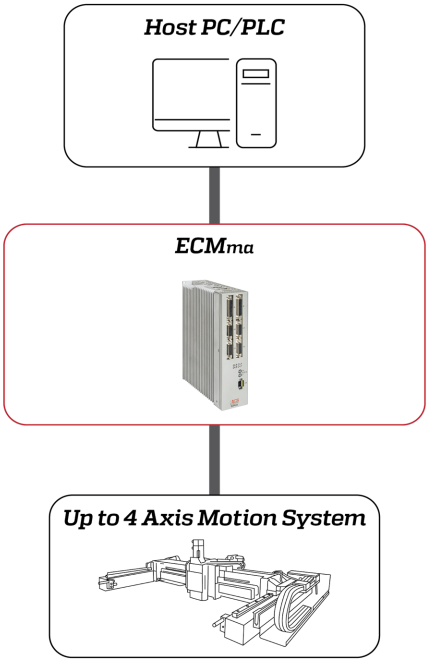
ECMma

2 or 4 Axis All-In-One Motion Controller With Integrated Drive

The **ECMma** 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 any type of motor or stage.

Product Highlights

- Compact Industrial Package for Streamlined OEM Integration
- Rich Host Programming and Simulation Tools for Faster Software Development
- Universal Motor Support for Maximum Motor/Stage Flexibility
- Simple Configuration and Tuning with SPiiPlus MMI Application Studio
- Max Drive Current: 10/20A at 150VDC, 15/30A at 100VDC
- Drive Supply Input: 24-150VDC
- Feedback Channels: 4 (AqB, SinCos, or Absolute)
- Analog I/O: 4/2
- Digital I/O: 12/12
  - Any can be used for general purpose
  - 4 High-Speed Position Capture (MARK) Inputs
  - 4 High-Speed Position Event Generation (PEG) Outputs
  - 2 Limit Sensor Inputs per axis
  - 4 Mechanical Brake Outputs
  - 4 General Purpose Digital 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

For the latest version of this document visit our website at www.acsmotioncontrol.com

Smarter Motion

ACS MOTION CONTROL

Specifications

Logic Supply Input
- Voltage range: 24 VDC ±5%
- Maximum Input Current: 2A @ 22.8VDC
- Protections: Reverse Polarity

Drive Supply Input
- Voltage Range: 24-150VDC
- Maximum Input Current: Load Dependent
- Regeneration Resistor: not included

Amplifiers
- Number of Axes: 2 or 4
- Type: PWM 3-phase power bridge
- Motor Support
  - DC brush
  - 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:
  - 5/10A, 10/20A at 150VDC
  - 15/30A at 100VDC (continuous/peak, sine amplitude)
- Peak Current TIme: 1 second
- PWM Switching Frequency: 20 kHz
- Minimum Load Inductance: 150 µH per phase at 150VDC bus (contact ACS to discuss applications with lower phase inductance motors)
- Max Output Voltage: 94% of Drive Supply input voltage
- Max Output Continuous / Peak Power Per Axis::
  - 633/1258W (continuous/Peak) for 5/10A
  - 1266/2517W (continuous/Peak) for 10/20A
  - 1208/2393W (continuous/Peak) for 15/30A
- Protections: Short Circuit, Overcurrent, Overtemperature, Motor Motor Overtemperature,Overvoltage, Undervoltage

Communication Interfaces
- SPI
  - Clock frequency up to 4 MHz
  - Can operate as Master or Slave
  - Up to 8 X SPI words per MPU Cycle
  - SPI word length is user configurable up to 16 bits
- Ethernet: 100 Mbps TCP/IP, Modbus, Ethernet/IP
- RS-232: Up to 115200 bps

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

Real-Time Programming
- Language: ACSPL+ object-oriented multi-threading
- Number of User-Programmable Buffers (Threads): 4
- Max Program (MPU) Cycle Rate: 1 kHz
- Max Data Collection Rate: 20 kHz up to 4 variables
- RAM: 256MB
- Flash: 1GB

Servo Control Algorithms
- Standard
  - Cascaded PIVFF with loop shaping filters
  - Advanced feedforward
  - 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: 50 MHz
    - Electrical Interface: RS-422
    - Error Detection: Encoder not connected, illegal transition
  - SinCos Encoders (Optional)
    - Max Frequency: 500 kHz
    - Electrical Interface: 1 V peak to peak +/-10%
    - Max Multiplication: 4,096 (per full signal period)
    - Error Detection: Not connected, Encoder Error
    - 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: 1 set per axis
    - 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 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.

Specifications Continued

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

- Total Quantity: 12/12
- High-Speed Position Capture (MARK) Input
  - Qty: 4 (can be used as general purpose digital inputs)
  - Electrical Interface: 5/24V ±20%, Opto-isolated, two terminals
  - Max Capture Frequency: 1 per 2 MPU cycles
- Limit Sensor Inputs
  - Qty: 2 per axis (can be used as general purpose digital inputs)
- High-Speed Position Event Generation (PEG) Output
  - Qty: 1 per axis
  - Electrical Interface: RS-422
  - Max Pulse Frequency: 10 MHz
  - Pulse Width Range: 40 ns to 671 ms
- Mechanical Brake Output
  - Qty: 1 per axis
  - Electrical Interface: 5/24V ±20%, opto-isolated, sink or source (jumper selectable)
  - Output Current: 100 mA (2 of the 4 support 0.5A)
- General Purpose Outputs
  - Qty: 4
  - Max Update Frequency: 1 kHz
  - Electrical Interface: 5/24V ±20%, opto-isolated, sink or source (jumper selectable)
  - Output Current: 100 mA

Standards and Certifications (Pending)

- CE
  - Self Declaration: Yes
  - Electrical Safety: IEC61800-5-1
  - EMC: IEC 61326-3-1, IEC 61800-3, IEC 61500-5-2
- UL
  - Electrical Safety: UL 61800-5-1
- TUV
  - STO & SS1 Functional Safety: IEC 61508, ISO13849, IEC 61800-5-2

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

- Analog Inputs
  - Quantity: 4
  - Electrical Interface: ±10V differential or 0-10V single ended
  - Resolution: 12 bit
  - Input Frequency: 5 kHz
- Analog Outputs
  - Quantity: 2
  - Electrical Interface: Electrical Interface: ±10V differential or 0-5V single ended
  - Resolution: 10 bit
  - Max Ripple: <25 mV
  - Max Load: 10 kΩ
  - Max Update Frequency: 1 per MPU cycle

Physical

- Dimensions: 246 x 177 x 55mm
- Weight: 2 kg
- Environmental
  - Rated Operational Temperature: 0° to 50°C.
  - Humidity: 5 to 90% non-condensing humidity
  - Storage and Transportation Temperature Range: -25° to 60°C
  - Shock: 50 m/s^2 (5 G)
  - Vibration: 10 m/s^2 (1 G)

Optional Accessory Products

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

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
  - Exact deceleration time value is fixed (SS1-t functionality) and depends on product configuration (see Safety Manual for more details)

Ordering Options

	Field	Example selection by user	Optional Values
Number of Axes	1	4	2,4
Current Rating (Amps peak of sine)	2	B	A = (Reserved) B = All axes 5/10A up to 150Vdc C = All axes 10/20A up to 150Vdc D = All axes 15/30A up to 100Vdc
Number of 500 kHz SinCos Encoders[1]	3	1	0,1,2,3,4
Number of Absolute Encoders 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] Multi-Channel feedback requires both a digital (incremental or absolute) and an analog feedback device.

Example: ECMma-4B101-TNNNN **Description:** 4 axes 10/20A, 1 500 MHz SinCos Encoder, 1 Absolute Encoder, STO & SS1

Field		1	2	3	4	5	6	7	8	9	10
PN	**ECMma**	4	B	1	0	1	T	N	N	N	N