SPiiPlusCM HV

EtherCAT® Master Motion Controller with Two Integrated 480Vac drives

> Two built-in drives with up to 15A continuous/30A peak @ 480 VAC or up to 20A continuous/60A peak @ 230 VAC

> Integrated EtherCAT master with one or two built-in drives Up to 32 axes and thousands of I/O

> Exceptional Servo Performance: High accuracy, move & settle time, smooth velocity, stability and robustness

> Two feedback inputs per axis

> STO: Safe Torque Off (optional)

> Digital I/O: 8 + 8 or 10 + 6

> Analog I/O: 4 + 2, Inputs resolution 12 bit, Outputs resolution 10 bit

> A rich set of tools for application development, set up, tuning and diagnostics

> Powerful ACSPL+ multitasking motion programming language

The SPiiPlusCM HV is a state of the art line of EtherCAT network multi-axis machine and motion controllers with one or two built-in universal drives. It is specifically designed to extend the capabilities of the SPiiPlusCM line of control modules to address the needs of modern machinery for high voltage, up to 480Vac, high power, economical and scalable distributed control for motion centric applications.

The SPiiPlusCM HV controls and generates the motion profile for up to 32 axes at 2KHz.Its open architecture operates in conjunction with ACS' line of EtherCAT servo and step motor drives and I/Os modules, as well as with any certified EtherCAT module that complies with CAN over EtherCAT (CoE) protocol, and provides a comprehensive and cost effective control solution for demanding machinery.

The SPiiPlusCM HV is complemented by the SPiiPlusNT suite of software tools with built-in simulator. The tools are designed to minimize time to market while providing the flexibility to meet the specific machine requirements throughout its life cycle.

It provides easy setup, fast host and embedded application development, and quick diagnostics, reducing efforts and costs.

The SPiiPlusCM HV is powered by AC input and by a 24Vdc control supply that keeps all low voltage signals alive during emergency conditions.

The SPiiPlusCM HV is offered with the following currents (cont./peak): 5A/10A, 10A/20A, 15A/30A, 20A/20A + 5A/10A with 400-480Vac, and 10A/30A, 15A/45A, 20A/60A with 230Vac.

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.

ACS
MOTION CONTROL

Product X -number of Axes YY - Other configuration options	SPiiPlusCMHV X-A-YY	SPiiPlusCMHV X-B-YY	SPiiPlusCMHV X-C-YY	SPiiPlusCMHV X-D-YY	SPiiPlusCMHV X-E-YY	SPiiPlusCMHV X-F-YY	SPiiPlusCMHV X-G-YY	SPiiPlusCMHV 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 @ 230 Vac [KW]	-	-	-	-	1.2/3.3	2.2/6.3	3.5/9.7	4.5/12.7
Max. Heat dissipation per axis @ 480 Vac [W]	50	102	156	211+50	-	-	-	-
Max. Heat dissipation per axis @ 230 Vac [W]	-	-	-	162+36	48	98	84	114
Weight [Kg]	5.3							
Dimensions [mm³]	260 x 246 x 120							

* 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

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

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.
Regeneration
Internal option: 150Ω/300W for 400 - 480Vac modules
50Ω/300W for 230Vac modules
Mating connector supplied..

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.

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/sec².
Protection: Encoder error, not connected
Absolute Encoder (optional)
Up to two, EnDat 2.1(Digital)/2.2, Smart-Abs, Panasonic, Hiperface, Biss-A/B/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).

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

Communication Channels
Ethernet: one, TCP/IP,10/100 Mbits/sec.
Serial: One RS-232. Up to 115,200bps. Modbus protocol as master or slave
EtherCAT ports: Two, In & Out, 100 Mbit/sec, CoE and FoE protocols

ACS MOTION CONTROL

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

Number of Controller Axes
Up to 32

Motion Processor Unit (MPU)
Processor Type: Multi-core Intel Atom CPU (model depends on controller configuration)
    RAM: 1GB
    Flash: 2GB

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
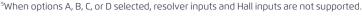UL: UL508C
Functional Safety: IEC 61800-5-1, IEC 61800-5-2

Example:CMhv2B24E2NA1AWNAYNNND

Field	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PN **CMhv**	2	B	2	4	E	2	N	A	1	A	W	N	A	Y	N	N	N	D

Ordering Options

	Field	Example selection by user	Optional Values
Number of built-in drives	1	2	1, 2
Voltage & current rating of built-in drives (cont/peak)[5]	2	B	(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	2	0, 1, 2
Total number of feedback channels[4]	4	4	2, 4
Absolute encoders type[6]	5	E	None (N), EnDAT 2.1(digital)/2.2 (E), Smart Abs (S), Panasonic (P), Hiperface (H), Resolver (R)[2], BiSS-A/B/C (B), SSI (I)
Number of absolute encoder channels	6	2	0, 1, 2
STO	7	N	Yes (Y), No (N)
Maximum number of axes	8	A	2, 4, 8, 16(A), 32(B)
ECAT 3rd party Servo Drive	9	1	Up to the maximum number of axes (FOC) - number of internal drives
ECAT 3rd party Step motor Drive (open & closed loop	10	A	Up to the maximum number of axes (FOC) - number of internal drives
ECAT 3rd party IO EtherCAT node)	11	W	32 (W) FOC,64(X)
G-Code, Flexible configuration, Both	12	N	None (N), G-code (G), Flexible configuration (F), Both (T)
ServoBoost™ number of axes supported	13	A	0(N), 4(A), 8(B), 12(C), 16(D), 20(E), 24(F), 28(G), 32(H)
Input shaping, Learning Boost, Both	14	Y	N = No, L = LearningBoost, Y = Input Shaping, B = Both
I/O configuration	15	N	(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	16	N	None (N), 50Ω/300W for 230Vac (A)[2], 150Ω/300W for 480Vac (B)[3]
XL Scan (unit per scanner)	17	N	None(N), 1,2,...9,10(A),11(B),12(C),13(D),14(E),15(F),16(G)
Number of ACSPL+ buffers	18	D	Default[1] (D), 16 (A),32 (B)

[1] Default number of ACSPL+ buffers is a function of the number of axes specified (field 8). Up to 8 axes - 10 buffers; 16 axes - 16 buffers; 32 axes - 32 buffers
[2] Available selection for "Voltage and Current Rating" (field 2) E,F,G,H
[3]Available selection for "Voltage and Current Rating" (field 2) A,B,C,D
[4] To use a 5Vdc external supply for the encoders consult ACS.
[5]When options A, B, C, or D selected, resolver inputs and Hall inputs are not supported.
[6]All absolute encoder channels must be the same type

ACS
MOTION CONTROL