

# UDM<sub>HV</sub>

## EtherCAT<sup>®</sup> Single & Dual Axis 480VAC Drive Module



- > Universal single and dual axis EtherCAT Drive Modules
- > 400 - 480Vac with up to 15/30A continuous / peak current
- > 230Vac with up to 20/60A continuous / peak current
- > Exceptional Servo Performance
- > Two feedback inputs per axis
- > Supports incremental digital & analog encoders, absolute encoders & resolver
- > Digital I/O: 8 inputs, 8 outputs
- > Analog I/O: 4 inputs, 2 outputs, 12 bit resolution
- > Safe Torque Off (STO)

The UDM<sub>HV</sub> is a line of EtherCAT universal single & dual axis economical drives for AC servo / DC brushless, AC induction\*, and DC brush motors. The UDM<sub>HV</sub> operates as an EtherCAT node under any SPiiPlus EtherCAT master controller including the PC based SPiiPlusSC Soft Controller. It is designed to address cost sensitive applications requiring high dynamics and large loads.

The UDM<sub>HV</sub> is offered with the following current levels (cont./peak): 5A/10A, 10A/20A, 15A/30A, 20A/20A + 5A/10A with 400 -480Vac, and 10A/30A, 15A/45A, 20A/60A with 230Vac.

The module is powered by 3 phase 400 to 480Vac. In addition to the AC supply, the UDM<sub>HV</sub> is supplied by a separate 24Vdc control supply that keeps all low voltage signals alive during emergency conditions.

The optional Safe Torque Off (STO) module cuts the power to the motor without removal of the power source to comply with SIL-3 and PLe safety levels.

\* Consult ACS.

## Specifications

Product X - number of Axes YY - Other configuration options	UDMHV X-A-YY	UDMHV X-B-YY	UDMHV X-C-YY	UDMHV X-D-YY	UDMHV X-E-YY	UDMHV X-F-YY	UDMHV X-G-YY	UDMHV X-H-YY
Number of axes	1 or 2							
Control voltage input [Vdc]	24 ±10%							
Motor voltage input range [Vac-3 phase, 50-60Hz]	400 – 525 (480 nominal)				185-250 (230 nominal)			
PWM frequency [KHz]	10				20			
Phase Current per axis Cont./Peak sine amplitude at Vmax 480V [A]**	5/10	10/20	15/30	20/20 + 5/10	-	-	-	-
Phase Current per axis (Cont./Peak) sine amplitude at Vmax 230V [A]	-	-	-	-	5/15	10/30	15/45	20/60
Peak current time [sec]	1							
Max. output voltage to motor phase-to-phase [Vrms]	(Vac in) x 95%				(Vac in) x 88%			
Max. input continuous power @ 480 Vac [kVA]	7.6	15.1	22.7*	19	-	-	-	-
Max. input continuous power @ 230 Vac [kVA]	-	-	-	-	3.5	6.7	10.2	13.4
Min. load Inductance, at maximum motor voltage [mH]	1							
Max. output power (cont./peak) per axis @ 480 Vac [KW]	2.6/4.9	5.1/9.9	7.7/14.8	10.4+2.6/ 10.3+5.1	-	-	-	-
Max. output power (cont./peak) per axis @ 400 Vac [KW]	2.6/5	5.2/10	7.9/15.2	10.6+2.6/ 10.4+5.2	-	-	-	-
Max. Heat dissipation per axis @ 480 Vac [W]	50	102	156	211+50	-	-	-	-
Max. Heat dissipation per axis @ 230 Vac [W]	-	-	-	-	48	98	84	114
Weight [Kg]	5.3							
Dimensions [mm <sup>3</sup> ]	260 x 246 x 120							
Standards	CE, UL (Pending)							

\* Phase input current is limited to 27.8Arms

\*\* Up to 25% higher current is possible with customization when operating at 400Vac. Please contact ACS for more information.

### Servo

A standard comprehensive set of powerful algorithms to enhance accuracy, move & settle time, smooth velocity, stability and robustness

- > Advanced PIV cascaded structure
- > Loop shaping filters
- > Gain Scheduling
- > Gantry MIMO control
- > Dual feedback / loop control
- > Disturbance rejection control

### Supplies

The module is fed by two power sources. A drive 3 phase AC supply and a 24Vdc control supply.

During emergency conditions there is no need to remove the 24VDC control supply

#### Drive Supply

Range: 400 to 480Vac, or 230Vac, 3 Phase.

See 'ordering options' for the different configurations.

Current rating should be calculated based on actual load

Mating connector supplied.

#### Control Supply

Range: 24Vdc ± 10% Maximum input current / power: 4A / 100W

Note: The module consumes 2A (50W) Additional 2A are needed when the motor brake feature is used.

Mating connector supplied.

#### Regeneration

Internal and external options

Internal: 150Ω/300W for 400 - 480Vac modules

50Ω/300W for 230Vac modules

External: 50Ω/300W for 230Vac, 150Ω/300W for 480Vac

(see ordering options field 16)

### Motor Types

Two- and three-phase permanent magnet synchronous (DC brushless/AC servo), DC brush, Voice coil, Two- and three-phase stepper (micro-stepping open or closed loop), AC induction\*.

\* Consult ACS

### Drives

Type: digital current control with field oriented control and space vector modulation

Current ripple frequency: 20 kHz for A, B, C, D drivers and 40kHz for E, F, G, H drivers

Current loop sampling rate: 20 kHz

Programmable current loop bandwidth: up to 4kHz, will vary with tuning & load

parameters.

Commutation type: sinusoidal. Initiation with and without hall sensors

Switching method: advanced unipolar PWM

Protection: Short current (phase-to-phase or phase to ground), Over current, Over

temperature

### Feedback

Up to 4 feedback devices. The following are supported:

#### Incremental Digital Encoder

Up to four, two per axis, AqB,I; Clk/Dir,I RS-422. Max. rate: 50 million encoder counts/ sec.

Protection: Encoder error, not connected

#### Sin-Cos Analog Encoder (optional)

Up to two, one per axis. 1Vptp, differential

Multiplication factor: From x4, to- x4,096, frequency: 250kHz.

Automatic compensation of Offset, Phase and Amplitude. Squared Sin-Cos output option

Maximum acceleration: 108 million sine periods/sec<sup>2</sup>.

Protection: Encoder error, not connected

#### Absolute Encoder (optional)

Up to two, EnDat 2.1(Digital)/2.2, Smart-Abs, Panasonic, Hiperface, Biss-C, SSI.

#### Resolver (optional)

Two, 12b resolution (4,096 counts/rev). Available only with the 230Vac options (E, F, G, H in field 2 of ordering options).

#### Hall inputs for initial commutation

One set of three per axis, Single-ended, 5V, source, opto-isolated.

Input current: <7mA. Available only with the 230Vac options (E, F, G, H in field 2 of ordering options).

## Specifications

### Digital I/O

#### General Purpose Inputs

Eight, Single-ended, 24V±20%, opto-isolated, source. (optional 5V & sink configuration upon order) Input current: 4-14mA

#### Safety Inputs

Left + right limit per axis, Single-ended, 24V±20%, opto-isolated, source. optional 5V & sink configuration upon order, Input current: 4-14mA. E-Stop: Opto-isolated, floating two-terminal

#### MARK (High Speed Position Capture)

Four. Two are RS422 with dedicated inputs and can be used as GP inputs. Two share General Purpose Inputs 6,7

#### General Purpose Outputs

Eight, Single-ended, 24V±20%, opto-isolated, source. 0.5A per output with up to 3A for all outputs

#### Motor Brake outputs

One per axis, 24V, 1A, opto-isolated.

Powered by the 24V Control Supply

#### PEG (Position Event Generator)

Two PEG Pulse and two PEG State, RS422.

Flexible axis assignment. Can be used as GP outputs.

Two general purpose opto-isolated outputs can be programmed to be used as the PEG Pulse outputs. Pulse width with RS422 outputs:

26nSec to 1.75mSec.

Maximum rate with RS422 outputs: 10MHz

Pulse width with GP outputs: 0.75mSec to 1.75mSec.

Maximum rate with GP outputs: 1kHz

#### HSSI

One channel, RS422, Flexible assignment to both axes

#### STO

Two pairs of inputs

### Analog I/O

#### Analog Inputs

Four, ±10V, differential, 12 bit resolution. 20kHz sampling rate.

Can be used as feedback to the servo loops

#### Analog Outputs

Two, ±10V, differential, 10 bit resolution. Sampled at the servo sampling rate

### Host Communication Ports

Serial: One, Modbus protocol as slave

EtherCAT ports: Two, In & Out, 100 Mbit/sec, CoE and FoE protocols

### Environment

Operating range: 0 to + 40°C

Storage and transportation range: -25 to +60°C

Humidity (operating range): 5% to 90% non-condensing

### Accessories

Mating Connectors Kit: CMhvUDMhv-ACC1

J11 mating connector +2m cable, flying leads: CMhvUDMhv-ACC2

Clamping Yoke: CMhvUDMhv-ACC3

Cover fan kit: HV COVER FAN ACC1

Heatsink fan kit: HV HEATSINK FAN ACC1

STO kit, 2 meter cable with flying leads for STO: STO-ACC1

STO kit, Connector Kit for STO card: STO-ACC2

### Certifications

CE: Yes

Electrical Safety: IEC 61010-1, IEC 61800-5-1

EMC: EN 61800-3

UL Certification: UL508C

Functional Safety: IEC 61800-5-1, IEC 61800-5-2

## Ordering Options

Ordering Options	Field	Example User Selection	Values
Number of built-in drives	1	1	1, 2
Voltage & current rating of built-in drives (cont/peak) <sup>1</sup>	2	2	A - 400-480V, 5/10A, B - 400-480V, 10/20A, C - 400-480V, 15/30A, D - 400-480V, 20/20A+5/10A, E - 230V, 5/15A, F - 230V, 10/30A, G - 230V, 15/45A, H - 230V, 20/60A
250kHz Sin-Cos encoder interface	3	3	0, 1, 2
Total number of feedback channels <sup>4</sup>	4	4	2, 4
Absolute encoders type <sup>5</sup>	5	5	N - None, E - EnDAT 2.1(digital)/2.2, S - Smart Abs, P - Panasonic (P), B - BiSS-A/B/C, H - Hiperface, R - Resolver <sup>3</sup> , I - SSI
Number of absolute encoder channels	6	6	0, 1, 2
STO	7	7	Y - Yes, N- No
I/O configuration	8	8	N - Inputs & limits: 24V/SOURCE (PNP), Outputs: 24V/SOURCE (PNP). D - Identical to N. For compatibility reasons. S - Inputs & limits: 24V/SINK (NPN), Outputs: 24V/SOURCE (PNP). U - Inputs: 24V/SOURCE (PNP), Limits 24V/SINK (NPN), Outputs: 24V/SOURCE (PNP).
Built-in Shunt Resistor	9	9	None (N), 50Ω/300W for 230Vac (A) <sup>2</sup> , 150Ω/300W for 480Vac (B) <sup>2</sup>
NanoPWM	10	10	N - No

<sup>1</sup>When Option A, B, C, or D is selected for this field, Resolver inputs and Hall inputs are not supported

<sup>2</sup>Available selection for "Voltage and Current Rating" (field 2) A,B,C,D

<sup>3</sup>Available selection for "Voltage and Current Rating" (field 2) E,F,G,H

<sup>4</sup>To use a 5Vdc external supply for the encoders consult ACS.

<sup>5</sup>All absolute encoder channels must be the same type

#### Example: UDMhv2A12B1YSAN

Field	1	2	3	4	5	6	7	8	9	10	
PN	UDMhv	2	A	1	2	B	1	Y	S	A	N