

# UDM<sub>SA</sub>



## Single Axis EtherCAT® Universal Drive Module

### Product Highlights

- > Advanced Servo Control Algorithms for Maximum Motion Performance
  - > *ServoBoost™*
  - > Cascaded Dual Loop Control
  - > Non-Linear Control
  - > Customized Algorithms
- > Universal Motor and Encoder Support for Maximum Flexibility
- > Seamless Integration with any SPiiPlus Platform EtherCAT Master Controller
- > 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
- > Feedback Channels: 2 (AqB, SinCos, or Absolute)
- > Analog I/O: 1/1
- > SPI Interface for Integrating Sensor Data into Custom Servo Algorithms
- > Digital I/O: 4/3
  - > Any can be used for general purpose
  - > 1 High-Speed Position Capture (MARK) Input
  - > 2 Limit Sensor Inputs
  - > 1 Brake Output
  - > 1 High-Speed Position Event Generation (PEG) Output
  - > 1 General Purpose Output
  - > 1 General Purpose Input
- > Functional Safety: STO, SS1

The UDM<sub>SA</sub> is a member of the Universal Drive Module (UDM) series of EtherCAT-based drives designed to meet the needs of OEMs with demanding motion control applications. Controllable by any ACS SPiiPlus Platform EtherCAT master, it leverages powerful servo control algorithms to maximize motion system performance, while its universal servo drive technology provides the system designer flexibility to control most any type of motor or stage.

## Specifications

### Logic Supply Input

- > Voltage Range: 24 Vdc  $\pm 5\%$
- > Maximum Input Current: 2A @ 22.8Vdc
- > Protections: Reverse polarity
- > Drive Supply Input
  - > Voltage Range: 12-150 Vdc
  - > Maximum Input Current: Load dependent
  - > Regeneration Resistor: Not included

### Amplifiers

- > 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 up to 100VDC (continuous/peak, sine amplitude)
- > Peak Current Time: 1 second
- > PWM Switching Frequency: 20 kHz
- > Minimum Load Inductance: 12.5  $\mu$ H per phase at 24Vdc 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:
  - > 316/629W (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

### EtherCAT

- > Interface: Dual RJ-45, 100BASE-TX
- > Communication Profile: SPlIPlus Platform Proprietary Telegram Protocol
- > Max Cycle Rate: 4 kHz
- > Modes of Operation: profile velocity mode

### 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

### 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)
  - > ServoBoost (Optional, licensed on controller)
  - > Non-Linear Control (Optional, licensed on controller)
- > Servo Sampling and Update Rate: 20 kHz position, 20 kHz velocity, 20 kHz current

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

Total Quantity: 4/3

- > High-Speed Position Capture (MARK) Input
  - > Qty: 1
  - > Electrical Interface: 5/24V  $\pm 20\%$ , 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
  - > Qty: 1
  - > Max Update Frequency: 5 kHz (equal to EtherCAT network cycle rate)
  - > Electrical Interface: 5/24V  $\pm 20\%$ , opto-isolated, sink or source (jumper selectable)
  - > Output Current: 100 mA
- > General Purpose Outputs
  - > Qty: 1
  - > Max Update Frequency: 5 kHz (equal to EtherCAT network cycle rate)
  - > Electrical Interface: 5/24V  $\pm 20\%$ , opto-isolated, sink or source (jumper selectable)
  - > Output Current: 100 mA

### 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
  - > 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)
    - Electrical Interface: 5/24V  $\pm 20\%$ , optoisolated, sink or source (jumper selectable)
  - > SinCos Encoders (Optional)
    - Max Frequency: 500 kHz or 10 MHz, according to ordering option
    - Electrical Interface: 1 V peak to peak  $\pm 10\%$
    - Max Multiplication: 65,536(per full signal period)
    - Error Detection: Encoder 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
  - > Absolute (Optional)
    - > Types: BiSS-C, EnDat 2.1 & 2.2, Smart-Abs, SSI, Sanyo Denki, Panasonic A4
    - > Max Frequency: EnDat- 16MHz, 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: For identification of compatible stages' configuration parameters.

### Functional Safety I/O (Optional)

- > Safe Torque Off (STO) Input
  - > Electrical Interface: Dual-channel 24V isolated
  - > Safety Standards: See Standards and Certifications
- > 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)

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

- > Analog Input
  - > Qty: 1
  - > Electrical Interface:  $\pm 10$ V differential or 0-10V single ended
  - > Resolution: 16 bit
  - > Input Frequency: 5 kHz
- > Analog Output
  - > Qty: 1
  - > Electrical Interface:  $\pm 10$ V differential
  - > Resolution: 10 bit
  - > Max Ripple: 25 mV
  - > Max Load: 10 kOhm
  - > Max Update Frequency: 1 kHz

### 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

### Physical

- > Dimensions: 128x139x 55 mm
- > Weight: <600g
- > Environmental
  - > Operational Temperature: 0 to 50C°
  - > Humidity: 5 to 90% non-condensing humidity
  - > Storage and Transportation Temperature: -25°C to 60°C
  - > Shock: 50 m/s<sup>2</sup> (5 G)
  - > Vibration: 10 m/s<sup>2</sup> (1 G)

### Optional Accessory Products

- > XDMsa-ACC1: Mating Connector Kit
- > STO-ACC1: STO Breakout Cable
- > SPI-ACC1: SPI Breakout Cable

## Ordering Options

Ordering Options	Field	Example User Selection	Values
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
10 MHz SinCos Encoder Channels	4	0	0, 1, 2
Absolute Encoder Channels	5	1	0, 1, 2
Functional Safety	6	T	N=None, T=STO & SS1
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: UDMsa-1C101-TNNNN**

**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 UDMsa	1	C	1	0	1	T	N	N	N	N