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 (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 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 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® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany
**Specifications**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>X represents number of axes</th>
<th>SPIi+CMntUDMpm-ACC1: mating connector kit</th>
<th>SPIi+CMntUDMpm-ACC2: J11 mating connector with two meters cable with flying leads</th>
<th>SPIi+CMntUDMpm-UDMpm-ACC2: J11 mating connector with two meters cable with flying leads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Axes</td>
<td>1 or 2</td>
<td>1.8 / 3.6</td>
<td>5 / 10</td>
<td>20kHz</td>
</tr>
<tr>
<td>Input voltage range [Vac]</td>
<td>85 to 265</td>
<td>3.6 / 7.1</td>
<td>2.5 / 5.5</td>
<td>0.9 / 1.8</td>
</tr>
<tr>
<td>Input voltage range [Vdc]</td>
<td>120 to 375</td>
<td>2.5 / 10</td>
<td>5 / 10</td>
<td>0.55 / 1</td>
</tr>
<tr>
<td>Phase Current Cont./Peak, sine amplitude [A]</td>
<td>7.5 / 15</td>
<td>2.2 / 2</td>
<td>2.2 / 2</td>
<td>0.55 / 1.1</td>
</tr>
<tr>
<td>Phase Current Cont./Peak, RMS [A]</td>
<td>1.6 / 3.2</td>
<td>1.6 / 3.2</td>
<td>1.6 / 3.2</td>
<td>1.8 / 3.6</td>
</tr>
<tr>
<td>Peak current time [sec]</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Max. output voltage [Vdc] (Vac in) x 1.41 x 88%</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Max. current power per axis @ 230Vdc [kW]</td>
<td>0.9 / 1.8</td>
<td>1.8 / 3.6</td>
<td>5 / 5.5</td>
<td>0.55 / 1.1</td>
</tr>
<tr>
<td>Max. output power (Cont./Peak) per axis @ 230Vdc [kW]</td>
<td>0.9 / 1.8</td>
<td>1.8 / 3.6</td>
<td>5 / 5.5</td>
<td>0.55 / 1.1</td>
</tr>
<tr>
<td>Min. load Inductance, at maximum motor voltage [mH]</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Max. Heat dissipation per axis @ 230Vdc [W]</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>25</td>
</tr>
<tr>
<td>Weight [gram]</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Dimensions (mm²)</td>
<td>270 x 157 x 67</td>
<td>270 x 157 x 67</td>
<td>270 x 157 x 67</td>
<td>270 x 157 x 67</td>
</tr>
<tr>
<td>Standards</td>
<td>CE, UL</td>
<td>CE, UL</td>
<td>CE, UL</td>
<td>CE, UL</td>
</tr>
</tbody>
</table>

**Motor Type**
DC Brushless (AC Servo), DC brush motors

**Feedback**
Incremental Digital Encoder: Four, two per axis, A&B, I, CLK/DIR
RS-422. Max rate: 50 million encoder counts/sec. Protection: Encoder error, not connected
Sin-Cos Analog Encoder (optional): Two, one per axis, V/ptp, 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°/million sine periods/sec². 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-Abss, 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 DC 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: 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 opt-isolated outputs can be programmed to be used as the PEG Pulse outputs
Pulse width with RS422 outputs: 265Sec 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

**Ordering Options**

<table>
<thead>
<tr>
<th>Ordering options</th>
<th>Field</th>
<th>Example</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of built-in drives (85Vac-265Vac)</td>
<td>2</td>
<td>2</td>
<td>2.5/5A, 5/10A, 7.5/15A</td>
</tr>
<tr>
<td>Current rating of built-in drives (cont/peak)</td>
<td>5</td>
<td>5</td>
<td>0.12</td>
</tr>
<tr>
<td>No. of 250kHz Sin-Cos encoder interfaces</td>
<td>3</td>
<td>0</td>
<td>1.2</td>
</tr>
<tr>
<td>Encoder channels per axis</td>
<td>4</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Absolute encoders type</td>
<td>5</td>
<td>N</td>
<td>N, None, E- EnDat2.1/digital/2.2, S- Smart-Abss, P- Panasonic, B- BiSS-C, H- Hiperface, R- Resolver</td>
</tr>
<tr>
<td>Number of Absolute encoders interface</td>
<td>6</td>
<td>0</td>
<td>0.1,2</td>
</tr>
<tr>
<td>STO</td>
<td>7</td>
<td>Y</td>
<td>Y, N- No</td>
</tr>
<tr>
<td>Maximum number of axes</td>
<td>8</td>
<td>16</td>
<td>2,4,8,16,32</td>
</tr>
<tr>
<td>ECAT 3rd party Servo Drive</td>
<td>9</td>
<td>0</td>
<td>0 to 16 (0,1,2,3, ... ,9,A,B,C,D,E,F,G)</td>
</tr>
<tr>
<td>ECAT 3rd party Step Motor Drive (open &amp; closed loop)</td>
<td>10</td>
<td>0</td>
<td>0 to 16 (0,1,2,3, ... ,9,A,B,C,D,E,F,G)</td>
</tr>
<tr>
<td>ECAT 3rd party IO EtherCAT node</td>
<td>11</td>
<td>G</td>
<td>G- (included automatically FOC)</td>
</tr>
<tr>
<td>PLC (IEC-61131-3), G-Code, or both</td>
<td>12</td>
<td>N</td>
<td>N- None, Y- PLC only, G- G-code only, B- Both</td>
</tr>
<tr>
<td>ServoBoost, number of axes supported</td>
<td>13</td>
<td>N</td>
<td>N- Not Supported</td>
</tr>
<tr>
<td>Input shaping</td>
<td>14</td>
<td>N</td>
<td>Y-Yes, N- No</td>
</tr>
</tbody>
</table>

**Example:** CMnt2502N0Y1600GNNNN

**Field**
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

| PN | CMMnt | 2 | 5 | 0 | 2 | N | Y | 16 | 0 | G | N | N | N | N |

**Ordering options**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

| I/O Configuration | 15 | N |

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

**Accessories**
SPIi+CMMntUDMpm-ACC1: mating connector kit
SPIi+CMMntUDMpm-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
- Grantry 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 sampling rate: 20 kHz
Current ripple frequency: 40 kHz Current loop control and space vector modulation

**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

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

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