Rockwell Automation

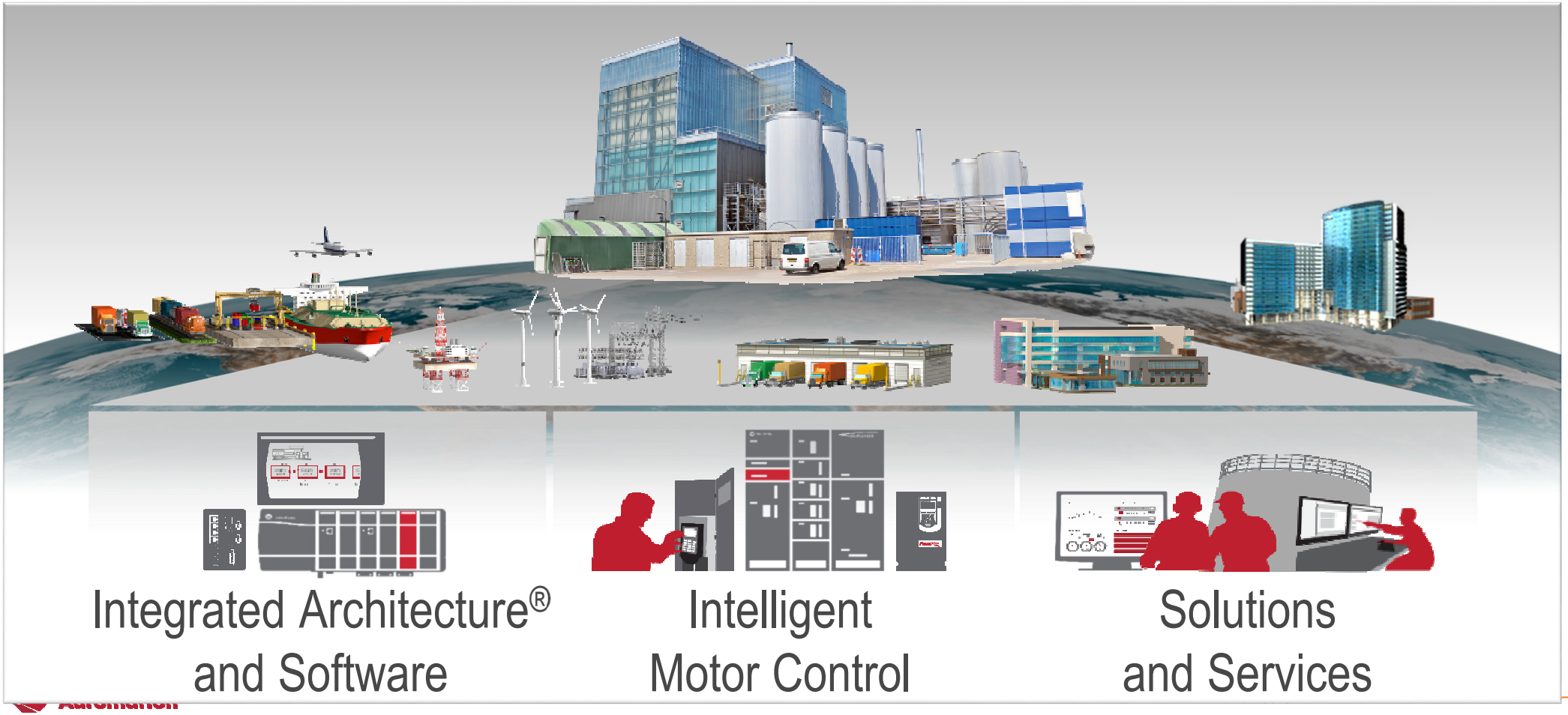
Innovation & Technology Forum

What's new in Kinetix

Roman Foukal
Commercial Engineer A&S

Integrated Control and Information

Our Core Platforms Enable the Connected Enterprise



Integrated Architecture® and Software

Intelligent Motor Control

Solutions and Services

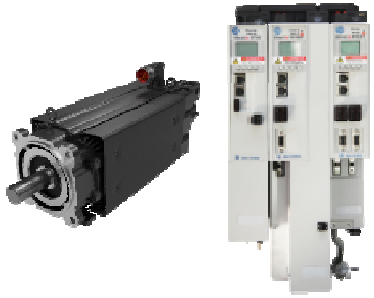
Integrated Architecture

New Products Enabling a High-Performance Architecture

Controllers

I/O

Motion



Drives

Network Infrastructure

Visualization and Manufacturing Intelligence

Integrated Development Environment

Application Libraries

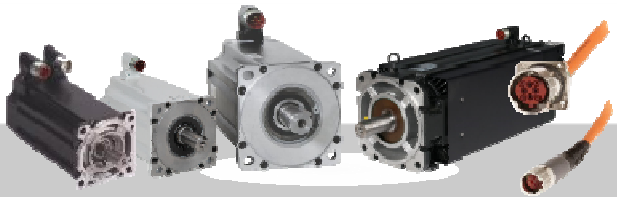
Motion Portfolio

INDEPENDENT CART TECHNOLOGY
iTRAK® and MagneMotion®

- Modular, scalable linear motor system that allows independent control of multiple movers
- Ideal for packaging, automotive, life sciences, logistics industries

SERVO MOTORS and CABLES
Kinetix Motors and Cables

- Designed to meet the unique needs of many industries including wash down applications
- Single or dual cable motor options available
- Sil2/PLd encoder options



SERVO DRIVES
Kinetix Drives and Accessories

- Broad range of drives from low power indexing drives to high power, multi-axis drives
- Integrated motion on EtherNet/IP
- Embedded advanced safety features

Agenda

Independent Cart: iTRAK and MagneMotion

Kinetix Motors and Cables

Kinetix Drives and Accessories

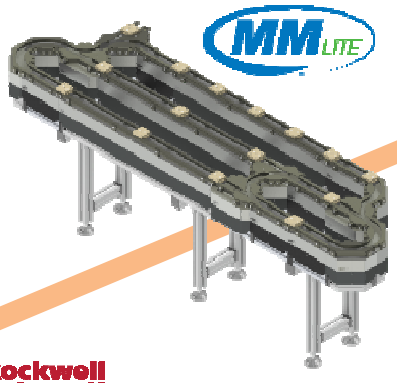
Motion Analyzer

Kinetix 5700 Advanced Safety Demo

Independent Cart Technology Portfolio

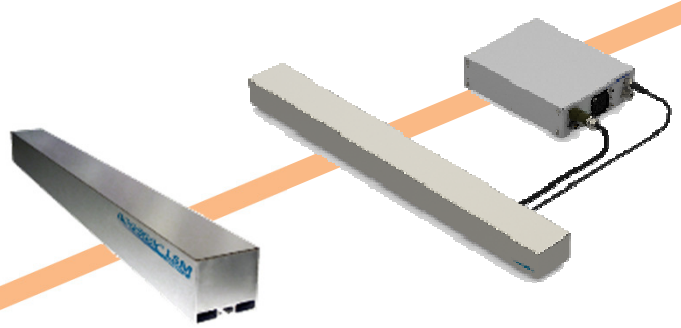
MagneMover LITE

- Intelligent conveyor system for light payloads (≤10 kg)
- Easy design and setup
- Modular and flexible
- Simple programming and control of 1–1,000+ independent carts

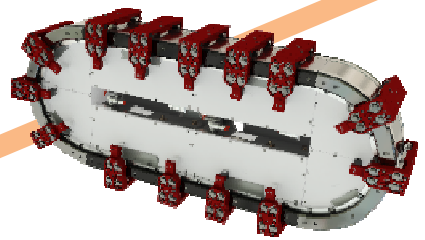


QuickStick® QuickStick® HT

- Intelligent propulsion and control system for intelligent conveyor and positioning systems
- Payloads from 10s to 1,000s of kilograms
- Flexible layout with variable motor spacing to optimize cost



iTRAK® SYSTEM



- Intelligent positioning and conveyor system
- Deterministic closed-loop servo performance
- Automatic synchronization with other motion axes
- High dynamic performance and force

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Independent Cart Technology (ICT) Benefits

Benefits

- Higher throughput
- Greater flexibility
- Increased uptime
- Smaller footprint

Hear It from Our Customer

KUKA Pulse

- Installed at numerous automotive end users
- Key features:
  - Dramatic uptime improvement
  - Reduced maintenance
  - Faster production rates
  - Smaller footprint
- Uses QuickStick® HT

Agenda

Independent Cart: iTRAK and MagneMotion

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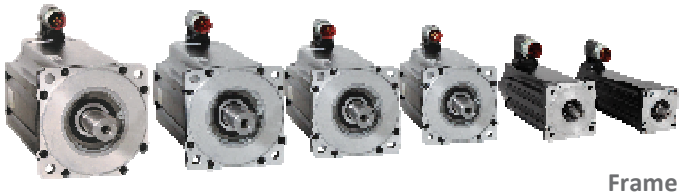
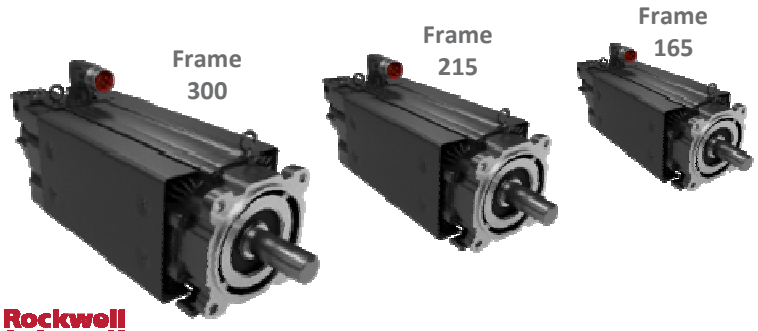
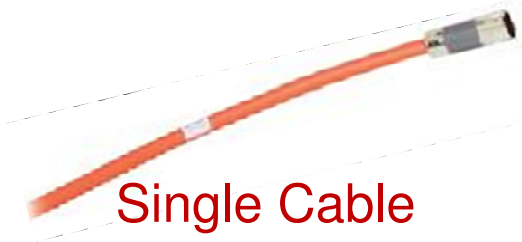
Single Cable Motion Solution Overview

Kinetix VPL / VPF / VPC Motors







Single Cable Interface

60% LESS wiring!

Kinetix 5500 / 5700 Drives

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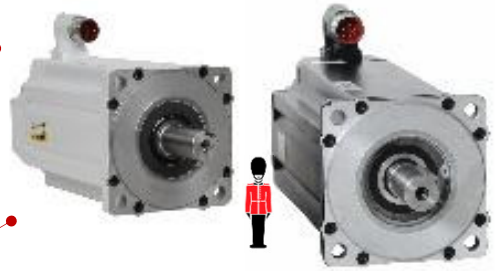
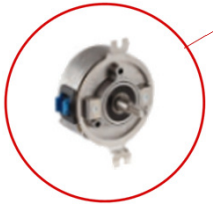
SIL 2 Rated Kinetix VP Motors

Will support advanced safety functions *via Kinetix 5700 "**ERS4**", Safe Speed Monitoring drives*

9–12 bit safety channel feedback *when used within Integrated Safety systems **"W" or "Q" Encoder Option***





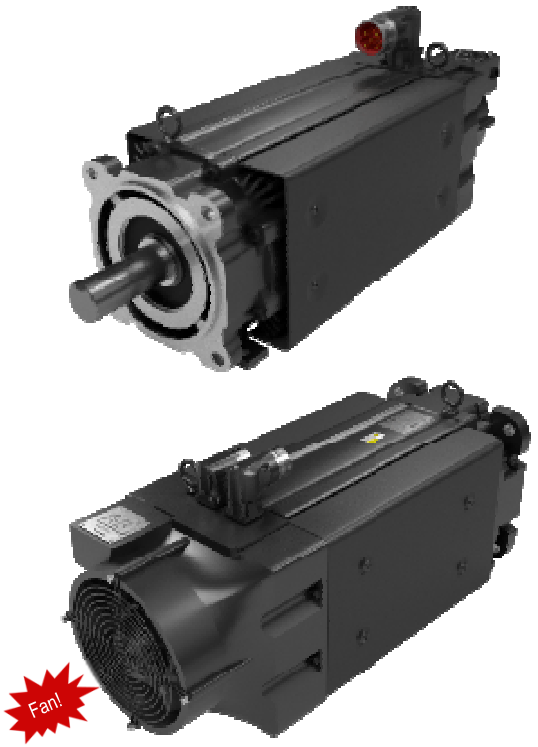
23-bit primary channel feedback *provides application flexibility (Frame 100 - Frame 165)*

SIL 2 TÜV Certification *on optical encoder*

Current "C, P" encoder options remain active *for ease of ordering"*

Introducing the Kinetix VPC

- Expansion of the Kinetix VP motor series
- VP = Single-cable (option)
- C = Continuous-duty
- Interior Permanent Magnet (IPM)
- Higher power
- Higher continuous torque



VPC Key Features and Benefits

Single and dual cable offerings

Kinetix 5700 Servo Drive

IE4 energy efficiency rated

Foot mount option matches competition

EnDat digital multi-turn (25-bit)
DSL digital multi-turn, (23-bit)
SIL 2
Hiperface single-turn (21-bit)

Extended L10 bearing life
Expanded power up to 30 kW
IP65

Quick-change fan kit
Removable side shrouds

Increased max speeds

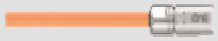
Cooling fins

** **BOLD** text denotes a new servo motor feature with VPC*

Flexible System Solution

Kinetix 5700 Drives

Cable Options Encoder Options



Single Cable

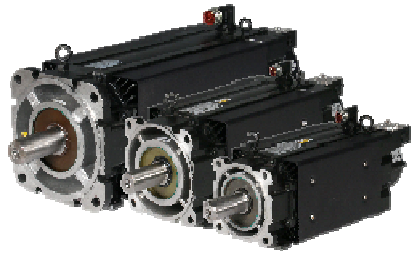
Absolute, Multi-turn
DSL protocol

OR

Separate Power **and**
Feedback Cables

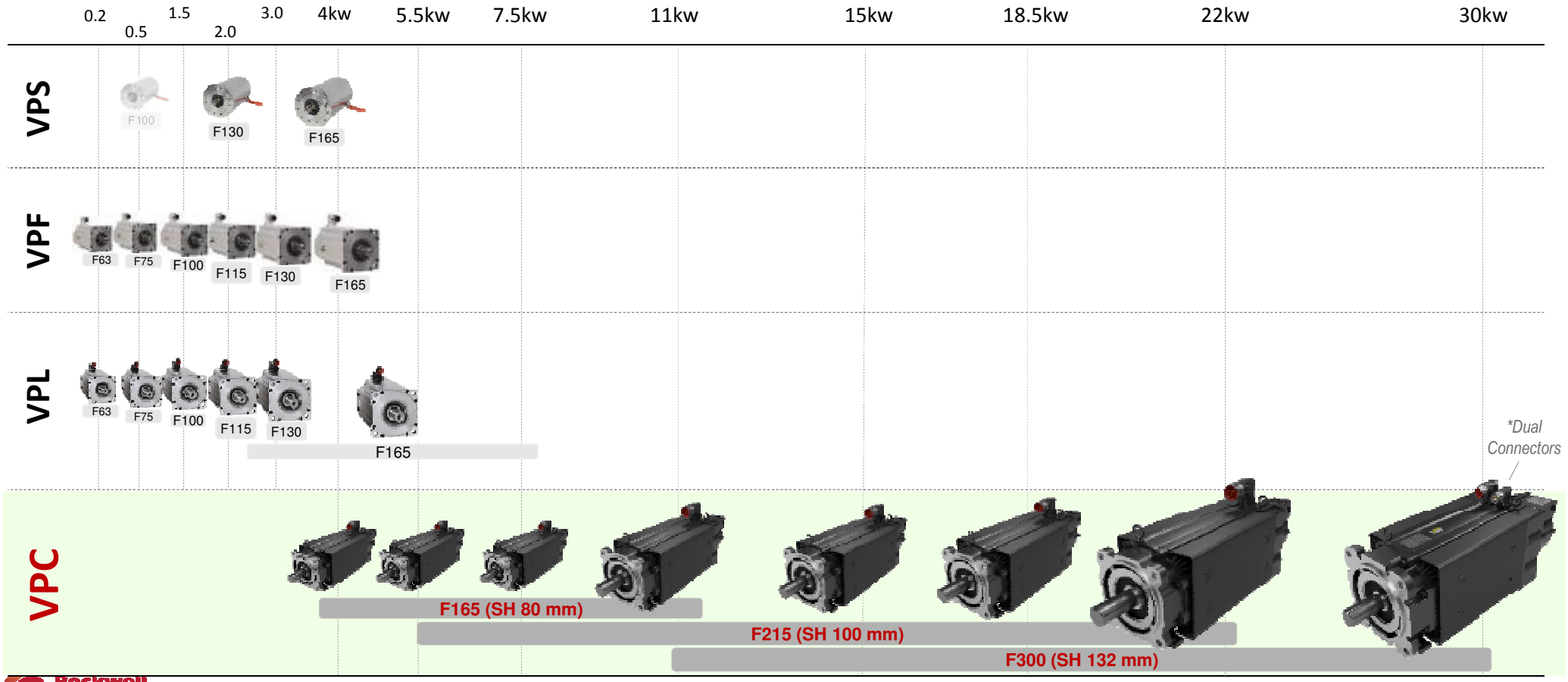
Absolute, Single-turn
Hiperface protocol

Absolute, Multi-turn
EnDat digital protocol



Kinetix VPC Motors

Positioning: Kinetix VP Motors Portfolio



Why the Kinetix VPC Motor?

Increase your machine performance

- Up to 60% increased continuous torque*
- Up to 150% increased max speeds*
- New 23 bit and 25-bit hi-resolution encoders

Reduce your downtime

- Up to 60% improvement in L10 bearing life*
- Single cable provides faster installations
- 10 minutes or less field-replaceable fan

Reduce your energy costs

- IE4 rating offers up to 5% greater efficiency than IE3 rated motors
- Less current draw by sizing smaller drive and motor*

** Comparisons made to current MP-series motors*

Cables

- Patented DSL communication technology
- Single Extension cables up to 30 m **now available**
- New 6 AWG and 8 AWG **now available**
- Single cable options
  - 18, 14, 10 AWG
  - DF option – Kinetix 5500 drive with flying lead
  - DE option – Kinetix 5700 drive with DSL connector
  - DG option – Kinetix 5x00 drive with flying lead

Agenda

Independent Cart: iTRAK and MagneMotion

Kinetix Motors and Cables

Kinetix Drives and Accessories

Motion Analyzer

Kinetix 5700 Advanced Safety Demo

Kinetix 5500 Servo Drive

Flexible Control
- Safety options for hardwired or integrated safety over EtherNet/IP
- Integrated with SIL3/PLe and Hardwired SIL2/PLd

Scalable Platform
- Dual-port Ethernet for Linear or Device Level Ring topologies
- Safer commissioning and troubleshooting with 24V DC control power reducing overall power consumption

Simplified system design
- Innovative AC/DC bus improves energy efficiency while eliminating hardware, reduces installation time and lowers costs
- Single-cable solution reduces installation errors inventory and wiring pathways
- Zero stacked drives, no backplane or power rail required, reduces panel

Kinetix 5700 Servo Drive

Flexible Control

- Single or dual axis modules available
- Safety options for hardwired or integrated safety over EtherNet/IP
- Integrated and hardwired with SIL3/Ple rating

Scalable Platform

- Dual-port EtherNet/IP supports both Linear and Device Level Ring topologies, and extends motion capabilities with integrated safety
- Multi-feedback port extends motor support for Stegmann Hiperface, EnDat sin/cos, EnDat digital, and TTL feedback with Allen-Bradley and third-party motors

Simplified system design

- Shared DC Bus minimizes wiring and optimizes energy usage, 24V DC Control Bus
- Four high-speed input ports for enable, home, registration, and over travel functions
- Single cable solution reduces installation errors inventory and wiring pathways
- Zero stacked drives, no backplane or power rail

Kinetix 5500/5700 Drive - Tuning Technology

Kinetix 5500 and 5700 drives will……..

- Reduce the need for a tuning expert
- Reduce the time to commission the drive
- Compensate for unknown mechanical effects
- Compensate for loads that can change over time
- Improve the performance of most applications
- Minimize power consumption and machine vibration
- Provide diagnostic data for preventative maintenance

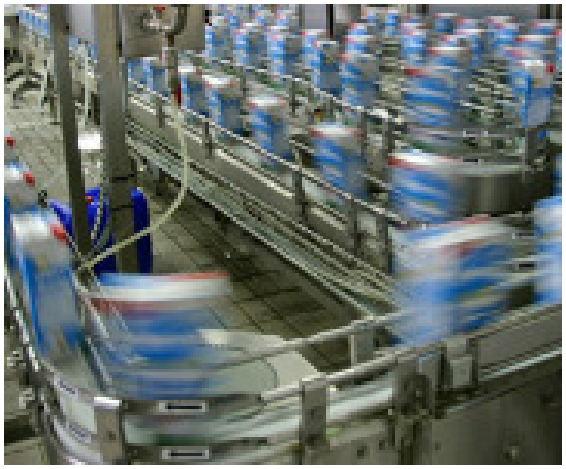
Kinetix 5500/5700 Drive - Tuning Technology

- **Load Observer: Improved performance and time savi**
  - Tune servo loops similar to a motion control expert
  - Automatically compensates for unknown mechanics, and c s, flexible couplings, and shafts
  - Applications where inertia varies during operation
  - Save time by eliminating the need for tuning each axis

Dramatically reduces the need to tune most motion axes

Kinetix 5500/5700 Drive - Tuning Technology

- **Adaptive Notch: Time savings and ease of use**
  - Higher performance tuning possible as tracking notch can eliminate harmful resonance and vibration in systems
  - Automatically adapts to changing frequency over time
  - Use tracking notch as an indicator to proactively monitor machine performance



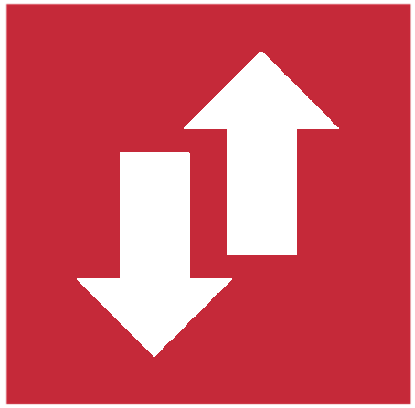
Dramatically reduces the need to tune most motion axes

Kinetix 5700 Drive - Advanced Safety

Scalable

Scalable Safety Level

SIL CL2, Up to PLd – Single Encoder
SIL CL3, Up to PLe – Dual Encoder



Productive

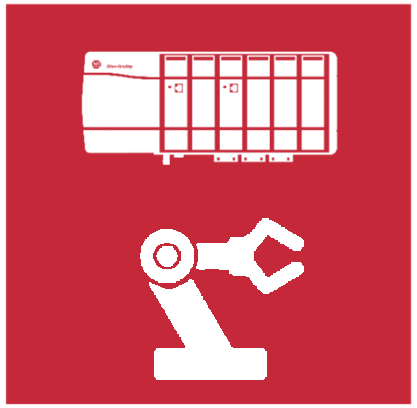
Studio 5000 Logix Designer

Configure safety and motion control

Flexible

New Safety Functions in GuardLogix®

Safety applications that are customized for any indus

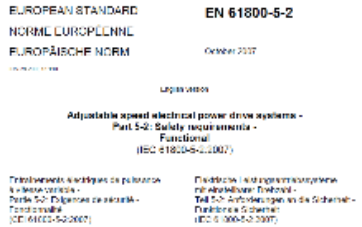


Differentiation

- **Improved Productivity**: Complete safety function integration within Studio 5000 Logix Designer® software
- **Higher Availability**: Seamless integration of safe monitoring capabilities within the safety controller
- **Improved Flexibility**: Setpoints that can be adjustable during runtime
- **Superior Scalability**: Right sized safety solutions to efficiently solve safety requirements
- **Superior Implementation**: Safety applications that are easily customized for any industry

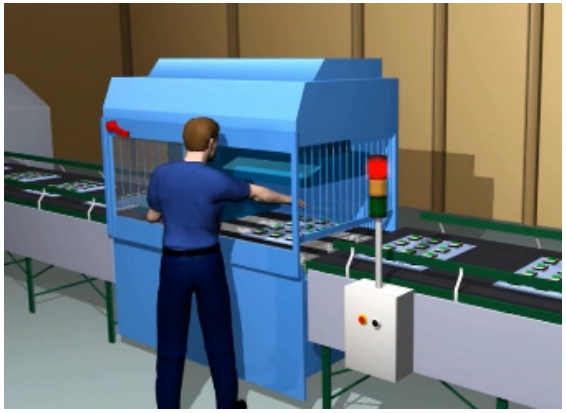
Kinetix Advanced Safety Elements

- Common, unified safety monitoring in Logix Controllers
  - High-performance 5580ES GuardLogix and 5380ES Compact GuardLogix controller platforms
  - Programmed with new safety instructions in Studio 5000 design environment
- Safety instructions based on IEC 61800-5-2 safety standards
- Common, unified safety implementation for motor control
  - Kinetix or PowerFlex® drives

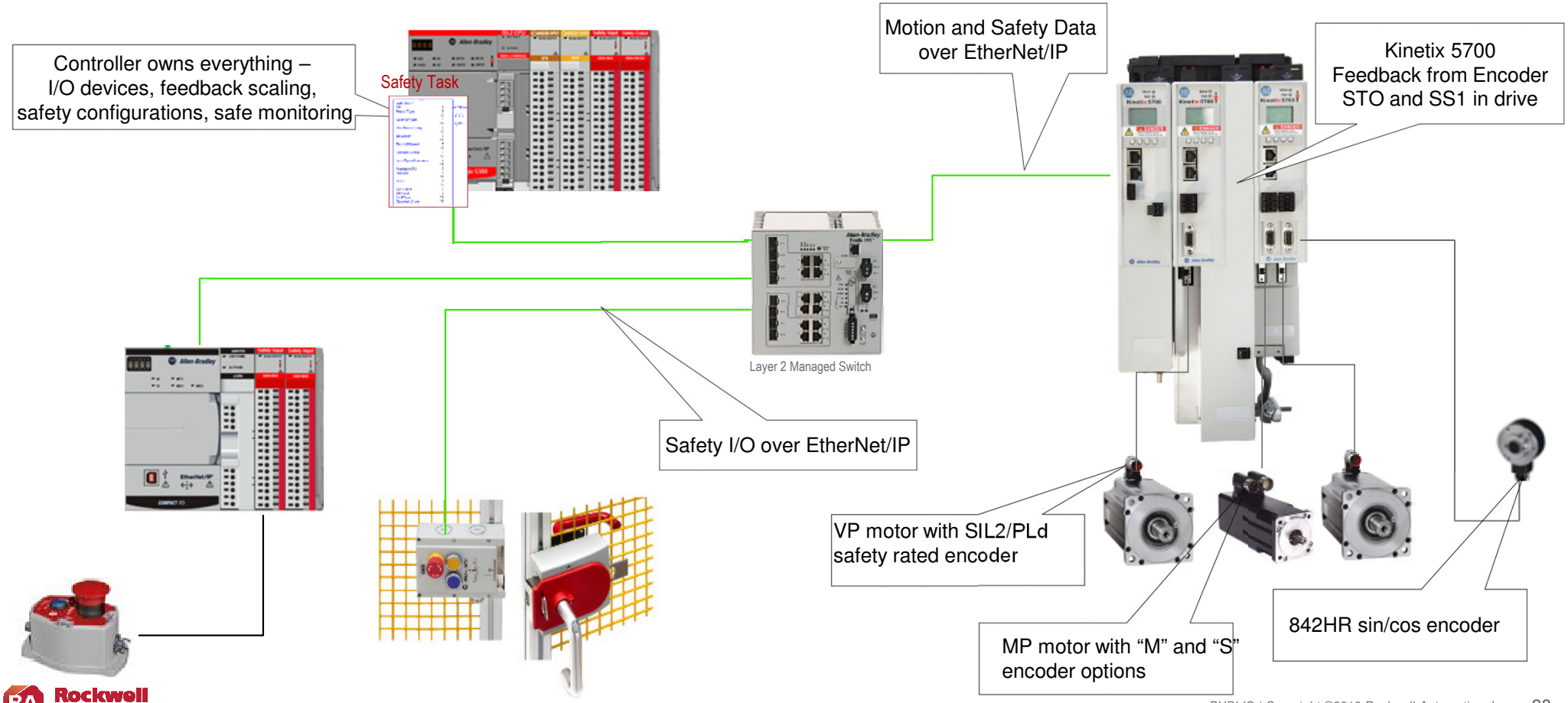


IEC 61800-5-2 Safety Functions

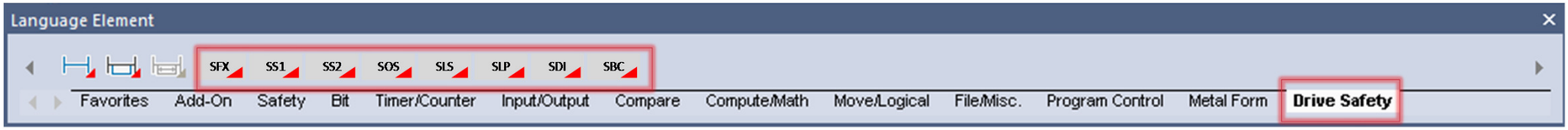
- Initial release:
  - STO Safe Torque Off
  - SS1 Safe Stop 1
  - SS2 Safe Stop 2
  - SOS Safe Operational Stop
  - SLS Safely-Limited Speed
  - SDI Safe Direction
  - SBC Safe Brake Control
  - SLP Safely-Limited Position
  - SFX Safe Feedback Scaling



Architecture



Drive Safety Instructions
IEC 61800-5-2 Safety Instructions



- **IEC-61800-5-2** › Adjustable speed electrical power drive systems – Safety requirements - Functional
  - New "**Drive Safety**" Instructions (8)
    - SFX (Safe Feedback Scaling)
    - SS1 (Safe Stop 1)
    - SS2 (Safe Stop 2)
    - SOS (Safe Operating Stop)
    - SLS (Safely-limited Speed)
    - SLP (Safely-limited Position)
    - SDI (Safe Direction)
    - SBC (Safe Brake Control w/ external brake)
  - Available in the 5380ES and 5580ES Family of Controllers

Kinetix 5700 Safe Monitoring Servos

New Safe Stop functions SS1, SS2, and SOS

Increase efficiency:
Keep equipment running while safety monitoring

Power meets flexibility:
Unlimited setpoints and Multiple functions capable

Single Axis **"ERS4"** Servos

Dual Axis **"ERS4"** Servos

TÜV certified for SIL3/PLe safe monitoring solutions

Safety monitor speed, direction, and position

Supports Kinetix VP motors with SIL2/PLd rated encoders and sin/cos encoders

EtherNet/IP Encoder Output Module

SHIPPING NOW!

Synchronize third-party devices to your integrated motion system

Simplified installation – Eliminates need to mount external encoders on the machine.

Flexibility – Synchronize to any axis of motion (CIP™ or Virtual) within the system.

Ease of use – Configure with Studio 5000 Logix Designer application. Programming interface with Logix Add-On Instruction.

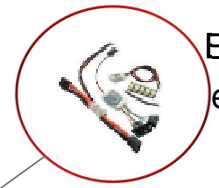
Reduce wiring and increase reliability – Eliminate the need to split encoder signals between the motor and drive.

Rockwell Automation

EtherNet/IP Encoder Output Module

Simplified installation
Eliminates need to mount external encoders on the machine.

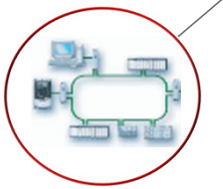
Reduce wiring
Eliminate the need to split encoder signals between the motor and drive.

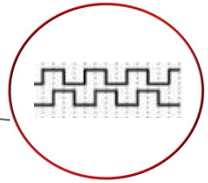


Ease of use
Configure with V30 Studio 5000 Logix Designer software. Programming interface with Logix Add-On Instruction.

Flexibility
Synchronize two axes of motion (CIP™ or Virtual) within the system.

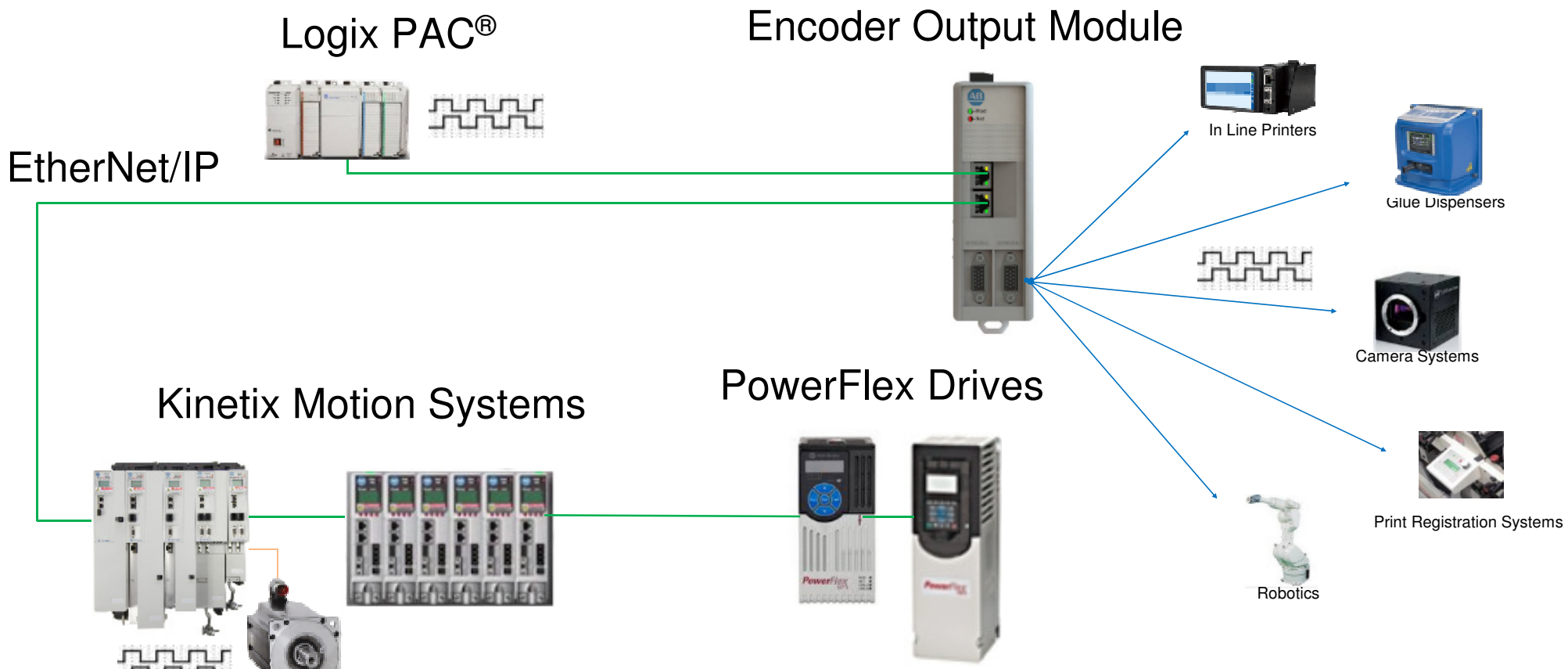
Dual EtherNet/IP ports
Supports standard network topologies.





Configurable Outputs
AQB or Pulse Train.

System Architecture



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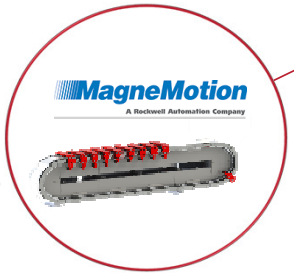
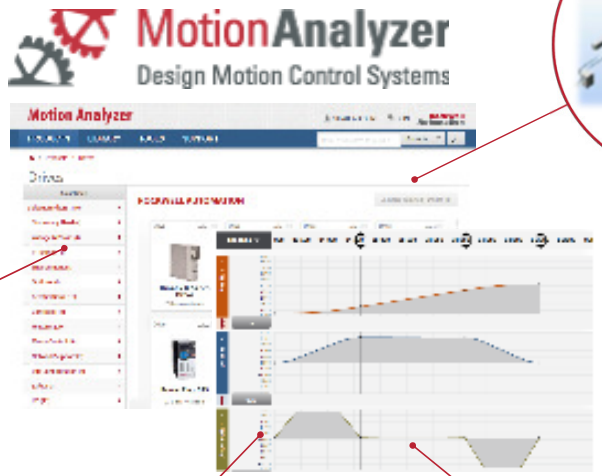
Motion Analyzer Evolution

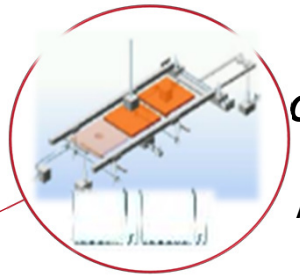
Drives and Motion Sizing
Single-stop shop and resource center for drives and motion sizing.

Independent Cart Sizing
Sizing and selection of next generation motion solutions.



Studio 5000 and IAB Integration
Optimized workflows, data import into Studio 5000 and IAB data exchange.





Collaborative Design and Optimization Platform
Application templates and design optimization in a collaborative environment.

Comprehensive Partner Product Portfolio
Broad portfolio of partner products to complement RA offering.

Agenda

Independent Cart: iTRAK and MagneMotion

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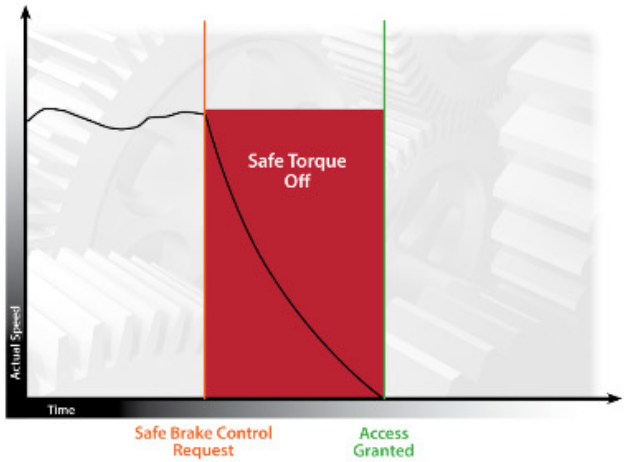
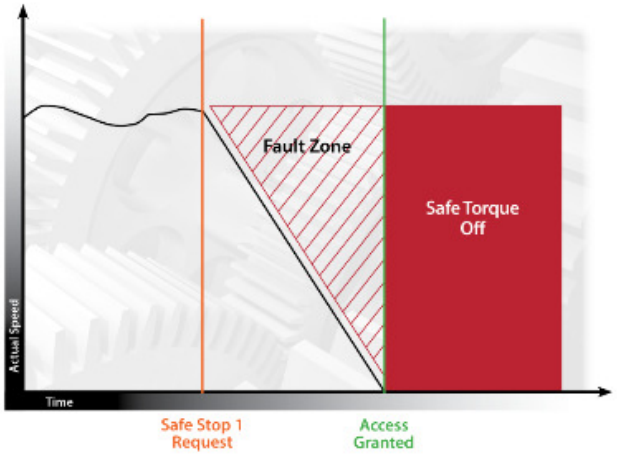
Stop Functions

Stop Functions – Safe Torque Off



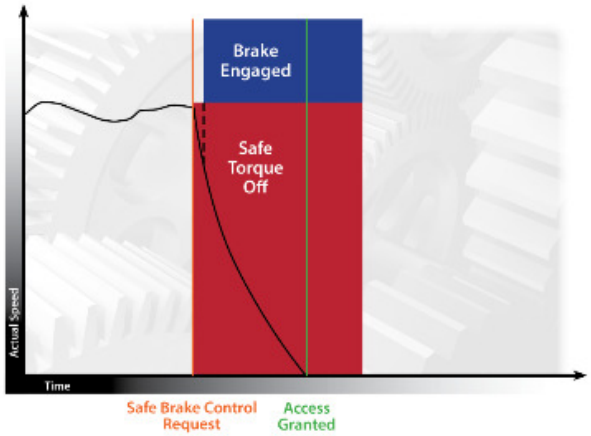
Power, that can cause rotation (or motion in the case of a linear motor), is removed from the motor. The drive will not provide energy to the motor, which can generate torque (or force in the case of a linear motor).

Stop Functions – Safe Stop 1



Initiates and monitors the motor deceleration rate within set limits to stop the motor and initiates the STO function when the motor speed is below a specified limit.

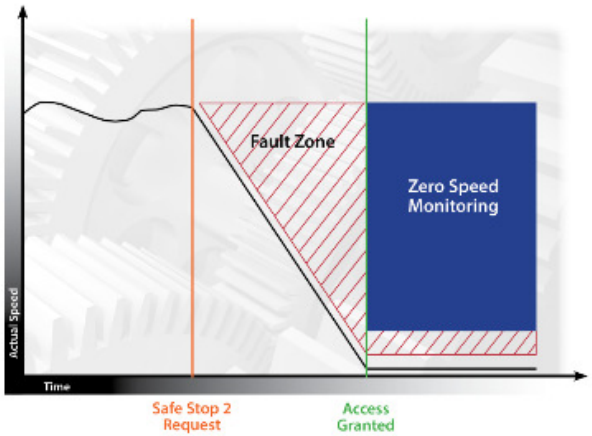
Stop Functions – Safe Brake Control



Provides a safe output signals to control an external brake. The SBC function is coordinated with the STO function.

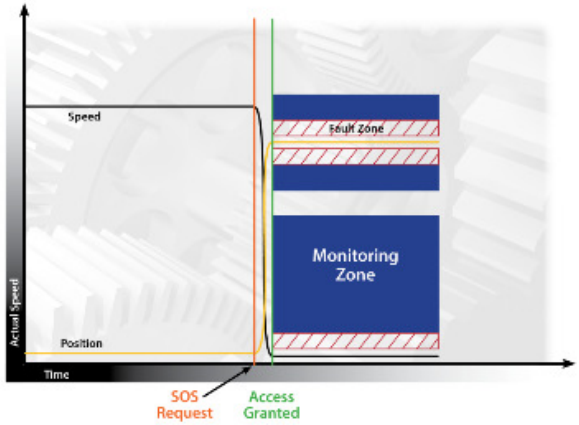
Stop Functions

Stop Functions – Safe Stop 2



Initiates and monitors the motor deceleration rate within set limits to stop the motor and initiates the safe operating stop function when the motor speed is below a specified limit.

Stop Functions – Safe Operating Stop

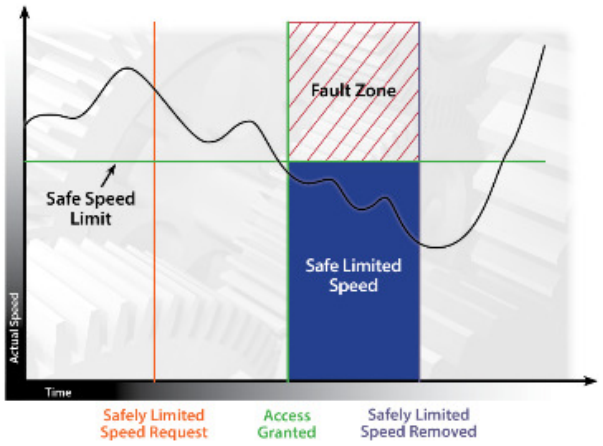


Can monitor either position or speed of motor while stopped.

The SOS function prevents the motor from deviating more than a defined amount from the stopped position. The drive provides energy to the motor to enable it to resist external forces.

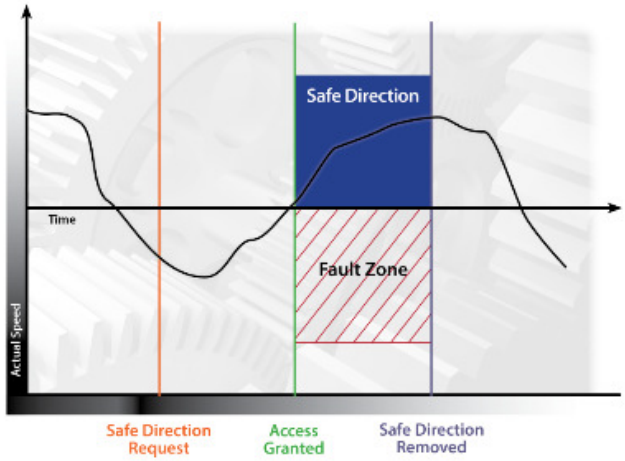
Monitoring Functions

Safely Limited Speed



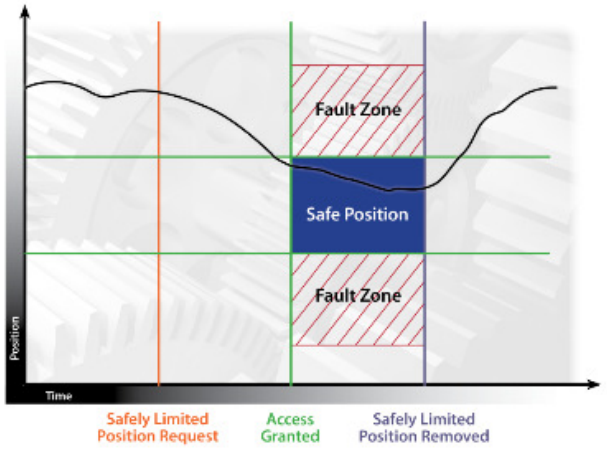
The SLS function prevents the motor from exceeding the specified speed limit.

Safe Direction



The SDI function prevents the motor shaft from moving in the unintended direction.

Safely Limited Position



The SLP function prevents the motor shaft from exceeding one or more specified position limits.

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Thank you

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