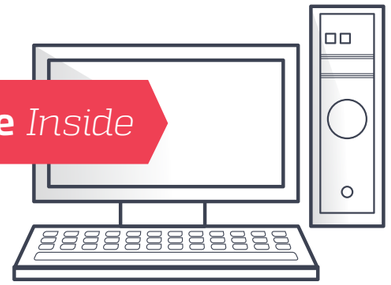
Smarter Motion

Powerful Control Solutions for Demanding
Multi-Axis Machinery

ACS
MOTION CONTROL

Tools for Setup, Application Development, Monitoring and Diagnostics

SPiiPlusNT Suite *Inside*



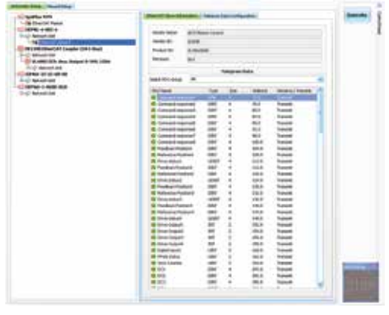
Pages 8-9

Powerful Controller Simulator

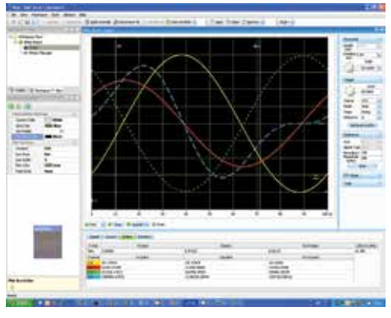
Program Development

System Setup & Tuning

Network Configuration



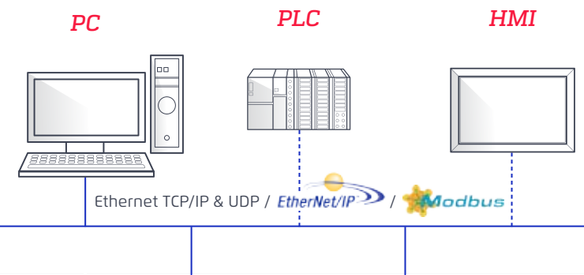
Diagnostics & Monitoring



EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany

Comprehensive Control Solutions for Machinery with Demanding Multi-Axis Motion

Easy Interface with a Variety of Hosts



Soft Controller: Use your PC to run the Most Powerful Motion Controller

SPiiplusSC inside an ACS industrial PC

Pages 12-13

SPiiplusSC inside a User Specified PC

EtherCAT

Standalone EtherCAT Motion Controller

SPiiPlusNTM

Page 10

Control Modules: EtherCAT Motion Controller with Built-In Drives

MC4UNT	*SPiiPlusCMNT*	*SPiiPlusCMHP/BA*
(320V, 45/90A) (560V, 15/30A)	2 built-in drives (320V, 7.5/15A)	3 built-in drives (320V, 15/30A)

Pages 14-19

Up to 64 axes and thousands of I/Os

Universal Drive Modules: Outstanding Move & Settle, Nanometer Jitter, Smooth Velocity

UDMLC	*UDMPC*	*UDMNT*	*UDMMC*	*UDM HP/BA*	*UDMPM*	*MC4UDC*	*SDMNT*
(48V, 5/10A)	(48V, 10/20A)	(80V, 10/20A)	(80V, 20/40A)	(320V, 15/30A)	(320V, 7.5/15A)	(320V, 45/90A) (560V, 15/30A)	Unipolar stepper (40V, 3A)

Interfaces

UDIHP/LT	*PDMNT*
±10V drives	P/D drives

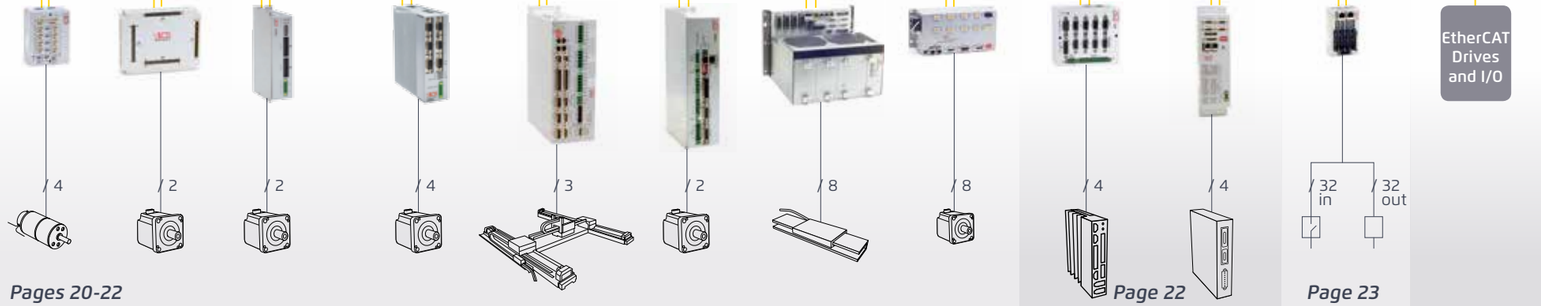
I/O

IOMNT

Digital 24V I/O

3rd party devices

EtherCAT Drives and I/O



Pages 20-22

Page 22

Page 23

Delivering Powerful Control Solutions and Application Support Services to Customers Worldwide

ACS Motion Control is a global manufacturer of high performance machine control systems for demanding motion centric applications.

Since 1985, ACS Motion Control has provided state of the art control solutions to world leading manufacturers, such as GE, Philips, Applied Materials, Samsung and LG. ACS has its international headquarters in Israel with sales and support centers in the USA, China and South Korea.

Backed by an ISO9001-certified design and manufacturing facility with an ongoing commitment to quality control and reliability testing, ACS Motion Control works with an experienced and well trained full solution provider network that provides sales support and customer service worldwide.

Servo Performance Testing Laboratory

Production and Repair Facility

Training Classes are periodically conducted at our facilities

With proven technical expertise and application experience, ACS Motion Control ensures that customers realize a true competitive advantage by enhancing their accuracy and throughput with superior motion and I/O control, robust user-friendly software and application development support.

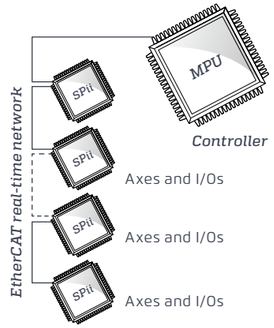
Your Application Our Challenge

- *Motion Centric*
- *Semiconductors*
- *Electronic Assembly*
- *FPD*
- *Bio Medical*
- *Medical Scanners*
- *Digital Printing*
- *Laser Processing*

A World Class Unique Combination of Technology, Know-how, and Support for Ultimate Performance

Powerful Platform Designed for Performance

ACS' powerful platform consists of an EtherCAT Controller MPU (MotionProcessor Unit) and one Servo Processor (SPii) at each EtherCAT node. The MPU can manage systems with up to 64 fully synchronized axes, executing all high level tasks, such as communication, real time ACSPL+ and PLC programs, diagnostics, I/O control and profile generation. The SPii floating point processor at each node executes the real time control algorithms for up to four axes, always at a sampling and update rate of 20kHz for each and every axis. The MPU can modify and update the SPii control algorithm, inject excitation signals to the controlled plant and sample real time data, such as position error, at 20kHz. ACS has utilized a distributed processor platform for over 20 years, making the adoption of EtherCAT a natural evolution. All logical and safety related issues encountered when implementing a distributed control platform (such as system response to failure of the controller, a node, or a communication link) have been solved long ago, enabling ACS to provide the most robust EtherCAT control solutions in the industry today.



High Level Integration, Enhancing Accuracy & Throughput

Performance depends on all components - controller, software, drives, power supply, interconnection and support tools. Each of these components are designed and optimized to achieve one goal: Enhancing the performance in your machine. The complete system is tested to ensure an uncompromised level of motion performance.

Leverage our Know-how and Experience

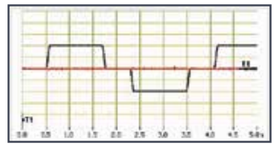
ACS' control experts have many years of experience in demanding, state of the art applications in the fields of: semiconductor inspection, digital printing, electronic assembly and similar systems. These highly trained engineers will help to ensure that your entire system operates optimally in terms of robustness, stability, and minimal sensitivity to mechanical changes (load, friction, component parameter deviations). If your application has highly challenging requirements such as accurate force control for wire bonding or dynamic high bandwidth auto-focus, we will implement and test the required control algorithms for you. ACS takes pride in the rich history of enabling our customers to push the boundaries of throughput and accuracy.

ServoBoost™ - for Unprecedented Performance

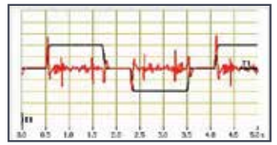
The standard ACS servo algorithm enables industry leading performance in terms of move and settle, constant velocity and standstill stability. However, in cases when additional performance enhancement is required, ServoBoost™ is the answer.

ServoBoost™ provides better, more consistent servo performance that is insensitive to noise or large changes in the system. This technology should be considered when:

- Extremely high accuracy constant velocity is required. ServoBoost™ provides a typical enhancement of x5.
- When standstill position jitter specifications cannot be achieved.
- There are large changes in load or system dynamics.
- The system has weakly damped resonances.
- The system has low stiffness or large inertia mismatch.

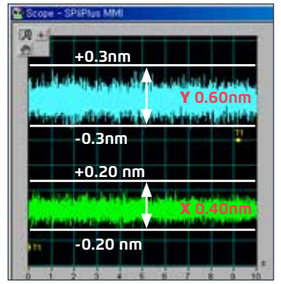


With ServoBoost™



Position Error (red) following a 50% load increase with standard algorithm

Nanometer Positioning and High Velocities



For high-speed, nanometer position resolutions, OEMs till now have been limited to expensive laser interferometer feedback systems. With ACS's 5MHz SPiiPlus Sin-Cos encoder multiplier, control system designers now have a much cheaper alternative, using analog optical encoders or laser-based ultra-fast encoders.

NanoPWM™ Drives - Replaces Linear Drives

Utilizing ACS's proprietary and revolutionary PWMBoost™ technology, the NanoPWM™ line of PWM drives provides the ultimate standstill jitter and velocity smoothness performance! Compared to best in class commercially-available linear drives, ACS' NanoPWM™ drives offer: better motion performance (guaranteed!), reduction in footprint, reduction in heat dissipation, and more economical pricing. The NanoPWM™ drive is the ultimate drive for 450mm and 300mm wafer handling stages, as well as other servo control applications demanding high speed and acceleration, with smooth velocity and sub-nanometer standstill jitter.

Using a SPiiPlus controller and NanoPWM™ drives controlling a linear tables, the following performance has been achieved:
- Standstill jitter better than ±0.3nm! (Mechanical table)
- Following error of ±10nm at speeds of 100mm/second! (Air-bearing table)

The Most Accurate and Flexible Gantry Control

For highly accurate gantry positioning tables, where two motors (each with its own feedback) are used to control an axis, ACS Motion Control has developed unique and powerful algorithms that provide an unprecedented levels of position accuracy, speed stability, and settling time.

Gantry algorithm key features:

- MIMO Control with decoupled loops:
- Loop controlling the longitudinal direction
- Loop controlling the rotational (yaw) direction
- Automatic force / encoder scheduling as a function of the cross axis position
- Dynamic compensation for the yaw angle
- Suitable for both "stiff" and "flexible" gantries

Advantages:

- Higher bandwidth
- Better stability
- Minimal crosstalk
- Easy tuning
- Reliable operation

The Best Printer Requires the Best Controller

Durst Phototechnik is a market leader in the field of industrial digital printers for paper, textile ceramic tiles and more. Durst uses multiple configurations of the MC4U integrated control module.

"What I really like when using ACS Motion Control systems is the high flexibility and high performance of the controllers. You can drive a linear motor, ac servo or stepper drive on the same output and it is possible to scale the number of drives as needed but the interface is always the same. ACS Motion Control has great support, real experts and sophisticated algorithms also for tricky and challenging projects. They are always open for direct contact in case of problems and for customized adjustments of the controllers if needed."

O.F., System Engineer, Durst Phototechnik AG

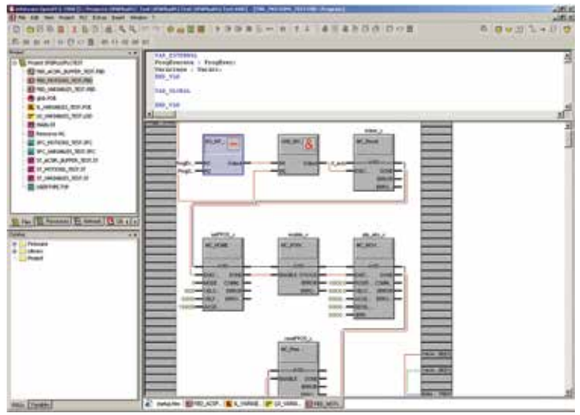
Digital printing

Better Programming for Better Machine Control

EtherCAT Multi-axis Controller & Powerful PLC for Complete Machine Control

ACS controllers use a multi-tasking operating system and can be programmed both using PLCopen IEC61131- 3 languages that are optimized for logic and process sequencing, and using ACSPL+, a powerful motion language.

Many ACSPL+ tasks and PLC tasks can run simultaneously. For host programming a powerful API is available.



ACSPL+ Powerful and Simple Motion Programming

ACSPL+ is a fully compiled, truly multi-tasking high level programming language, capable of running up to 64 simultaneous threads (buffers). ACSPL+ supports complex motion-time-events and sequences with accurate positioning and timing.

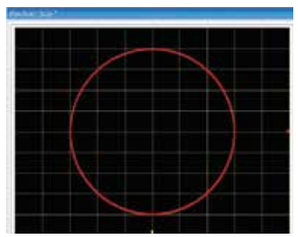
- Multi-axis point-to-point, jog, tracking and sequential multipoint motion
- Smooth multi-axis motion paths made of arcs and lines
- Arbitrary path with PVT cubic interpolation and advanced look-ahead capabilities
- Third order profiles (S-curve)
- Smooth on-the-fly change of target position and motion parameters
- Inverse/Forward kinematics and coordinate transformations
- Master-slave with position and velocity locking (electronic gear/ cam) and Virtual master axis
- User-defined units
- 64-bit floating point arithmetic
- Complex mathematical expressions and a rich set of logical, statistical, arithmetic, trigonometric and signal processing functions
- User-defined auto-routines (software programmable interrupts), triggered instantly when a a logical condition is satisfied
- Ability to defined responses for any safety related event or system error
- Real time data collection at rates up to 20kHz

SPiiPlus Library - API for Host Programming

The SPiiPlus library supports simultaneous communications and multi-threaded applications with up to sixteen communication channels and interrupts with callback functions. One application can communicate with several controllers or several applications can communicate with one controller. The library resolves all communication traffic issues. A comprehensive set of drivers, in conjunction with C and COM Dynamic Link Library (DLL), are provided for programming in C/ C++/C#/.NET/Visual Basic and LabView. The library supports Windows XP, ME, Vista, and 7 (both 32 and 64 bit) and is continuously updated to support new versions.

ACSPL+, Simply Powerful - real code example showing interpolated circle

```
GLOBAL REAL PI, RADIUS;
GLOBAL INT COUNTER,VERTICES
PI=ACOS(-1); COUNTER=0;
VERTICES=100; RADIUS=500;
ENABLE (X,Y);
STARTLOOP:
   PTP/E (X,Y) RADIUS*COS(2*PI*COUNTER/VERTICES),
   RADIUS *SIN(2*PI*COUNTER/VERTICES);
   COUNTER=COUNTER+1;
GOTO STARTLOOP;
STOP
```



MODBUS and Ethernet/IP

MODBUS TCP and Serial protocols enable various HMI operator interface terminals to interface with the controller. Ethernet/ IP support provides the ability to interface directly to Rockwell PLC devices using Explicit and Implicit messaging

EtherNet/IP Modbus

Better Tools for Better Work-flow

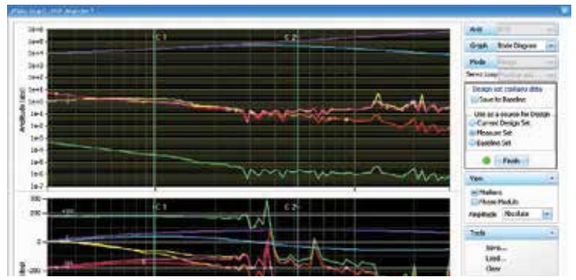
SPiiPlusNT Suite with Powerful Simulator for Faster Setup, Development & Diagnostics

The SPiiPlusNT Suite of software tools is designed to minimize time to market while providing the flexibility to meet the specific machine requirements throughout its entire life cycle. It provides extraordinarily easy setup, fast application development, and quick diagnostics for all SPiiPlus control products. With the SPiiPlus Simulator, you can develop the entire Windows host front end application, and real time PLC and motion programs. A full simulation of your entire machine can be developed, using ACSPL+ programs to emulate real life changes of inputs, outputs, safety faults, errors and more. The front end and machine control software can then be logically tested and debugged from a desktop or laptop computer without attaching any hardware.

The SPiiPlusNT Suite includes the SPiiPlus MMI Application Studio, the SPiiPlus Utilities for software maintenance and application management, comprehensive documentation of all ACS products and software tools, and a training program. The latest version of the SPiiPlusNT Suite can be downloaded from the ACS Motion Control website.

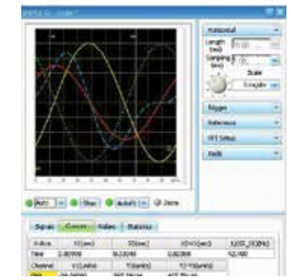
SPiiPlus MMI Application Studio

The MMI provides an easy-to-use set of interactive tools for configuring controllers, drives, I/Os and EtherCAT networks, and for servo tuning, programming and monitoring. It includes an ACSPL+ program manager (development environment), an eight channel interactive oscilloscope with FFT capability, a frequency response function analyzer (FRF), a communication terminal, a motion manager, an I/O monitoring screen, safety monitoring features, application management tools, and more.

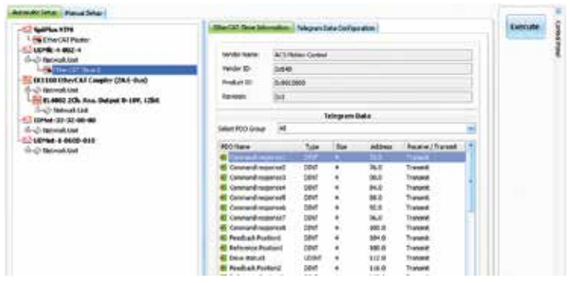


Measure and analyze your complete electromechanical system frequency response and optimize performance

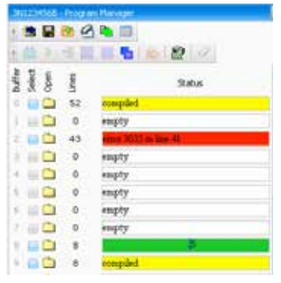
Complete ACSPL+ application development and |debugging environment



8 channel scope with 20kHz sampling rate



Simple EtherCAT network setup



Motion design and testing

A Wide Line of EtherCAT Motion Controllers to Match Your Needs

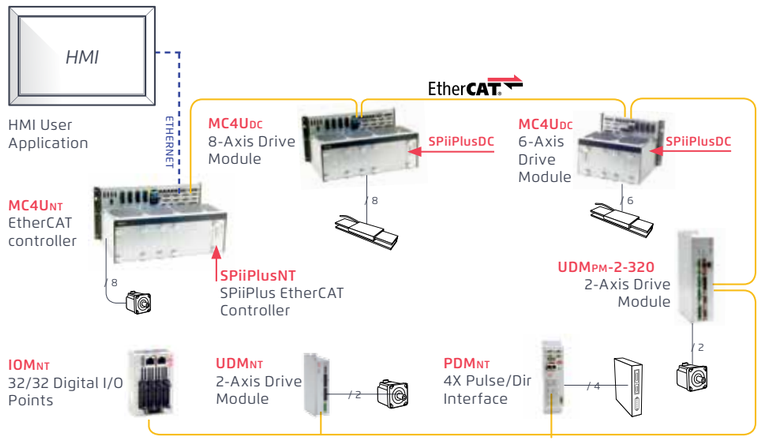
Different EtherCAT Motion Controllers, One Common Architecture, One Set of Tools

- All in one: EtherCAT motion controller and PLC
- Migrating from one to another involves minimal effort due to fully compatible software
- Support for third party IO and motor drives that comply with CoE (CAN Over EtherCAT)
- One common architecture and set of tools.

Every Control Module is also an EtherCAT Motion Controller

The Control Module integrates a motion and EtherCAT controller, one to eight motor drives and power supply. The line of SPiiPlusCMxx and the MC4UNT are powerful and economical standalone full solutions. The MPU within such a module can control up to 32 axes and hundreds of IO points, as a full PLC, providing a unique compact solution, that is completely scalable. The Control Module communicates with a host computer through Ethernet and RS232 communication channels. (See pages 17-18 for more information)

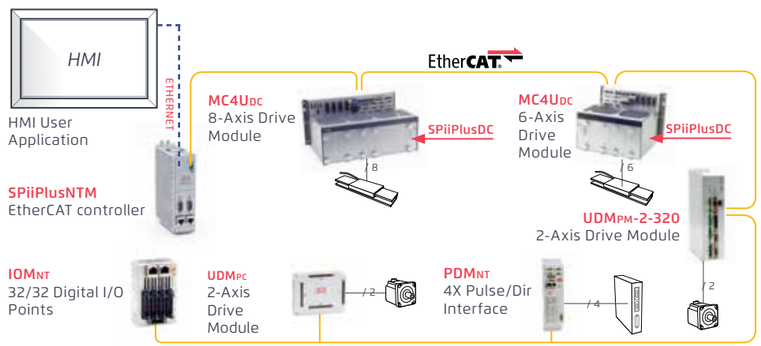
Control Module - Integrated controller and drives



SPiiPlusNTM Standalone EtherCAT Motion Controller

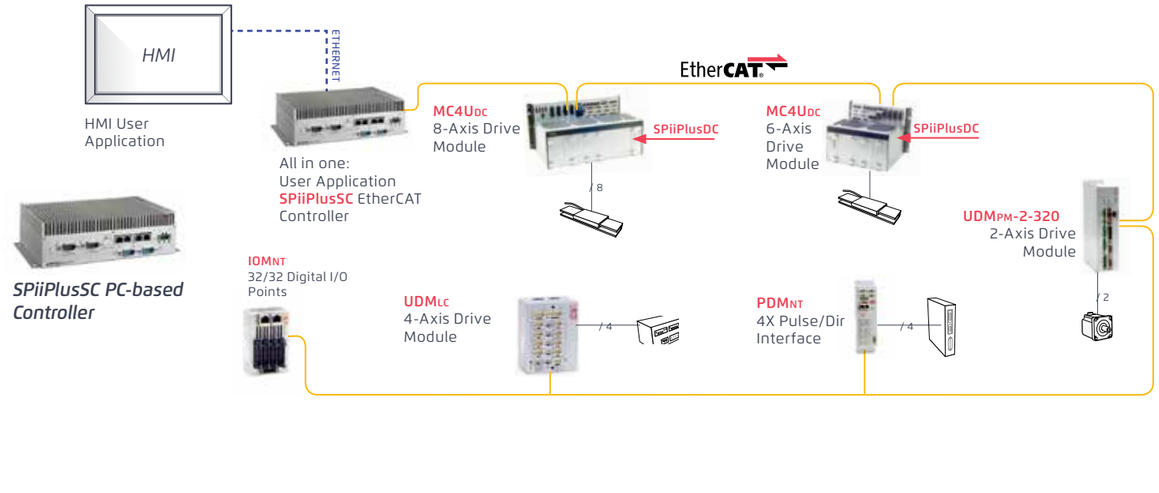
An economical standalone EtherCAT controller. The SPiiPlusNTM is available with a standard MPU capable of controlling up to 32 axes and hundreds of I/O points with a 1 millisecond cycle time, and is also available with a more powerful MPU capable of controlling up to 64 axes and thousands of I/O points with a 0.5 millisecond cycle time. It communicates with a host computer through Ethernet and RS232 communication channels.

SPiiPlusNTM



SPiiPlusSC PC-based EtherCAT Motion Controller

The SPiiPlusSC Controller & EtherCAT converts your standard PC into the most powerful motion and machine controller at the lowest price. (See pages 12,13 for more information).



State-of-the-art SMT assembly system uses the most advanced EtherCAT based control system

Assembléon provides Pick & Place solutions for the electronics manufacturing industry. The iFlex SMT assembly system places up to 70,000 parts per hour. It has up to 40 axes of motion and hundreds of I/Os. The SPiiPlussc soft EtherCAT motion controller manages the entire system. It controls the ACS servo and stepper drives, I/Os, and non-ACS drives. Assembléon implemented all real time functionality in the ACSPL+ controller programming language.

"ACSPL+ provided the real-time environment and the parallelism we needed,enabling us to make changes and test them easily. This, together with the Simulator, which all our software developers use heavily to test their software, saved us a lot of development time. With the SPiiPlussc that runs on the host PC and communicates with the Windows environment through fast shared memory, there is no communication limitation when you have a host-based application program that requires intensive and fast communication with the controller. When we started this project, EtherCAT was new to us. Without ACS' know-how, flexibility, and support, it would have taken us much more time to complete the project"

R.v.d.B, Motion Architect, Assembléon

Electronic Assembly

The SPiiPlusSC Turns Your Standard PC Into the Most Advanced EtherCAT Motion Controller

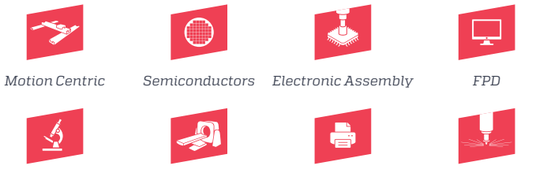
Powerful Motion Controller and PLC...

- Up to 64 fully synchronized axes and thousands of I/O points
- High-speed Host-Controller communication over shared RAM
- Programming in both PLCopen IEC61131-3 languages and by ACSPL+ powerful multi-tasking motion language
- Full API for Windows based host programming
- Open architecture - supports ACS and other vendors' qualified EtherCAT components

The Best Control Solution for Motion-Centric Applications

The SPiiPlusSC PC-based Soft Controller provides demanding machinery with the highest performance possible at the most affordable price, leveraging on the processing power of modern PC technology and on the connectivity of a real-time open industrial Ethernet network. Now, a standard PC with Windows can run your machine application, the Graphical User Interface (GUI) and the SPiiPlusSC motion controller and PLC without adding any hardware. The SPiiPlusSC includes its own real-time operating system, which runs on one of the cores of a multi-core PC. It communicates with the host applications through shared RAM and virtual TCP/IP. It manages the network using one of the Ethernet ports of the PC as the EtherCAT communication channel. The result - the highest performance and most flexible controller at the best price. The SPiiPlusSC is also a more cost effective, state of the art replacement for standalone motion controllers and PLCs. It is more powerful and it simplifies connectivity of the entire system by eliminating the dedicated controller hardware. It is available in two versions: The SPiiPlusSC-HP for complex and performance demanding applications with up to 64 axes, and the SPiiPlusSC-LT, an economical version that addresses the needs of one to eight axes cost sensitive applications. Both versions provide the same uncompromising servo and motion performance. The table on the right depicts the differences between the two.

for Demanding Applications



SPiiPlusSC	LT	HP
Maximum Number of Axes	8	64
ACSPL+ buffers (threads)	8	64
Host application interface	TCP/IP	Shared RAM+TCP/IP
EtherCAT Cycle rate	1 kHz	Up to 5kHz
Control loops update rate	20 kHz	

Shared RAM R/W operations	Microseconds
Read/Write single value	8
Read/Write of 200 values	26
Read/Write of 2000 values	226
Callback Round-Trip Time	100+(Cycle-time)/2

Average execution time, statistics over 100,000 samples

The Most Efficient Host-Controller Communication

The SPiiPlusSC communicates with the host applications over virtual TCP/IP and over the 100kByte of shared RAM (HP version only) with Inter-Processor Interrupt (IPI) based Callbacks. Communication over the shared RAM guarantees that your machine throughput will not be affected by any communication bottlenecks. The user defines the variables that reside in the shared RAM. Once defined, both the controller and the host application have instantaneous access to such variables.

Just a Standard PC With No Special Requirements

Any PC with the following minimal requirements can host the SPiiPlsSC: Dual (or more)-core Intel, 1 GB RAM, a Network Interface Controller (NIC) for EtherCAT communication, hard drive or flash disk, standard communication interfaces, Windows 7, 7 embedded, XP and XP Embedded. No need for any Windows real-time extension.

A Comprehensive Line of Industrial PCs

A Powerful Combination of Host PC and Motion Control

Advantech, the world's leading manufacturer of industrial PCs, and ACS Motion Control are partnering together, offering the most powerful PC-based control solutions for demanding motion applications. Such solutions consist of an industrial embedded PC with a touch panel monitor, or a touch panel PC, the SPiiPlussc motion and EtherCAT Controller Software, and a comprehensive line of motor drives and I/O modules. These control solutions are economical and scalable; providing an excellent fit for cost sensitive applications, from tabletop inspection and positioning stages with only a few axes, to complex applications such as high speed SMT assembly machines, die bonders and FPD manufacturing equipment with dozens of coordinated motion axes, hundreds of I/O points and real time machine vision. Now you can run your whole machine application and motion control on one PC, achieving the best performance and the most efficient application-controller communication at the best price. This elegant and simple solution is complemented by efficient and easy to use development and diagnostics tools to shorten development time and reduce cost of ownership.

- A wide line of leading edge industrial computers to fit your exact needs
- Long product life cycles, eliminating the need for frequent requalification of new PC hardware
- Flexible options for PC configurations, such as BIOS, O/S, and hardware customizations
- First rate support by highly skilled application engineers with motion control experience

Embedded PC solution

Performance	P/N	Description
Entry-level	ARK-3360F-D5A1E	Intel® Atom™ D510 High Value Fanless Embedded Box PC with 3x GigaLAN and Isolated COM Ports
Entry-level	UNO-3074A-A33E	Intel® Atom™ D510 Automation Computer with 4x PCI, 2x GigaLAN and FireWire
Middle-level	UNO-2174G-C54E	Intel® Celeron M 847E 1.1 GHz Automation Computer with 4x GigaLAN, 2x Mini PCIe and DVI/DP/HDMI output
Middle-level	UNO-1172A-A33E	Intel® Atom™ D510 DIN-rail Fanless Embedded PC with 3x GigaLAN, 2x COM, VGA, Mini PCIe and PC/104+ expansion
Middle-level	UNO-2178A-A33E	Intel® Atom™ D510 Automation Computer with 6x USB, 8x COM, 2x Mini PCIe
High-level	UNO-2184G-D44E	Intel® Core i7-2655LE Automation Computer with 4x GigaLAN, 2x Mini PCIe and DVI/DP/HDMI output
High-level	ARK-3440F-U5A2E	Intel® Core i7 Fanless Embedded Box PC with PCI/PCIe Expansion and Dual SATA HDD bays

Flat Panel PC and Monitors

Category	P/N	Description
Panel pc-TPC	TPC-1071H-D3AE	10.4" SVGA TFT LCD Intel® Atom™Dual-Core D525 Touch Panel Computer
	TPC-1271H-D3AE	12.1" SVGA TFT LCD Intel® Atom™Dual-Core D525 Touch Panel Computer
	TPC-1571H-D3AE	15" XGA TFT LCD Intel® Atom™Dual-Core D525 Touch Panel Computer
Panel pc-IPPC	IPPC-6152A-R1AE	15" XGA TFT LCD Core™2 Quad / Core™2 Duo Industrial Panel PC with 2 x PCI Slots
	IPPC-6172A-R1AE	17" XGA TFT LCD Core™2 Quad / Core™2 Duo Industrial Panel PC with 2 x PCI Slots
	IPPC-6192A-R1AE	19" XGA TFT LCD Core™2 Quad / Core™2 Duo Industrial Panel PC with 2 x PCI Slots
Monitor-FPM	FPM-5151G-R3AE	15" XGA Industrial Monitors with Resistive Touch-screens, Direct-VGA, and DVI Ports
	FPM-5171G-R3AE	17" XGA Industrial Monitors with Resistive Touch-screens, Direct-VGA, and DVI Ports
	FPM-5191G-R3AE	19" XGA Industrial Monitors with Resistive Touch-screens, Direct-VGA, and DVI Ports

Additional Options for Completing the PC-Based Control Solution:

- Preinstalled memory device - type and capacity (DDR2 or DDR3 RAM)
- Preinstalled storage device - type and capacity (2.5" SATA Hard disk, 2.5" Industrial Grade SATA Flash drive, or Industrial Grade Compact Flash device)
- Preinstalled SPiiPlus SC Soft Controller - consumes 1 Ethernet LAN port for EtherCAT communication (2 ports for redundant network support)
- Pre installed SPiiPlusNT Suite development software - only recommended for i5/i7 processors series when SPiiPlus SC is also pre installed
- Preloaded O/S
- Burn-in test service

Control Modules - Integrated EtherCAT Motion Controller & Drives

A Wide Line of Ready-made Solutions, Now Scalable

ACS' Control Modules combine a powerful EtherCAT motion controller, with up to 8 universal motor drives and a power supply all contained in a compact enclosure. The type of motor - rotary or linear, DC or AC, single, two or three phase is programmable. Now every Control Module, as an EtherCAT Controller, can control up to 32 axes and thousands of IO points!

The line of Control Modules consists of the following:

MC4UNT *up to 8 built-in drives, wide range of voltages and currents*

A modular system that allows you to mix and match controllers, drivers and supplies to meet your specific needs.
See pages 17-20 for the full description of the MC4UNT.

SPiiPlusCMNT *2 built-in drives, up to 320Vdc, 7.5A/15A*

An economical line of EtherCAT network controller and multi-axis machine and motion controllers with two built-in universal drives. It is designed to address the needs of cost sensitive applications such as PCB Automatic Optical Inspection systems. The SPiiPlusCMNT controls and generates the motion profile for up to 32 axes. The EtherCAT network scanning rate is up to 2kHz. All drives are highly synchronized by a distributed clock with accuracy better than 0.1 microsecond, and execute the control algorithms at a 20kHz rate.

The SPiiPlusCMNT is offered with two current levels: 5A/10A (cont./peak) and 7.5A/15A. 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 (rectified internally to generate a Vac x 1.4 motor bus voltage) and by a separate 24Vdc control supply that keeps all logic signals alive during emergency conditions. It supports a wide range of incremental and absolute position feedback devices.incremental digital (total of 4) and analog (SIN-COS) encoders, absolute encoders and resolvers.

SPiiPlusCMHP/BA *3 built-in drives, up to 320Vdc, 15A/30A*

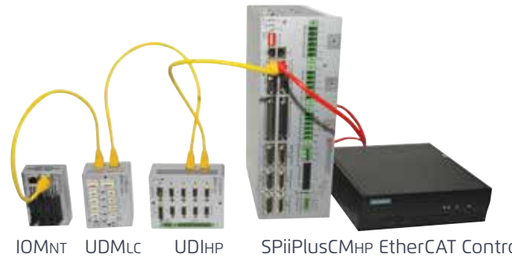
A line of EtherCAT network controllers and multi-axis machine and motion controllers with up to three built-in universal drives. The internal EtherCAT Controller manages and generates the motion profile for up to 32 axes. The EtherCAT network scanning rate is up to 2kHz. All drives are highly synchronized by a distributed clock with accuracy better than 0.1 microsecond, and execute the control algorithms at a 20kHz rate.

The SPiiPlusCMHP addresses high accuracy demanding applications, while theSPiiPlusCMBA is a more economical version. The modules are offered with three current levels: 5A/10A (cont./peak), 10/20 and 15/30A. The modules are powered by a single or three-phase 85 to 265Vac input (rectified internally to generate a Vac x 1.4 motor bus voltage) and by a separate 24Vdc control supply that keeps all logic signals alive during emergency conditions. The modules support a wide range of position feedback devices.

The following table describes the main characteristics of each type:

Product	Built in drives	Motor Supply voltage [Vin]	Logic supply voltage	Motor bus voltage	Current Cont./ Peak Sine amp [A]	In	Out	Ana. In	Ana. Out	Special Inputs	Special Outputs	Dimensions [mm³]
MC4UNT	2 to 8	85-400Vac	24Vdc	Up to 560Vdc	Up to 45/90	8	8	Up to 4	Up to 4	Up to 8 Mark STO	6 PEG up to 8 brake	See page 17
SPiiPlusCMNT	1,2	85-230Vac	24Vdc	Vin x 1.4	up to 7.5/15	8	8	4	2	4 Mark STO	4 PEG 2 brake	270x157x67
SPiiPlus CMHP/BA	2,3	85-230Vac	24Vdc	Vin x 1.4	Up to 15/30	8	8	Up to 6	2	4 Mark	6 PEG 3 brake	324x249x120

Special inputs/outputs can also be assigned for use as general purpose I/O.



Better Control for Unique Assembly Systems

IXMATION NORTH AMERICA designs and builds unique assembly systems for customers in the Medical, Electronics, Consumer goods, and Automotive industries. IXMATION uses a variety of ACS' SPiiPlus controllers.

"In multi-axis motion controllers, the top three characteristics we look for are technical support, performance and features. ACS offers superior quality and service in all these categories. It is typical to get a direct connection with an ACS application engineer who is extremely knowledgeable, not only with ACS products, but with general motion and closed-loop control to help solve technical issues in a timely manner. ACS's ability to remotely connect and take control of our PC to help examine mechanical performance or tuning has been extremely valuable in keeping our projects moving forward. The unique SPiiPlus simulator allows our engineers to develop and test motion routines with surprising simulated performance before the equipment is actually built. As users of Allen-Bradley PLCs, the Ethernet/IP connectivity is a must for our applications. The ACS' implementation of the Ethernet/IP is easy to setup and use and provides flexible Read/Write access to low-level controller parameters as well as to user defined variables."

J.S.Senior Controls Engineer / Group Leader, IXMATION North America

Motion Centric

MC4U - Complete Control Solution Tailored to Your Exact Requirements

MC4U: Customized Multi-axis Control Using Standard Components

- Integrated motion & machine controller, 8 universal built-in drives and power supply
- Units can be networked together to create a fully integrated solution for up to 64 axes and hundreds of I/Os
- Wide power range of motor drives - from 100W to 10kW
- High axis density
- Short lead time for a fully custom-tailored application
- Shorter development time, reduced risk, lower cost
- ACS field proven robustness and reliability
- NanoPWM™ and PWMboost™ Technology, drives that deliver higher performance and higher power, at smaller size and at better price.

The MC4U is a unique modular complete solution that addresses the tailor-made, flexible machine and motion control needs of OEMs. The MC4U's high performance, Lego-like system combines an EtherCAT controller (for MC4UNT) or drive controller (for MC4UDC), up to 8 universal motor drives, and power supplies with networking to provide a complete machine and motion control solution to demanding motion centric machine automation. Built from standard plug-in components, the MC4U addresses all machine control needs, resulting in shorter development cycle time, reduced risk, small footprint and lower costs.

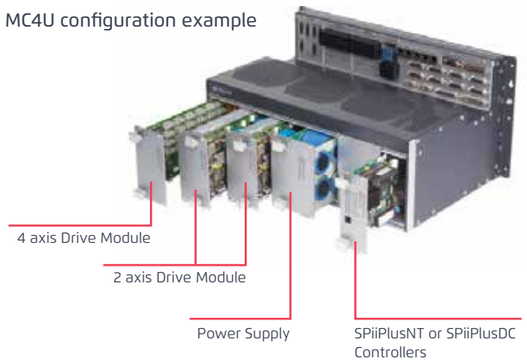
High performance stems from the fine balance and interaction of the controller software, its hardware interfaces, the drives, the power supplies and the precise integration of all components. Each and every component is designed to deliver performance and the system is tested as a whole to ensure that your most demanding specifications can be achieved. Now many MC4U units and additional ACS and third party EtherCAT components can be networked together, thus creating a single highly integrated system with up to 64 axes and hundreds more I/Os.

The Upright Piano Enclosure - Simple Connectivity, the Right Size

Different enclosure sizes are available to provide the minimum size and volume needed to meet your power and number of axes needs.

Enclosure dimensions				
Enclosure	**22"**	**19"**	**11"**	**9"**
Height	221.5 ±1			
Width [mm]				
With front brackets	---	483 ±1	---	---
With rear brackets	542 ±1	476 ±1	316.7±1	251±1
With no brackets	502 ±1	436 ±1	276.7±1	211±1
Depth [mm]				
With extractors	292 ±1	292 ±1	287.3±1	287.3±1
Without extractors	279 ±1	279 ±1	273.8±1	273.8±1
Net weight [Kg]	4.9	4.3	2.6	2

MC4U configuration example



Modularity & Scalability by Design

The MC4U can be configured to meet the needs of your system with regards to number of axes, power, features and performance. For your specific application you select:

1. The proper controller - One that is also an EtherCAT Controller (SPiiPlusNT) or just a Drive Controller (SPiiPlusDC) to be managed by an EtherCAT Controller; a high performance one with extensive set of advanced features (HP) or an economical one that reduces the cost (LT).
2. The set of drives to meet your exact motor type and power needs.
3. The power supply to meet the motor drives power needs.
4. The proper enclosure that optimizes footprint.

Powerful Motion and EtherCAT Controllers or Drives Controllers

The SPiiPlusNT/DC family of multi-axis EtherCAT controllers (NT) and Drive Controllers (DC) is designed to address the control requirements of the most demanding motion centric applications, such as semiconductors manufacturing, electronic assembly, wafer inspection, Flat Panel Display assembly and testing equipment. The SPiiPlusNT/DC provides outstanding motion performance, sub-nanometer resolution, high speed for maximum throughput, smooth velocity, full PLC programmability, ease of use, and excellent scalability using an EtherCAT network. The SPiiPlusNT can manage a network of up to 32 axes. (If more axes are needed, then the SPiiPlusNTM or SPiiplusSC can be used). For distributed systems with additional EtherCAT nodes, one unit, designated MC4UNT acts as the EtherCAT controller, using a SPiiPlusNT. supports fast analog SIN-COS encoders with raw frequencies up to 5MHz. This enables running stages using high resolution laser encoders with sub-nanometer resolution at more than 1 meter/second.

All other units, which are clusters of drives (MC4UDC), include a SPiiPlusDC Drive Controller.
If a separate EtherCAT controller is used, such as the SPiiPlusNTM or the SPiiPlusSC, then all units are of MC4UDC type and each one includes a SPiiPlusDC Drive Controller.

SPiiPlusNT EtherCAT Controller
SPiiPlusDC EtherCAT Drive Controller

SPiiPlusNT Line of Motion and EtherCAT Controllers; up to 32 axes:

1. SPiiPlusNT-LT - Economical motion controller. All built-in drives are PWM.
2. SPiiPlusNT-HP - High Performance motion controller. All built-in drives are PWM.
3. SPiiPlusNT-LD - High Performance motion controller. One to four built-in drives are linear.

SPiiPlusDC line of Drive Controllers; up to 8 axes:

1. SPiiPlusDC-LT - Economical drive controller. All built-in drives are PWM.
2. SPiiPlusDC-HP - High Performance drive controller. All built-in drives are PWM.
3. SPiiPlusDC-LD - High Performance drive controller. One to four built-in drives are linear.

SPiiPlusNT EtherCAT Controller

SPiiPlusDC EtherCAT Drive Controller

Choose the SPiiPlusNT/DC-HP if one of the following is needed:

- SIN-COS analog encoders with high multiplication factor
- Special control algorithm, such as Gantry, Input Shaping, Servoboost™.
- EtherCAT / MPU cycle <1 msec.
- If in addition a linear drive is used, then choose a SPiiPlusNT/DC-LD.

Control Solutions for FPD and AOI

Orbotech is a leading provider for PCB AOI and FPD inspection systems. Orbotech uses a variety of Control Modules, such as the MC4U, a wide line of Universal Drive Modules (UDM) and I/O modules.

"Orbotech has been using ACS Motion Control solutions for over 20 years. ACS is always listening to our needs and is providing first rate support. ACS' wide line of controllers, EtherCAT universal drives and I/O modules enable us to implement complex inspection systems, with 30 and more axes and hundreds of I/O points in the most efficient way. The unique level of performance achieved with ACS solutions contributes to increased throughput and inspection quality."

D.K. Control Engineer, Orbotech

FPD

MC4U Wide Line of Drives and Matching Power Supplies

High Performance Universal PWM Drives for the Best Performance With any Type of Motor

The MC4U line of universal digital PWM drive modules is specifically designed to provide a high performance and cost effective solution for demanding multi-axis applications. The drives are optimized for low noise, providing the lowest possible jitter and velocity smoothness and are fully programmable for easy setup and diagnostics. Each drive can be programmed to control any type of single, two or three phase DC brushless motors, AC induction motors, DC brush motors, voice coils, or step motors with open or closed loop control. The MC4U drive modules support linear and rotary motors covering a wide power range of 100W to 10kW. Drive modules with up to 750W per axis, include up to four drives, and modules with up to 5kW per axis include two drives for optimal performance, cost and footprint. Modules with 30/60A (7.5kW) and 45/90A (10kW) include one drive. Drives are available with optional Safe Torque Off (STO) feature to enable machine builders to comply with SIL-3 and PLe safety levels.

PWM Drive Modules	Part Number	Number of Axes	Bus Voltage [Vdc]	Phase Current Cont./Peak [Amps]	Output Power per Axis Cont. /Peak [kW]
	DDM3U-2/4-60V-4A	2 or 4	18-60	4 / 5	0.15 / 0.3
	DDM3U-4-320V-1A	2 or 4	24-320	1 / 2	0.25 / 0.5
	DDM3U-4-320V-2A	2 or 4	24-320	2 / 4	0.5 / 1
	DDM3U-4-320V-3A	2 or 4	24-320	3 / 6	0.75 / 1.5
	DDM3U-1/2-320V-5A	1 or 2	24-320	5 / 10	1.35 / 2.7
	DDM3U-1/2-320V-10A	1 or 2	24-320	10 / 20	2.7 / 5.4
	DDM3U-1/2-320V-15A	1 or 2	24-320	15 / 30	4.1 / 8.2
	DDM3U-1/2-320V-20A	1 or 2	24-320	20 / 40	5.5 / 11
	DDM3U-1-320V-30A	1	24-320	30 / 60	7 / 14
	DDM3U-1-320V-45A	1	24-320	45 / 90	10 / 20
	DDM3U-1/2-560V-5A	1 or 2	24-560	5 / 10	1.35/2.7
	DDM3U-1/2-560V-10A	1 or 2	24-560	10 / 20	2.7/5.4
	DDM3U-1/2-560V-15A	1 or 2	24-560	15 / 30	4.1/2.8

NanoPWM™ & Digitally Controlled Linear Drives for Minimal Standstill Jitter & Maximum Velocity Smoothness

The NanoPWM™ line of PWM drives is specifically designed for applications with demanding standstill jitter and velocity smoothness requirements. These drives provide currents up to 15A/30A (continuous/peak) at up to 100Vdc. It is the ultimate drive for 450mm and 300mm wafer handling stages, demanding high speed, high acceleration, smooth velocity and sub-nanometer standstill jitter.
The LDM line of digitally-controlled universal linear drives is designed for applications with demanding standstill jitter, smoothness requirements and low electrical noise. It provides currents up to 6.25A/25A (continuous/peak) at up to 55Vdc. Combining NanoPWM™ or LDM drives with the powerful ServoBoost™ algorithms is a pre-requisite for achieving sub-nanometer standstill jitter and minimal settling time into the nanometer range.

LDM Linear Drives	Part Number	Motor Supply (Vm) min./max. (Vdc)	Motor Phase Current sine amplitude, cont./peak [A]	Maximum output power [W]
	LDM3U-28V-8A-D	24-32	4/8	81/162
	LDM3U-28V-16A-D	24-32	4/16	81/324
	LDM3U-55V-8A-D	45-60	4/8	166/333
	LDM3U-55V-16A-D	45-55	4/16	150/600
	LDM3U-55V-16A-S	45-55	4/16	173/693
	LDM3U-55V-25A-S	45-55	6.25/25	271/1083

NanoPWM™ Drives	Model No	Number of Axes	Bus Voltage [Vdc]	Phase Current Cont./Peak [Amps]	Output Power Per Axis Cont./Peak [kW]
	DDM3U-1-100V-5A-NP	1	24 – 100	5/10	0.36/0.69
	DDM3U-1-100V-10A-NP	1	24 – 100	10/20	0.72/1.36
	DDM3U-1-100V-15A-NP	1	24 – 100	15/30	1.07/1.98
	DDM3U-1-100V-20A-NP	1	24 – 100	20/40	1.41/2.61

A Line of Matching Power Supplies

A wide range of power supplies is available to match the motor drives with bus voltages ranging from 28Vdc to 560Vdc. An MC4U configuration can include two supplies in a single enclosure to support two voltages or enhance power. The high voltage supplies include a shunt regulator and a 100W regeneration resistor. If addition regeneration capability is needed, an external 600W shunt resistor is available.

Power Supply Modules	Part Number	Input Voltage [Vac]	Output Voltage [Vdc]	Nominal Power
	PSM3U-28V-0.5kW	85-265[1]	28	500W
	PSM3U-48V-0.7kW	85-265[1]	48	700W
	PSM3U-48V-1.4kW	85-265[1]	48	1400W
	PSM3U-320V-4kW	85-265[2]	120-320	4kW
	PSM3U-320V-8kW	85-265[2]	120-320	8kW
	PSM3U-320V-10kW	85-265[2]	120-320	10kW
	PSM3U-320V-11kW	85-265[2]	120-320	11kW
	PSM3U-320V-20kW	85-265[2]	120-320	20kW
	PSM3U-320/48V-0.7/8kW	85-265[2]	48, 120-320[4]	8kW
	PSM3U-560-7kW	360-440[3]	500-560	7kW
	PSM3U-100V-3kW	30-70[5]	44-100	3kW

[1] Single phase; [2] Single or three phase; [3] Three phase; [4] Features dual bus voltage outputs of 48Vdc and up to 320Vdc
[5] To achieve the best jitter and smoothness when powering a NanoPWM™ or LDM drive, it is recommended to feed this supply from an external, well regulated DC power source.

Wafer Inspection with Nanometer Performance Level

Hermes Microvision Inc. (HMI) develops the most advanced E-beam Inspection (EBI) tools and solutions for leading semiconductor companies.
"HMI has been using ACS controller for more than 12 years. It is a reliable and high performance controller. The MMI software is versatile and user friendly for both the development and field engineering. Tech support is timely, responsive, and effective. ACS has excellent knowledge of motion control engineering and is able and willing to customize for special applications. It enables us to have the most advanced control solution to meet our special needs. The ServoBoost™ control algorithm demonstrated its superior function in improving our demanding motion performance."

B.C., Mechanical Engineer, HMI

Semiconductors

A Wide Range of EtherCAT Universal Motor Drives to Address Your Needs

A wide line of high performance universal drive modules are available. These drives are designed for industry-leading performance, ranging from 10W up to 10kW, with motor bus voltages ranging from 12Vdc to 560Vdc.
The drives can be operated only with ACS EtherCAT controllers. The drives are optimized for low noise, providing the lowest possible jitter and velocity smoothness, and are fully programmable for easy setup and diagnostics. Each drive can be programmed to control any type of motor (single, two or three phase, DC brushless, AC induction, DC brush, step), with open or closed loop control.

The following table describes the main characteristics of each type:

Product	Built In drives	Motor Supply voltage [Vin]	Logic supply voltage	Motor bus voltage	Current Cont./ Peak Sine amp. [A]	In	Out	Ana. In	Ana. Out	Special Inputs	Special Outputs	Dimensions [mm³]
UDMLC	2,4	12-48Vdc	12-48Vdc	Vin	Up to 5/10	-	-	-	-	4 Mark	1 PEG 4 brake	100x75x48
UDMPC	1,2	5-48Vdc	24Vdc	Vin	Up to 10/20	8	4	4	2	2 Mark STO	2 PEG	112x87x20
UDMNT	1,2	12-80 Vdc	24Vdc	Vin	Up to 10/20	4	2	2	1	4 Mark	2 PEG	162x113x38
UDMMC	2,4	12-80 Vdc	24Vdc	Vin	Up to 20/40	-	-	-	-	4 Mark STO	1 PEG 4 brake	152x138x48
UDMHP/BA	2,3	85-230Vac	24Vdc	Vin x 1.4	Up to 15/30	8	8	Up to 6	2	4 Mark	6 PEG 3 brake	324x249x120
UDMPM	1,2	85-230Vac	24Vdc	Vin x 1.4	up to 7.5/15	8	8	4	2	4 Mark STO	4 PEG 2 brake	270x157x67
MC4UDC	2 to 8	85-400Vac	24Vdc	Up to 560Vdc	Up to 45/90	8	8	Up to 4	Up to 4	Up to 8 Mark STO	6 PEG up to 8 brake	See page 19
SDMNT for step motors	4,8	85-230Vac or 40Vdc	24Vdc	40Vdc	3A	6	6	-	-	-	-	290x130x90

See specific product data sheet for full specifications.
Special inputs/outputs can also be assigned for use as general purpose I/O.
All ACS' drives and interfaces work only with ACS' motion controllers and EtherCAT masters

UDMLC *4 Axis, up to 48Vdc, 5A/10A*

A line of small footprint EtherCAT modules with dual/quad axis cost effective universal drives for small motors. Its primary goal is to the address the needs of applications that require multiple motors in the range of up to 200W, such as inspection heads and table top motion stages, where space is limited. It is offered with the following current levels: 1.25/2.5A, 2.5/5A or 5/10A (cont./ peak). The unit is powered by a 12 to 48Vdc motor bus voltage input and by a separate 12 to 48Vdc logic supply input that keeps all low voltage signals alive during emergency conditions. The UDMlc is panel or din rail mountable.

UDMPC *2 Axis, up to 48Vdc, 10A/20A*

A line of compact PCB mounted EtherCAT modules, with single/dual axis universal drives. It is designed to address high performance applications with demanding move & settle, smooth velocity and stand still jitter requirements with power of up to 400W/800W (continuous/peak) per axis. The UDMpc is offered with the following current levels: 2.5/5A (cont./peak), 5/10A and 10/20A. An optional Safe Torque Off (STO) feature cuts the power to the motor without removal of the power source to comply with SIL-3 and PLe safety levels. The module can be provided mounted on the optional UDMpc-2- 048-BOB Breakout carrier board and a set of mating connectors. This carrier board also enables the user to configure the safety and general-purpose inputs and outputs (5V, 24V, sink or source); test the STO operation and set the network ID of the unit.

UDMNT *2 Axis, up to 80Vdc, 10A/20A*

A line of EtherCAT single/dual axis universal drive modules. The UDMNT supports motors rated up to 700W, with peak power of up to 1400W. Optional current levels: 2.5/5A, 5/10A or 10/20A (continuous/ peak). The drives are powered by 12Vdc to 80Vdc for the motor bus voltage, and by a separate 24Vdc control supply that retains all control and logic signals during emergency conditions.

UDMMC *4 Axis, up to 80Vdc, 20A/40A*

A line of compact EtherCAT drive modules with four and two built-in drives for motors with power up to 2.5kW. Its primary goal is to address the needs of applications that require multiple motors, such as pick & place stages and table top applications where space is limited.
It is offered with the following current levels: 2.5/5A (cont. /peak), 5/10A, 10/20A and 20/40A. The modules with four drives can also be ordered with a combination of two different current rates. Two drives with high current and two drives with a lower current. The following combinations are available: 5/10A+10/20A, 5/10A+20/40A, 10/20A+20/40A. The UDMMC is powered by a 24 to 80Vdc voltage input and by a 24Vdc logic supply input that keeps all low voltage signals alive during emergency conditions.

UDMHP/BA *3 Axis, up to 320Vdc, 15A/30A*

A line of EtherCAT modules with up to 3 universal drives. The UDMhp addresses high accuracy demanding applications. The UDMba is a more economical version. The modules are offered with three current levels: 5A/10A (cont./ peak), 10/20A and 15A/30A. The modules are powered by a single or three-phase AC input from 24 to 265Vac (rectified internally to generate a Vac x 1.4 motor bus voltage) and by a separate 24Vdc control supply that keeps all logic signals alive during emergency conditions. It supports a wide range of position feedback devices: incremental digital (total of 4), analog (SIN-COS), and absolute encoders.

UDMPM *2 Axis, up to 320Vdc, 7.5/15A*

A line of compact EtherCAT dual/quad drive modules for medium size motors with power up to 2.5kW. Its primary goal is to the address the needs of applications that require multiple motors, such as pick & place stages, where space is limited. It is offered with the following current levels: 2.5/5A (cont. / peak), 5/10A, 10/20A and 20/40A. The UDMmc is powered by a 24 to 80Vdc voltage input and by a 24Vdc logic supply input that keeps all low voltage signals alive during emergency conditions.

MC4UDC *8 built-in drives, wide range of voltages and currents*

A comprehensive line of EtherCAT modules with 2 to 8 drives each, with 100W to 10kW per drive The MC4U is a unique modular complete solution that addresses the tailor-made, flexible machine and motion control needs of OEMs. Built from standard plug-in components, the MC4U addresses all machine control needs, resulting in shorter development cycle time, reduced risk, small footprint and lower costs. See pages 18-19 for full details.

SDMNT *Unipolar Stepper, 8 Axis, up to 40Vdc, 3A*

A line of EtherCAT modules with open loop step motor drives that are specifically designed to address the needs for economical solutions for machines with many open loop step motors operating as part of an EtherCAT network. It is available in 4 and 8 axis versions, with or without built-in motor power supply. Each unit includes one bipolar drive with up to 40Vdc, 3A. All other drives are unipolar with up to 40Vdc, 3A. The current level is individually programmable for each drive and can be set to the following levels: 1A, 1.5A, 2A and 3A. The step resolution is individually programmable for each drive and can be set to the following levels: full step, 1/2, 1/4, 1/8 and 1/16 step. The SDMNT includes two sets of Pulse/Dir inputs and two sets of Pulse/Dir outputs for Master-Slave operation. There are 6 general-purpose inputs and 6 general purpose outputs. Modules with 40Vdc, 240W built-in motor supply are fed by 95Vac to 240Vac. The 40Vdc is also available as an output to power additional units. Modules without built-in motor supply are fed by a 12Vdc to 40Vdc input. The unit is also fed with a 24Vdc logic supply that keeps logic signals and communication alive.The unit is also fed with a 24Vdc logic supply that should not be removed during emergency conditions, thus keeping the logic and communication alive.

EtherCAT Interfaces for Servo and Step Motor Drives

UDI - *Commanding Closed Loop Motor Drives with ±10V Interface*

The UDI (UDI - Universal Drive Interface) is a compact EtherCAT module that controls up to 4 motor drivers with ±10V analogue interface. It supports both torque commands (single ±10V differential signal per axis) and sinusoidal commutation current commands (two ±10V differential signals per axis). It includes 4 incremental encoder and 2 absolute encoder interfaces, safety limit inputs, 4 registration inputs, 4 24Vdc/0.2A brake control outputs and one PEG (Position Event Generator) output. The servo update and sampling rate is always 20kHz.
The UDI is available in two versions:

- UDIHP - high performance version
- UDILT - economical version

The UDILT utilizes a 10 bit DAC to generate the ±10V commands and supports digital encoders only (both incremental and absolute). The UDIHP utilizes a 16 bit DAC to generate the ±10V commands and it also supports fast analog SIN-COS encoders with raw frequencies up to 5MHz. This enables running stages using high resolution laser encoders with sub-nanometer resolution at more than 1 meter/second.

Dimensions: 121 X 100 X 48 mm³

PDMNT - *Commanding Motor Drives with Pulse/Direction Interface*

The PDMNT controls up to four open loop step motor and servo motor drives with Pulse/Dir interface. It includes also safety limit inputs and 8/8 general purpose I/O points. The maximum pulse rate is 4MHz. The module can also be used by a SPiiPlus EtherCAT controller to control Laser generators with a dynamically programmable pulse rates.
The module can also be used by a SPiiPlus EtherCAT controller to control laser generators with dynamically programmable pulse rates.

UDI & PDMnt interfaces operate only with ACS EtherCAT master controllers.

Dimensions: 264 X 75 X 25 mm³

IOMNT - *Compact and Powerful EtherCAT Digital I/O Modules*

The IOMNT line of EtherCAT digital I/O modules offers an economical and compact design with up to 32 inputs and 32 outputs (24Vdc/0.5A each) with minimal power dissipation. There are four 20-pin connectors, one per 16 I/O channels. It enables secure connection of plug connectors using insulation displacement contact, such as ribbon cables, thus significantly simplifying the wiring of many I/Os. 64 LEDs display the logical states of the inputs and outputs.

The SPiiPlus IOMNT line includes the following modules:

Product	Description
IOMNT-8-8	8 inputs and 8 outputs
IOMNT-16-16	16 inputs and 16 outputs
IOMNT-32-16	32 inputs and 16 outputs
IOMNT-32-32	32 inputs and 32 outputs

Dimensions: 101 X 65.5 X 59 mm

Filters for Improved Motor Performance

For applications with demanding standstill jitter requirements or applications utilizing sensors that are sensitive to the electromagnetic noise, the MC4U-MF-CD three-phase motor filter reduces the noise induced by the PWM drive's high current switching.

Regeneration Shunt Resistor

If the power supply built-in regeneration resistor is not enough, the external MC4U-REGEN 600W shunt resistor can be used to absorb higher energy ratings.

Helping PING Revolutionizing the Golf Equipment Industry

PING has revolutionized the golf equipment industry by utilizing modern computer and automation technology to achieve the highest levels of precision, performance, and quality in the design and manufacturing of their products. The latest generation club testing systems at PING were designed with ACS Motion Control solutions. The PING Man and PING Man Tee systems utilize the MC4U integrated control and drive solution, while the Shaft Fatigue test system uses SPiiPlusNTM motion and EtherCAT Controller and UDM drives.

"ACS Motion Control was an instrumental partner in our upgrade of the PING Man and PING Man Tee systems The accuracy which we're able to hold during testing has increased dramatically. The SPiiPlus MMI Application Studio is intuitive, logical, and was a snap to learn. The Scope and Watch tools, just to name a few, were vital during system installation. ACS' highly knowledgeable and friendly Application Engineers helped us to quickly overcome issues during the development process. The modularity of the products has enabled us to consolidate dis-similar test systems (PING Man and Shaft Fatigue) under one motion control platform. Two entirely different applications, one development tool (SPiiPlus MMI Application Studio), one language (ACSPL+), one very happy engineering team." C.P. Test Engineer, PING

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