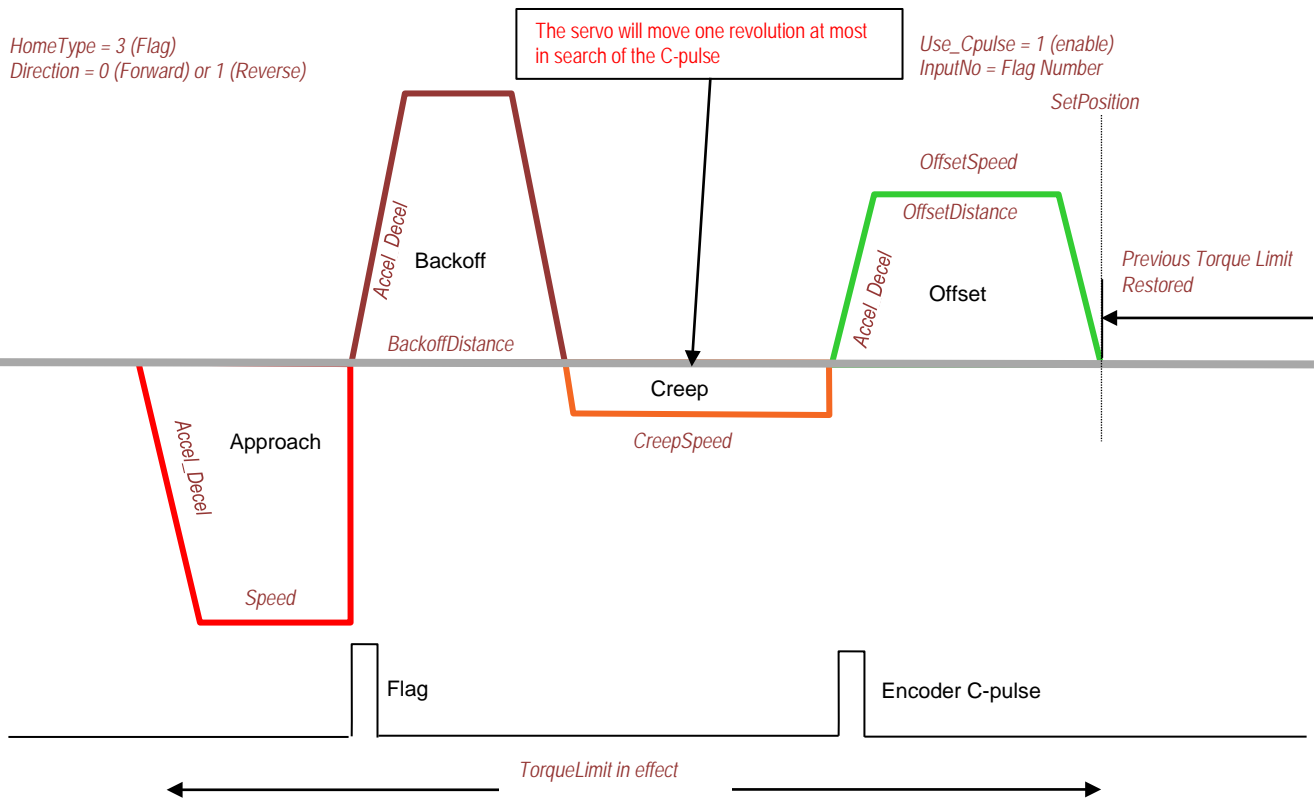
Type 4: Home to Encoder C-Channel Only

Home to Encoder C-Channel Only performs the following sequence:

- Axis begins to creep in the specified Direction using Creep-Speed.
- When a C-Channel is found , Offset move is performed according to the value set in Offset-Distance and Offset-Speed. Direction will be automatically opposite of search direction.
- Position is defined as the Set-Position.

HomeType = 4 (C- Channel)
Direction = 0 (Forward) or 1 (Reverse)

The servo will move one revolution at most in search of the C-pulse

Use_Cpulse = 1 (enable)
InputNo = Flag Number

SetPosition

OffsetSpeed

OffsetDistance

Accel/ Decel

Previous Torque Limit Restored

Offset

Creep

CreepSpeed

Encoder C-pulse

TorqueLimit in effect

Available Languages

📄 Relay Ladder

```
                    ┌── MAH_Yaskawa ──────────────────┐
                    │  Motion Axis Home                │
                    │  MAH_Yaskawa    ?  [...]   ErrorCode    ?  ├─(EN)
                    │  Axis           ?                         ├─(DN)
                    │  HomeType       ?                         ├─(IP)
                    │                ??                         ├─(ER)
                    │  Direction      ?                         ├─(PC)
                    │                ??                         ├─(FLT_RDY)
                    │  Use_CPulse     ?                         ├─(FLT_BSY)
                    │                ??
                    │  Accel_Decel    ?
                    │                ??
                    │  Speed          ?
                    │                ??
                    │  TorqueLimit    ?
                    │                ??
                    │  FlagNo         ?
                    │                ??
                    │  BackoffDistance ?
                    │                ??
                    │  CreepSpeed     ?
                    │                ??
                    │  OffsetDistance ?
                    │                ??
                    │  OffsetSpeed    ?
                    │                ??
                    │  SetPosition    ?
                    │                ??
                    └─────────────────────────────────┘
```

📘 Function Block

```
        ┌── MAH_Yaskawa ──── [...] ──┐
        │   Motion Axis Home          │
        │  Axis                 ?     │
        ─┤ HomeType          EN ┤─     │
        ─┤ Direction         DN ┤─
        ─┤ Use_CPulse        IP ┤─
        ─┤ Accel_Decel       ER ┤─
        ─┤ Speed             PC ┤─
        ─┤ TorqueLimit  FLT_RDY ┤─
        ─┤ FlagNo       FLT_BSY ┤─
        ─┤ BackoffDistance ErrorCode ┤
        ─┤ CreepSpeed          │
        ─┤ OffsetDistance      │
        ─┤ OffsetSpeed         │
        ─┤ SetPosition         │
        └─────────────────────┘
```

📄 Structured Text

MAH_Yaskawa(MAH_Yaskawa,Axis,HomeType,Direction,Use_CPulse,Accel_Decel,Speed,TorqueLimit,FlagNo,Backoff Distance,CreepSpeed,OffsetDistance,OffsetSpeed,SetPosition);

Parameters

Required	Name	Data Type	Usage	Description
x	MAH_Yaskawa	MAH_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	HomeType	INT	Input	0 = Set Position 1 = Home to Hard Stop 2 = Home to Overtravel Switch 3 = Home to Flag 4 = Home to C-Pulse Only

|				
x	Direction	INT	Input	0 = Positive 1 = Negative
x	Use_CPulse	INT	Input	0 = Do Not Use C-Pulse 1 = Use C-Pulse
x	Accel_Decel	REAL	Input	Homing Accel/Decel [unit/s/s]
x	Speed	REAL	Input	Homing Speed [unit/s]
x	TorqueLimit	REAL	Input	Torque or Force Limit for Homing [%motor rated torque/force]
x	FlagNo	INT	Input	SigmaLogic Flag to use as Trigger for Home Type 3
x	BackoffDistance	REAL	Input	Distance to back off before moving to hard stop (Type 1) or after finding the overtravel or flag (Type 2 and 3)
x	CreepSpeed	REAL	Input	Homing Creep Speed [units/s]
x	OffsetDistance	REAL	Input	Homing Offset Distance [unit]
x	OffsetSpeed	REAL	Input	Homing Offset Speed [unit/s]
x	SetPosition	REAL	Input	Position to Define at end of homing process
	ApproachDistanceLimit	REAL	Input	(Not supported)
	ApproachTimeLimit	REAL	Input	(Not supported)
	CreepDistLimit	REAL	Input	(Not supported)
	CreepTimeLimit	REAL	Input	(Not supported)
	EN	BOOL	Output	The AOI is Active
	DN	BOOL	Output	Homing is Done
	IP	BOOL	Output	Homing is In Process
	ER	BOOL	Output	Homing Process Error
	PC	BOOL	Output	Homing Process is Successfully Completed
	FLT_RDY	BOOL	Output	The Servo is Not Ready
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis
	ErrorCode	INT	Output	Homing process Error Code

MAHSP_Yaskawa v2.0.0

Motion Axis Home "Set Position"

This AOI sets the current position of the servo motor or of the External Encoder (if applicable) to a specified value. This command is a simpler alternative to the MAH_Yaskawa command with HomeType = 0. Axis can be in either an enabled or disabled state.

Available Languages

📄 Relay Ladder
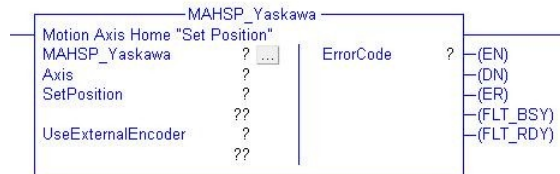
📄 Function Block
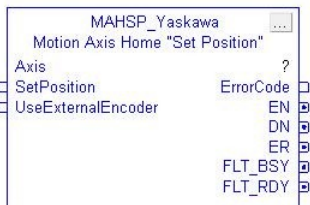
📄 Structured Text

MAHSP_Yaskawa(MAHSP_Yaskawa,Axis,SetPosition,UseExternalEncoder);

Parameters

Required	Name	Data Type	Usage	Description
x	MAHSP_Yaskawa	MAHSP_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	SetPosition	REAL	Input	Set the current position to this value
x	UseExternalEncoder	INT	Input	If set to 1, the Set Position will apply to the external encoder axis instead of the main motor axis
	ErrorCode	INT	Output	Set Position Error Code
	EN	BOOL	Output	The AOI is Active
	DN	BOOL	Output	Homing is Completed
	ER	BOOL	Output	Homing Process Error
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis
	FLT_RDY	BOOL	Output	The Servo is Not Ready
	IP	BOOL	Output	Homing is In Process

MAJ_Yaskawa v2.0.0

Motion Axis Jog

This AOI moves a servo axis indefinitely at a commanded speed based on the motion profile parameters. Use the Motion Axis Jog instruction to jog the axis with or without registration. Speed may be updated on-the-fly without stopping by changing the value for Speed while holding the block EnableIN input ON.

When the MAJ_Yaskawa EnableIN is removed, the axis will decelerate to a stop - no need to activate the MAS_Yaskawa command separately.

Available Languages

Relay Ladder
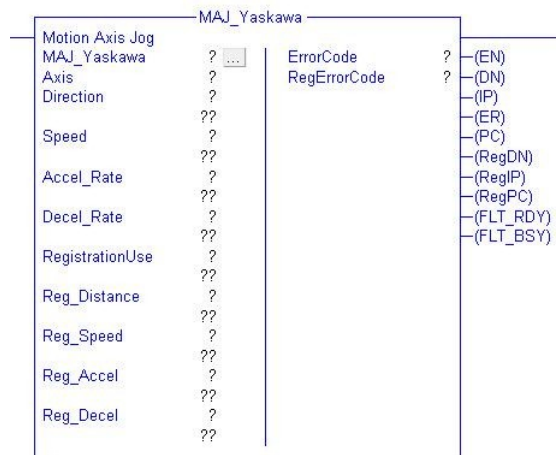
Function Block
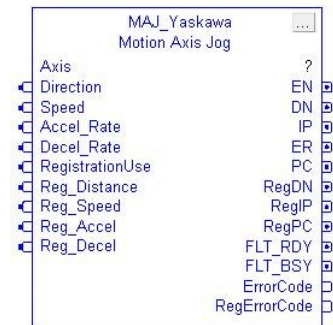
Structured Text

MAJ_Yaskawa(MAJ_Yaskawa,Axis,Direction,Speed,Accel_Rate,Decel_Rate,RegistrationUse,Reg_Distance,Reg_Speed,Reg_Accel,Reg_Decel);

Parameters

Required	Name	Data Type	Usage	Description
x	MAJ_Yaskawa	MAJ_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	Direction	INT	Input	0 = Forward 1 = Reverse
x	Speed	REAL	Input	Commanded Speed [unit/s]
x	Accel_Rate	REAL	Input	Acceleration rate [unit/s/s]
x	Decel_Rate	REAL	Input	Deceleration rate [unit/s/s]
x	RegistrationUse	INT	Input	0 = Disabled (Do Not use Registration Latch) 1 = Enabled (Arm the Registration Latch)
x	Reg_Distance	REAL	Input	Registration Distance to Move (Relative)
x	Reg_Speed	REAL	Input	Registration Move Speed [unit/s]
x	Reg_Accel	REAL	Input	Registration Move Acceleration rate [unit/s/s]
x	Reg_Decel	REAL	Input	Registration Move Deceleration rate [unit/s/s]
	EN	BOOL	Output	The AOI is Active
	DN	BOOL	Output	Jog motion has been initiated
	IP	BOOL	Output	Axis jog motion is In Process
	ER	BOOL	Output	Jog Motion Error
	PC	BOOL	Output	The axis is jogging at commanded speed
	RegDN	BOOL	Output	Registration move has been initiated
	RegIP	BOOL	Output	The Axis is moving to the Registration Position
	RegPC	BOOL	Output	The Axis has reached the Registration Position
	FLT_RDY	BOOL	Output	The Servo is Not Ready
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis
	ErrorCode	INT	Output	Jog Error Code
	RegErrorCode	INT	Output	Registration Move Error Code

MAJ_Yaskawa Timing Diagram

MAM_Yaskawa v2.0.0

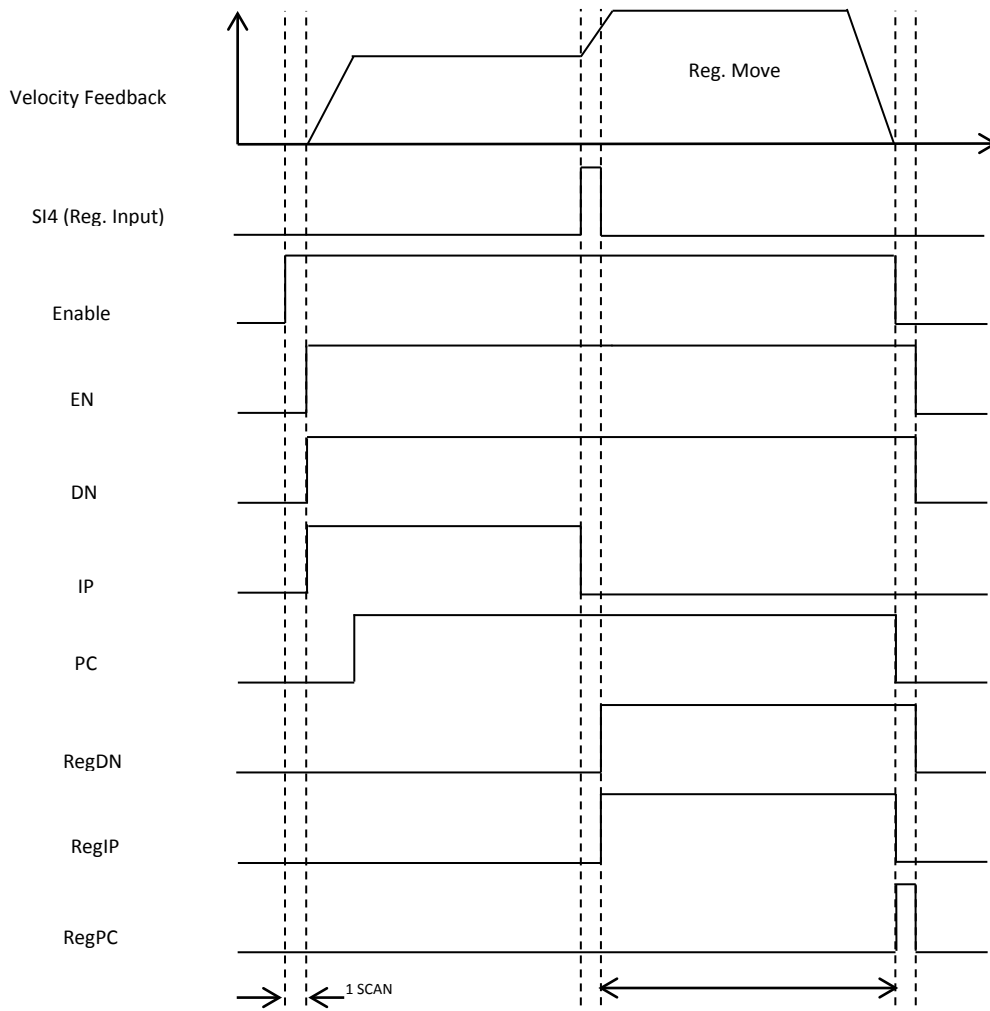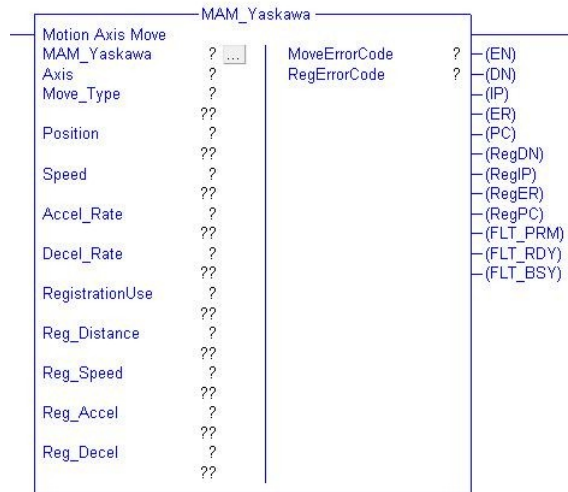## Motion Axis Move

This AOI moves a servo axis to a position based on the motion profile parameters. Use the Motion Axis Move instruction to move to a specified position (absolute) or a specified distance (Relative), with or without registration.

Available Languages

Relay Ladder

```
                    MAM_Yaskawa
  Motion Axis Move
  MAM_Yaskawa       ?  ...      MoveErrorCode     ?  ─(EN)
  Axis              ?           RegErrorCode      ?  ─(DN)
  Move_Type         ?                                ─(IP)
                    ??                               ─(ER)
  Position          ?                                ─(PC)
                    ??                               ─(RegDN)
  Speed             ?                                ─(RegIP)
                    ??                               ─(RegER)
  Accel_Rate        ?                                ─(RegPC)
                    ??                               ─(FLT_PRM)
  Decel_Rate        ?                                ─(FLT_RDY)
                    ??                               ─(FLT_BSY)
  RegistrationUse   ?
                    ??
  Reg_Distance      ?
                    ??
  Reg_Speed         ?
                    ??
  Reg_Accel         ?
                    ??
  Reg_Decel         ?
                    ??
```

Function Block

```
            MAM_Yaskawa        ...
            Motion Axis Move
   Axis                     ?
  ─ Move_Type          EN ─
  ─ Position           DN ─
  ─ Speed              IP ─
  ─ Accel_Rate         ER ─
  ─ Decel_Rate         PC ─
  ─ RegistrationUse  RegDN ─
  ─ Reg_Distance     RegIP ─
  ─ Reg_Speed        RegER ─
  ─ Reg_Accel        RegPC ─
  ─ Reg_Decel       FLT_PRM ─
                    FLT_RDY ─
                    FLT_BSY ─
              MoveErrorCode ─
              RegErrorCode ─
```

Structured Text

MAM_Yaskawa(MAM_Yaskawa,Axis,Move_Type,Position,Speed,Accel_Rate,Decel_Rate,RegistrationUse,Reg_Distance,Reg_Speed,Reg_Accel,Reg_Decel);

Parameters

Required	Name	Data Type	Usage	Description
x	MAM_Yaskawa	MAM_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	Move_Type	DINT	Input	0 = Linear Absolute 1 = Incremental (Relative) 2 = Rotary Absolute, Shortest Path 3 = Rotary Absolute, Positive 4 = Rotary Absolute, Negative
x	Position	REAL	Input	If Absolute: Target Position If Incremental (Relative): Distance to Move
x	Speed	REAL	Input	Commanded Speed [unit/s]
x	Accel_Rate	REAL	Input	Acceleration rate [unit/s/s]
x	Decel_Rate	REAL	Input	Deceleration rate [unit/s/s]
x	RegistrationUse	INT	Input	0 = Disabled (Do Not use Registration Latch) 1 = Enabled (Arm the Registration Latch)
x	Reg_Distance	REAL	Input	Registration Distance (Relative) [unit]
x	Reg_Speed	REAL	Input	Registration Move Speed [unit/s]
x	Reg_Accel	REAL	Input	Registration Move Acceleration rate [unit/s/s]
x	Reg_Decel	REAL	Input	Registration Move Deceleration rate [unit/s/s]
	EN	BOOL	Output	A false-to-true transition has caused the AOI to execute
	DN	BOOL	Output	Motion has been initiated
	IP	BOOL	Output	The axis is Moving to the end Position ("In Process")
	ER	BOOL	Output	An error has occured
	PC	BOOL	Output	The axis has reached the end Position ("Position Completed")
	RegDN	BOOL	Output	Registration move has been initiated
	RegIP	BOOL	Output	The Axis is moving to the Registration Position
	RegER	BOOL	Output	An error has occurred with the Registration Move

	RegPC	BOOL	Output	The Axis has reached the Registration Position
	FLT_PRM	BOOL	Output	Invalid parameter
	FLT_RDY	BOOL	Output	The Servo is Not Ready
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis
	MoveErrorCode	INT	Output	Move Error Code for Absolute Moves
	RegErrorCode	INT	Output	Registration Move Error Code

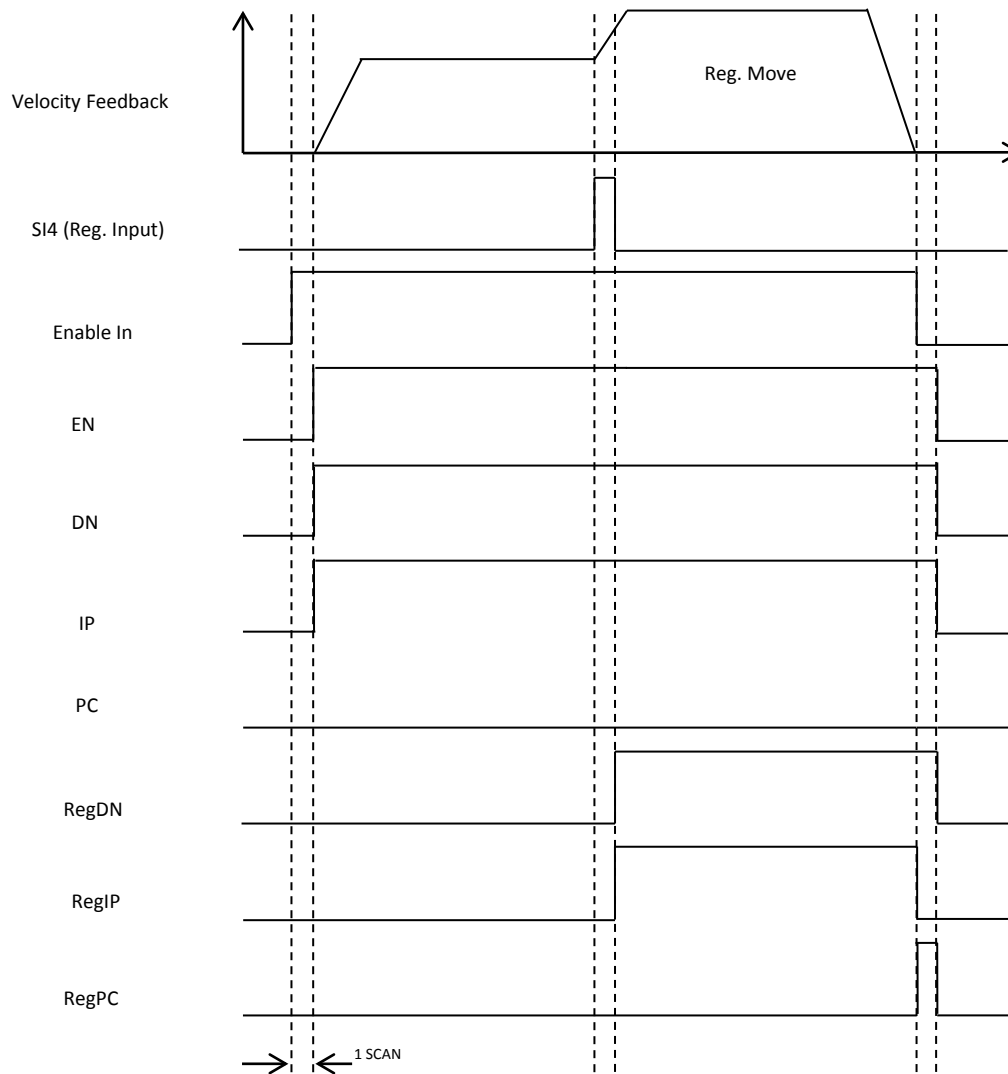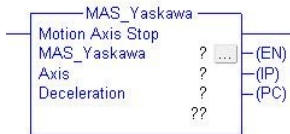## MAM_Yaskawa Timing Diagram
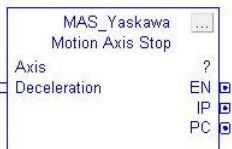
MAS_Yaskawa v2.0.0

Motion Axis Stop

This AOI stops any motion in progress on the servo axis on the rising edge of the EnableIN input. The Deceleration rate specified with this AOI will be used during stopping. If Deceleration is left at zero, the rate will default to 1000 units/s/s.

Available Languages

Relay Ladder

```
        MAS_Yaskawa
   Motion Axis Stop
   MAS_Yaskawa     ? ...  (EN)
   Axis            ?       (IP)
   Deceleration    ?       (PC)
                  ??
```

Function Block

```
      MAS_Yaskawa    ...
      Motion Axis Stop
   Axis              ?
   Deceleration    EN
                   IP
                   PC
```

Structured Text

MAS_Yaskawa(MAS_Yaskawa,Axis,Deceleration);

Parameters

Required	Name	Data Type	Usage	Description
x	MAS_Yaskawa	MAS_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	Deceleration	REAL	Input	The Deceleration rate used during stopping.
	EN	BOOL	Output	The AOI is Active
	IP	BOOL	Output	The axis is in the process of stopping
	PC	BOOL	Output	Motion is successfully stopped/aborted

MAS_Yaskawa Timing Diagram
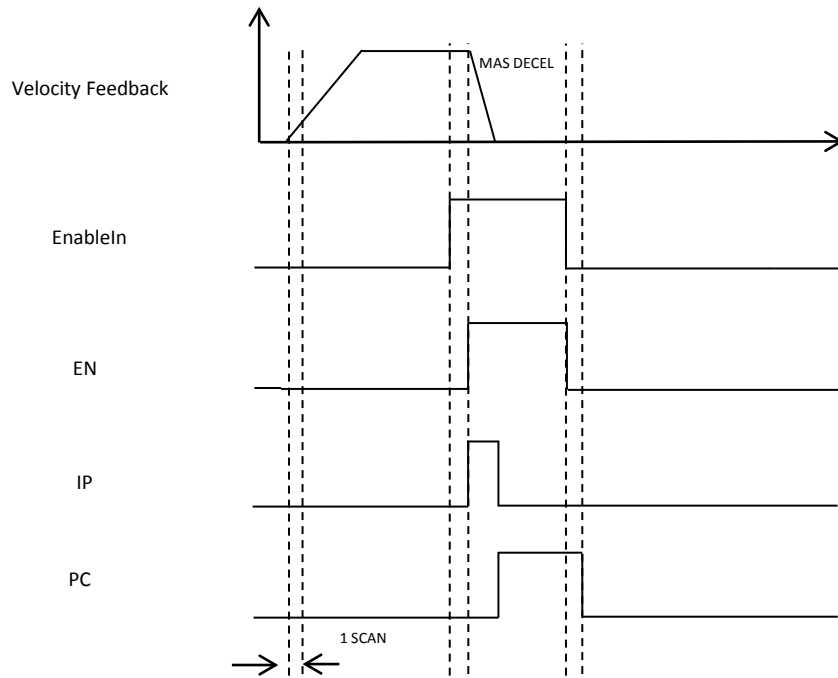
MCLK_Yaskawa v2.0.0

Motion Set Clock

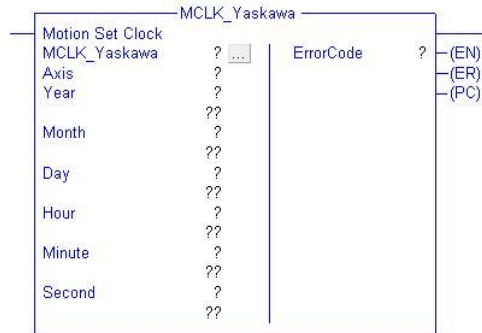This AOI sets the clock in the motion axis to values provided by the PLC. This AOI is provided so that the user can easily synchronize the clocks for more accurate Alarm History reporting.

Available Languages

Relay Ladder

```
                    ─MCLK_Yaskawa ──────────────
Motion Set Clock
MCLK_Yaskawa        ?  ...      ErrorCode      ? ─(EN)
Axis                ?                            ─(ER)
Year                ?                            ─(PC)
                   ??
Month               ?
                   ??
Day                 ?
                   ??
Hour                ?
                   ??
Minute              ?
                   ??
Second              ?
                   ??
```

Function Block

```
        MCLK_Yaskawa      ...
        Motion Set Clock
Axis                       ?
Year                    EN ▣
Month                   ER ▣
Day                     PC ▣
Hour              ErrorCode ▢
Minute
Second
```

Structured Text

MCLK_Yaskawa(MCLK_Yaskawa,Axis,Year,Month,Day,Hour,Minute,Second);

Parameters

Required	Name	Data Type	Usage	Description
x	MCLK_Yaskawa	MCLK_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	Year	INT	Input	Year Data
x	Month	INT	Input	Month Data
x	Day	INT	Input	Day Data
x	Hour	INT	Input	Hour Data [24-hr format]
x	Minute	INT	Input	Minute data
x	Second	INT	Input	Second Data
	EN	BOOL	Output	The AOI is Active
	ER	BOOL	Output	The AOI has an Error
	PC	BOOL	Output	Clock has been set successfully
	ErrorCode	INT	Output	ErrorID returned from the controller

MHSI_Yaskawa v2.0.0

Motion Axis High Speed Index

This AOI transfers settings to the remote axis node for high response motion to be executed in the remote node using local servo I/O. The motion goes through a Move-Dwell cycle when triggered. Move time can either be entered directly or derived from the Speed, Accel and Distance parameters.

Available Languages

Relay Ladder

Function Block

Structured Text

```
MHSI_Yaskawa(MHSI_Yaskawa,Axis,MoveMode,MoveType,RepeatNumber,CalcMethod,Distance,Speed,
Accel,MoveTime,DwellTime,Direction,TriggerFlagAssign,MovingFlagAssign,DwellingFlagAssign
,DoneFlagAssign);
```

Parameters

Required	Name	Data Type	Usage	Description
x	MHSI_Yaskawa	MHSI_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	MoveMode	INT	Input	0 = Relative 1 = Moves per Machine Cycle
x	MoveType	INT	Input	0 = Single 1 = Repeating Move 2 = Repeat for "x" Times
x	RepeatNumber	INT	Input	For MoveType #2
x	CalcMethod	INT	Input	0 = Use Acc/ Decel 1 = Use Time
x	Distance	REAL	Input	[units]
x	Speed	REAL	Input	[units/s]
x	Accel	REAL	Input	[units/s/s]
x	MoveTime	DINT	Input	msec
x	DwellTime	DINT	Input	msec
x	Direction	INT	Input	0 = Positive 1 = Negative
x	TriggerFlagAssign	INT	Input	
x	MovingFlagAssign	INT	Input	
x	DwellingFlagAssign	INT	Input	
x	DoneFlagAssign	INT	Input	
	EN	BOOL	Output	AOI is Active
	DN	BOOL	Output	HSI Cycle (Index then Dwell) Completed
	IP	BOOL	Output	HSI Busy (move in operation)
	ER	BOOL	Output	HSI Error
	MV	BOOL	Output	HSI Move (move is in motion)
	DW	BOOL	Output	HSI Dwelling
	FLT_RDY	BOOL	Output	The Servo is Not Ready
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis
	ErrorCode	INT	Output	ErrorID for High Speed Index function

MPLS_Yaskawa v2.0.0

Motion Programmable Limit Switch

This AOI transfers settings to the remote axis node for high-response of local outputs in relation to servo position. This block can run simultaneously with other motion function blocks. Up to four local digital outputs can be configured as a PLS output. Each has a single switch for OnPosition and OffPosition in relation to the servo axis position. Automatic Speed Compensation is supported independently for the OnPosition and for the OffPosition. Output Time Duration limiting is NOT supported at this time. However, the main PLC can easily monitor the switch output signals and deactivate the switch from the application code if a certain time limit is exceeded.
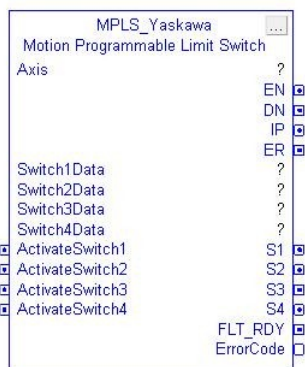
SwitchData is a structure consisting of

- FlagNumber [INT]
- OnPosition [REAL]
- OffPosition [REAL]
- OnCompensation [INT]
- OffCompensation [INT]

Available Languages

Relay Ladder
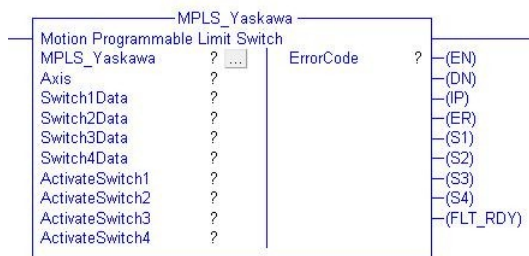
Function Block

Structured Text

MPLS_Yaskawa
(MPLS_Yaskawa,Axis,Switch1Data,Switch2Data,Switch3Data,Switch4Data,ActivateSwitch1,ActivateSwitch2,ActivateSwitch3,ActivateSwitch4);

Parameters

Required	Name	Data Type	Usage	Description
x	MPLS_Yaskawa	MPLS_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
	EN	BOOL	Output	AOI is Active
	DN	BOOL	Output	PLS_Busy
	IP	BOOL	Output	PLS_Running
	ER	BOOL	Output	PLS_Error
x	Switch1Data	Yaskawa_PLS_Switch	InOut	Structure of parameters needed for PLS switch operation using MPLS_Yaskawa
x	Switch2Data	Yaskawa_PLS_Switch	InOut	Structure of parameters needed for PLS switch operation using MPLS_Yaskawa
x	Switch3Data	Yaskawa_PLS_Switch	InOut	Structure of parameters needed for PLS switch operation using MPLS_Yaskawa
x	Switch4Data	Yaskawa_PLS_Switch	InOut	Structure of parameters needed for PLS switch operation using MPLS_Yaskawa
x	ActivateSwitch1	BOOL	Input	
x	ActivateSwitch2	BOOL	Input	
x	ActivateSwitch3	BOOL	Input	
x	ActivateSwitch4	BOOL	Input	
	S1	BOOL	Output	Switch1 Status
	S2	BOOL	Output	Switch2 Status
	S3	BOOL	Output	Switch3 Status
	S4	BOOL	Output	Switch4 Status
	FLT_RDY	BOOL	Output	The Servo is Not Ready
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis
	ErrorCode	DINT	Output	Fault code for PLS function

MRSE_Yaskawa v2.0.0

Motion Report Servo Error

Alarm text will be reported to controller tag at "AxisRef.I.AlarmText"

Available Languages

📄 Relay Ladder

📘 Function Block
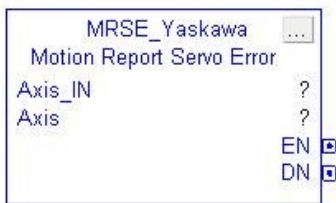
📄 Structured Text

MRSE_Yaskawa(MRSE_Yaskawa,Axis_IN,Axis);

Parameters

Required	Name	Data Type	Usage	Description
x	MRSE_Yaskawa	MRSE_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
	AOI_ON_LOCAL	BOOL	Input	
x	Axis_IN	AB:ETHERNET_MODULE_DINT_256Bytes:I:0	InOut	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
	EN	BOOL	Output	Function is executing
	DN	BOOL	Output	MRSE completed successfully

MSF_Yaskawa v2.0.0

Motion Servo Off

This AOI disables the servo axis on the rising edge of the EnableIN input.

Available Languages

Relay Ladder
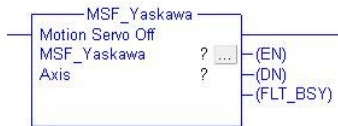
Function Block

Structured Text

MSF_Yaskawa(MSF_Yaskawa,Axis);

Parameters

Required	Name	Data Type	Usage	Description
x	MSF_Yaskawa	MSF_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
	EN	BOOL	Output	Function is Executing
	DN	BOOL	Output	Servo loop has been successfully disabled
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis [Disabled in v1.2.0]

MSO_Yaskawa v2.0.0

Motion Servo On

The Motion Axis Servo On (MSO_Yaskawa) function activates the servo loop of a remote axis. This is also referred to as 'Enabling' the axis. The EN output will mirror the state of EnableIn (rung power)
The DN output will come on after the command has been received and the servo axis is verified to be 'Enabled' and under servo loop control. The FLT_RDY output will come on if conditions are not right for the axis to become enabled. Examples of this condition are:

- Main power is not applied
- The axis is faulted
- Hardware BaseBlock (ST0) is applied

The FLT_BSY output will be set ON if another Yaskawa AOI already has control. Control condition can be monitored at the MCFG_Yaskawa.AOI_Active output. Once the axis is enabled, the axis enabled status can be continuously monitored at the MCFG_Yaskawa.SvON output.
Releasing EnableIn will set all block outputs to OFF.

Available Languages

Relay Ladder
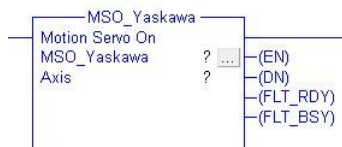
Function Block
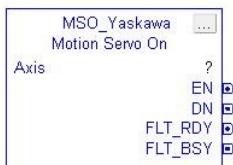
Structured Text

MSO_Yaskawa(MSO_Yaskawa,Axis);

Parameters

Required	Name	Data Type	Usage	Description
x	MSO_Yaskawa	MSO_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
	EN	BOOL	Output	Function is executing
	DN	BOOL	Output	MSO completed successfully and the axis servo loop is Enabled
	FLT_RDY	BOOL	Output	Conditions are not right for the function to properly complete.
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis

MTRQ_Yaskawa v2.0.0

Motion Axis Torque Control

This AOI moves a servo axis indefinitely at a commanded maximum torque with an overall speed limit. The polarity of the torque determines the direction of motion. The motor speed will vary depending on the amount of resistance to motion present in the system. When the maximum torque value is reached, the IP output will signal 'In-Torque'.

Available Languages

🖹 Relay Ladder

```
                    ─── MTRQ_Yaskawa ───
  Motion Axis Torque Control
  MTRQ_Yaskawa        ?  ...     ErrorCode      ? ─(EN)
  Axis                ?                          ─(IP)
  Torque_Limit        ?                          ─(ER)
                     ??                          ─(FLT_RDY)
  Torque_Ramp         ?                          ─(FLT_BSY)
                     ??
  Speed_Limit         ?
                     ??
  Accel_Rate          ?
                     ??
  Decel_Rate          ?
                     ??
```

🖹 Function Block

```
        MTRQ_Yaskawa       ...
      Motion Axis Torque Control
   Axis                       ?
 ◁ Torque_Limit        EN ▣
 ◁ Torque_Ramp         IP ▣
 ◁ Speed_Limit         ER ▣
 ◁ Accel_Rate     FLT_RDY ▣
 ◁ Decel_Rate     FLT_BSY ▣
                  ErrorCode ▢
```
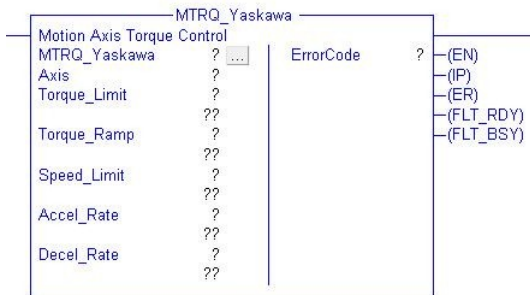
🖹 Structured Text

MTRQ_Yaskawa(MTRQ_Yaskawa,Axis,Torque_Limit,Torque_Ramp,Speed_Limit,Accel_Rate,Decel_Rate);

Parameters

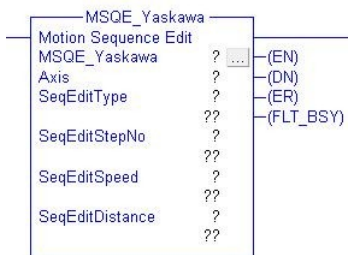| Require	Name	Data Type	Usage	Description
x	MTRQ_Yaskawa	MTRQ_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	Torque_Limit	REAL	Input	Torque Limit [%] during motion. Positive value is forward direction, Negative value is reverse
x	Torque_Ramp	REAL	Input	Torque Ramp Rate [%/sec]
x	Speed_Limit	REAL	Input	Maximum Absolute Speed to move the axis in [unit/s]
x	Accel_Rate	REAL	Input	Acceleration rate of the axis in [unit/s/s]
x	Decel_Rate	REAL	Input	Deceleration rate of the axis in [unit/s/s]
	EN	BOOL	Output	The AOI is Active
	IP	BOOL	Output	The axis is holding "At Torque"
	ER	BOOL	Output	An error has occurred with the Torque Control Motion
	FLT_RDY	BOOL	Output	The Servo is Not Ready
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis
	ErrorCode	INT	Output	Torque Control ErrorID returned from the SigmaLogic axis

MSQE_Yaskawa v2.0 0

Motion Sequence Edit

This AOI edits the speed or distance parameter of a step in the predefined Sequence Table. This change is only made in RAM. When the controller is warm started or rebooted, the step parameters will revert back to the values transferred in from the LogicWorks Configuration Utility file.

Sequence steps may not be edited while executing.

Available Languages

Relay Ladder

```
                 MSQE_Yaskawa
         Motion Sequence Edit
         MSQE_Yaskawa      ?  ...  ─(EN)
         Axis              ?       ─(DN)
         SeqEditType       ?       ─(ER)
                          ??       ─(FLT_BSY)
         SeqEditStepNo      ?
                          ??
         SeqEditSpeed       ?
                          ??
         SeqEditDistance    ?
                          ??
```

Function Block

```
            MSQE_Yaskawa      ...
         Motion Sequence Edit
      Axis                      ?
    ◁ SeqEditType         EN ▷
    ◁ SeqEditStepNo       DN ▷
    ◁ SeqEditSpeed        ER ▷
    ◁ SeqEditDistance  FLT_BSY ▷
```

Structured Text

MSQE_Yaskawa(MSQE_Yaskawa,Axis,SeqEditType,SeqEditStepNo,SeqEditSpeed,SeqEditDistance);

Parameters

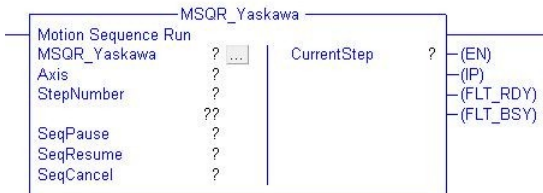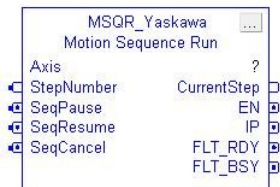| Required	Name	Data Type	Usage	Description
x	MSQE_Yaskawa	MSQE_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	SeqEditType	INT	Input	1 = Edit Speed 2 = Edit Distance 3 = Edit Both
x	SeqEditStepNo	INT	Input	Sequence Step # to Edit (Range is 1 to 200)
x	SeqEditSpeed	REAL	Input	The new Speed for the given Step #
x	SeqEditDistance	REAL	Input	The new Distance for the given Step #
	EN	BOOL	Output	Function is executing
	DN	BOOL	Output	Sequence Edit Completed
	ER	BOOL	Output	Sequence Edit Error
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis

MSQR_Yaskawa v2.0 0

Motion Sequence Run

This AOI runs a step in the predefined Sequence Table. Other controls are also made available to Pause, Resume or Cancel sequence table execution. Pausing a sequence will also pause motion.

Available Languages

Relay Ladder

Function Block

Structured Text

MSQR_Yaskawa(MSQR_Yaskawa,Axis,StepNumber,SeqPause,SeqResume,SeqCancel);

Parameters

Required	Name	Data Type	Usage	Description
x	MSQR_Yaskawa	MSQR_Yaskawa	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	Axis	Yaskawa_EIP_Servo	InOut	Yaskawa SigmaLogic Axis Structure
x	StepNumber	INT	Input	Sequence Starting Step #
x	SeqPause	BOOL	Input	Pause Current Running Sequence
x	SeqResume	BOOL	Input	Resume Current Running Sequence
x	SeqCancel	BOOL	Input	Cancel Current Running Sequence
	CurrentStep	INT	Output	Indicates the Current Sequence Step #
	EN	BOOL	Output	Function is Executing
	IP	BOOL	Output	Sequence is In Process
	FLT_RDY	BOOL	Output	Conditions are not right for the function to properly complete
	FLT_BSY	BOOL	Output	There is another AOI Active for this Axis

ErrorID List

ErrorID	Name	Description
0	NoErrorCode	No error
1	TimeLimitExceeded	Time limit exceeded.
2	DistanceLimitExceeded	Distance limit exceeded.
3	TorqueLimitExceeded	Torque limit exceeded.
Motion State Error		
4369	MotionQueueFull	The move could not be buffered because the axis motion queue is full. 16 moves is the maximum which can be buffered.
4370	MotionProhibited	The move could not be started because motion is prohibited. The drive may not be enabled. MC_Power.Enable_Positive or MC_Power.Enable_Negative might be low. Check MC_Power.Status output. MC_Stop.Execute might be held high, preventing motion. If MC_Stop has control of the axis, no other function block can override the "Stopping" state. Other blocks that try to cause motion while MC_Stop has control of the axis will generate this error.Also, a motion block may be attempting to abort an MC_TorqueControl move.
4371	EnableFailed	The servo drive failed to enable or disable. Check the amplifier wiring for L1 / L2 / L3. The amplifier could be e-stopped or have an alarm.
4372	Drive Pn R/W did not complete	The operation to read or write a servopack parameter did not complete.
4373	Drive Pn R/W failed	The operation to read or write a servopack parameter failed.
4374	TorqueMoveProhibited	Torque move prohibited while non-torque moves queued or in progress.
4375	NoCamForCamOut	CamOut called while not camming.
4376	MasterNotSet	The master-slave relationship cannot be defined yet because the master axis has not yet been set.

4377	CamTableSelectInProgress	Y_CamTableSelect cannot open another cam table while a previous cam table is still being opened.
4378	InvalidAxis	The function block is not applicable for the external axis specified
4379	HomingSequenceInProgress	A homing sequence is already in progress.
4380	SetPositionWhileMoving	MC_SetPosition can not be executed while the axis is moving.
4381	AxisAlarm	Motion aborted due to axis alarm. It is also possible that a software limit has been exceeded.
4382	SetPositionOutofRange	When the axis is in rotary mode, and the MC_SetPosition tries to set a position that is equal to or greater than the MachineCycle, this error is generated, and the position is not set.
4383	HomingFailed	Axis must be commanded at standstill when homing is attempted.Refer to the Motion State Diagram and MC_ReadStatus
4384	Clear Alarms in progress	Command to clear alarms is already in progress
4385	Axis reset in progress	Command to reset an axis is already in progress.
4386	MECHATROLINK reset is already in progress.	MECHATROLINK reset is already in progress.
4387	CamStructSelectInProgress	Y_CamStructSelect cannot transfer another cam structure while transfer of a previous cam structure is in progress.
4388	Read Cam Table in progress	Y_CamTableRead cannot read another cam structure while reading of a previous cam structure is in progress.
4389	Write Cam Table in progress	Y_CamTableWrite cannot write to another cam structure while writing of a previous cam structure is in progress.
4390	SetPositionProhibited	Position cannot be defined while the axis is the cam master of other axes.
4391	VirtualAxisNotAllowed	The function block can not be used with a virtual axis.
4392	VFD axis not allowed	The function block can not be used with a VFD axis.
4393	Parameter file R/W in process	Y_VerifyParameters or Y_WriteParameters cannot be called again while a previous call is in progress.
4394	UnableToAddPositionMonitor	Unable to add position monitor.
4395	InvalidPositionMonitor	Window parameters are outside the wrap range.
4396	AxisLatchFunctionInUse	Axis latch function already in use.

4397	FailedToMoveAwayFromOT	Over travel limit still ON after attempting to move away from it.
4398	The cam shift is not possible with EndPosition and current master position.	The cam shift is not possible with EndPosition and current master position. This error occurs if the shift is greater than the distance to the end of the window.
4399	NoDrivePower	The L1 / L2 / L3 power inputs on the drive may not be supplied with power, possibly due to an E-Stop condition.
4400	HardwareBaseBlock	The Safety input (HHB) is preventing the drive from enabling.
4401	AxisUnavailable	The controller cannot communicate with the axis. It may be disconnected from the network.
4402	ExternalAxisRequired	The scan compensation delay parameter 1305 is only valid for external encoders.
4403	HighSpeedOutputNotSupported	The High Speed Output functionality is only available on external encoders.
4404	Not gearing	MCGearOut cannot be executed because the axis is not in gear.
4405	CamOut cancelled	Y_CmOut was aborted.
4406	UnsupportedContinuousLatch	Continuous Latch Mode not supported on Sigma II, Sigma III, or external encoders
4407	InternalBufferOverflow	Internal buffer overflow
4408	Multi-Latch invalid sequence count	Invalid pattern size or count for Y_ProbeContinuous.
4409	Parameter write in progress	A parameter write command is currently being executed.
4410	Read-only parameter	Attempt was made to write to a parameter that is a read-only type.
4411	Parameter read in progress	A parameter read command is currently being executed.
4412	Parameter not supported	Parameter not supported for this axis.
4413	Stepper axis not allowed	The function block cannot be used with a stepper axis.
4415	Reboot in Progress	Reboot is already in progress
Invalid Structure Value		
4624	InvalidStructureValue	RESERVED
4625	InvalidAxisID	Axis ID does not correspond to an axis configured on the system. Verify the value of AxisNum matches a logical axis number in the configuration. Tip: Make sure AXIS_REF is

		properly declared as a VAR or VAR_GLOBAL in all relevant POUs.
4626	InvalidMasterSlave	The master slave relationship is defined. A slave cannot be a master to another axis.
4627	Invalid input	The input reference does not correspond to a real input of the system.
4628	Invalid output	The output reference does not correspond to a real output of the system.
4629	Invalid I/O number	The input/output number does not correspond to a real input or output bit.
4630	InvalidTrigger	Trigger reference is not valid
4631	Invalid CamSwitch	The CamSwitch structure is not valid.
4632	Invalid Track Options	The track structure structure is not valid.
4633	InvalidTableSize	Table size results in misaligned data.
4634	InvalidBufferSize	Buffer size results in misaligned data
4635	UnsupportedTableType	Table type is not supported
4636	InvalidStartIndex	Invalid start index.
4637	InvalidEndIndex	Invalid end index
4638	BufferOverrun	Buffer Overrun
Invalid Enumeration Type		
4640	Invalid Enumeration Type	REVERVED.
4641	InvalidBufferMode	Buffer mode does not correspond to a valid enumeration value.
4642	InvalidDirection	Direction does not correspond to a valid enumeration value.
4643	InvalidStartMode	Start mode does not correspond to a valid enumeration value.
4644	Invalid Shift Mode	Shift Mode does not correspond to a valid enumeration value.
4645	Invalid Offset Mode	Offset Mode does not correspond to a valid enumeration value.
4646	InvalidMode	Mode does not correspond to a valid enumeration value.
4647	Invalid Synch Mode	Synch Mode does not correspond to a valid enumeration

		value.
4648	InvalidParameter	The parameter number does not exist for the specified axis
4649	InvalidAdjustMode	Adjust Mode does not correspond to a valid enumeration value.
4650	Invalid Ramp-In Type	Ramp-in does not correspond to a valid enumeration value.
4651	Invalid Control Mode	Control Mode does not correspond to a valid enumeration value.
4652	Invalid End Mode	End Mode does not correspond to a valid enumeration value.
4656	Range Error	RESERVED.
Range Error		
4657	NonPositiveDistance	Distance parameter is less than or equal to zero.
4658	NonPositiveVelocity	Velocity parameter is less than or equal to zero.
4659	NonPositiveAcceleration	Acceleration is less than or equal to zero.
4660	NonPositiveDeceleration	Deceleration is less than or equal to zero.
4661	Non-Positive Torque	The torque parameter is less than or equal to zero.
4662	Non-Positive Time	The time parameter is less than or equal to zero.
4663	NegativeTime	Specified time was less than zero.
4664	Non-Positive Scale	The scale parameter is less than or equal to zero.
4665	NegativeVelocity	Velocity parameter is negative.
4666	Zero Denominator	The denominator parameter is equal to zero.
4667	NonPositiveJerk	Jerk is less than or equal to zero.
4668	Non-Positive Torque Ram	The torque ramp parameter is less than or equal to zero.
4669	InvalidEngagePosition	Engage position is outside the cam table domain.
4670	InvalidEngageWindow	Engage window is less than zero.
4671	InvalidDisengagePosition	Disengage position is outside the cam table domain.
4672	NegativeDisengageWidth	Negative Disengage Window
4673	InvalidStartPosition	StartPosition is outside of master's range.
4674	InvalidEndPosition	EndPosition is outside of master's range.
4675	Invalid Filter Time Constant	Axis filter time constant setting is out of range.

4676	Invalid Feedback delay	Feedback delay setting is out of range.
4677	InvalidArraySize	Array size is too large
4678	InvalidBufferArrayIndex	Buffer array index out of range
Invalid Input Data		
4880	Invalid Input Data	RESERVED.
4881	Invalid Parameter	The specified parameter does not exist.
4882	Invalid Track Mask	The mask does not correspond to valid tracks.
4883	Invalid Profile	The profile must start with relative time equal to zero, and the time must be increasing.
4884	Unknown Cam File	The specified cam file does not exist.
4885	InvalidCamFileHeader	Invalid header for the cam file. Cam tables must have a header indicating the number of rows, number of columns and a feed forward velocity flag.
4886	Unknown Cam File	The specified cam file does not exist.
4887	InvalidCamRef	CamTableID does not refer to a valid cam table.
4888	Exceeded Synch Time	Slave axis could not attain the target position and velocity within the user specified time limit.
4889	Exceeded Synch Distance	Slave axis could not attain the target position and velocity within the user specified master distance.
4890	Invalid Width	Width is an enumeration type with the following allowable values WIDTH_8(in single quotes)=0, WIDTH_16(in single quotes)=1, and WIDTH_32(in single quotes)=2.
4891	IdenticalMasterSlave	The slave axis can not be the same as the master axis.
4892	No Default Parameter Info	Default drive parameter info is not available for this parameter
4893	InvalidExternalAxis	The specified external axis may not be used. A physical axis is required.
4894	InvalidVirtualAxis	The specified virtual axis may not be used with this function block.
Toolbox ErrorID		
10020	InvalidProductSize	ProductSize cannot be less than or equal to zero
10021	MissedMarkLimit	Maximum allowed consecutive missed registration marks reached

10022	BufferOverrun	Product buffer overrun
10023	InvalidBuffer	Buffer size cannot be zero
10024	InvalidSampleSize	SampleSize must be greater than 1.
10025	SensorRangeError	SensorRange Error - Might be crossed or the same non-zero value
10026	PositionLimitsCrossed1	Positive Position Limit must be greater than Negative Position Limit
10027	PositionLimitsCrossed2	Negative Position Limit must be less than Positive Position Limit.
10028	InvalidPositiveVelocityLimit	Positive Velocity Limit must be LREAL#0.0 or greater.
10029	InvalidNegativeVelocityLimit	Negative Velocity Limit must be LREAL#0.0 or lower.
10030	InvalidPositiveAccelerationLimit	Positive Acceleration Limit must be greater than 0.
10031	InvalidNegativeAccelerationLimit	Negative Acceleration Limit must be less than 0.
10032	InvalidPositiveDecelerationLimit	Positive Deceleration Limit must be greater than 0.
10033	InvalidNegativeDecelerationLimit	Negative Deceleration Limit must be less than 0.
10034	InterpolationCalculationError	Interpolation calculation error.
10035	GripperCloseError	Gripper close error (timeout).
10036	GripperOpenError	Gripper open error (Timeout).
10037	DirectionError	Offset cannot be in the same direction as the original motion into the limit switch.
10038	InvalidSegmentSize	Segment Size Error - Must be greater than 0 and less than 20.
10039	InvalidResolution	Cam Segment Resolution cannot be zero
10040	InvalidCurveType	Curve Type selected in a segment is not valid.
10041	PairsExceeded	Total pairs required would exceed DataType definition based on number of segments and resolution settings.
10042	InvalidMasterData	Master must be always increasing from segment to segment.
10043	TangentMatchError	Tangent Match formula error, cannot have only one segment.
10044	TangentBlendError	Tangent Blend error, must have two segments, a straight line and a Tangent Blend, in either order.

10045	PositionNotFound	Position not found.
10046	SamePointsRequired	Both cam tables must have the same number of point to be added together.
10047	SameMasterCycleRequired	Both tables must have the same master cycle to be added together.
10048	InvalidIndexSpeed	The IndexSpeed is less than 20.
10049	InvalidFrequency	Frequency cannot be less than 1 Hz.
10050	InvalidDwell	The dwell cannot be greater than the IndexTime.
10051	InvalidOscillation	There must be a whole number of oscillations in an index at a given speed.
10052	ProfileDescrepancy	There is a discrepancy between the master values in Profile1 and Profile 2. At the same pair somewhere in the table, the masters have values differing by more than 1 user unit.
10053	LatchError	DataPoint error.
10054	InvalidSegmentType	SegmentType error.
10055	SegmentTooShort	Segment too short.
10056	CircleError	Circle error.
10057	PointError	Point error.
10058	StartAngleError	Start angle error.
10059	SynchronizationError	Synchronization error.
10061	InvalidMasterType	MasterType is something other than 0 or 1.
10062	InvalidMachineCycle	MachineCycle must be a positive value if MasterType = 0
10063	InvalidLastSwitch	LastSwitch is set outside the 0-255 range.
10064	InvalidTrackNumber	Track Number outside the 0-31 range.
10065	InvalidFirstOnPosition	FirstOnPosition is not equal to 0.
10066	InvalidLastOnPosition	LastOnPosition is not equal to 0.
10067	InvalidAxisDirection	AxisDirection is not equal to 0.
10068	InvalidCamSwitchMode	CamSwitchMode is not equal to 0.
10069	InvalidDuration	Duration is set to 0 or a negative value.
10070	InvalidOnCompensationScaler	OnCompensationScaler is set to an invalid value.
10071	InvalidOffCompensationScaler	OffCompensationScaler is set to an invalid value.

10072	InvalidOnPos	Needs to be in the 0-255 range.
10073	InvalidOnOffPosition	Needs to be in the 0-255 range.
10077	Formula31Error	Cubic Spline maximum number of consecutive segments exceeded. DataType definition for the Matrix could be increased if necessary.
10078	Formula27Error	Formula 27 Error is reserved for errors with circle calculations.
10079	UserNoDwellModifiedConstantVelocity	When using UserNoDwellModifiedConstant Velocity, there must be three contiguous segments with the same formula code applied, and the master percentages must be increasing.
10080	Formula29Error	Formula 29 error.
10081	Decision error. Decision position must be greater than zero	
10082	ModeError. The Cam mode must be either 1 or 2	
10100	AxesInterlock	Both axes must be configured for the same axis type (Rotary / Linear) and if Rotary, they must have the same Machine Cycle
10110	TabberError1	Too many tabs specified
10111	TabberError2	Pitch between labels would be negative, need more spacing between tabs
10112	TabberError3	
10113	Incorrect cam table size (check the camtable.Header.Datasize)	
10130	InvalidCenterError: The center to co-ordinate distance for the two input co-ordinates are not the same	
10131	InvalidRadiusError: Zero radius is invalid	
10132	InvalidModeError: Only modes 0 (center + 2 co-ordinates) and 1 (radius + 2 coordinates) are supported	
10133	InvlalidCoordinateError: The coordinates of the two data points are the same	

10140	SegmentSizeError - Must be greater than zero and less than 20	Mode Error - Tab mode must be specified as 1 (Tabbing) or 2 (Stamp)
10150	Theta1 Below Minimum.	Kinematics, Delta2_1_Control: Theta1 Below Minimum
10151	Theta1 Above Maximum.	Kinematics, Delta2_1_Control: Theta1 Above Maximum
10152	Theta2 Below Minimum.	Kinematics, Delta2_1_Control: Theta2 Below Minimum
10153	Theta2 Above Maximum.	Kinematics, Delta2_1_Control: Theta2 Above Maximum
10154	Imaginary ChordHeight (impossible for mechanism).	Kinematics, FwdKmatx_D2_1: Imaginary ChordHeight (impossible for mechanism)
10155	Maximum Compression Reached (Mechanism squats too deeply).	Kinematics, InvKmatx_D2_1: Maximum Compression Reached (Mechanism squats too deeply)
10156	Locked Leg at Knee Joint B (Link2-Link3).	Kinematics, InvKmatx_D2_1: Locked Leg at Knee Joint B (Link2-Link3)
10157	Locked Leg at Knee Joint D (Link1-Link4).	Kinematics, InvKmatx_D2_1: Locked Leg at Knee Joint D (Link1-Link4)
10160	The requested parameter does not exist, Or the string is longer than 80 characters	Communications, GetParameter: The requested parameter does not exist, or the string is longer than 80 characters
10161	Invalid CommandCode.	Communications, CommandProcessor: Unsupported command detected in the character buffer
10162	Parameter being searched for is out of range.	Communications, CommandProcessor: The parameter requested from the command does not exist
10163	Mode input not valid.	Communications, CommandProcessor: Delimiter not detected
10164	Invalid character position input.	FileRW, ReadValue: Multi line comments are not supported. Found opening comment character, but no closing comment
10165	XML Tag Not Found	FileRW, MC_WriteParameter: General failure searching the file for the correct XML tag.
10166	File Not Found	FileRW: ReadCSVFile: The specified file name cannot be found in the specified path.
10168	Buffer Size Error.	FileRW: ReadBuffer: Buffer size is insufficient to hold the data.
10170	Maximum deviation between motor and encoder exceeded	PLCopen: Full Closed Loop Control: Position difference between motor and external encoder is too large.
10171	Home approach distance limit reached	PLCopen: Home_TouchProbe: Latch input not detected within the approach distance limit.
10172	UsePointer Error - Pointer wraparound	PLCopen: GetusePointers, UpdateUsePointer: If using MultiUsePointers, the range is 0 to 9, and UseIndex must be less than or equal to RegistrationData.LastUsePointer
10180	SpeedMatchLengthError: PartLength <= Speed Match Length	RotaryKnife_AppSolPackage: RotaryKnife_CamGen:
10181	SpeedMatchLimitError: SlaveCycle <= SpeedMatch Start angle	RotaryKnife_AppSolPackage: RotaryKnife_CamGen:
10182	SpeedMatchRangeError: SpeedMatch start angle <= SpeedMatch end angle	RotaryKnife_AppSolPackage: RotaryKnife_CamGen:
10183	SensorDistanceError: SensorDistance <= Part length	RotaryKnife_AppSolPackage: RotaryKnife_Registration: Cam blend cannot be accomplished with these conditions.
10184	EngageDistanceError: SafeEngageDistance <= Part length.	RotaryKnife_AppSolPackage: RotaryKnife_Registration: Cam blend cannot be accomplished with these conditions.

10190	PartLengthError: PartLength value must be > 0.0	LinearFlyingShear_AppSolPackage: LinearShearCamGen:
10191	SpeedMatchDistanceNegative: SpeedMatchDistance value must be > 0.0'	LinearFlyingShear_AppSolPackage: LinearShearCamGen:
10192	MasterSpeedMatchPositionNegative: MasterSpeedMatchStartPosition must be > 0.0	LinearFlyingShear_AppSolPackage: LinearShearCamGen:
10193	SpeedMatchLengthError: PartLength must be > SpeedMatchDistance	LinearFlyingShear_AppSolPackage: LinearShearCamGen:
10194	StrokeLengthExceeded: Calculated stroke length is greater than the allowable ShearStrokeLength.	LinearFlyingShear_AppSolPackage: LinearShearCamGen: Increase the allowable shear stroke length or reduce the speed match distance.
10200	Region Error: The min and max values for the region size are swapped	CasePack_Toolbox: SelectPickOutputs: Set max value > min value for the region.
10201	NoOutputsError: Tooling output is not within the pick area.	CasePack_Toolbox: SelectPickOutputs: The function did not find an output on the tooling which resides in the area for the part to be picked.
10202	DuplicateOutputError: Output already used.	CasePack_Toolbox: SelectPickOutputs: The function tried to allocate an output for a part which was already assigned to another part.
10203	ContainerError: CP_Struct.LastContainer must be greater than zero	CasePack_Toolbox: Set value properly.
10204	PartError: CP_Struct.LastPart must be greater than zero	CasePack_Toolbox: Set value properly.
10205	LayerError: CP_Struct.LastLastLayer must be greater than zero	CasePack_Toolbox: Set value properly.
10206	PickError: Each CP_Struct.Layer[n].LastRegion must be greater than zero	CasePack_Toolbox: Set value properly.
10207	PickDimensionError: X or Y value for regions was zero, or the OrientationDelta is not 0, 90, or 180	CasePack_Toolbox: Set values properly.
10208	RegionLocationError:	CasePack_Toolbox: Set value properly.
10209	LocationError: CP_Struct.LastLayer must be greater than zero	CasePack_Toolbox: Set value properly.
10210	RegionError: All parts in a region must be from the same location / conveyor system	CasePack_Toolbox: Set values properly.
10211	ToolError: CP_Struct.Tool.XTips and CP_Struct.Tool.YTips must be greater than zero	CasePack_Toolbox: Set values properly.
10600	Unsupported Letter Code. A G Code started with a character that was not recognized.	Group_Toolbox: G_Code_Processor:
10601	Unsupported G Code	Group_Toolbox: G_Code_Processor:
10602	Unsupported M Code	Group_Toolbox: G_Code_Processor:
10603	PathData currently in use by MC_MovePath.	Group_Toolbox: Read_GCode_File: It is not possible to read more data into the structure until MC_MovePath is Done.
10604	CircleError	Group_Toolbox: G_Code_Processor:
10605	Offset Error. G10 P parameter must be 1 through 6	Group_Toolbox: G_Code_Processor:
10606	User Unit Error. Mismatch between Hardware Configuration and G code data.	Group_Toolbox: G_Code_Processor: Example: HC set for revolutions, but G Code file specifies mm. The G Code Processor can convert between linear units only.
10607	Segment Error. No matching SegmentID	Group_Toolbox: GetMotionSegment: Internal MC_MovePath could not find a matching motion segmentID

10608	CompTypeError- There was no valid combination of motion segments (Line-Line, Line-Arc, Arc-Line, Arc- Arc)	Group_Toolbox: CalcToolComp:
10609	Tool Compensation Error- There was no valid solution found for an Arc- Arc combination	Group_Toolbox: CalcToolComp:
10610	LogicError - General failure determining a solution for the required tool compensated coordinates.	Group_Toolbox:
10611	Divide by zero was prevented from occurring	Group_Toolbox: Failed to determine the solution for required tool compensated coordinates.
10612	Tool Compensation Type Error. Line to Line, Line To Arc, Arc to Line, or Arc to Arc not detected.	Group_Toolbox:
10613	No Solution found for Tool Compensation	Group_Toolbox:
10614	Set Tool Error. P parameter must be between 1 and MaxTools	Group_Toolbox:
10615	G10 Error. I & J cannot be zero	Group_Toolbox:
10616	OperationMode Error. Path too big for InfiniteRepeat Mode	Group_Toolbox: Path is too large to fit within the PathData completely, and the beginning of the path was lost.
10617	Group Name Error.	CheckAxesGroup.Name for validity.
10618	ControllerInfo Error.	Connect a Global variable of datatype CONTROLLER_INFO and locate it at address %MD3.66560
10619	Invalid file name.	File names must only contain alphanumeric characters. The first character must not be numeric.
11050	Cam Correction Aborted	Cam correction (shift/offset) has been aborted by another function block.
12000	Read response timeout, no response was received within the supplied TimeOut.	Communications, DNS_Lookup: Read response timeout, no response was received within the supplied TimeOut
12010	Not a response (QR should be 1 but it was 0)	Communications, DNS_Lookup: Not a response (QR should be 1 but it was 0)
12011	Response was truncated because it extended beyond the 512byte UDP packet size	Communications, DNS_Lookup: Response was truncated because it extended beyond the 512byte UDP packet size
12012	Recursive is not available but was requested by the Query packet	Communications, DNS_Lookup: Recursive is not available but was requested by the Query packet
12021	Format error, the name server was unable to interpret the query	Communications, DNS_Lookup: Format error, the name server was unable to interpret the query
12022	Server failure, the name server was unable to process the query due to an internal problem	Communications, DNS_Lookup: Server failure, the name server was unable to process the query due to an internal problem
12023	Name error, not valid for this block (only valid for Authoritative servers)	Communications, DNS_Lookup: Name error, not valid for this block (only valid for Authoritative servers)
12030	Address length was less than 3 characters which is not possible	Communications, DNS_Lookup: Address length was less than 3 characters which is not possible

12031	Address format was incorrect as it does not contain a dot	Communications, DNS_Lookup: Address format was incorrect as it does not contain a dot
12032	BufferSizeError. CommandType is set to Fixed, but the BufferSize is not greater than zero	Communications, CommunicationsChannel:
12033	PacketSizeError. CommandType is set to fixed, but the amount of data sent was less than the specified buffersize	Communications, CommunicationsChannel:
12034	CommTypeError - CommType must be set to either serial or ethernet. Default of 0 is n/a.	Communications, CommunicationsChannel:
12100	Connect to SMTP server timeout	Communications, SendEmail: No connection was established within the supplied TimeOut
12101	DATA portion of e-mail was not successful	Communications, SendEmail: E-mail may not send or may be malformed
12102	QUIT error, there was an error sending the QUIT command to the server	Communications, SendEmail: QUIT error, there was an error sending the QUIT command to the server
12103	NumRcpt cannot equal 0	Communications, SendEmail: NumRcpt cannot equal 0
12200	Connect to FTP server timeout	Communications, FTP_SendFile: Connect to FTP server timeout, no connection was established within the supplied TimeOut
12201	Connect to FTP data socket timeout	Communications, FTP_SendFile: Connect to FTP data socket timeout, no connection was established within the supplied TimeOut
12202	QUIT error, there was an error sending the QUIT command to the server	Communications, FTP_SendFile: QUIT error, there was an error sending the QUIT command to the server
12203	Incorrect FTP server credentials	Communications, FTP_SendFile: The credentials for the FTP server were incorrect (either one or both username and password)
12300	File Error, no error information available	Communications, FTP_SendFile: File Error, no error information available
12301	Invalid file handle	Communications, FTP_SendFile: Invalid file handle
12302	Maximum number of files are already opened	Communications, FTP_SendFile: Maximum number of files are already opened
12304	File already open	Communications, FTP_SendFile: File is already opened
12305	File is write protected or access denied	Communications, FTP_SendFile: File is write protected or access denied
12306	File name not defined	Communications, FTP_SendFile: File name not defined
12310	End of data reached	Communications, FTP_SendFile: End of data reached
12312	Too many characters for buffer	The number a characters to be read from file is greater than the data buffer.
12322	No data could be read from file	Communications, FTP_SendFile: No data could be read from file

12421	Service not available, closing control connection	Communications, Sendmail/FTP_SendFile: Service not available, closing control connection. This may be a reply to any command if the service knows it must shut down.
12425	Can't open data connection.	Communications, Sendmail/FTP_SendFile: Cannot open data connection.
12426	Connection closed; transfer aborted.	Communications, Sendmail/FTP_SendFile: Connection closed; transfer aborted.
12430	Invalid username or password.	Communications, Sendmail/FTP_SendFile: Invalid username or password
12434	Requested host unavailable.	Communications, Sendmail/FTP_SendFile: Requested host unavailable
12450	Requested file action not taken / Requested mail action not take {mailbox unavailable).	Communications, Sendmail/FTP_SendFile: Requested file action not taken / Requested mail action not taken (mailbox unavailable)
12451	Requested action aborted. Local error in processing.	Communications, Sendmail/FTP_SendFile: Requested action aborted. Local error in processing
12452	Requested action not taken, insufficient storage space in system {FTP: File unavailable)	Communications, Sendmail/FTP_SendFile: Requested action not taken, insufficient storage space in system (FTP: File unavailable)
12500	Syntax error, command unrecognized.	Communications, Sendmail/FTP_SendFile: Syntax error, unrecognized command
12501	Syntax error in parameters or arguments.	Communications, Sendmail/FTP_SendFile: Syntax error in parameters or arguments
12502	Command not implemented.	Communications, Sendmail/FTP_SendFile: Command not implemented
12503	Bad sequence of commands.	Communications, Sendmail/FTP_SendFile: Bad sequence of commands
12504	Command not implemented for that parameter.	Communications, Sendmail/FTP_SendFile: Command not implemented for that parameter
12521	[domain] does not accept mail.	Communications, Sendmail/FTP_SendFile: <domain> does not accept mail
12530	Not logged in/Access denied.	Communications, Sendmail/FTP_SendFile: Not logged in / Access denied
12532	Need account for storing files.	Communications, Sendmail/FTP_SendFile: Need account for storing files
12550	Requested action not taken. File unavailable {e.g., file not found, no access) *1* Mailbox unavailable.	Communications, Sendmail/FTP_SendFile: Requested action not taken. File unavailable (e.g., file not found, no access) / Mailbox unavailable)
12551	Requested action aborted. Page type unknown / User not local.	Communications, Sendmail/FTP_SendFile: Requested action aborted. Page type unknown / User not local
12552	Requested file action aborted, exceeded storage allocation / Requested mail action aborted, exceeded star-age allocation .	Communications, Sendmail/FTP_SendFile: Requested file/mail action aborted, exceeded storage allocation
12553	ReQuested action not taken, file name not allowed / mailbox name not allowed .	Communications, Sendmail/FTP_SendFile: Requested action not taken, file/mailbox name not allowed

12554	Transaction failed.	Communications, Sendmail/FTP_SendFile: Transaction failed
SigmaLogic Error		
13000	Invalid Trigger Flag number	SigmaLogic: HSI_Control: Invalid Trigger Flag number
13001	Invalid Moving Flag number	SigmaLogic: HSI_Control: Invalid Moving Flag number
13002	Invalid Dwelling Flag number	SigmaLogic: HSI_Control: Invalid Dwelling Flag number
13003	Invalid Done Flag number	SigmaLogic: HSI_Control, Invalid Done Flag number
13004	Flag numbers not unique	SigmaLogic: HSI_Control: PLS_Control: Flag numbers not unique
13005	Bad parameters for Indexes-per-MachineCycle Mode	SigmaLogic: HSI_Control: Evenly dividing moves along a Machine Cycle requires Rotary Mode Configuration and a non-zero, positive number of indexes per machine cycle
13006	Invalid Move Type	SigmaLogic: HSI_Control: Invalid Move Type
13007	Invalid number of Repeats. Must be between 1 and 32767.	SigmaLogic: HSI_Control: Invalid number of Repeats. Must be between 1 and 32767.
13008	Too many segments specified for Indexes-per-MachineCycle mode. Max is 32767.	SigmaLogic: HSI_Control: Too many segments specified for Indexes-per-MachineCycle mode. Max is 32767.
13009	Invalid MoveTime. Would result in divide by zero error.	SigmaLogic: HSI_Control: Valid Move Time not provided. Would result in divide by zero error.
13010	Invalid Move Accel and Speed.	SigmaLogic: HSI_Control: Valid Move Accel and Speed not provided.
13011	Invalid Input Number. Must be >=0 and <=7.	SigmaLogic: Homing (Flag Method): Invalid Input Number. Must be >=0 and <=7.
13012	Output already in use by PLS	SigmaLogic: HSI_Control: Output already in use by PLS
13013	Invalid PLS Flag number	SigmaLogic: PLS_Control: Invalid PLS Flag number
13014	PLS Switch position is outside the Machine Cycle	SigmaLogic: PLS_Control: PLS Switch position is outside the Machine Cycle
13015	Output conflicts with Motor Brake output (BK)	SigmaLogic: PLS_Control: Output conflicts with Motor Brake output (BK)
13016	Output already in use by High Speed Index function or sequence table	SigmaLogic: HSI_Control, PLS_Control: Output already in use by High Speed Index function or sequence table'

13017	Invalid Homing Parameters	SigmaLogic: Homing: Invalid Homing Parameters
13018	Invalid Move Type - Overtravel(s) Disabled	SigmaLogic: Homing: Invalid Move Type - Overtravel(s) Disabled
13000	Invalid Trigger Flag number	SigmaLogic: HSI_Control: Invalid Trigger Flag number
13001	Invalid Moving Flag number	SigmaLogic: HSI_Control: Invalid Moving Flag number
13002	Invalid Dwelling Flag number	SigmaLogic: HSI_Control: Invalid Dwelling Flag number
13003	Invalid Done Flag number	SigmaLogic: HSI_Control, Invalid Done Flag number
13004	Flag numbers not unique	SigmaLogic: HSI_Control: PLS_Control: Flag numbers not unique
13005	Bad parameters for Indexes-per-MachineCycle Mode	SigmaLogic: HSI_Control: Evenly dividing moves along a Machine Cycle requires Rotary Mode Configuration and a non-zero, positive number of indexes per machine cycle
13006	Invalid Move Type	SigmaLogic: HSI_Control: Invalid Move Type
13007	Invalid number of Repeats. Must be between 1 and 32767.	SigmaLogic: HSI_Control: Invalid number of Repeats. Must be between 1 and 32767.
13008	Too many segments specified for Indexes-per-MachineCycle mode. Max is 32767.	SigmaLogic: HSI_Control: Too many segments specified for Indexes-per-MachineCycle mode. Max is 32767.
13009	Invalid MoveTime. Would result in divide by zero error.	SigmaLogic: HSI_Control: Valid Move Time not provided. Would result in divide by zero error.
13010	Invalid Move Accel and Speed.	SigmaLogic: HSI_Control: Valid Move Accel and Speed not provided.
13011	Invalid Input Number. Must be >=0 and <=7.	SigmaLogic: Homing (Flag Method): Invalid Input Number. Must be >=0 and <=7.
13012	Output already in use by PLS	SigmaLogic: HSI_Control: Output already in use by PLS
13013	Invalid PLS Flag number	SigmaLogic: PLS_Control: Invalid PLS Flag number
13014	PLS Switch position is outside the Machine Cycle	SigmaLogic: PLS_Control: PLS Switch position is outside the Machine Cycle
13015	Output conflicts with Motor Brake output (BK)	SigmaLogic: PLS_Control: Output conflicts with Motor Brake output (BK)

13016	Output already in use by High Speed Index function or sequence table	SigmaLogic: HSI_Control, PLS_Control: Output already in use by High Speed Index function or sequence table
13017	Invalid Homing Parameters	SigmaLogic: Homing: Invalid Homing Parameters
13018	Invalid Move Type - Overtravel(s) Disabled	SigmaLogic: Homing: Invalid Move Type - Overtravel(s) Disabled