Connect.
Command.
Control.

ECMSA

Single-Axis All-In-One Motion Controller With Integrated Drive

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: 12-150VDC
- > Analog I/O: 1/1
- > Feedback Channels: 2 (AqB, SinCos, or Absolute)
- > Digital I/O: 4/3
  - Any can be used for general purpose
  - 1 High-Speed Position Capture (MARK) Input
  - 1 High-Speed Position Event Generation (PEG) Output
  - 2 Limit Sensor Inputs
  - 1 Brake Output
  - 1 General Purpose Output
  - 1 General Purpose Digital Input
- > Functional Safety: STO, SS1

The **ECMSA** 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.

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: 12-150VDC
- Maximum Input Current: Load Dependent
- Regeneration Resistor: not included

Amplifiers
- Number of Axes: 1
- 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: 2.5/5A, 5/10A, 10/20A, 15/30A at 100VDC only (continuous/peak, sine amplitude)
- Peak Current TIme: 1 second
- PWM Switching Frequency: 20 kHz
- Minimum Load Inductance: 12.5 uH per phase at 24Vdc bus (contact ACS to discuss applications with lower phase inductance motors)
- Max Output Voltage: 97% of Drive Supply input voltage
- Max Output Power:
  - 316/629 W (continuous/peak) for 2.5/5A
  - 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, Overvoltage, Undervoltage

Communication Interfaces
- SPI: 8 word (16 bits per word) 4 MHz bi-directional master/slave interface for data input to / output from custom servo algorithms
- Ethernet: 100/1000 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 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: 2
- 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: 65,536 (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
    - 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
    - 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 A4
  - Max Frequency: EnDat- 2MHz, 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)

- High-Speed Position Capture (MARK) Input
  - Qty: 1
  - Electrical Interface: 5/24V ±20%, Opto-isolated, two terminals
  - Max Capture Frequency: 2 kHz
- General Purpose Input
  - Qty: 1
  - Electrical Interface: 5/24V ±20%, Opto-isolated, two terminals
  - Max Capture Frequency: 2 kHz
- Limit Sensor Inputs
  - Qty: 2 (See Feedback section for more details)
- High-Speed Position Event Generation (PEG) Output
  - Qty: 1
  - Electrical Interface: RS-422
  - Max Pulse Frequency: 10 MHz
  - Pulse Width Range: 40 ns to 671 ms
- Motor Brake Output
  - Qty: 1
  - Electrical Interface: 5/24V ±20%, opto-isolated, sink or source (jumper selectable)
  - Output Current: 100 mA
- General Purpose Output
  - Qty: 1
  - 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
- 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
  - SS1 Functional Safety: IEC 61800-5-1, IEC 61800-5-2

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

- Analog Inputs
  - Electrical Interface: ±10V differential or 0-10V single ended
  - Resolution: 16 bit
  - Input Frequency: 5 kHz
- Analog Outputs
  - Electrical Interface: ±10V differential
  - Resolution: 10 bit - Max Ripple: 25 mV
  - Max Load: 10 kOhm
  - Max Update Frequency: 1 kHz

Physical

- Dimensions: 128x139x55mm
- Weight: < 600g
- 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

- XDMsa-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 user manualfor more details)

Ordering Options

Ordering Options	Field	Example User Selection	Values
Controller & Drive Axes	1	1	1
Current and Bus Voltage Rating	2	C	A = 2.5/5A up to 150VDC B = 5/10A up to 150VDC C=10/20A up to 150VDC D=15/30A up to 100VDC
500 kHz SinCos Encoder Channels	3	1	0, 1, 2
Absolute Encoder Channels	4	1	0, 1, 2
Functional Safety	5	T	N=None, T=STO & SS1
Reserved for Future	6	N	N
Reserved for Future	7	N	N
Reserved for Future	8	N	N
Reserved for Future	9	N	N
Reserved for Future	10	N	N

Example: ECMsa-1C1T-NNNNN

Description: 10/20A, 1 channel 500kHz SinCos, 1 channel absolute encoder, STO & SS1

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