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# Motion Dynamic Configuration Attributes

These are the motion dynamic configuration attributes associated with a Motion Control Axis.

## Maximum Speed

Usage	Access	Data Type	Default	Min	Max	Semantics of Values
Required - FPV	Set/SSV	REAL	FD	0	maxspd	Position Units / Sec

The value of the Maximum Speed attribute is used by various motion instructions to determine the steady-state speed of the axis. These instructions all have the option of specifying speed as a percent of the Maximum Speed attribute value for the axis. This value is typically set to ~85% of the maximum speed rating of the motor. This provides sufficient 'head-room' for the axis to operate at all times within the speed limitations of the motor.

## Maximum Acceleration and Maximum Deceleration

Usage	Access	Attribute Name	Data Type	Default	Min	Max	Semantics of Values
Required - FPV	Set/SSV	Maximum Acceleration	REAL	FD	0	maxacc	Position Units / Sec <sup>2</sup>
Required - FPV	Set/SSV	Maximum Deceleration	REAL	FD	0	maxacc	Position Units / Sec <sup>2</sup>

The Maximum Acceleration value is frequently used by motion instructions, (for example, MAJ, MAM, and MCD) to determine the acceleration rate to apply to the axis. These instructions all have the option of specifying acceleration as a percent of the Maximum Acceleration for the axis. This value is typically set to ~70% of the maximum acceleration rate of the axis. This provides sufficient 'head-room' for the axis to operate at all times within the acceleration limits of the drive and motor.

The Maximum Deceleration attribute value is frequently used by motion instructions, (for example, MAJ, MAM, and MCD), to determine the deceleration rates to apply to the axis. These instructions all have the option of specifying deceleration as a percent of the Maximum Deceleration for the axis. This value is typically set to ~70% of the maximum deceleration rate of the axis. This provides sufficient 'head-room' for the axis to operate at all times within the deceleration limits of the drive and motor.

Setting the Maximum Deceleration to zero with a SSV command will generate a minor fault. Motion on an axis cannot start with a deceleration of zero, so this value will not be accepted.

## Programmed Stop Mode

Usage	Access	Data Type	Default	Min	Max	Semantics of Values
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Required - All	Set/SSV	USINT	0	-	-	Enumeration 0 = Fast Stop (default) 1 = Fast Disable 2 = Hard Disable 3 = Fast Shutdown 4 = Hard Shutdown
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The Programmed Stop Mode attribute determines how a specific axis will stop when the Logix processor undergoes a critical processor mode change or when an explicit MGS (Motion Group Stop) instruction is executed with its stop mode set to 'programmed'.

There are currently four modes defined for the Logix processor: Program Mode, Run Mode, Test Mode, and Faulted Mode. Any mode change into or out of program mode (prog ->run, prog->test, run->prog & test->prog) will initiate a programmed stop for every axis owned by that processor.

There is a time-out period of 60 seconds applied to the programmed stop process, after which the mode change will occur, even if motion on one or more axes has not stopped. Each individual axis can have its own Programmed Stop Mode configuration independent of other axes. Five methods of stopping a given axis are currently supported.

Method	Description
Fast Stop	When the Programmed Stop Mode attribute is configured for Fast Stop, the axis is decelerated to a stop using the current configured value for Maximum Deceleration. Servo action is maintained after the axis motion has stopped.
Fast Disable	When the Programmed Stop Mode attribute is configured for Fast Disable, the axis is decelerated to a stop using the current configured value for Maximum Deceleration. Servo action is maintained until the axis motion has stopped at which time the axis is disabled, for example, Drive Enable disabled, and Servo Action disabled.
Hard Disable	When configured for Hard Disable, the axis is immediately disabled, for example, Drive Enable disabled, Servo Action disabled, but the OK contact is left closed. Unless the drive is configured to provide some form of dynamic braking, this results in the axis coasting to a stop.
Fast Shutdown	When configured for Fast Shutdown, the axis is decelerated to a stop as with Fast Stop but, once the axis motion is stopped, the axis is placed in the Shutdown state, for example, Drive Enable disabled, Servo Action disabled, and the OK contact opened. Recovering from the Shutdown state requires execution of one of the axis or group Shutdown Reset instructions (MASR or MGSR).
Hard Shutdown	When configured for Hard Shutdown, the axis is immediately placed in the Shutdown state, for example, Drive Enable disabled, Servo Action disabled. Unless the drive is configured to provide some form of dynamic braking, this results in the axis coasting to a stop. To recover from the Shutdown state requires execution of one of the axis or group Shutdown Reset instructions (MASR or MGSR).

## Maximum Acceleration Jerk

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Required - FPV	Set/ SSV	REAL	FD	0	∞	Position Units / Sec <sup>3</sup>
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The Maximum Acceleration Jerk attribute value is used by motion instructions, for example, MAM and MAJ, to determine the acceleration jerk to apply to the axis when the acceleration jerk is specified as a percent of the Maximum. This value is only used by an S-Curve profile. Setting the Maximum Acceleration Jerk to zero with a SSV command will generate a minor fault. Motion on an axis cannot start with an acceleration of zero, so this value will not be accepted.

Maximum Acceleration Jerk may be calculated in terms of a percent of acceleration time spent while S-Curving.

In this case,  $0 \leq \%time \leq 100 \%$

## Maximum Deceleration Jerk

Usage	Access	Data Type	Default	Min	Max	Semantics of Values
Required - FPV	Set/ SSV	REAL	FD	0	∞	Position Units / Sec <sup>3</sup>

The Maximum Deceleration Jerk attribute value is used by motion instructions, for example, MAM and MAJ, to determine the deceleration jerk to apply to the axis when the deceleration jerk is specified as a percent of the Maximum. This value is only used by an S-Curve profile. Setting the Maximum Deceleration Jerk to zero with a SSV command will generate a minor fault. Motion on an axis cannot start with a deceleration of zero, so this value will not be accepted.

Maximum Deceleration Jerk may be calculated in terms of a percent of deceleration time spent while S-Curving.

In this case,  $0 \leq \%time \leq 100 \%$

## Dynamics Configuration Bits

Usage	Access	Data Type	Default	Min	Max	Semantics of Values
Required - FPV	Set/ SSV	DWORD	0:1 1:1 2:0	-	-	0 = Reduce S-Curve Stop Delay  1 = Prevent S-Curve Velocity Reversals  2 = Reduced Extreme Velocity Overshoot  3-31 = Reserved

This attribute is a collection of bits that control the operation of the motion planner dynamics.

Bit	Name	Description
0	Reduce S-Curve Stop Delay	Enables or disables the reduction of latency time when stopping motion with S-Curve velocity profile (MAS instruction).
1	Prevent S-Curve Velocity	Enables the prevention of unwanted velocity reversals when the deceleration rate is being dynamically changed (MAS

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	Reversals	instruction).
2	Reduced Extreme Velocity Overshoot	This bit limits the velocity overshoot to 50% of the programmed velocity by increasing the acceleration jerk as necessary.
3-31	Reserved	

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