

- ▷ [Quick Start Steps](#)
- ▷ [Logix Designer](#)
- ▷ [Module Information](#)
- ▲ [Instruction Set](#)

[Logix 5000 Controllers](#)

[Instruction and Application Considerations](#)

[Logix Designer Application Instruction Set](#)

[Interpret the Attribute Tables](#)

[Array Concepts](#)
- ▷ [CIP Axis Attributes](#)
- ▷ [Module Configuration Attributes](#)

[Bit Addressing](#)

[Common Attributes](#)

[Data Conversions](#)

[Elementary data types](#)

[LINT data types](#)

[Floating Point Values](#)

[Immediate values](#)

[Index Through Arrays](#)

[Math Status Flags](#)

[Motion Error Codes \(.ERR\)](#)

[Structures](#)
- ▷ [Equipment Sequence instructions](#)
- ▷ [Equipment Phase Instructions](#)
- ▷ [Alarm Instructions](#)
- ▷ [Advanced Math Instructions](#)
- ▷ [Array.\(File\)/Misc Instructions](#)
- ▷ [Array.\(File\)/Shift Instructions](#)
- ▷ [ASCII Conversion Instructions](#)
- ▷ [ASCII Serial Port Instructions](#)
- ▷ [ASCII String Instructions](#)
- ▷ [Bit Instructions](#)
- ▷ [Compare Instructions](#)
- ▷ [Debug Instructions](#)
- ▷ [Drives Instructions](#)
- ▷ [Drive Safety Instructions](#)
- ▷ [For/Break Instructions](#)
- ▷ [Filter Instructions](#)
- ▷ [Function Block Attributes](#)
- ▷ [Structured Text Attributes](#)
- ▷ [Compute/Math Instructions](#)
- ▷ [Move/Logical Instructions](#)
- ▷ [Input/Output Instructions](#)
- ▷ [License Instructions](#)
- ▷ [Math Conversion Instructions](#)
- ▷ [Metal Form Instructions](#)
- ▷ [Motion Configuration Instructions](#)
- ▷ [Motion Event Instructions](#)
- ▷ [Motion Group Instructions](#)
- ▲ [Motion Move Instructions](#)

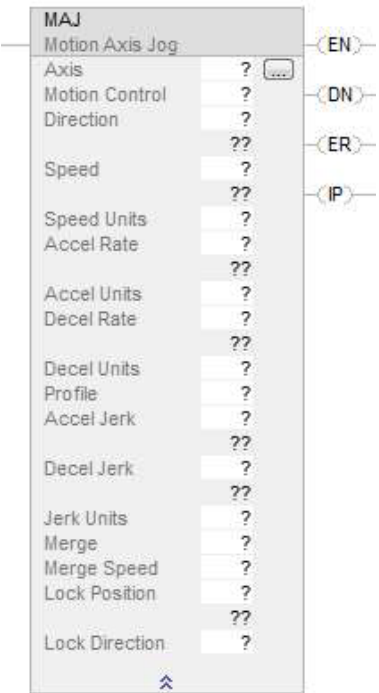
Motion Axis Jog (MAJ)

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 Axis Jog (MAJ) instruction to move an axis at a constant speed until you tell it to stop.

Available Languages

Ladder Diagram



Function Block

This instruction is not available in function block.

Structured Text

MAJ(Axis,MotionControl, Direction,Speed, SpeedUnits, AccelRate, AccelUnits, DecelRate, DecelUnits, Profile, AccelJerk, DecelJerk, JerkUnits, Merge, MergeSpeed LockPosition, LockDirection);

Operands

Operand	Type	Type	Format	Description
	CompactLogix 5370, Compact GuardLogix 5370, Compact GuardLogix 5380, CompactLogix 5380, CompactLogix 5480	ControlLogix 5570, GuardLogix 5570, ControlLogix 5580, and GuardLogix 5580 controllers		
Axis	AXIS_CIP_DRIVE AXIS_VIRTUAL	AXIS_CIP_DRIVE AXIS_VIRTUAL AXIS_GENERIC_DRIVE AXIS_SERVO AXIS_SERVO_DRIVE	Tag	Name of the axis to jog.
Motion Control	MOTION_INSTRUCTION	MOTION_INSTRUCTION	Tag	Control tag for the instruction.

Direction	DINT	DINT	Immediate or Tag	For This Jog Direction	Enter
				Forward	0
				Reverse	1
Speed	REAL	REAL	Immediate or Tag	Speed to move the axis in Speed Units.	
Speed Units	DINT	DINT	Immediate	<div>Which units do you want to use for the Speed?</div> <div><div><div>•</div>Units per sec (0)</div><div><div>•</div>% of Maximum (1)</div><div><div>•</div>Units per MasterUnits (4)</div></div>	
Accel Rate	REAL	REAL	Immediate or Tag	Acceleration rate of the axis in Accel Units.	
Accel Units	DINT	DINT	Immediate	<div>Which units do you want to use for the Accel Rate?</div> <div><div><div>•</div>Units per sec² (0)</div><div><div>•</div>% of Maximum (1)</div><div><div>•</div>Units per MasterUnit² (4)</div></div>	
Decel Rate	REAL	REAL	Immediate or Tag	Deceleration rate to the axis in Deceleration Units.	
Decel Units	DINT	DINT	Immediate	<div>Which units do you want to use for the Decel Rate?</div> <div><div><div>•</div>Units per sec² (0)</div><div><div>•</div>% of Maximum (1)</div><div><div>•</div>Units per MasterUnit² (4)</div></div>	
Profile	DINT	DINT	Immediate	<div>Select the velocity profile to run the jog:</div> <div><div><div>•</div>Trapezoidal (0)</div><div><div>•</div>S-curve (1)</div></div>	

[Master Driven Axis Control \(MDAC\)](#)

[Motion Axis Gear \(MAG\)](#)

[MAG Flow Chart \(True\)](#)

[Motion Axis Home \(MAH\)](#)

[MAH Flow Chart \(True\)](#)

[Motion Axis Jog \(MAJ\)](#)

[Motion Axis Move \(MAM\)](#)

[Motion Axis Position Cam \(MAPC\)](#)

[MAPC Flow Chart \(True\)](#)

[Motion Axis Stop \(MAS\)](#)

[Motion Axis Time Cam \(MATC\)](#)

[MATC Flow Chart \(True\)](#)

[Motion Calculate Cam Profile \(MCCP\)](#)

[Motion Calculate Slave Values \(MCSV\)](#)

[Motion Change Dynamics \(MCD\)](#)

[MCD Flow Chart \(True\)](#)

[Motion Redefine Position \(MRP\)](#)

[MRP Flow Chart \(True\)](#)

[Speed, Acceleration, Deceleration, and Jerk Enumerations](#)

[Status Bits for Motion Instructions \(MAM, MATC, MAJ\) When MDAC Is Active](#)

[Time Based Planning](#)

[Change between Master Driven and Time Driven Modes for Single Axis Motion instructions](#)

[Common Action Table for Slave and Master Axis](#)

▷ [Motion State Instructions](#)

▷ [Multi-Axis Coordinated Motion Instructions](#)

▷ [Logical and Move Instructions](#)

▷ [Program Control Instructions](#)

▷ [Sequencer Instructions](#)

▷ [Special Instructions](#)

▷ [Timer and Counter Instructions](#)

▷ [Trigonometric Instructions](#)

▷ [Process Control Instructions](#)

▷ [Select/Limit Instructions](#)

▷ [Sequential Function Chart \(SFC\) Instructions](#)

▷ [Statistical Instructions](#)

▷ [Safety Instructions](#)

▷ [Studio 5000 Logix Designer Glossary](#)

Accel Jerk	REAL	REAL	Immediate or Tag	<p>You must always enter values for the Accel and Decel Jerk operands. This instruction only uses the values if the Profile is configured as S-curve.</p> <ul style="list-style-type: none">• Accel Jerk is the acceleration jerk rate for the axis• Decel Jerk is the deceleration jerk rate for the axis. Use these values to get started. <ul style="list-style-type: none">• Accel Jerk = 100 (% of Time)• Decel Jerk = 100 (% of Time)• Jerk units = 2 Enter the jerk rates in these Jerk Units. <p>0 = Units per sec³</p> <p>1 = % of Maximum</p> <p>2 = % of Time (use this value to get started)</p> <p>4 = Units per MasterUnit³</p> <p>6 = % of Time-Master Driven</p>
Decel Jerk	REAL	REAL	Immediate or Tag	
Jerk Units	DINT	DINT	Immediate	
Merge	DINT	DINT	Immediate	<p>Do you want to turn all current axis motion into a pure jog governed by this instruction regardless of the motion instructions currently in process?</p> <ul style="list-style-type: none">• NO — Choose Disabled (0)• YES — Choose Enabled (1)

Merge Speed	DINT	DINT	Immediate	<div>If Merge is Enabled, which speed do you want to jog at?<ul style="list-style-type: none">Speed of this instruction<ul style="list-style-type: none">Choose Programmed = 0Current speed of the axis<ul style="list-style-type: none">Choose Current = 1</div>
Lock Position	REAL	REAL	Immediate or Tag	<div>Position on the Master Axis where a Slave should start following the master after the move has been initiated on the Slave Axis.</div> <div>See the Structure section below for more information.</div>
Lock Direction	UINT32	UINT32	Immediate or Tag	<div>Specifies the conditions when the Lock Position should be used.</div> <div>See the Structure section below for more information.</div>

Structured Text

This Operand	Has These Options Which You	
	Enter as Text	Or Enter as a Number
Axis	No enumeration	Tag
MotionControl	No enumeration	Tag
Direction	No enumeration	Immediate or Tag
Speed	No enumeration	Immediate or Tag
SpeedUnits	units per sec % of maximum unitspermasterunit	0 1 4
AccelRate		
AccelUnits	units per sec ² % of maximum unitspermasterunit ²	0 1 4

DecelRate		
DecelUnits	units per sec ² % of maximum unitspermasterunit ²	0 1 4
Profile	Trapezoidal S-curve	0 1
AccelJerk	No enumeration	Immediate or Tag You must always enter a value for the Accel and Decel Jerk operands. This instruction only uses the values if the Profile is configured as S-curve. Use these values to get started. <ul style="list-style-type: none">• Accel Jerk = 100 (% of Time)• Decel Jerk = 100 (% of Time)
DecelJerk	No enumeration	
Jerk Units	units per sec ³ %ofmaximum %oftime seconds unitspermasterunit ³ %oftimemasterdriven masterunits	0 1 2 (use this value to get started) 3 4 5 6
Merge	disabled enabled	0 1
Merge Speed	programmed current	0 1
Lock Position	No enumeration	Immediate or Tag
Lock Direction	none immediateforwardonly immediatereverseonly positionforward positionreverse	0 1 2 3 4

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

MOTION_INSTRUCTION Structure

To See If	Check To See If This Bit Is Set To	Data Type	Notes
A false-to-true transition caused the instruction to execute.	EN	BOOL	The EN bit stays set until the process is complete and the rung goes false.
The jog was successfully initiated.	DN	BOOL	
An error happened.	ER	BOOL	

The axis is jogging.	IP	BOOL	Any of these actions stop this jog and clear the IP bit: <ul style="list-style-type: none">• Another MAJ instruction supersedes this MAJ instruction.• Motion Axis Stop (MAS)instruction.• Merge from another instruction.• Shutdown command.• Fault Action.
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Description

Use the MAJ instruction to move an axis at a constant speed without regard to position.

Programming Guidelines

Important: If you change move parameters dynamically by any method, that is by changing move dynamics [Motion Change Dynamics (MCD) instruction or Motion Coordinated Change Dynamics (MCCD)] or by starting a new instruction before the last one has completed, be aware of the risk of velocity or end position overshoot.


A Trapezoidal velocity profile can overshoot if maximum deceleration is decreased while the move is decelerating or is close to the deceleration point.

An S-curve velocity profile can overshoot if:

- Maximum deceleration is decreased while the move is decelerating or close to the deceleration point; or
- Maximum acceleration jerk is decreased and the axis is accelerating. Keep in mind, however, that jerk can be changed indirectly if it is specified in % of time.

For more information, see Troubleshooting Axis Motion.

Guidelines	Details
In ladder diagram, toggle the rung condition each time you want to execute the instruction.	This is a transitional instruction: In ladder diagram, toggle the rung-condition-in from cleared to set each time you want to execute the instruction.
In structured text, condition the instruction so that it only executes on a transition.	In structured text, instructions execute each time they are scanned. Condition the instruction so that it only executes on a transition. Use either of these methods: <ul style="list-style-type: none">• qualifier of an SFC action• structured text construct For more information, see Structured Text Syntax.
Use the jerk operands for S-curve profiles.	Use the jerk operands when the instruction uses an S-curve profile. You must fill in the jerk operands regardless of the profile.
Use % of Time for the easiest programming and tuning of jerk.	For an easy way to program and tune jerk, enter it as a % of the acceleration or deceleration time. For more information, see Tune an S-curve Profile.

Use Merge to cancel the motion of other instructions.	How you want to handle any motion that’s already in process?		
	If You Want To	And You Want To	Then Set
	Add the jog to any motion already in process		Merge = Disabled Merge Speed = Programmed The instruction ignores Merge Speed but you must fill it in anyway.
	End the motion from other instructions and just jog	Jog at the speed that you set in this instruction	Merge = Disabled Merge Speed = Programmed
		Jog at the speed that the axis is already moving	Merge = Enabled Merge Speed = Current The instruction ignores the value that you put in the Speed operand.
Be careful if you start another jog while the axis is already jogging.	If you start a new MAJ instruction while one is already in process, you can cause: <ul style="list-style-type: none">• an accelerating axis to overshoot its speed• a decelerating axis to reverse (revision 15 and earlier) This happens if the MAJ instructions use an S-curve profile. The new MAJ instruction cancels the old MAJ instruction. The axis uses the speed, acceleration, deceleration, and jerk of the new instruction. For more information, see Troubleshoot Axis Motion.		
Use an MAS instruction to stop the jog.			
Use an MCD instruction to change the speed while jogging.			

When MAJ (Merge = Enabled) is used on any axis associated with a coordinate system and a coordinated motion instruction is running on it, Coordinate system’s maximum deceleration is used to stop remaining axes. If the coordinate system contains orientation axes, Coordinate system’s Orientation maximum deceleration is used for stopping remaining Rx, Ry or Rz axes.

Structure

See Input and Output Parameters Structure for Single Axis Motion Instructions for the input and output parameters that are available for the MAJ instruction via the Master Driven Speed Control (MDSC) function. Before any of these parameters is active, you must execute an MDAC instruction and it must be active (IP bit is set).

Affects Math Status Flags

No

Major/Minor Faults

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

Execution Ladder Diagram

Condition/State	Action Taken
Prescan	The .EN, .DN, .ER, and .IP bits are cleared to false.
Rung-condition-in is false	The .EN bit is cleared to false if either the .DN or .ER bit is true.
Rung-condition-in is true	The .EN bit is set to true and the instruction executes.
Postscan	N/A

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-condition-in 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.

Runtime Error Condition

The slave move must start at rest if Speed Units = Seconds or Master Units. This condition may occur when the MAJ with Speed = Seconds or Master Units is started while another MAJ is in progress (merging or replacement mode).

Extended Error Codes

Use Extended Error Codes (EXERR) for more instruction about an error.

If ERR is	And EXERR is	Then		
		Cause	Corrective Action	
13	Varies	An operand is outside its range.	The EXERR is the number of the operand that is out of range. The first operand is 0. For example, if EXERR = 3, then check the Speed.	
			EXERR	MAS Operand
			0	Axis
			1	Motion Control
			2	Direction
			3	Speed

15	-1	The coordinated system has a Maximum Deceleration of 0.	Go to the Properties for the coordinate system axis and set a Maximum Deceleration.
	0 or more	An axis in the coordinate system has a Maximum Deceleration of 0.	<div>1. Open the Properties for the axis.</div> <div>2. Use the EXERR value to see which axis has the Maximum Deceleration of 0.</div> <div>3. The axis that you are jogging has a deceleration rate of 0.</div>

Changes to Status Bits

Motion Instruction Predefined Data Type Status Bits

See Status Bits for Motion Instructions (MAM, MATC, MAJ) When MDAC Is Active.

MAJ Changes to Instruction Status Bits

Bit Name	Meaning	
MotionStatus	The motion status bit for your axis.	
	Bit Number	Meaning
AccelStatus	0	The axis is not accelerating (FALSE state).
DecelStatus	1	The axis is not decelerating (FALSE state).
MoveStatus	2	The axis is not moving (FALSE state).
JogStatus	3	The axis is not jogging (FALSE state).
GearingStatus	4	The axis is not gearing (FALSE state).
HomingStatus	5	The axis is not homing (FALSE state).
StoppingStatus	6	The axis is stopping (TRUE state).
AxisHomedStatus	7	The axis is not homed (FALSE state).
PositionCamStatus	8	The axis is not position camming (FALSE state).
TimeCamStatus	9	The axis is not time camming (FALSE state).
PositionCamPendingStatus	10	The axis does not have a Position Cam Pending (FALSE state).
TimeCamPendingStatus	11	The axis does not have a Time Cam Pending (FALSE state).
GearingLockStatus	12	The axis is not in a Gear Locked condition (FALSE state).
PositionCamLockStatus	13	The axis is not in a Position Cam Locked condition (FALSE state).

TimeCamLockStatus	14	The axis is not in a Time Cam Locked condition (FALSE state).
MasterOffsetMoveStatus	15	The axis is offset (TRUE state).
CoordinatedMotionStatus	16	Sets when the MDAC instruction executes (TRUE state). Clears when the instruction completes (FALSE state).
TransformStateStatus	17	The axis is part of an active transform (TRUE state).
ControlledByTransformStatus	18	The axis is moving because of a transform (TRUE state).
DirectVelocityControlStatus	19	The axis is not under Direct Velocity Control (FALSE state).
DirectTorqueControlStatus	20	The axis is not under Direct Torque Control (FALSE state).
JogLockStatus	24	<p>MAJ is Locked to Master in MDSC Mode (TRUE state).</p> <p>The bit is cleared when a MGS, MGSD, MAS, or MASD is executed.</p> <p>If either the Slave or Master axis (or both) is paused by changing its speed to 0, then the JogLockStatus bit stays set.</p> <p>Master Driven Mode</p> <p>The bit is set when the Lock Direction request is satisfied.</p> <p>The bit is not used when the enumeration is NONE.</p> <p>For the enumerations Immediate Forward Only and Immediate Reverse Only, the JogLockStatus bit is set immediately when the MAJ is initiated.</p> <p>For the enumeration Position Forward Only and Position Reverse Only, the bit is set when the Master Axis crosses the Master Lock Position in the specified direction.</p> <p>The JogLockStatus bit is cleared when the Master Axis reverses direction and the Slave Axis stops following the Master Axis. The JogLockStatus bit is set again when the Slave Axis resumes following the Master Axis.</p> <p>Time Driven Mode</p> <p>The bit is not used when the enumeration is NONE.</p>
MasterOffsetMoveLockStatus	26	Master offset Move is Locked to master in MDSC Mode (TRUE state).
MaximumSpeedExceeded	27	Sets when the maximum axis speed that is specified in the axis configuration is exceeded during a move (TRUE state). Clears when the velocity is reduced below the limit (FALSE state).

MAJ Changes to Single Axis Status Bits

If Merge Is	Then the Instruction Changes These Bits

	Bit Name	State	Meaning
Disabled	JogStatus	TRUE	Axis is Jogging.
Enabled	JogStatus	TRUE	Axis is Jogging.
	MoveStatus	FALSE	Axis is no longer Moving.
	GearingStatus	FALSE	Axis is no longer Gearing.

Master Driven Speed Control (MDSC) and Motion Direct Command Support

The Motion Direct commands are not available in the instruction tree for the MDAC or MDCC instruction. You must program an MDAC in one of the supported programming languages before you execute an MAJ in Time Driven Mode. A runtime error will occur if an MDAC is not previously executed in an MAM or MAJ in Master Driven Mode.

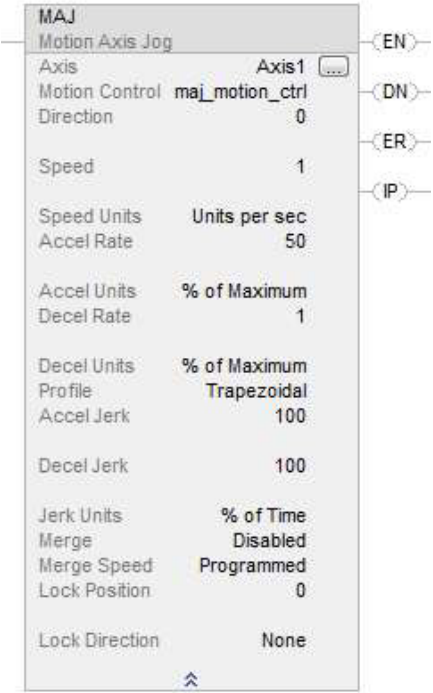
The Motion Direct Command supports the MDSC enumerations speed, acceleration, deceleration, and Jerk for MAJ.

Note that Event Distance and Calculated Data are not supported parameters for the MAJ and Motion Direct Command.

Master Driven Speed Control (MDSC) and CIP Axis Manual Tune and Motion Generator

Event Distance and Calculated Data parameters are not supported for MAJ.

Examples Ladder Diagram



See also

- [Troubleshoot Axis Motion](#)
- [Structured Text Syntax](#)
- [Status Bits for Motion Instructions \(MAM,MATC,MAJ\) When MDAC Is Active](#)
- [Motion Error Codes \(.ERR\)](#)
- [Common Attributes](#)