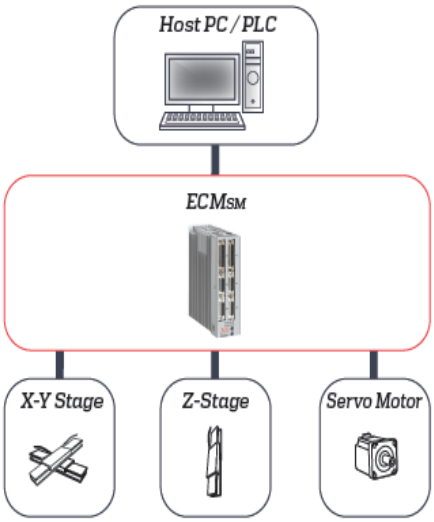
ECMsm

2 or 4 Axis All-In-One Motion Controller with Integrated Drives

The **ECMsm** is a member of the Economical Control Modules (ECM) series of compact, highly integrated all-in-one motion controller and drives solutions designed to meet the needs of OEMs with cost-sensitive motion control applications. Its unique multiprocessor architecture leverages powerful control algorithms to achieve best-in-class performance, while its universal servo drive technology enables the system designer to easily control most types of motors and stages.



Product Highlights

- Compact Industrial Package for Streamlined OEM Integration
- Comprehensive Software Tools for Reducing Time to Market
- Universal Motor Support for Maximum Motor/Stage Flexibility
- Max Drive Current: 5/10A per Axis
- Drive Supply Input: 12-48 VDC
- Analog I/O: 2/2
- Digital I/O: 12/16
  - 4 High-Speed Position Capture (MARK) Inputs
  - 8 Limit Sensor Inputs (2 per axis)
  - 4 Brake Outputs
  - 4 High-Speed Position Event Generation (PEG) Outputs
  - 8 General Purpose Outputs
- Functional Safety: STO, SS1

VALUE
Achieve excellent performance at an economical price

FLEXIBILITY
Control various motion stage technologies

INTEGRATION
Minimize design effort with all-in-one industrially packaged solution

Specifications

Logic Supply Input

- Voltage range: 24 VDC +/-5%
- Maximum Input Current: 2A @ 22.8VDC
- Protections: Reverse polarity

Drive Supply Input

- Voltage range: 12-48 VDC
- Maximum Input Current: Load dependent

Amplifiers

- Number of Axes: 2 or 4
- Type: PWM 3-phase power bridge
- Motor Support
  - DC brush
  - Voice coil
  - 2 and 3 phase DC brushless
  - 2 and 3 phase stepper: Open or closed loop, up to 1024 microsteps per step, dynamic current adjustment
- Output Current: 1.25/2.5 A, 2.5/5 A, or 5/10A per axis (continuous/peak, sine amplitude)
- Peak Current Time: 1 second
- PWM Switching Frequency: 20 kHz
- Minimum Load Inductance: 25 µH per phase at 48VDC bus (contact ACS to discuss applications with lower phase inductance motors)
- Max Output Voltage: 92% of Drive Supply input voltage
- Max Output Power: 187/364 W per axis (continuous/peak)
- Protections: Short Circuit, Overcurrent, Drive Overtemperature, Motor Overtemperature, Overvoltage, Undervoltage

Communication Interfaces

- Ethernet: 100Mbps TCP/IP, Modbus, Ethernet/IP
- RS-232: Up to 115200 bps
- SPI: 8 word (16 bits per word) 4MHz bi-directional master/slave interface for data input to / output from custom servo algorithms

Real-Time Programming

- Language: ACSPL+ object-oriented multi-threading
- Number of User-Programmable Buffers (Threads): 6
- Program Cycle Rate: 1 kHz
- Max Data Collection Rate: 1 per 2 MPU cycles
- RAM: 256 MB
- Flash: 1 GB

Profile Generation

- 3rd order with smooth on-the-fly endpoint modification

Servo Control Algorithms

- Standard
  - Cascaded PIVFF with loop shaping filters
  - Advanced feedforward
  - Multi-input multi-output (MIMO) gantry
  - Dual loop
  - Disturbance rejection
  - Gain scheduling
  - Field-oriented control
  - Space vector modulation
- Optional
  - Custom algorithms to meet demands of unique applications (contact ACS)
- Loop Sampling and Update Rate: 20 kHz position, 20 kHz velocity, 20 kHz current

Feedback

- Total Number of Channels: 4
- Incremental
  - AqB Encoders (Default type)
    - Max Frequency: 50MHz
    - Electrical Interface: RS-422
    - Error Detection: Encoder not connected, illegal transition
  - SinCos Encoders
    - Max Frequency: 500 kHz
    - Electrical Interface: 1 V peak to peak +/-10%
    - Max Multiplication: 4,096 (per full signal period)
    - Error Detection: Not connected
    - Compensation: Phase, Gain, Offset
    - Note: The drive automatically generates a digital quadrature echo of the SinCos encoder signal and sends it as an output to the AqB encoder pins
  - Digital Hall Sensor Inputs
    - Qty: 3 per axis (12 total)
    - Electrical Interface: 5V, Single-ended, source, opto-isolated
    - Note: Used for initial commutation, not for position servo feedback
  - Limit Sensor Inputs (Usable as general purpose)
    - Qty: 2 per axis (8 total)
    - Electrical Interface: 5/24V ±20%, opto-isolated, sink or source (jumper selectable)
- Absolute (Optional)
  - Types: BiSS-C, EnDat 2.1 & 2.2, Smart-Abs, SSI, Sanyo- Denki, Panasonic A6
  - Max Frequency: EnDat- 8MHz, Smart-Abs- 2.5MHz, Biss-C- 10MHz, Panasonic- 2.5MHz, Sanyo- 2.5MHz
  - Electrical Interface: RS-485
  - Error Detection: CRC, timeout, encoder not ready
- Supply Output: 5.1V. Total available current for all digital encoders: 1.5A for all analog encoders and 1.5A for all digital encoders
- ID Chip Interface: 1 per axis. For identification of compatible stages' configuration parameters.

Digital I/O (All are usable as general purpose)

- Total Quantity: 12/16
- High-Speed Position Capture (MARK) Inputs
  - Qty: 4
  - Electrical Interface: 5/24V ±20%, Opto-isolated, two terminals
  - Max Capture Frequency: 1 per 2 MPU cycles
- Limit Sensor Inputs
  - Qty: 8 (See Feedback section for more details)
- High-Speed Position Event Generation (PEG) Outputs
  - Qty: 4
  - Electrical Interface: RS-422
  - Max Pulse Frequency: 10MHz
  - Pulse Width Range: 27 ns to 1.745 ms
- Brake Outputs
  - Qty: 4
  - Electrical Interface: 5/24V ±20%, opto-isolated, sink or source (jumper selectable)
  - Output Current: 100 mA
  - Max Update Frequency: 1kHz

Specifications Continued

- General Purpose Outputs
  - Qty: 8
  - Max Update Frequency: 1 kHz
  - Electrical Interface: RS-422

Analog I/O (All are usable as general purpose)

- Analog Inputs
  - Qty: 2
  - Electrical Interface: ±10V differential or 0-10V single ended
    Resolution: 12 bit
  - Input Frequency: 1 kHz
- Analog Outputs
  - Qty: 2
  - Electrical Interface: ±10V differential or 0-10V single ended
  - Resolution: 10 bit
  - Max Ripple: 25 mV
  - Max Load: 10 kOhm
  - Max Update Frequency: 1 kHz

Standards and Certifications

- CE Self Declaration: Yes
- CE Electrical Safety: IEC61800-5-1
- CE EMC: EN 61800-3
- UL Electrical Safety: UL 61800-5-1
- STO Functional Safety: IEC 61800-5-1, IEC 61800-5-2 (Pending)
- SS1 Functional Safety: IEC 61800-5-1, IEC 61800-5-2 (Pending)

Functional Safety I/O (Optional)

- Safe Torque Off (STO) Input
  - Electrical Interface: Dual-channel 24V isolated
  - Safety Standards: See Standards and Certifications Section
- Safe Stop 1 (SS1) Feature
  - Deceleration time till STO activation: 110-230ms.
  - Exact deceleration time value is fixed (SS1-t functionality) and depends on product configuration (see user manual for more details)

Physical

- Dimensions: 168 x 158 x 48.3 mm
- Weight: 800g
- Environmental
  - Operational Temperature: 0 to 50C. See user manual for external fan cooling requirements above 40C ambient temperature.
  - Humidity: 5 to 90% non-condensing humidity.
  - Storage and Transportation Temperature: -25 to 60C°
  - Shock: 50 m/s^2 (5 G) - Vibration: 10 m/s^2 (1 G)

Optional Accessory Products

- XDMsm-ACC1: Mating Connector Kit
- STO-ACC1: STO Breakout Cable
- SPI-ACC1: SPI Breakout Cable
- RS232-ACC1: RS232 Adapter Cable

Ordering Options

Ordering Options	Field	Example User Selection	Values
Number of axes	1	4	2, 4
Current Rating (Amps Peak of Sine)	2	C	A = Reserved B = 2.5/5A C = 5/10A
Number of 500 kHz SinCos Encoder Channels[1]	3	2	0, 1, 2, 3, 4
Number of absolute encoder channels[1]	4	1	0, 1, 2, 3, 4
Functional Safety	5	T	N=None, T=STO & SS1
Autofocus	6	N	N = No A = Autofocus
Reserved	7	N	N=N/A
Reserved	8	N	N=N/A
Reserved	9	N	N=N/A
Reserved	10	N	N=N/A

[1] The total number of encoder channels ordered may not exceed 4 per field. Multi-Channel feedback requires both a digital(incremental or absolute) and an analog feedback device.

Example: ECMsm-2C202-TNNNN **Description:** 2 axis 5/10A, 2 X Absolute encoder, STO & SS1

Field		1	2	3	4	5	6	7	8	9	10
PN	ECMsm	2	C	2	0	2	T	N	N	N	N

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