



The Drive to Win

IDM_{SM}

2 or 4 Axis EtherCAT® DS402 Drive

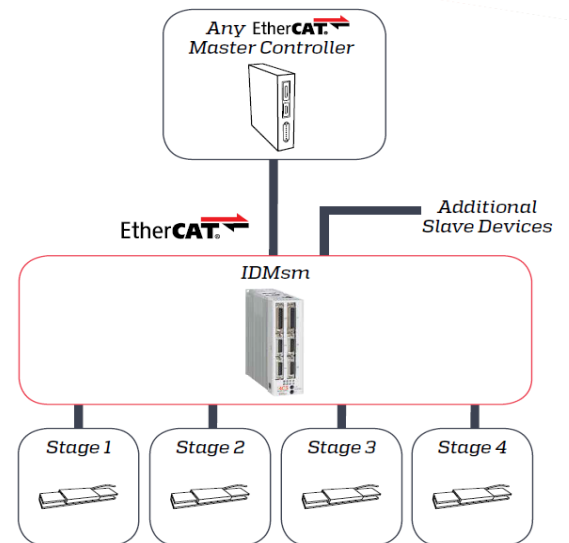


EtherCAT®
Conformance tested

The **IDMsm** is a member of the Intelligent Drive Module (IDM) series of EtherCAT® DS402 drives designed to meet the needs of OEMs employing EtherCAT-based control systems with high-precision motion stages. Controllable by any EtherCAT master, its unique multi-processor architecture leverages powerful control algorithms to maximize motion system performance, while its universal servo drive technology enables the system designer to easily control most types of motors and stages.

Product Highlights

- > Advanced Servo Control Algorithms for Maximum Motion Performance
- > Multi-Threading Program Execution for Maximum Application Flexibility
- > Universal Motor Support for Maximum Motor/Stage Flexibility
- > Standard DS402 (CiA402) CANOpen over EtherCAT Interface
- > Max Drive Current: 5/10A per Axis
- > Drive Supply Input: 12-48VDC
- > Analog I/O: 2/2
- > Digital I/O: 12/16
 - Any can be used as general purpose
 - 4 High-Speed Position Capture (MARK) Inputs
 - 8 Limit Sensor Inputs (2 per axis)
 - 4 Motor Brake Outputs
 - 4 High-Speed Position Event
 - 8 General Purpose Outputs
- > Functional Safety: STO, SS1



CONFIDENCE
Leverage 30+ years
of high-performance
motion control expertise



FLEXIBILITY
Control various motion
stage technologies



PERFORMANCE
Achieve a competitive advantage
with higher throughput and accuracy

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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: 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
 - 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, 2.5/5A, 5/10A (continuous/peak, sine amplitude)
- Peak Current Time: 1 second
- PWM Switching Frequency: 20 kHz
- Minimum Load Inductance: 25 uH 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

EtherCAT

- Interface: Dual RJ-45, 100BASE-TX
- Communication Profiles: CoE, FoE
- Device Profiles: DS402 (CiA402)
- Modes of Operation: CSP, CSV, CST, Homing, Profile Position
- PDO Mapping: User-configurable, up to 128 bytes
- Max Cycle Rate: 4 kHz

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

Real-Time Programming

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

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 or 10 MHz, according to ordering option
 - 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 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.

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).

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MOTION CONTROL

Specifications Continued

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

- High-Speed Position Capture (MARK) Inputs
 - Qty: 4
 - Electrical Interface: 5/24V $\pm 20\%$, Opto-isolated, two terminals
 - Max Capture Frequency: 2 kHz
- Limit Sensor Inputs
 - Qty: 1 (See Feedback section for more details)
- High-Speed Position Event Generation (PEG) Outputs
 - Qty: 1
 - Electrical Interface: RS-422
 - Max Pulse Frequency: 10 MHz
 - Pulse Width Range: 27 ns to 1.745 ms
- Motor Brake Outputs
 - Qty: 1
 - 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: 4 kHz
 - Electrical Interface: RS-422

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

- Analog Inputs
 - Qty: 1
 - Electrical Interface: $\pm 10V$ differential or $\pm 5V$ single ended
 - Resolution: 10 bit
 - Input Frequency: 4 kHz

- Analog Outputs
 - Electrical Interface: $\pm 10V$ differential or $\pm 5V$ single ended
 - Resolution: 10 bit - Max Ripple: 25 mV
 - Max Load: 10 k Ω
 - Max Update Frequency: 4 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
 - EtherCAT Technology Group Conformance Tested: Yes

Physical

- Dimensions: 128x139x55mm
- Weight: < 600g
- Environmental
 - Rated Operational Temperature: 0° to 50°C. See user manual for external fan cooling requirements above 40°C ambient temperature.
 - Humidity: 5 to 90% non-condensing humidity
 - Storage and Transportation Temperature Range: -25° to 60°C
 - Shock: 50 m/s² (5 G)
 - Vibration: 10 m/s² (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
Drive Axes	1	1	2,4
Current Rating	2	C	A = 2.5/5A up to 150VDC B = 5/10A up to 150VDC C = 10/20A up to 150VDC
500 kHz SinCos Encoder Channels	3	1	0, 1, 2,3,4
10 MHz SinCos Encoder Channels	4	0	0, 1, 2,3,4
Absolute Encoder Channels	5	1	0, 1, 2,3,4
Functional Safety	6	T	N=None, T=STO & SS1
Non-Linear Control	7	N	N = No, C = Non-Linear Control
Reserved for Future	8	N	N
Reserved for Future	9	N	N
Reserved for Future	10	N	N

Example: **IDMsm-2C201-TNNNN** Description: **4 axis 5/10A, 2x SinCos 500kHz encoder, 1x Absolute encoder, STO & SS1**

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



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