# Class 5 Overview

## Class 5 Control Overview

- Faster Processor, greater than 5 time faster than Existing Class 4 Motors
- Faster RS232 / RS485 Communications Speeds, up to 115.2KBaud means unparalled connectivity
- Multi-Port Simultaneous Communications, RS 232/RS 485/ CAN Bus
- Enhanced Trap Mode Commutation
- Expanded Math Function Capability with Floating Point Math & Trigomometic Functions
- Modulo Encoder Count Capability
- 8 Level Priority Stacked User Definable Interrupts
- 4 User Definable Independent Timers
- DE/Dt: Rate of Change of Following Error Limit
- Increased I/O Interrupt Assignments
- Software Programmable Limits can be set to trigger interrupts w/o fault
- Enhanced Parameter and Function Based Syntax
- Increased System Status Bit Registers for Advanced Diagnostics
- Optional On-board Expanded I/O : 10 Channels 24VDC Isolated Assignable as Inputs or Outputs
- Optional 10 additional points of isolated 24V I/O source up to 300mA and read both digital and analog signals
- 4 times faster PID update rate (down to 62.5µsec) enables ultra precise motion
- Optional CANopen communications with high speed contouring to sub-millisecond synchronization
- New Sinusoidal Commutation capability delivers smooth and quiet motion, even at low speeds
- Commutative, Associative, and Distributive math syntax
- Software Programmable Limits can be used as programmable electronic Cam switch triggers

## Enhanced Trap Mode and Sine Mode Commutation:

The motors can be operated with encoder-based commutation that allows for a more precise alignment and association of rotor to stator magnetic phases. The result is a smooth, quiet rotation with very low cogging. As a result, much slower commanded speeds may be achieved with little speed fluctuation.

## Higher Frequency PID Update Rate:

User selectable PID update rate defaults to 125 microseconds. Optionally it may be decreased or increased. The faster 62.5 microsecond update rate allows for smoother high speed operation and faster accel/decel correction under varying load conditions.

## Expanded Math Function Capability:

Class 5 SmartMotor™ includes:

- Added Boolean operators such as Exclusive OR and Modulo,
- Trigonometry functions, SIN, COS, TAN, ASIN, ACOS, ATAN
- Absolute Value
- IEEE-754 Single Precision Floats
- Commutative and Associative math operations are allowed with up to 128 characters on the right side of an equal sign.

## Advantages over Conventional Systems

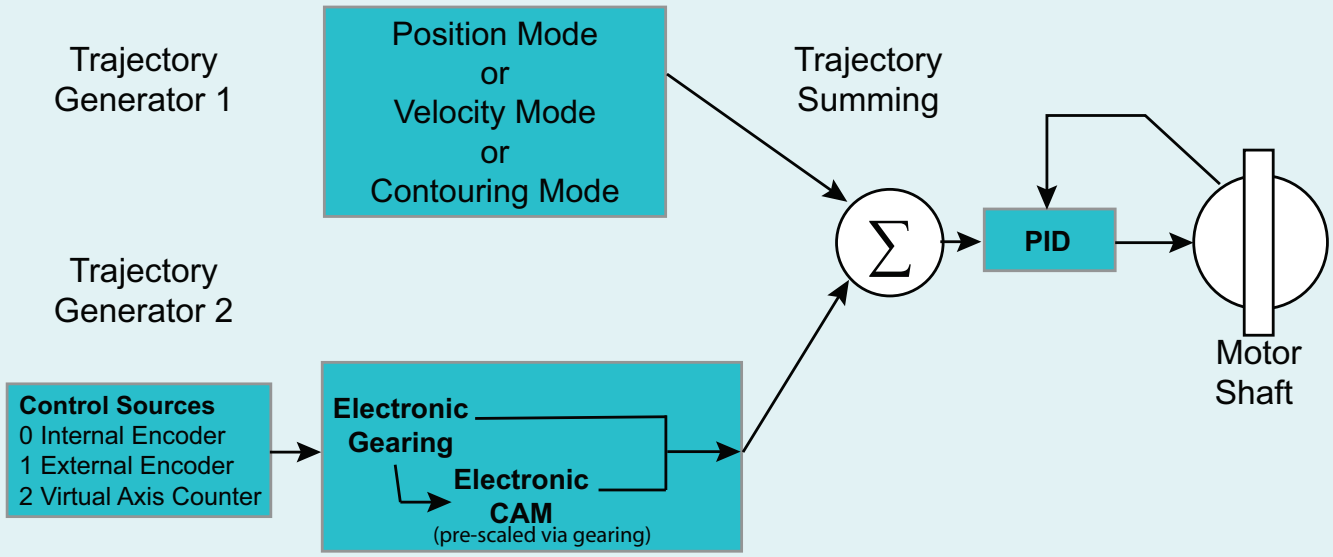
- High noise immunity
- Low emissions
- Very high tuning bandwidth (very stable)
- Very compact motion system (Shortest axial length closed-loop servo available)

| | | |
|---|---|---|
| **Power & Encoder** | | |
| Drive Power: | +20 - 48VDC | |
| Control Power: | +20 - 48VDC (must be supplied separately when DE option is ordered) | |
| Expanded I/O Option: | +24VDC isolated (must be supplied) | |
| Commutation: | Trapezoidal (Default) | |
| | Enhanced Trapezoidal based on Encoder Position | |
| | Sinusoidal | |
| Encoder Resolution | 23 Frame: 4000 counts per revolution (Class 5) | |
| | 34 Frame: 8000 counts per revolution (Class 5) | |
| **Processor/Clocks:** | | |
| Processor Clock Speed: | 32MHz | |
| PWM Switching Frequency: | 16KHz | |
| CPU Regulator Frequency: | 140KHz +/-10% load dependant | |
| Drive Stage Regulator: | 100MHz | |
| **PID Update Rates:** | 8KHZ Adjustable | |
| **Programming:** | | |
| Code: | Command Interpretive Text Based | |
| Program: | 32K Program/32K Data Storage | |
| Subroutines: | up to 1000 | |
| Stack Pointers: | 10 Nested GOSUB( ) and/or Interrupt calls | |
| **Communications:** | | |
| RS-232: | 2400 to 115200 Baud | 9600 default |
| RS-485: | 2400 to 115200 Baud | 9600 default |
| (Optional) CAN Bus: | 20K to 1MBaud | 125000 default |

## New in Class 5: Dual Trajectory Path Generators

The processor now has the ability to sum in Positioning, Velocity, or Contouring mode profiles on top of Electronic Gearing or Camming profiles.

This also includes Virtual Axis gearing and Camming where independent profiles may be run off of a virtual time base separate from Position or Velocity Modes or summed in on top of them.




## Velocity Mode and Electonic Gearing Summed Together:

Electronic Gearing ensures instant response to Master Nip Roller speed while Velocity Mode is controlled by the tension arm. The net effect is assurance of constant tension over the change in supply reel radius.