SPiiPlusCM_{NT}
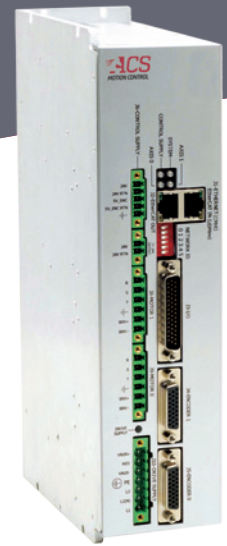
32 Axis EtherCAT® Master Control module with 2 Built-in Drives

- Integrated EtherCAT master with two built-in drives
  Up to 32 axes and thousands of I/O
  Open Architecture – Command ACS and third party EtherCAT drives and I/O

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

- Powerful ACSPL+ multitasking motion and IEC-61131-3 PLC programming languages

- Extending the capabilities of the field proven SPiiPlus line to address the needs of cost sensitive applications

- Two built-in drives
  85 to 265Vac, up to 7.5A continuous and 15A peak current (~1.6kW/3.2kW @230Vac)
  Dual feedback per axis
  20kHz sampling and update rate of all control loops
  Safe Torque Off (STO)

- Digital I/O: 8 + 8

- Analog I/O: 4 + 2, 12 bit resolution

The SPiiPlusCM_{NT} is a state of the art line of EtherCAT network multi-axis machine and motion controllers with two built-in universal drives. It is specifically designed to extend the capabilities of the SPiiPlus line of control modules to address the needs of modern machinery for an economical, scalable distributed control for motion centric applications. 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, providing a comprehensive and cost effective control solution for demanding machinery. The SPiiPlusCM_{NT} controls and generates the motion profile for up to 32 axes.

The SPiiPlusCM_{NT} is complemented by the SPiiPlus 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_{NT} is offered with the following current levels: 2.5/5, 5A/10A and 7.5A/15A (cont./peak). 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. The module is powered by a single phase 85 to 230Vac and by a separate 24Vdc control supply that keeps all low voltage signals alive during emergency conditions.

CE, UL

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ACS
MOTION CONTROL

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: 40 kHz Current loop sampling rate: 20 kHz
Programmable Current loop bandwidth: up to 5 kHz
Commutation type: sinusoidal. Initiation with and without hall sensors
Switching method: advanced unipolar PWM
Protection: Over voltage, Phase-to-phase short circuit, Short to ground, Over current, Over temperature

Supply

The module is fed by two power sources
A motor AC supply and a 24Vdc control supply
During emergency conditions there is no need to remove the 24Vdc control supply

Motor Supply
Range: 85 to 265Vac
Current rating should be calculated based on actual load

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

Motor Type

DC Brushless (AC Servo) ,DC brush motors, AC Induction

Feedback

Incremental Digital Encoder: Four, two per axis, A&B,I; Clk/Dir,I
RS-422. Max. rate: 50 million encoder counts/ sec., Protection:Encoder error, not connected
Sin-Cos Analog Encoder (optional): 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: 10^8 million sine periods/ sec^2. Protection: Encoder error, not connected
Hall inputs: Two sets of three per axis
Single-ended, 5V, source, opto-isolated
Input current: <7mA
Resolver: 12b resolution (4,096 counts/rev)
Absolute encoders (optional): EnDat 2.1(Digital)/2.2, Smart-Abs, Panasonic, Biss-C, Hiperface
5V feedback supply: Total current available for feedback devices: 250mA

Digital I/O

Safety Inputs: Left + right limit per axis
Single-ended, 24V±20%, opto_isolated, source. optional 5V & sink configuration upon order Input current: 14mA. E-Stop: Opto-isolated, floating two-terminal
Motor Brake outputs: Two. 24V, 1A ,opt_ isolated. Powered by the 24V Control Supply
STO (optional): Two pairs of inputs
General Purpose Inputs: Eight, Single-ended, 24V±20%, opto-isolated, source. (optional 5V & sink

configuration upon order) Input current: 14mA
Registration MARK: 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
Position Event Generator (PEG): Two PEG_Pulse and two PEG_State, RS422. Flexible axis assignment. Can be used as GP outputs
Two GP 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

Analog I/O

Four inputs, Two outputs, ±10V, differential, 12 bit resolution. 20kHz sampling rate. The inputs can be used as feedback to the servo loops

Controller and EtherCAT Master

Number of axes: Up to 32
MPU/EtherCAT Cycle Rate: 2kHz (2,4,6,8 axes), 1kHz (16,32 axes)
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: Two, In & Out, 100 Mbit/sec, CoE and FoE protocols
MPU User Memory: RAM: 128Mb. Non-volatile memory (Flash): 128Mb. Power up Time: 25sec.

Environment

Operating: 0 to + 50°C. Storage : -25 to +70°C
Humidity: 5% to 90% non-condensing

Specifications

Part Number X represents number of axes XX represents other options	SPiiPlusCM$_{NT}$ X-002-XX	SPiiPlusCM$_{NT}$ X-005-XX	SPiiPlusCM$_{NT}$ X-007-XX
Number of Axes		1 or 2	
Input voltage range [Vac]		85 to 265	
Phase Current Cont./Peak, sine amplitude [A]	2.5 / 5.5	5 / 10	7.5 / 15
Phase Current Cont./Peak, RMS [A]	1.8 / 3.6	3.6 / 7.1	5.4 / 10.8
Peak current time [sec]		1	
Max. output voltage [Vdc]		(Vac in) x 1.41 x 88%	
Max. Input cont. power per axis @ at 230Vdc [kVA]	0.9 / 1.8	1.8 / 3.6	2.5 / 5
Max. output power (Cont./Peak) per axis @ 230Vdc [kW]	0.55 / 1.1	1.1 / 2.2	1.6 / 3.2
Min. load Inductance, at maximum motor voltage [mH]. With a lower voltage the min. inductance value can be reduced proportionally		0.05	
Max. Heat dissipation per axis @ 230Vac [W]	25	50	75
Weight [gram]		2,000	
Dimensions [mm³]		270 x 157 x 67	
Standards		CE,UL	

Note: Cooling by forced airflow is required. For maximum power at elevated temperature the additional heat sink option is required. See manual.

Example: CM$_{NT}$2502N0N1600GNNNN

Field		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PN	**CM$_{NT}$**	2	5	0	2	N	0	N	16	0	0	G	N	N	N	N

Ordering Options

Ordering options	Field	Example	Values
Number of built-in drives (85Vac-265Vac)	1	2	1,2
Current rating of built-in drives (cont/peak)	2	5/10A	2.5/5A, 5/10A, 7.5/15A
No. of 250kHz Sin-Cos encoder interfaces	3	0	0,1,2
Encoder channels per axis	4	2	1,2
Absolute encoders type	5	None	N- None, E- EnDat 2.1(digital)/2.2, S- Smart-Abs, P- Panasonic, B- BiSS-C, H- hiperface, R- Resolver
Number of Absolute encoders interface	6	0	0,1,2
STO	7	Yes	Y- Yes, N- No
Maximum number of axes	8	16	2,4,8,16,32
ECAT 3rd party Servo Drive	9	0	0 to 16 (0,1,2,3,...9,A,B,C,D,E,F,G)
ECAT 3rd party Step motor Drive (open & closed loop)	10	0	0 to 16 (0,1,2,3,...9,A,B,C,D,E,F,G)
ECAT 3rd party IO EtherCAT node	11	G	G- 4 (included automatically FOC) 8,16, W- 32, X- 64
PLC (IEC-61131-3), G-Code, or both	12	No	N- None, Y- PLC only, G- G-code only, B- Both
ServoBoost, number of axes supported	13	0	N- Not Supported
Input shaping	14	No	Y-Yes, N-No
I/O Configuration	15	N	**N- Inputs & limits:** 24V/SOURCE (PNP), **outputs:** 24V/SOURCE (PNP) **D-** Identical to (N), For compatability reasons. **S-** Inputs & limits: 24V/SINK (NPN) **Outputs:** 24V/SOURCE (PNP) **R-** Inputs & limits: 5V/SOURCE (PNP) **Outputs:** 5V/SOURCE (PNP) **T-** Inputs & limits: 5V/SINK (NPN) **Outputs:** 5V/SOURCE (PNP)

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