

# SPiiPlusCM<sub>NT</sub>



## 32 Axis EtherCAT<sup>®</sup> 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 (or 120 to 375Vdc), 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<sub>NT</sub> 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<sub>NT</sub> controls and generates the motion profile for up to 32 axes.

The SPiiPlusCM<sub>NT</sub> 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<sub>NT</sub> 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 265Vac (or 120 to 375Vdc), and by a separate 24Vdc control supply that keeps all low voltage signals alive during emergency conditions.

### CE, UL

EtherCAT<sup>®</sup> is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany

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## Specifications

Part Number X represents number of axes XX represents other options	SPiiPlusCM <sub>NT</sub> X-002-XX	SPiiPlusCM <sub>NT</sub> X-005-XX	SPiiPlusCM <sub>NT</sub> X-007-XX
Number of Axes	1 or 2		
Input voltage range [Vac]	85 to 265		
Input voltage range [Vdc]	120 to 375		
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 @ 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 [mm <sup>3</sup> ]	270 x 157 x 67		
Standards	CE,UL		

Example: CM<sub>NT</sub>2502N0Y1600GNNNN

Field	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
PN	CM <sub>NT</sub>	2	5	0	2	N	0	Y	16	0	0	G	N	N	N	N

### Accessories

SPii+CMntUDMpm-ACC1: mating connectors kit

SPii+CMntUDMpm-ACC2: J11 mating connector with two meters cable with flying leads

STO-ACC1: STO mating connector with 2m cable

### 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 or 120 to 375Vdc  
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

### 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<sup>8</sup> million sine periods/sec<sup>2</sup>. 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

## 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	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	N	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	Y	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	N	N- None, Y- PLC only, G- G-code only, B- Both
ServoBoost, number of axes supported	13	N	N- Not Supported
Input shaping	14	N	Y-Yes, N-No
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).

Note: ServoBoost is not applicable to the following drives: The internal drives of this control module, UDMpm, UDMba.

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