# Converter Control Mode Attributes

The attribute table contains attributes that govern the overall control behavior of a converter in the Motion Control Axis.

## Converter Configuration

| Usage | Access | T | Data Type | Default | Min | Max | Semantics of Values |
|---|---|---|---|---|---|---|---|
| Required - G | Set | | USINT | AOP* | - | - | Enumeration<br>0 = Bus Voltage Control<br>1 = Active Current Control (O)<br>2-255 = Reserved |

* The default value can specified by the specific drive profile (AOP).

The Converter Configuration attribute determines the general control behavior of the regenerative or low harmonic AC/DC converter axis instance. This attribute is used by the controller to set the Converter Control Mode attribute that is sent to the drive during initial configuration. When the Converter Configuration is configured in Logix Designer application, the Converter Control Mode is also updated.

This table provides descriptions of the Converter Configuration enumerations.

| Enumeration | Required/ Optional | Name | Description |
|---|---|---|---|
| 0 | R/G | Bus Voltage Control | The Bus Voltage Control provides closed loop control of DC bus voltage, and includes closed loop control of Active and Reactive components of AC line current. This value is applied by the controller to the Converter Control Mode attribute and sent to the drive. |
| 1 | O/G | Active Current Control | The Active Current Control provides closed loop control of Active and Reactive components of AC line current. This value is applied by the controller to the Converter Control Mode attribute and sent to the drive. |
| 2-255 | | Reserved | - |

When modified programmatically, via SSV, the Converter Control Mode value cannot be set to an enumeration that the current Converter Configuration cannot support. For example, if the Converter Configuration is set for Active Current Control, the Converter Control Mode cannot be changed to Bus Voltage Control since bus voltage loop attributes have not been configured. Refer to the following table for a list of valid Converter Control Modes for a Converter Configuration:

| Converter Configuration | Valid Converter Control Modes |
|---|---|
| Bus Voltage Control | Bus Voltage Control<br>Active Current Control |
| Active Current Control | Active Current Control |

Search
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
AXIS_CIP_DRIVE Diagrams
AXIS_CIP_DRIVE Structure
Accessing Attributes
AC Line Condition Attributes
Acceleration Control Attributes
Acceleration Control Configuration Attributes
Additional Error Code Information
APR Fault Attributes
Auto-Tune Configuration Attributes
Axis Exception Action Configuration Attributes
Axis Info Attributes
Axis Safety Status Attributes
Axis Statistical Attributes
CIP Axis Status Attributes
CIP Error Codes
CIP Motion Axis Control Modes
Command Reference Generation Attributes
Configuration Fault Attributes
Control Mode Attributes
Converter AC Line Configuration Attributes
Converter AC Line Monitoring Attributes
Converter AC Line Source Configuration Attributes
Converter Bus Voltage Control Configuration Attributes
Converter Bus Voltage Control Signal Attributes
Converter Control Mode Attributes

# Converter Control Mode

| Usage | Access | T | Data Type | Default | Min | Max | Semantics of Values |
|---|---|---|---|---|---|---|---|
| Required - G<br><br>Derived from Converter Configuration | Get | | USINT | 0 | - | - | Enumeration<br><br>0 = Bus Voltage Control<br><br>1 = Active Current Control (O)<br><br>2-255 = Reserved |

The Converter Control Mode attribute determines the basic mode of operation for the regenerative converter.

When Bus Voltage Control is selected, the converter controls the DC bus voltage output of the converter. The output of the DC bus control loop drives an inner Active AC Line current control loop to maintain the commanded DC bus voltage level established by the Bus Voltage Set Point.

When Active Current Control is selected, the converter disables DC bus voltage regulation and directly controls the Active AC Line current component based on the Active Current Command. During initial configuration, the controller derives this value from the the Converter Configuration attribute value.

# Reactive Power Control

| Usage | Access | T | Data Type | Default | Min | Max | Semantics of Values |
|---|---|---|---|---|---|---|---|
| Optional - G | Set | | BOOL | 0 | - | - | Enumeration<br><br>0 = Disabled<br><br>1 = Enabled<br><br>2-255 = Reserved |

When Reactive Power Control attribute is enabled, the regenerative converter works solely as a reactive power compensation device by injecting reactive power to the grid. This is typically done to improve the power factor on the plant floor or to stabilize AC line voltage. In this mode, the converter does not transfer active power to associated drives on the DC Bus. Instead all of the converter's rating capacity is dedicated to reactive power correction to the grid. When enabled, the Reactive Power Control function is effective regardless of the configured Converter Control Mode.

# Converter Startup Method

| Usage | Access | T | Data Type | Default | Min | Max | Semantics of Values |
|---|---|---|---|---|---|---|---|
| Optional - G | Set | | USINT | 0 | - | - | Enumeration<br><br>0 = Enable Request<br><br>1 = Enable Input (O)<br><br>2 = Automatic (O)<br><br>3-255 = Reserved |

Attributes

Converter Current Control Configuration Attributes

Converter Current Control Signal Attributes

Converter Current Reference Configuration Attributes

Converter Current Reference Signal Attributes

Converter Output Attributes

Converter Reactive Power Control Attributes

Converter Types

Current Control Signal Attributes

Current Control Configuration Attributes

Cyclic Read and Cyclic Write

DC Bus Condition Attributes

Device Function Codes

Device Commissioning Attributes

Drive General Purpose I/O Attributes

Drive Output Attributes

Drive Parameters

Event Capture Attributes

Exception Factory Limit Info Attributes

Exception User Limit Configuration Attributes

Exception, Fault and Alarm Attributes

Exceptions

Fault and Alarm Behavior

Feedback Interface Types

Feedback Configuration Attributes

Frequency Control Configuration Attributes

Frequency Control Signal Attribute

General Feedback Info Attributes

General Feedback Signal Attributes

General Linear Motor Attributes

General Motor Attributes

General Permanent Magnet Motor Attributes

General Rotary Motor

The Converter Startup Method attribute specifies the method to use to initiate transition of the regenerative converter axis from the Stopped state to the Starting state.

If Enable Request is selected, assuming a successful Pre-charge and transition to the Stopped state, the converter stays in the Stopped state until it receives an Enable Request from the controller. After the converter receives Enable Request, it transitions to Starting state and checks for proper AC line synchronization. Once ready for regenerative control, the converter transitions to the Running state with all configured control loops operational.

If Enable Input is selected, assuming a successful Pre-charge and transition to the Stopped state, the converter checks the status of the Enable Input. If the Enable Input is active, the converter axis transitions from the Stopped state to the Starting state and checks for proper AC line synchronization. Once ready for regenerative control, the converter then transitions to the Running state with all configured control loops operational. If the Enable Input is not active, then the converter axis transitions from the Stopped state to Start Inhibited state. The converter axis remains in the Start Inhibited state until such time as the Enable Input is activated. Once activated, the axis state transitions from Start Inhibited to the Stopped state and then, without receiving any Enable Request from the controller, automatically transitions to the Starting state. Once ready for regenerative control, the converter then transitions to the Running state with all configured control loops operational. If the Enable Input is either not supported by the converter or the Enable Input Checking attribute is set to Disabled, the Enable Input is effectively inactive and the converter axis remains in the Start Inhibited state indefinitely. While waiting for Enable Input activation in the Start Inhibited state, the converter can optionally set the DC Bus Unload bit in Axis Status that is sent to the controller. Setting the DC Bus Unload bit causes the controller to set the Converter Bus Unload bit that is sent to all drives that can draw power from the converter's DC bus. In this way, the converter can prevent DC bus power draw while the converter axis is in the Start Inhibited state.

If Automatic is selected, assuming a successful Pre-charge and transition to the Stopped state, the converter automatically transitions to Starting state and checks for proper AC line synchronization. Once ready for regenerative control, the converter transitions to the Running state with all configured control loops operational.

## See also

Drive General Purpose I/O Attributes

CIP Axis Status Attributes

State Behavior

Attributes

Guard Safety Attributes

Guard Safety Status Attributes

Hookup Test Configuration Attributes

Hookup Test Result Attributes

Identify Motion Axis Attributes Based on Device Function Codes

Induction Motor Attributes

Inertia Test Configuration Attributes

Inertia Test Result Attributes

Initialization Faults

Interior Permanent Magnet Motor Attributes

Linear PM Motor Attributes

Load Transmission and Actuator Attributes

Local Mode Configuration Attribute

Module/Node Fault and Alarm Attributes

Motion Control Axis Behavior Model

Motion Control Configuration Attributes

Motion Control Interface Attributes

Motion Control Methods

Motion Control Modes

Motion Control Signal Attributes

Motion Control Status Attributes

Motion Database Storage Attributes

Motion Dynamic Configuration Attributes

Motion Fault and Alarm Exceptions

Motion Homing Configuration Attributes

Motion Instruction Compatibility

Motion Planner Configuration Attributes

Motion Planner Output Attributes

Motion Scaling Attributes

Motor Attributes

Motor Attributes Model

Motor Test Result Attributes

No Control Mode

Position Control Mode

Position Loop Signal Attributes

Position Loop Configuration Attributes

Power and Thermal Management Configuration Attributes

Power and Thermal Management Status Attributes

Replicated Attributes

Required vs. Optional Axis Attributes

Reset an APR Fault

Rockwell Automation Specific CIP Axis Alarm Names

Rockwell Automation Specific Exceptions

Rockwell Automation Specific CIP Axis Fault Names

Rockwell Automation Specific Initialization Faults

Rockwell Automation Specific Start Inhibits

Rotary PM Motor Attributes

Standard CIP Axis Fault and Alarm Names

Standard Exceptions

Rotary PM Motor Attributes

Standard Initialization Faults

Standard Start Inhibits

Start Inhibits Attributes

State Behavior

▷ Stopping and Braking Attributes

Torque Control Mode

Torque/Force Control Configuration Attributes

Torque/Force Control Signal Attributes

Velocity Control Mode

Velocity Loop Configuration Attributes

Velocity Loop Signal 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 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


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