SPiiPlusEC

Board Level

Panel Mounted

Powerful Motion Controller and EtherCAT® Network Manager

- Up to 64 fully synchronized axes
- 1,2,4 & 5KHz profile generation & EtherCAT cycle rates
- ***Network****Boost*™ network failure detection and recovery with ring topology
- 1GbE Ethernet host communication
- Open Architecture - ACS' and other vendor's EtherCAT devices, drives and I/O
- Comprehensive set of support tools for EtherCAT Network setup, axis tuning, application development, and diagnostics
- Available in board level format for table top applications with limited space

ACS' SPiiPlusEC is a state of the art line of Motion controllers and EtherCAT master.

It is specifically designed to extend the capabilities of the SPiiPlus line of controllers and etherCAT master, to address the needs of modern machinery for cost effective high performance multi-axis, scalable and distributed control of motion centric applications. The SPiiPlusEC 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 third party EtherCAT module that complies with CAN over EtherCAT (CoE) protocol. The unique ***Network****Boost*™ optional feature increases machines' uptime using ring topology based redundancy to continue operation upon a network failure.

The SPiiPlusEC EtherCAT cycle and profile generation rate is 1 to 5kHz. ACS drives execute the servo control algorithms at a 20kHz rate using a distributed clock to ensure synchronization of better than 0.1 microsecond between all axes.

The SPiiPlusEC is complemented by the SPiiPlusNT suite of software tools that are designed to minimize time to market and to address the specific machine requirements throughout its whole life cycle. It provides extraordinarily easy automatic network setup, fast host and embedded application development, and quick diagnostics. Set up of third party drives are done using by the third party tuning tools. Once connected to the EtherCAT network, real time variables, such as position, position error, velocity and others can be viewed, monitored and recorded with ACS' tools. All tools include a built-in simulator, powerful remote access and diagnostics, and fast error recovery, reducing training effort and costs.

The SPiiPlusEC is available in two form factors:
- Panel mounted enclosure
- Board level

ACS MOTION CONTROL

Specifications

Number of Axes
Up to 64 axes, Thousands of I/O's

Motion Types
- Multi-axis point-to-point, jog, tracking and sequential multi-point motion
- Multi-axis segmented motion with look-ahead
- Arbitrary path with PVT cubic interpolation
- Third order profiles (S-curve)
- Smooth on-the-fly change of target position or velocity
- Inverse/Forward kinematics and coordinate transformations (at application level)
- Master-slave with position and velocity locking (electronic gear/cam)

Programming
- ACSPL+ powerful motion language
  - Real-time program(s) execution
  - Up to 64 simultaneously running programs
- NC programs (G-code)
- C/C++, .NET and many others standard languages

Supported EtherCAT Slaves
All ACS SPiiPlus Platform EtherCAT slave products are supported. 3rd party EtherCAT drives can be controlled via DS402 CoE protocol in Cyclic Synchronous Position (CSP) mode.
ACS recommends qualification of 3rd party EtherCAT drives and I/O devices. Refer to ACS website for latest list of qualified devices and contact an ACS representative to discuss qualification options.

Communication Channels
Serial: two RS-232. Up to 115,200 bps
Ethernet: One, TCP/IP, 100/1000 Mbs
Simultaneous communication through all channels is fully supported.
Modbus as master or slave is supported over Ethernet and serial channels.
Ethernet/IP protocol as adapter is supported over Ethernet channel.

Power Supply
Panel Mounted: 24Vdc ± 10%, 0.8A
Board level: 5Vdc ±5% ,2.2A

MPU/EtherCAT Cycle Rate
The following options are available for MPU Cycle Rate:
For Maximum Number of Axes = 2, 4, or 8: 2 kHz (default), 4 kHz, 5 kHz
For Maximum Number of Axes = 16 or 32: 2 kHz (default), 4 kHz
For Maximum Number of Axes = 64: 1 kHz (default), 2 kHz
NetworkBoost™ and Segmented Motion (XSEG) features functionality can be limited as a function of MPU Cycle Rate and Number of Axes. Please refer to Software Documentation or contact ACS for more details.

Environment
Operating Temperature: 0°C to 55°C
An internal fan is automatically activated when operating temperature rises above 30°C
Storage Temperature: -20°C to 85°C
Humidity: 90%RH, non-condensing

Dimensions
158 x 124 x 45 mm^3

Weight
450 gr.

Accessories
Panel mounted version: Din rail mounting kit (DINM-13-ACC) included with product
Board level version: None

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

Certifications
CE: Yes
EMC: EN 61326-1

EtherCAT Ports
Two ports, Primary and secondary
Rate: 100 Mbit/sec
Protocols: CoE and FoE
Network*Boost* (optional) - Automatic network failure detection and recovery using ring topology and redundancy
Dual EtherCAT Network (optional) - Starting with V3.13, the Dual EtherCAT feature provides the ability to control two independent EtherCAT networks using a single ACS controller.

Field Upgrades
For controllers ordered from the factory with Maximum Number of Axes equal to 32 or less and Maximum MPU Cycle Rate of 2kHz (default), the following field upgrade options are available:

Maximium Number of Axes	Maximum MPU Cycle (kHz))
2	4, 5
4	4, 5
8	4, 5
16	4, 5[1]
32	2

[1]16 axes and 5 kHz (requires Dual EtherCAT Network option)

It is not possible to field upgrade a controller ordered with 32 axes or less to 64 axes.
For controllers ordered from the factory with Maximum Number of Axes equal to 64 and Maximum MPU Cycle Rate of 1kHz (default), the following field upgrade options are available:

Maximium Number of Axes	Maximum MPU Cycle (kHz))
64	2

Ordering Options

	Field	Example selection by user	Optional Values
Maximum number of axes	1	04	2,4,8,16,32,64
ECAT 3rd party Servo Drive	2	00	Up to the maximum number of axes
ECAT 3rd party Step motor Drive (open & closed loop)	3	00	Up to the maximum number of axes
ECAT 3rd party IO EtherCAT node	4	32	32, 64
G-Code, 5 Axis Coordinated Motion[1]	5	N	N - None F= 5 Axis Coordinated Motion D= G-Code & 5 Axis Coordinated Motion G - G-code
Number of ***Servo****Boost* and ***Servo****Boost* Plus Axes	6	A	N = None A = 4 axes ServoBoost B = 8 axes ServoBoost C = 8+ axes (equal to Max Number of Axes) ServoBoost J = 4 axes ServoBoost & ServoBoost Plus K = 8 axes ServoBoost & ServoBoost Plus L = 8+ axes (equal to Max Number of Axes) ServoBoost & ServoBoost Plus
Input shaping ***Learning****Boost*, Non-Linear Control Autofocus	7	Y	N = No Y = Input Shaping L = LearningBoost C = Non-Linear Control B = LearningBoost & Input Shaping D = Input Shaping & Non-Linear Control E = LearningBoost & Non-Linear Control F = LearningBoost & Input Shaping & Non-Linear Control G = AutoFocus H = Input Shaping & AutoFocus J = LearningBoost & AutoFocus K = Non-Linear Control & Autofocus
Maximum MPU cycle rate (kHz) & ***Motion****Boost*	8	D	D - Default, 2 - 2kHz[2], 4 - 4kHz[4], 5 - 5kHz[3,4]
Network*Boost*, Flexible configuration, Dual EtherCAT Network	9	N	N = None A = NetworkBoost B = Flexible Configuration C = NetworkBoost & Flexible Configuration D = Dual EtherCAT Network E = Dual EtherCAT Network & Flexible Configuration
Number of ACSPL+ Buffers & Real-Time C Function Support	10	D	D = Default[5] A = 16 B = 32 C = 64 E = Default & Real-Time C Function Support Enabled F = 16 & Real-Time C Function Support Enabled G = 32 & Real-Time C Function Support Enabled H = 64 & Real-Time C Function Support Enabled
Board level version[6]	11	N	Y - Yes, N - No
XL Scan (unit per scanner)	12	N	None(N), 1,2,...9,10(A),11(B),12(C),13(D),14(E),15(F),16(G)

[1] Includes 3+ Axis SmoothPath and 3+ NURBS
[2] Only relevant for controllers with Max Number of Axes = 64
[3] 16 axes and 5 kHz (requires Dual EtherCAT Network option)
[4] Includes MotionBoost, 2 axis SmoothPath, 2 Axis NURBS and SmoothPTP
[5] Default number of ACSPL+ buffers/tasks is a function of the number of axes specified (field 1)
Up to 8 axes - 10 buffers; 16 axes - 16 buffers; 32 axes - 32 buffers; 64 axes - 64 buffers
[6] Consult ACS with regards to availability and assembly instructions

Example: SP+EC-04000004NAYDNDNN

Field		1	2	3	4	5	6	7	8	9	10	11	12
PN	**SP+EC-**	04	00	00	32	N	A	Y	D	N	D	N	N