

Schaedler Yesco
EXPO 2010



Scalable Motion Solutions

Presenters

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Agenda

1. Integrated Architecture and Motion Control

2. Kinetix Servo Drives and Motors today

3. Recent Kinetix Additions

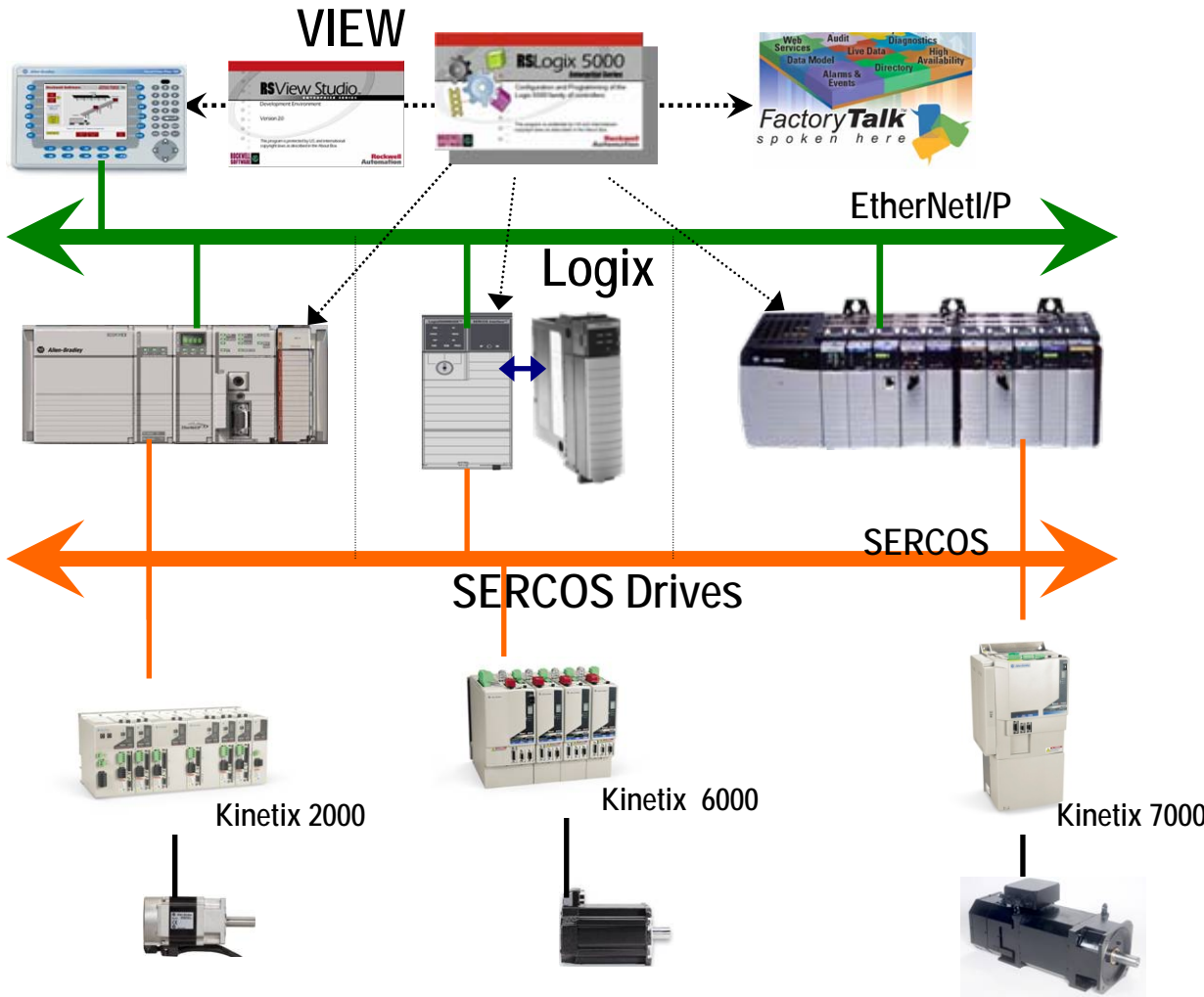
4. Labs for today

5. Details on CIP Motion products

Motion applications are simple to complex

- The labs and presentations today will demonstrate varied levels of motion control systems
 - On board motion control in RSLogix5000
 - Your processor is the motion controller
 - Single programming package for discrete, motion, safety, process and drives
 - Same approach and behavior in program regardless of scale
 - Simple indexing, velocity or current control solutions
 - New Ethernet control
 - Devicenet indexing
 - Stand alone PTO or analog

Integrated Architecture and Motion Control



Scalable

Integrated

Information Enabled

Kinetix Integrated Motion

Kinetix Family of Servo Drives

Drive Continuous Power Rating

250W

500W

1.2 KW

3 KW

7.5 KW

11 KW

22 KW

150 KW

460V 3 phase

Kinetix 6000



Kinetix 7000



GuardMOTION

All SERCOS based control with
CompactLogix L43/45 and
Controllogix

230V 3 phase

Kinetix 2000



GuardMOTION

230V 1 phase

Ultra3000



120V

Voltage

Kinetix Family New Additions

Drive Continuous Power Rating

250W 500W 1.2 KW 3 KW 7.5 KW 11 KW 22 KW 150 KW

Voltage

460V 3 phase

230V 3 phase
230V 1 phase

120V

Kinetix 6000



GuardMOTION

Kinetix 7000



GuardMOTION

Kinetix 2000



Ultra3000



Kinetix 6200 SERCOS based drive with built in safe speed monitoring control, 1.2KW to 22KW

Kinetix 6500 Ethernet IP control with same safe speed functionality as 6200, 480V only

Kinetix 6000 400W to 3KW, 120V to 480V



Less complex motion solutions






Kinetix 300

- Uses Ethernet IP for control and communications
- Compatible for class 1 I/O control in Compactlogix and Controllogix
- Compatible for class 3 messaging with Micrologix
- Uses common web page and Java configuration
- No programming or network software required
- 120v to 480V – 400W to 3KW
- 32 index steps
- Add on Profile and Add On Instruction for RSLogix5000

Ultra
Limited
Must have U
Limited t



Kinetix Portfolio Additions

Product Name	Picture	Description	Customer Value	Targeted Availability
Kinetix 6000		Enhanced Peak Power Capability for Kinetix 6000 Drives	<ul style="list-style-type: none"> ➤ 250% peak ➤ 50% Panel Space Savings ➤ 45% BOM Price Reduction 	Now
Kinetix 6200		SERCOS Advanced Safety Option	<ul style="list-style-type: none"> ➤ Advanced Safety Features <ul style="list-style-type: none"> ➤ Safe speed monitoring ➤ Safe direction ➤ Modular Design 	NOW V17 or later
Kinetix 6500		CIP Motion with Advanced Safety and Enhanced Safe off	<ul style="list-style-type: none"> ➤ Integrated motion over EtherNet/IP ➤ Modular Design ➤ 480V models only 	NOW Must be used with V18
Kinetix 7000		Additional rating for K7K product line	<ul style="list-style-type: none"> ➤ 150 kW single axis drive 	NOW
Ethernet/IP Indexing Drive Kinetix 300		Servo drive with E/IP interface for simple point-to-point motion	<ul style="list-style-type: none"> ➤ Indexing EtherNet/IP servo drive positioned to optimize motion solutions with the L2x 	NOW V17 or later

Kinetix Servo Motors - Product Offering

Continuous Torque

0.1 Nm

1 Nm

10 Nm

100 Nm

1000 Nm

400 / 460 Volts

MP-Series
Low Inertia



1326AB

HPK-
Series



F-Series



TL-Series








Low Inertia

Medium Inertia





Voltage

230 Volts

Kinetix Portfolio Additions

Product Name	Picture	Description	Customer Value	Availability
Heidenhain Feedback Support		EnDAT 2.1 and 2.2 sine/cosine support for K2K / K6K / K7K	<ul style="list-style-type: none"> ➤ Motor feedback connector kit to support motors with Heidenhain encoders 	NOW
Rotary Direct Drive Motors		Housed and Bearingless High-Torque, Low-Speed Motors up to 500 Nm continuous torque	<ul style="list-style-type: none"> ➤ Simplify machine design ➤ Eliminate mechanical transmission ➤ Improve machine performance 	NOW
Medium Inertia MP Motor		Medium Inertia MP design stator servo motor family. MPL voltage & options	<ul style="list-style-type: none"> ➤ Modern power-dense design ➤ IEC interface, common with MPL ➤ 12% lower list price vs. current designs 	NOW
MP Connector Standardization		Standard DIN connectors for all MP-Series motors	<ul style="list-style-type: none"> ➤ Rotatable right angle connectors ➤ Common cables for all premier integrated MP-Series motors and actuators 	Throughout CY2009 and 2010
Continuous Flex Cables		Flexible cables for continuous motion applications	<ul style="list-style-type: none"> ➤ Long life in continuous flex applications - 10 Million operations @ 12 x O.D. ➤ UL listed to meet NFPA-79 	Available Now

Linear Motion Solutions Portfolio Additions

Product Name	Picture	Description	Customer Value	Availability
Stacked Linear Stages		Multi-axis Linear Stages.	<ul style="list-style-type: none"> ➤ Simplified product selection (Motion Analyzer v4.5) ➤ Simplified machine design (CAD dwg's.). ➤ Simplified commissioning with RSLogix 5000 v16 software ➤ Pre-Engineered cable management ➤ AOI's and faceplates for 2/3D indexing and contouring 	Available Now
Linear Motor Components		Iron Core and Balanced Motors	<ul style="list-style-type: none"> ➤ Simplified product selection w/Motion Analyzer ➤ Simplified commissioning with RSLogix 5000 v16 > software ➤ Designers Guide to assist with brg./encoder selection 	NOW
Pneumatic Class Rod Style Actuator		Integrated Rod Actuator (Three frame sizes)	<ul style="list-style-type: none"> ➤ Linear Feed Force up to 2500N (562 lb.s) ➤ Stroke lengths to 800mm, speeds to 1m/sec. ➤ High resolution absolute positioning 	NOW
Hydraulic Class Rod Style Actuator		Integrated Rod Actuator	<ul style="list-style-type: none"> ➤ Linear feed force up to 28,000N (6400lb.s) ➤ Stroke lengths to 300mm, speeds to 560mm/sec. ➤ Compact Design, IP67 Env. Rating 	NOW

Labs for today

- Kinetix 300 Basics (new)
 - Set up from the start using nothing more than a Java interface (no programming software)
 - Set up, tune and test the drive
 - View a sample program in RSLogix 5000 to control the drive over Ethernet IP

You may or may not get through the entire lab. You are encouraged to look around the program and feel free to skip ahead. If you get stuck that a reading through it again doesn't help just let one of us know.

- Introduction to Kinetix Motion (Logix user)
 - Utilizing scalable Kinetix 2000 and CompactLogix hardware
 - Full power of RSLogix5000 motion instructions
- Basic Kinetix Motion Lab (Logix veteran)
 - Utilizing Kinetix 6000, Ultra 3000 SERCOS and ControlLogix demo cases.
 - A walk through of RSLogix5000 motion instructions and tools matching to a real world application



Kinetix® 6200 Modular Safe Speed Servo Drives

Kinetix 6200 Benefits - Upgrades

- The Kinetix 6200 SERCOS interface™ drive is compatible with your existing Kinetix 6000 system.
- Any number of axes can be upgraded to advanced safety where needed without replacing the entire system.
- Programming and wiring changes will be needed on any axis upgraded.



Kinetix 6200 Benefits - Modularity

- Additional modules will allow user to choose between safe off or advanced safety.
- Migration platform for EtherNet/IP network connectivity protects your investment for future technology enhancements
- Control module attaches to all power modules reducing spare parts inventory



Supported Advanced Safety Functions (S1)

<u>Function</u>	<u>Operation</u>
Safe stop	Initiate Safe Stop (NFPA 79 Category 0, 1, or 2)
Zero speed monitoring	Only allow access (unlock door) when axis is stopped.
Safe limited speed	When requested, monitor speed. If in excess of safe speed, initiate Safe Stop.
Safe maximum speed	Always monitor for safe maximum speed, even under normal operation. If in excess, initiate Safe Stop
Safe direction monitoring	When requested, monitor direction. If wrong rotation direction, initiate Safe Stop
Door monitoring and control	Unlock door to grant access when at safe speed or zero speed.
Enabling switch control	Use in conjunction with Safe Limited Speed. Allow access when at Safe Speed. If no Enable Switch, initiate Safe Stop.
Safe Max Accel monitoring	When configured, if accelerating too fast, initiate Safe Stop.

Configuring Safety

Address <http://192.168.1.1/> Go

Allen-Bradley Kinetix 6200 Safe Speed **Rockwell Automation**

Expand Minimize

- Home
- Diagnostics
- Fault Logs
- Data Logs
- Browse Power Rail
- Safety
 - Safety Main
 - Safety Configuration
 - Safety
 - Feedback
 - Input Configuration
 - Safe Stop
 - Safe Limited Speed
 - Safe Max Speed
 - Safe Max Accel
 - Safe Direction
 - Configuration Summary
 - Change Safety Password
 - User Documentation

Safety Feedback Input Safe Stop Safe Limited Speed Safe Max Speed Safe Max Accel Safe Direction

Change System Configuration

System Configuration	Cascaded First Unit
Operation Mode	SafeStop-SafeLimitedSpeed-DoorMonitor-EnablingSwitch
Reset Type	Disabled SafeStop
Door Control Output	SafeStop-DoorMonitor SafeStop-SafeLimitedSpeed
<input checked="" type="checkbox"/> Enable Lock Monitoring	SafeStop-SafeLimitedSpeed-DoorMonitor SafeStop-SafeLimitedSpeed-EnablingSwitch
Overspeed Response Time	SafeStop-SafeLimitedSpeed-DoorMonitor-EnablingSwitch
Speed Resolution	SafeStop-SafeLimitedSpeedStatusOnly

Commands
Apply

The diagram illustrates a cascaded drive system. On the left, two arrows labeled 'Sensors' point into a box labeled 'Cascaded Drive First Unit'. This box is connected to a stack of three boxes labeled 'Cascaded Drive Middle Unit'. The stack is connected to a box labeled 'Cascaded Drive Last Unit'. An arrow from the last unit points to 'Door Control Output'.

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Configuring Safe Input Types

Safety Feedback Input Safe Stop Safe Limited Speed Safe Max Speed Safe Max Accel Safe Direction

Change Input Configuration Type

Safe Stop	Dual Channel Equivalent	▼
Door Monitor	Dual Channel Equivalent	▼
Lock Monitor	Dual Channel Equivalent	▼
Safe Limited Speed	Dual Channel Equivalent	▼
Enabling Switch Monitor	Dual Channel Equivalent	▼

Commands

Apply

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Kinetix 6200 Features

Catalog number, serial number and date code label for the power module

250% peak power – No configuration required

2094-BC07-M05-M and
2094-BM05 rated to 200%

Connection point to secure SERCOS connection port protector

Scrolling display includes IP address, drive state, fault codes and fault descriptions for faster troubleshooting

Switches on integrated axis module to set the SERCOS node

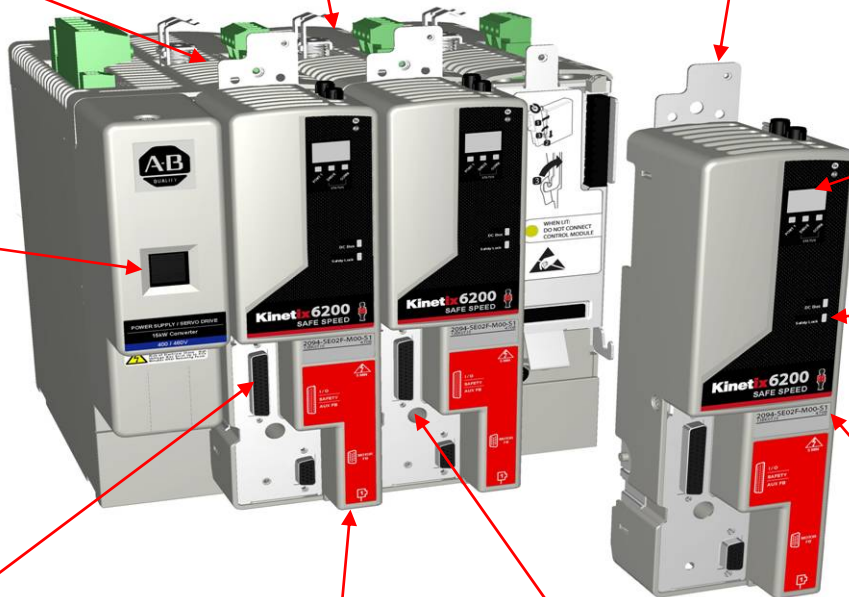
Modular control, allowing ease of upgrade and migration with options for: safe speed, safe off, and Ethernet connectivity, and attaches to any power module

44 pin connection port for I/O, safety and auxiliary feedback

Ethernet port for advanced safety configuration, and diagnostics

Power rail access point allows drive to be removed as a single unit

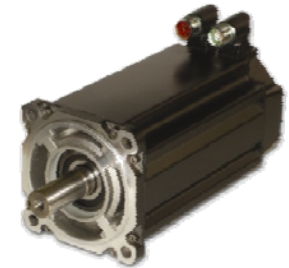
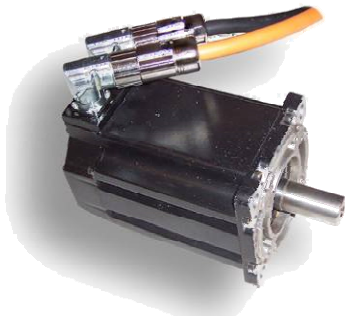
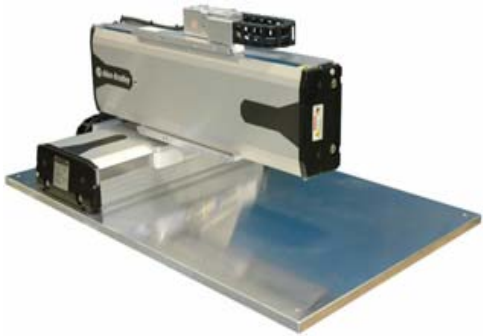
Catalog number, serial number and date code label for the control module



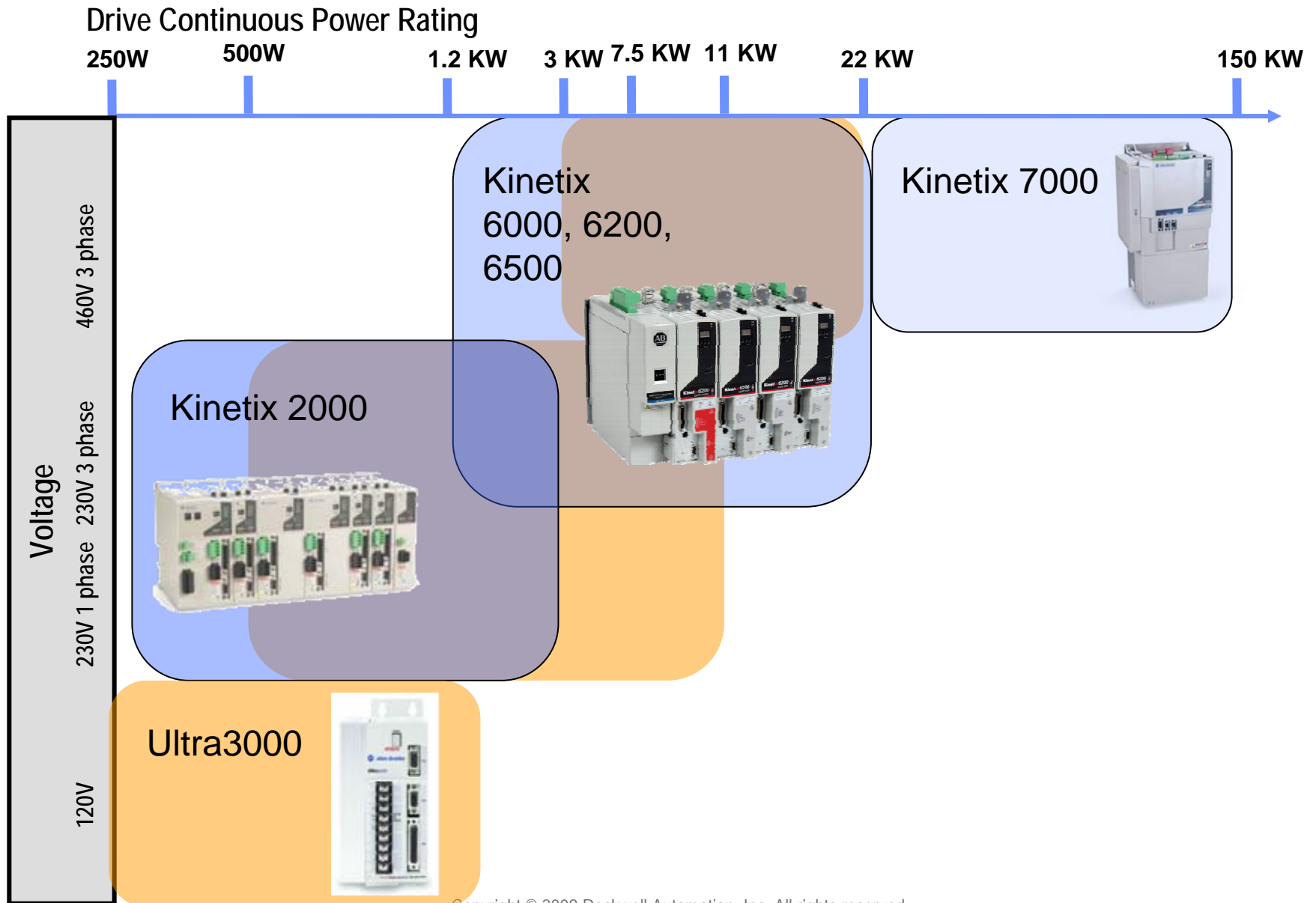
Motor and Actuator support

Lines

- MP-Series Low Inertia (MPL)
- MP-Series Stainless Steel (MPS)
- MP-Series Food Grade (MPF)
- TL-Series (TLY)
- MP-Series/ TL-Series Electric Cylinders (TLAR, MPAR)
- MP-Series Linear and Multi-axis Stages



Kinetix 6200 - Positioning



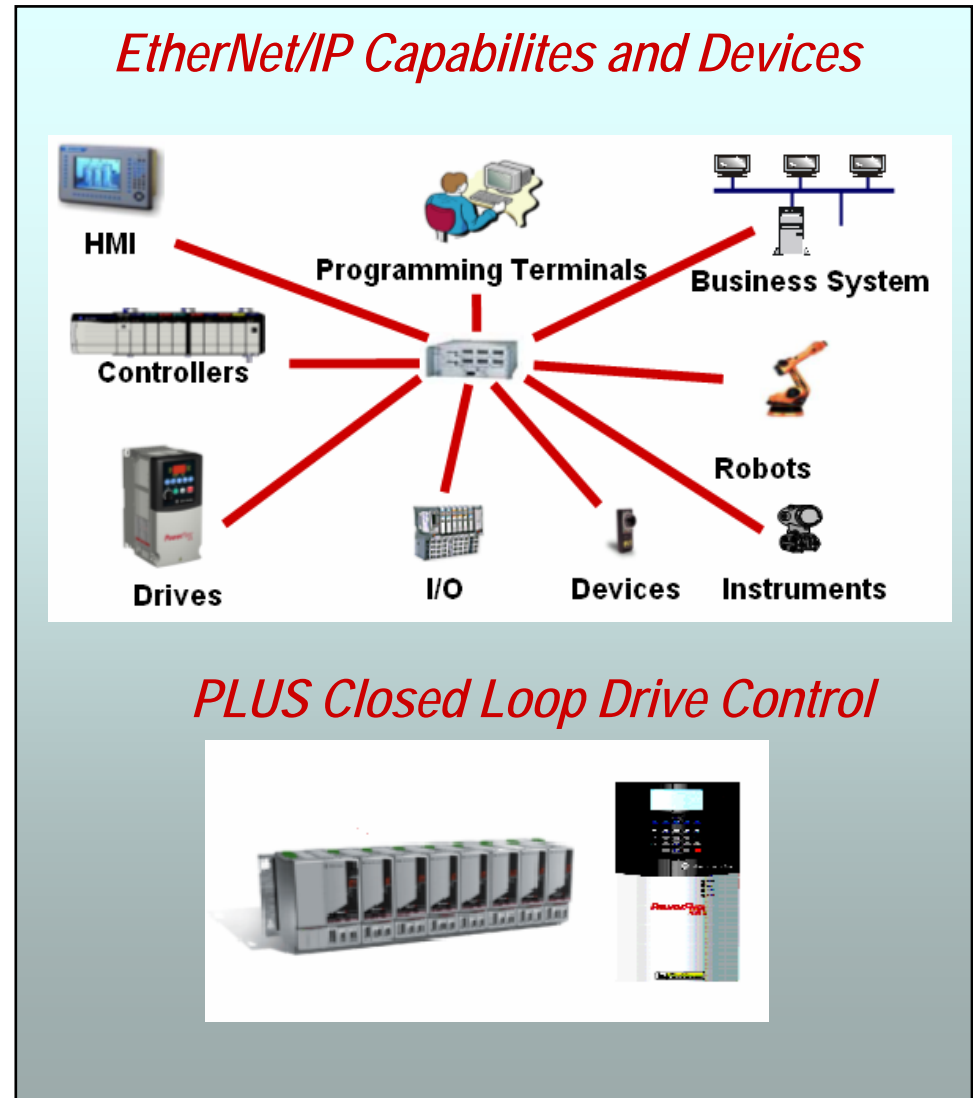
Kinetix 6500 Ethernet Safe Speed Servo



The Kinetix 6500 Safe Speed drives incorporate world class safety integration to our existing multi-axis premier integrated motion platform

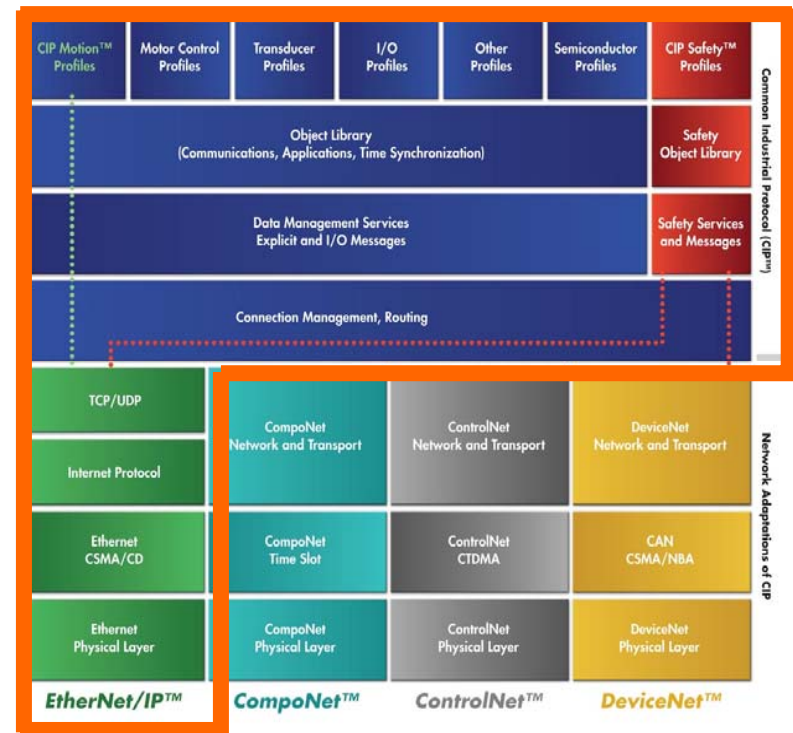
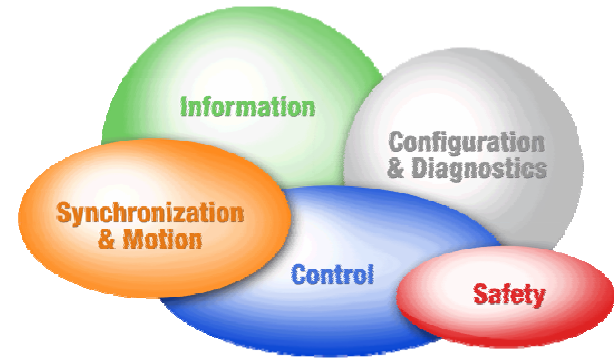
V18 EtherNet/IP with CIP Motion Support

- Integrated motion support on EtherNet/IP
 - Provides all the functionality of Logix SERCOS and more
 - Kinetix and PowerFlex 755 drives
- Integrate I/O, drives, EOI, and any other EtherNet/IP device on a single network
- Standard EtherNet
 - Compatible with commercially available Ethernet tools
 - Standard switches and components

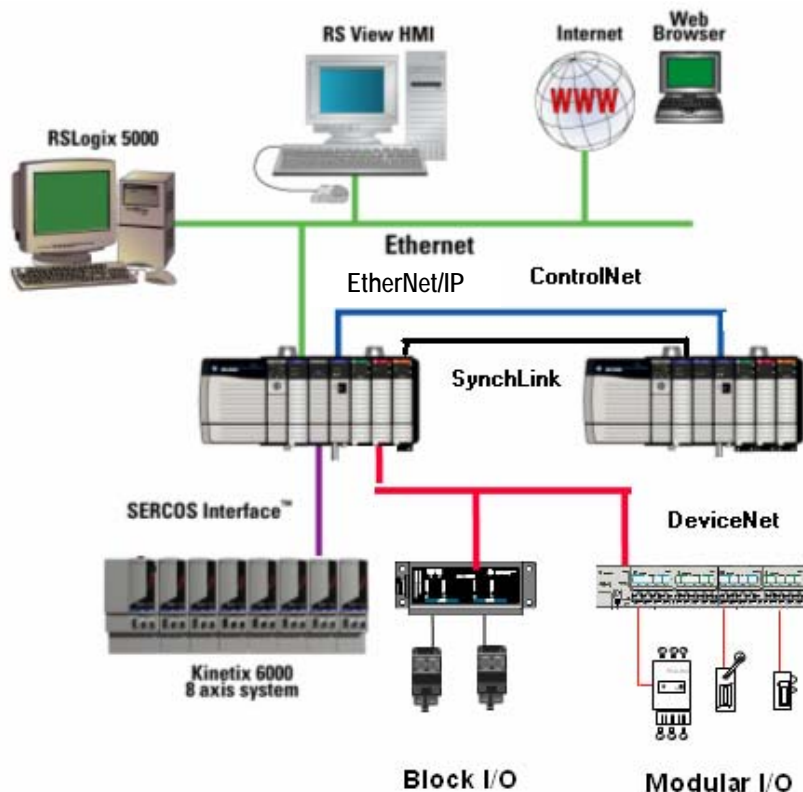


CIP Motion and CIP Sync

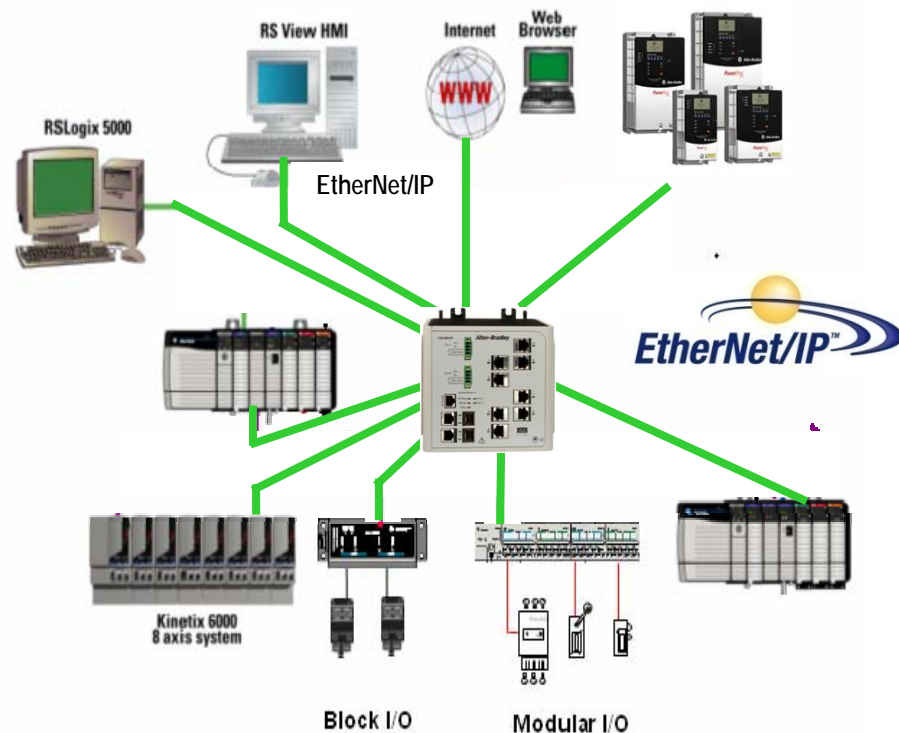
- “*CIP Motion*” and “*CIP Sync*” provide Synchronization and Motion support on EtherNet/IP
- “*CIP Sync*” time services
 - +/- 100 ns distributed node time synchronization on EtherNet/IP using IEEE 1588
 - Input time stamping, events and alarms time stamping
 - Time scheduled outputs
 - CIP Motion drive synchronization
- “*CIP Motion*” motion profiles
 - Control-to-drive and peer-to-peer functionality



Flat Network Topology

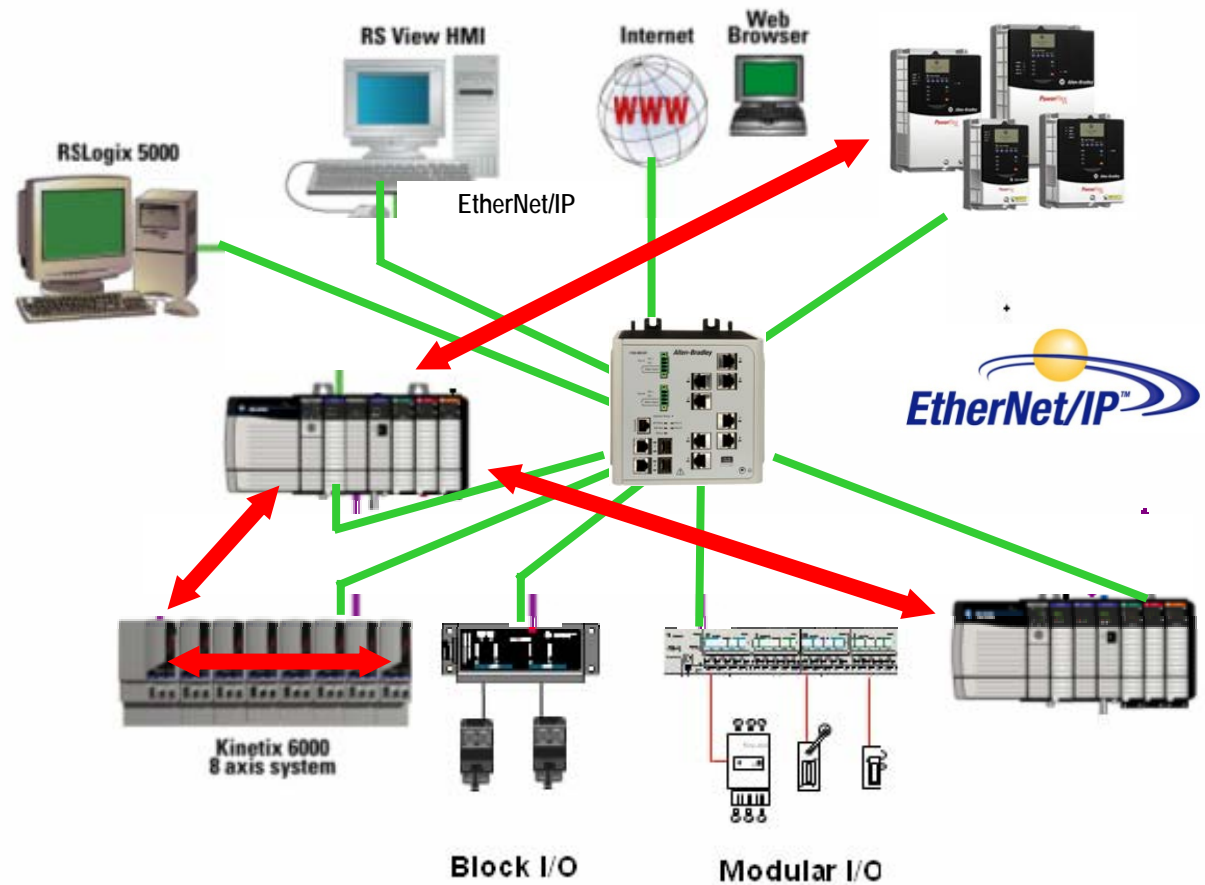


- *Lower system cost*
- *Better system performance*
- *Simplified integration*
- *Future Proof*



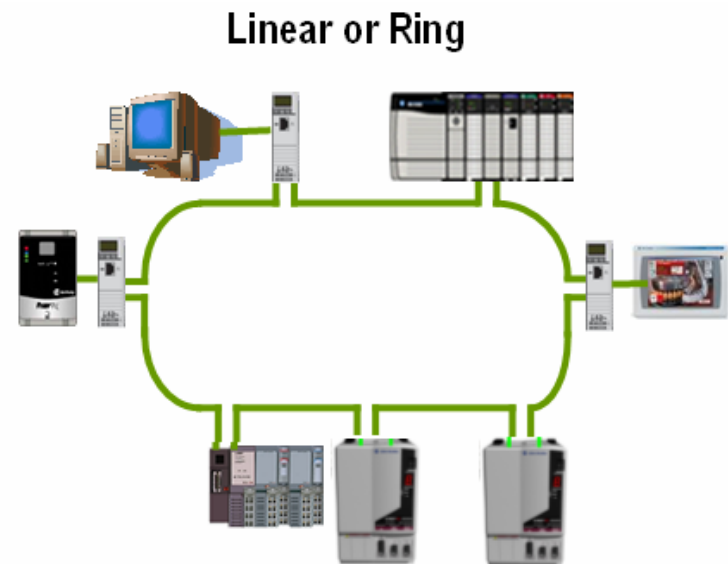
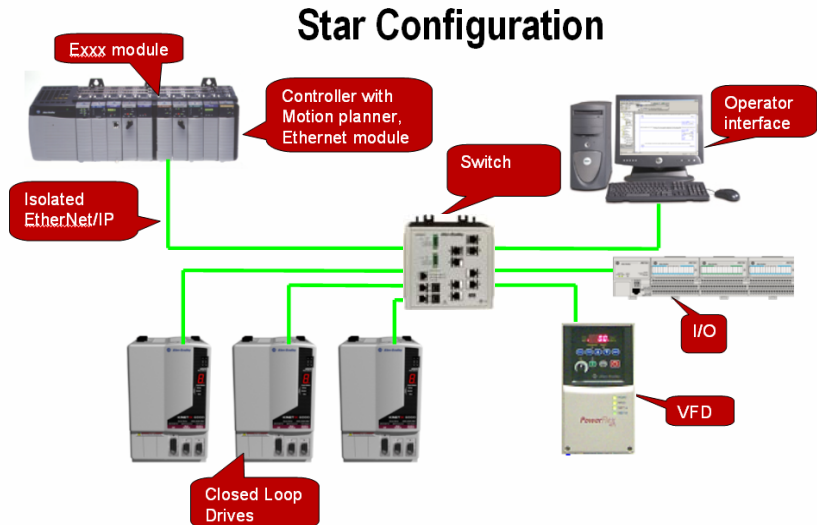
EtherNet/IP Control to Drive, Peer to Peer

- Control to drive
 - Closed and open loop drive control
- Control to control
 - CST time synchronization



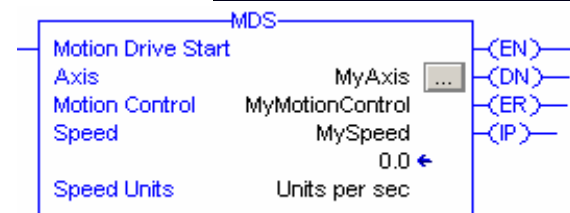
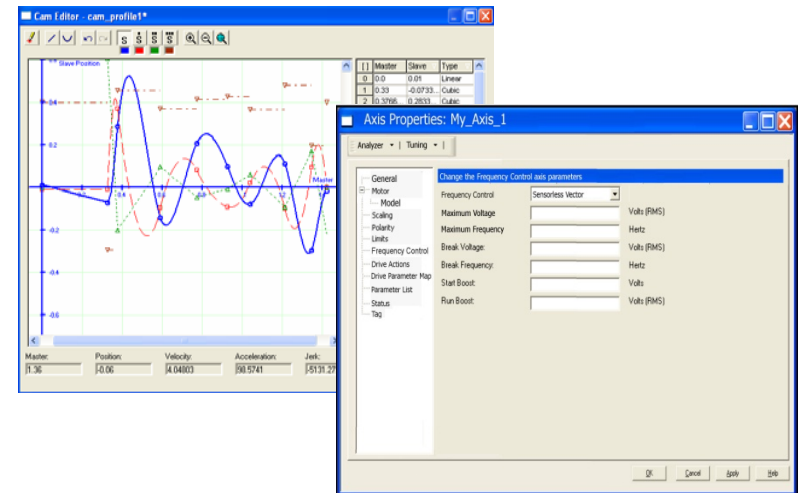
EtherNet/IP CIP Motion Topology support

- Support for any Ethernet topology using standard switches
- Star topology
 - Each drive is isolated so that loss of a drive(s) does not impact operation of the remaining drives
 - Removal/insertion of drives
 - Drive failure
 - Media failure
 - On-line addition of new drives
- Linear/Ring topology
 - Simplifies interconnect wiring between distributed devices
 - Effective when devices are not located near central switch
 - Kinetix drives with embedded switch eliminate the need for an external switch
 - Ring topology for high availability



PowerFlex 755 with CIP Motion (Availability June)

- Full integrated motion support
 - Configuration dialogs
 - Motion instruction set
 - Command and status tag attributes
- Fully interchangeable with Kinetix
 - Application program can be developed independent of PowerFlex or Kinetix drive use/mix
- VHZ/vector velocity control and vector position control
- MDS instruction for velocity control with flying start capability
- Broad power range
 - .5-700Hp @ 400/480V
 - 10-350Hp @ 575V



ENxT Motion Support

- Catalog Numbers: 1756-EN2T = 8 drives, 1756-EN3T = 255 drives
 - Only position mode configured drives count towards the drive limit
 - Unlimited velocity, torque, and VHZ configured drives
 - L6X/L7x controller drive limit of 128 drives
 - Drives can be coordinated across multiple 1756-ENxT modules
 - Controllers can share one or more 1756-ENxT modules
 - Supported EtherNet/IP CIP Motion drives
 - Kinetix K6K E drives
 - PowerFlex 755 drives
 - Supports any EtherNet/IP device
- Ease-of-use
 - Easy accessible USB device port for quick connection to the module and chassis backplane
 - Thumbwheel switches for quick IP address configuration



Kinetix 300



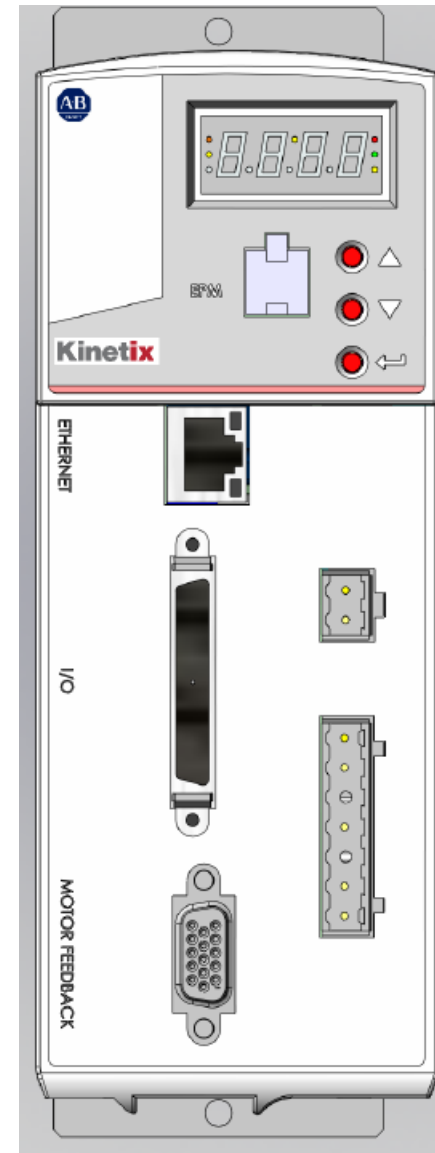
**Rockwell
Automation**

 *Allen-Bradley • Rockwell Software*

Ethernet/IP indexing drive

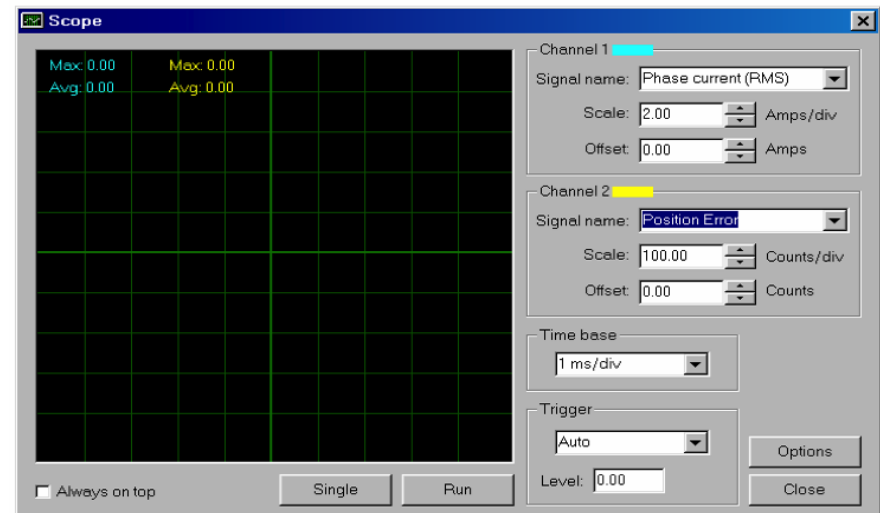
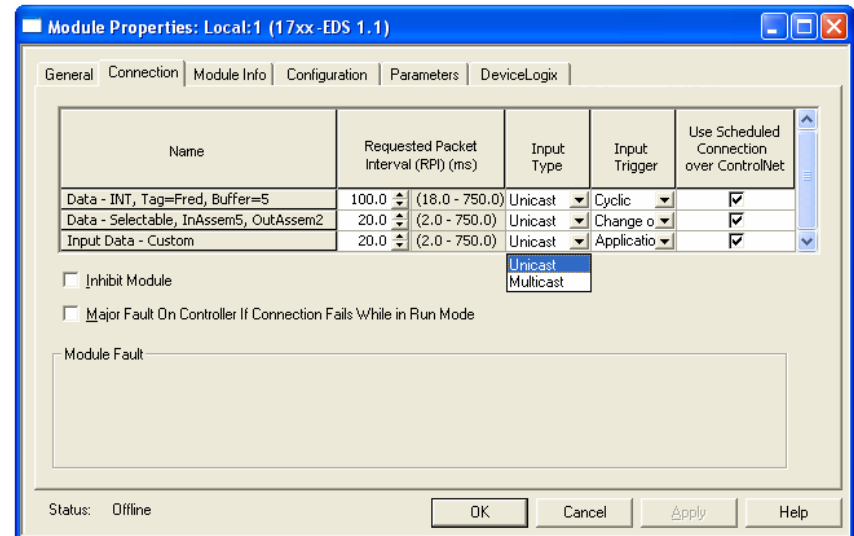
- **Main Features**

- 400W – 3kW
- ODVA Ethernet/IP Class1 and Class 3
- 120/230 single phase, 230/460 3-phase
- Absolute and Incremental Feedback, Stegman Hiperface and Tamagawa (MP and TLY motors)
- 300% Peak Power @ 40 deg. C
- 0 – 40 Deg. C Operating temperature
- Auto tuning
- Analog I/O (2/1) and Digital I/O (12/4)
- EN 954-1 class 3 Safe-off
- Memory Modules for ADR
- 4 character display
- Keypad input
- S-Curve moves
- Electronic Gearing
- 32 indexes supported



User Experience

- Smart Motor recognition for RA motors
 - Automatic population of gains
 - Auto and manual tuning if required
- RSLogix 5000 Add On Profile
 - Drive Configuration
 - Access to all tags and data types
 - Access I/O assembly Instances
 - V17 and V18 compatible
- RSLogix 5000 Add On Instructions
 - Logix Motion Commands
 - Drive parameter save and restore
- Additional Web-based Interface
 - Tools and configuration



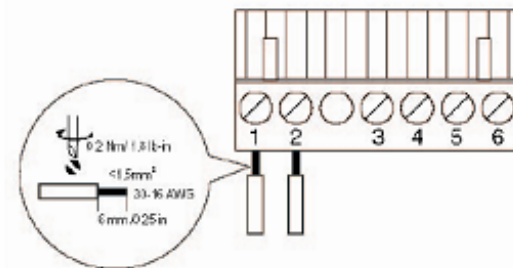
Safe Off

- The Kinetix 300 has an EN954-1 Category 3 compliant safety circuit.
- Safety functionality is implemented to allow the drive output to the motor to be disabled so that the drive cannot generate torque in the motor.
- 6-pin quick-connect terminal block for the safety function interface.

P8 PIN ASSIGNMENTS (SAFETY FUNCTION)

Pin	Name	Function
1	+24VDC Control	+24VDC Output from the Drive
2	Control COM	+24VDC Output Common
3	Safety Status	EN954-1 Safety Status
4	Safety Input1	EN954-1 Safety Input 1 (+24VDC to Enable)
5	Safety COM	EN954-1 Safety Common
6	Safety Input2	EN954-1 Safety Input 2 (+24VDC to Enable)

Torque: 0.2 Nm/ 1.8 lb-in
Nominal Cross Section: 1.5 mm² (2325 mils²)
Wire Stripping Length: 6mm (0.25 in.)
(30-16 AWG)



CompactLogix EtherNet/IP Operating Modes

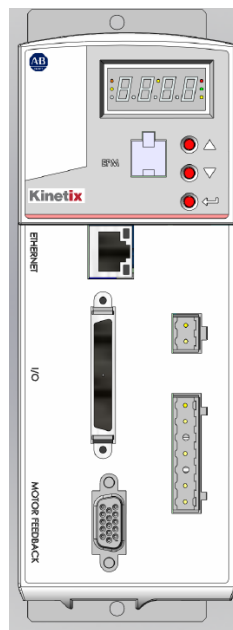


Commanded Control

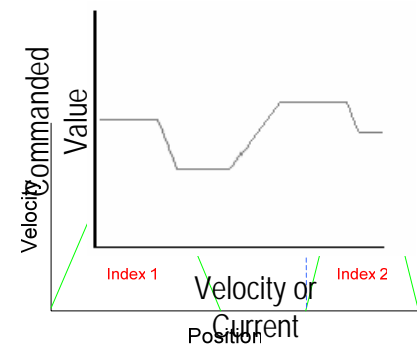
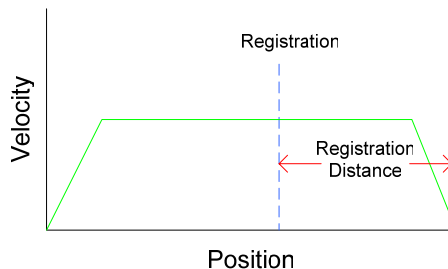
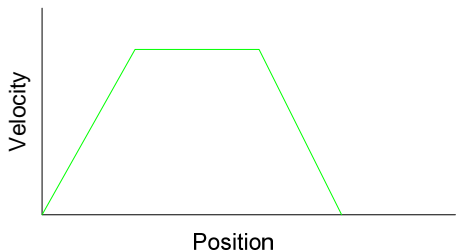
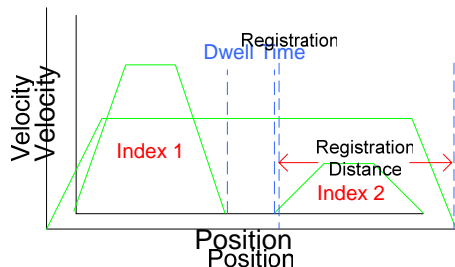
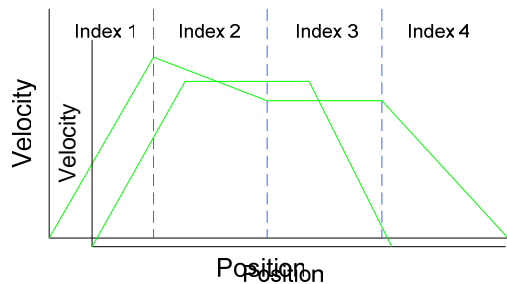
Class 1 I/O Messaging



Control Connection:
EtherNet/IP



Motor Support
MP and TLY
Absolute and Incremental

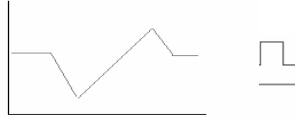


MicroLogix - Control modes

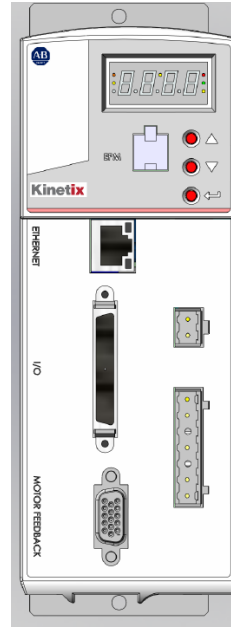


EtherNet/IP Control

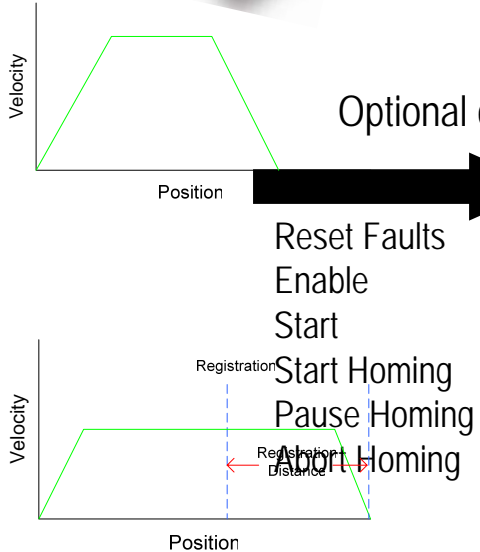
STEP
DIRECTION



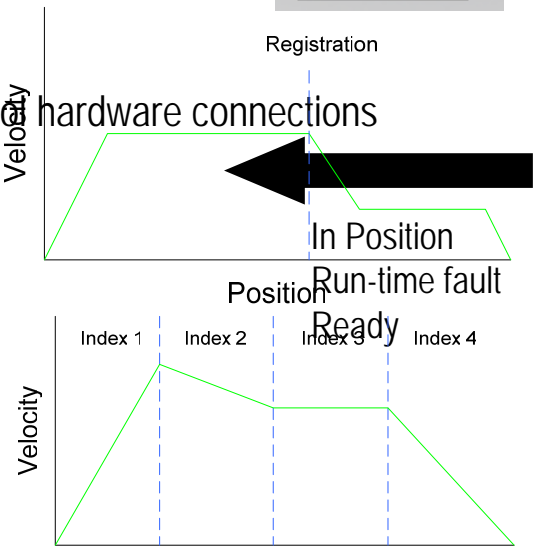
Control Connection:
EtherNet/IP Class 3
*Single ended or differential



Motor Support
MP and TLY
Absolute and Incremental



Reset Faults
Enable
Start
Start Homing
Pause Homing
Abort Homing



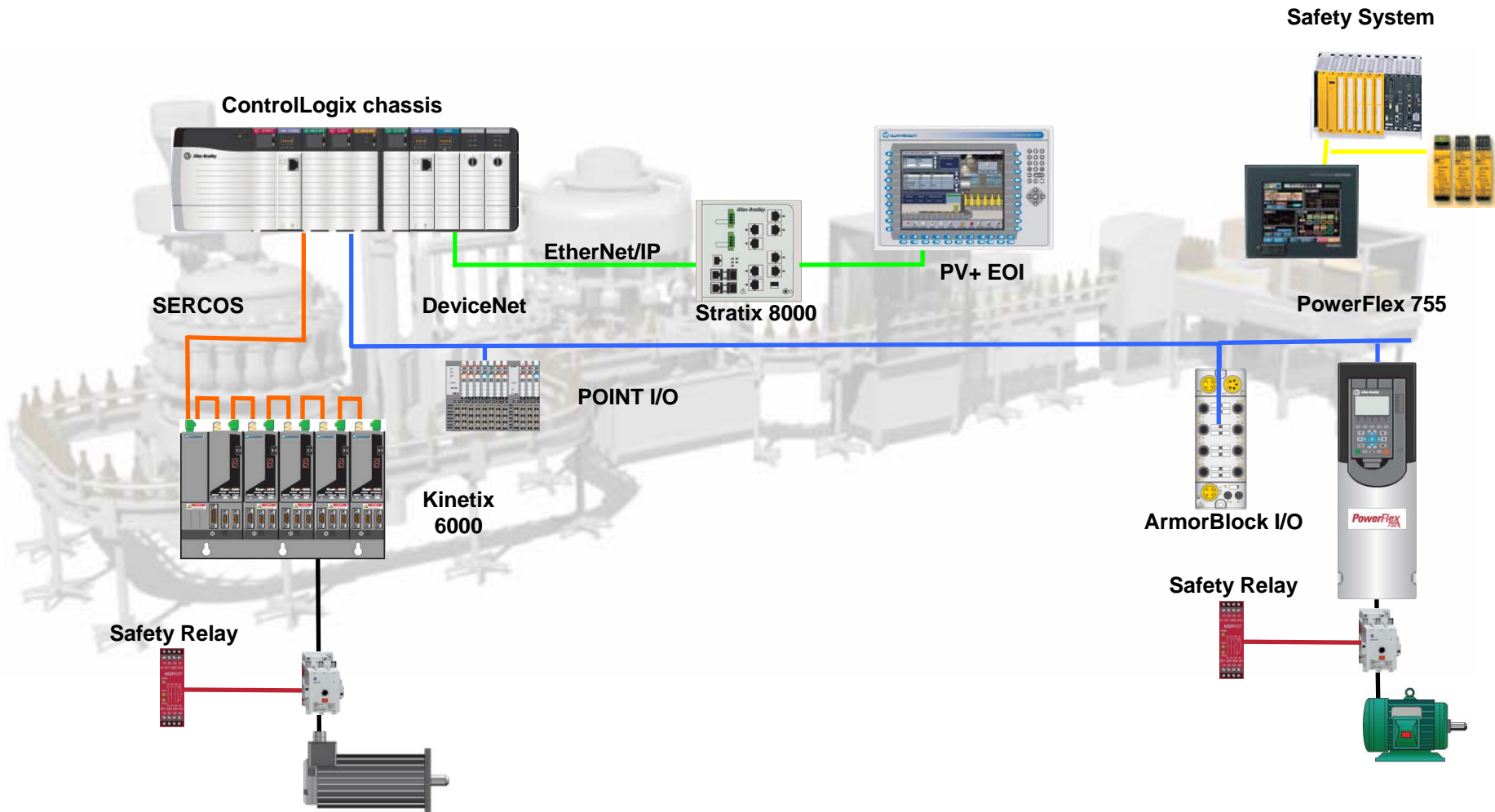
Optional control hardware connections

Run-time fault Ready

Runtime tags via Class 3 explicit messages.
Input and Output Assembly Instances

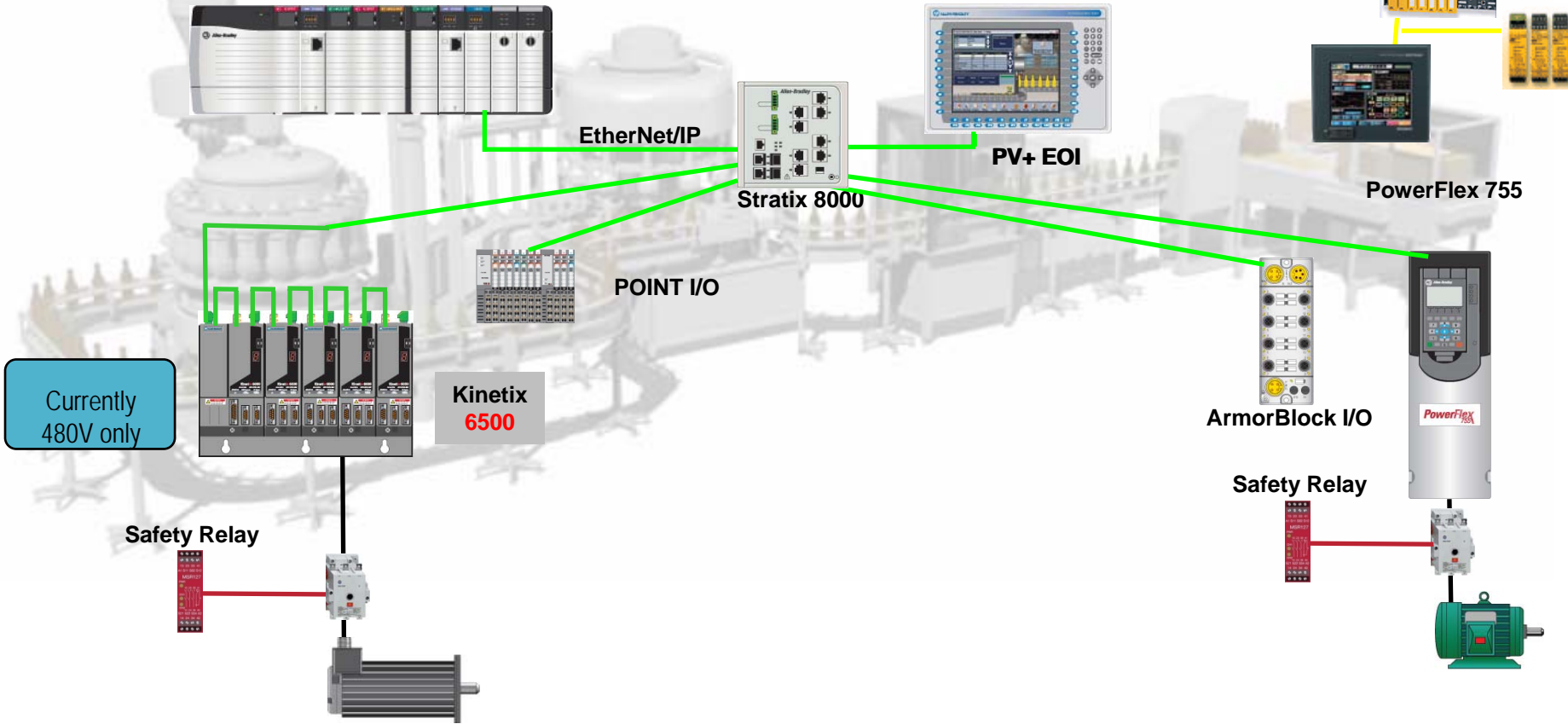
Development tags - configure with Web Browser or Class 3 Messaging.

So how does this help me?

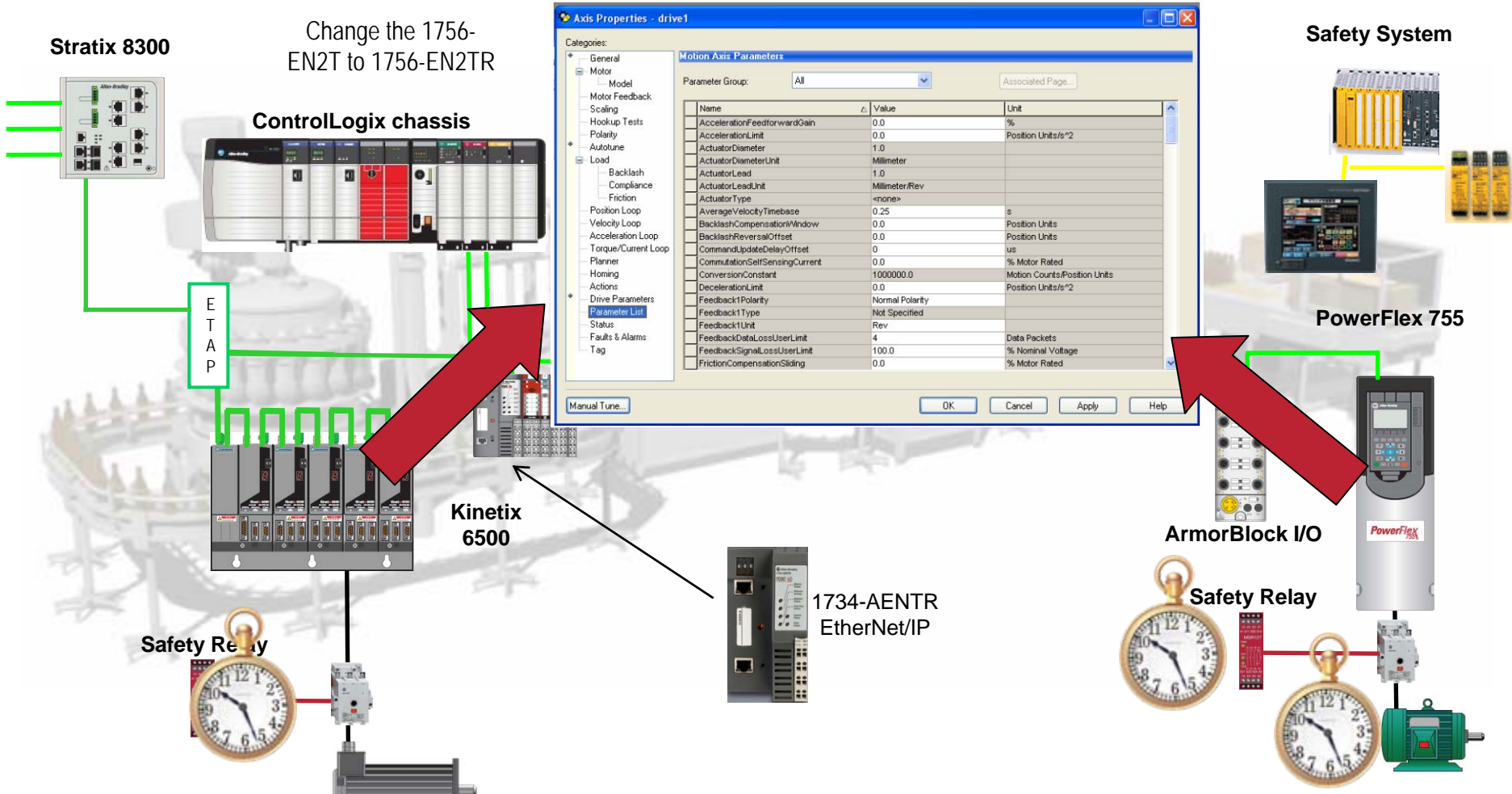


Reductions with Performance Additions

~~SERCOS Module~~ ~~DeviceNet Module~~
ControlLogix chassis

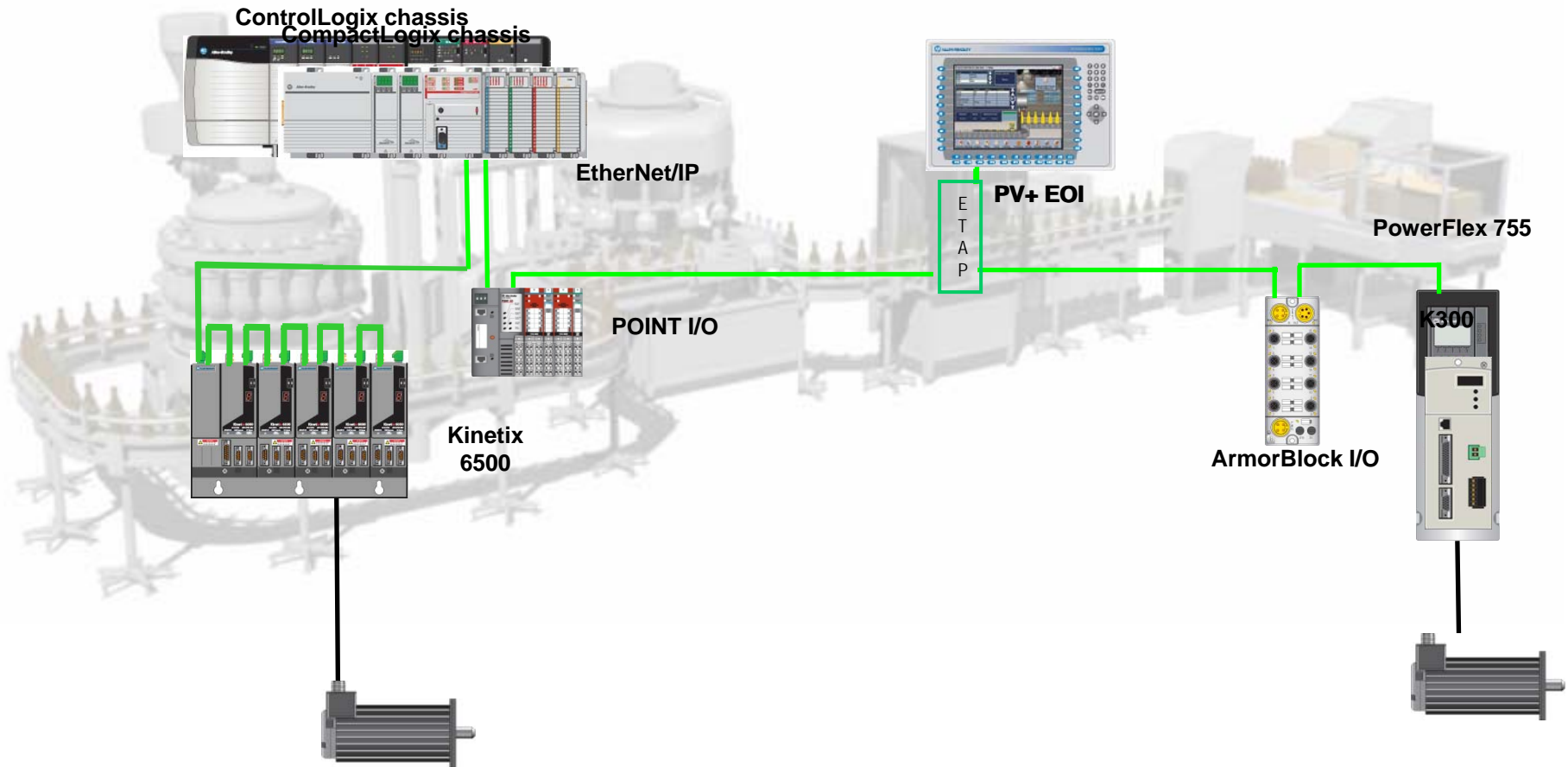


The Integrated Architecture Value



Reduction in hardware, simpler access to controller program and centralized data model to business system/historical software

Scalability (smaller machines)



Scalable Motion Solutions

Questions or comments?

Please fill out the short survey form at the end of the class.

If you need room for questions please just right on the back.

Thanks for your attention!