Motion Servo Off (MSF)

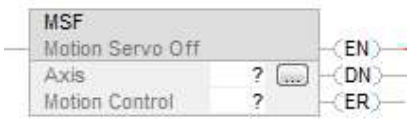
This information applies to the CompactLogix 5370, ControlLogix 5570, Compact GuardLogix 5370, GuardLogix 5570, Compact GuardLogix 5380, CompactLogix 5380, CompactLogix 5480, ControlLogix 5580, and GuardLogix 5580 controllers. Controller differences are noted where applicable.

Use the Motion Servo Off (MSF) instruction to deactivate the drive output for the specified axis and to deactivate the axis' servo loop.

Important: If you execute an MSF instruction while the axis is moving, the axis coasts to an uncontrolled stop.

Available Languages

Ladder Diagram



Function Block

This instruction is not available in function block.

Structured Text

MSF (Axis,MotionControl);

Operands

Ladder Diagram and Structured Text

Operand	Type **CompactLogix 5370, Compact GuardLogix 5370, Compact GuardLogix 5380, CompactLogix 5380, CompactLogix 5480**	Type **ControlLogix 5570, GuardLogix 5570, ControlLogix 5580, and GuardLogix 5580 controllers**	Format	Description
Axis	AXIS_CIP_DRIVE	AXIS_CIP_DRIVE AXIS_GENERIC AXIS_GENERIC_DRIVE AXIS_SERVO AXIS_SERVO_DRIVE **Tip:** AXIS_GENERIC is supported by the ControlLogix 5570 and the GuardLogix 5570 controllers only.	Tag	Name of the axis to perform operation on
Motion Control	MOTION_INSTRUCTION	MOTION_INSTRUCTION	Tag	Structure used to access instruction status parameters.

See *Structured Text Syntax* for more information on the syntax of expressions within structured text.

MOTION_INSTRUCTION Structure

Mnemonic	Description
.EN (Enable) Bit 31	It is set when the rung makes a false-to-true transition and remains set until the servo message transaction is completed and the rung goes false.
.DN (Done) Bit 29	It is set when the axis' servo action has been successfully disabled and the drive enable and servo active status bits have been cleared.
.ER (Done) Bit 28	It is set to indicate that the instruction detected an error, such as if you specified an unconfigured axis.

Description

The MSF instruction directly and immediately turns off drive output and disables the servo loop on any physical servo axis. With non-CIP motion, this places the axis in the Axis Ready state described in Motion State Instructions. With CIP motion, this places the axis in the Stopped state described in Motion State Instructions. The MSF instruction also disables any motion planners that may be active at the time of execution. The MSF instruction requires no parameters – simply enter or select the desired axis.

If the targeted axis does not appear in the list of available axes, the axis has not been configured for operation. Use the Tag Editor to create and configure a new axis.

You can use the MSF instruction to turn servo action off when you must move the axis by hand. Since the position continues to be tracked even with servo action off. When the servo loop is turned on again, by the Motion Servo On (MSO) instruction, the axis is again under closed-loop control, at the new position.

The axis stopping behavior varies depending upon the type of drive. In some cases the axis coasts to a stop and in other cases the axis decelerates to a stop using the drive's available stopping torque.

For non-CIP motion, to execute an MSF instruction successfully, the targeted axis must be configured as a Servo axis. If this condition is not met, the instruction errs. If you have an Axis Type of Virtual the instructions errors because with a Virtual Axis the servo action and drive enable status are forced to always be true. A Consumed axis data type also errors because only the producing controller can change the state of a consumed axis.

Important: The instruction execution may take multiple scans to execute because it requires multiple coarse updates to complete the request. The Done (.DN) bit is not set immediately, but only after the request is completed.

Additionally, for CIP motion, the MSF instruction supports canceling the Motion Drive Start (MDS) instruction. This includes clearing the MDS In Process (.IP) bit, and clearing the DirectVelocityControlStatus bit and the DirectTorqueControlStatus bit in the Motion Status attribute.

In this transitional instruction, the relay ladder, toggle the Rung-condition-in from cleared to set each time the instruction should execute.

Master Driven Speed Control (MDSC) and the MSF Instruction

If an MSF is issued in Master Driven Mode, the system shuts the servo off.

The IP bit of the Master Driven Axis Control (MDAC) instruction does not change on an axis that has its servos turned off.

The AC bit of the MDAC instruction resets when the axis stops as the servos are turned off.

Affects Math Status Flags

No

Major/Minor Faults

None specific to this instruction. See *Common Attributes* for operand-related faults.

Execution

Ladder Diagram

Condition	Ladder Diagram Action
Prescan	The .EN, .DN, and .ER bits are cleared. The rung-condition-out is set to false.
Rung-condition-in is false	The .EN bit is cleared if the .DN or .ER bit is true.
Rung-condition-in is true	The .EN bit is cleared to false if the .DN or .ER bit is true
Postscan	The rung-condition-out is set to false.

Structured Text

Condition/State	Action Taken
Prescan	See Prescan in the Ladder Diagram table
Normal execution	See Rung-condition-in is false, followed by rung is true in the Ladder Diagram table.
Postscan	See Postscan in the Ladder Diagram table.

Error Codes

See *Motion Error Codes (.ERR)* for Motion Instructions.

Extended Error Codes

Extended Error Codes provide additional instruction specific information for the Error Codes that are generic to many instructions.

MSF Changes to Status Bits

Axis Status Bits

Bit Name	State	Meaning
ServoActionStatus	FALSE	Axis is in Servo Off state with the servo loop inactive.
DriveEnableStatus	FALSE	Axis Drive Enable output is active.

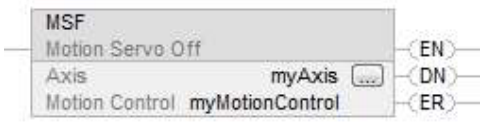
Motion Status Bits

Bit Name	State	Meaning
AccelStatus	FALSE	Axis is not Accelerating.
DecelStatus	FALSE	Axis is not Decelerating.
MoveStatus	FALSE	Axis is not Moving.
JogStatus	FALSE	Axis is not Jogging.
GearingStatus	FALSE	Axis is not Gearing.
HomingStatus	FALSE	Axis is not Homing.
StoppingStatus	FALSE	Axis is not Stopping.
PositionCamStatus	FALSE	Axis is not Position Camming.
TimeCamStatus	FALSE	Axis is not Time Camming.
PositionCamPendingStatus	FALSE	Axis does not have a Position Cam Pending.
TimeCamPendingStatus	FALSE	Axis does not have a Time Cam Pending.
GearingLockStatus	FALSE	Axis is not in a Gear Locked condition.
PositionCamLockStatus	FALSE	Axis is not in a Cam Locked condition.
DirectVelocityControlStatus	FALSE	Axis is not under Direct Velocity Control.
DirectTorqueControlStatus	FALSE	Axis is not under Direct Torque Control.

Example

When the input conditions are true, the controller disables the servo drive and the axis servo loop configured by Axis0.

Ladder Diagram



Structured Text

```
MSF(myAxis, myMotionControl);
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See also

MSF Flow Chart

Structured Text Syntax

Motion Error Codes (.ERR)

Motion State Instructions

Common Attributes