



CHOOSING THE RIGHT ACTUATOR TECHNOLOGY FOR YOUR APPLICATION

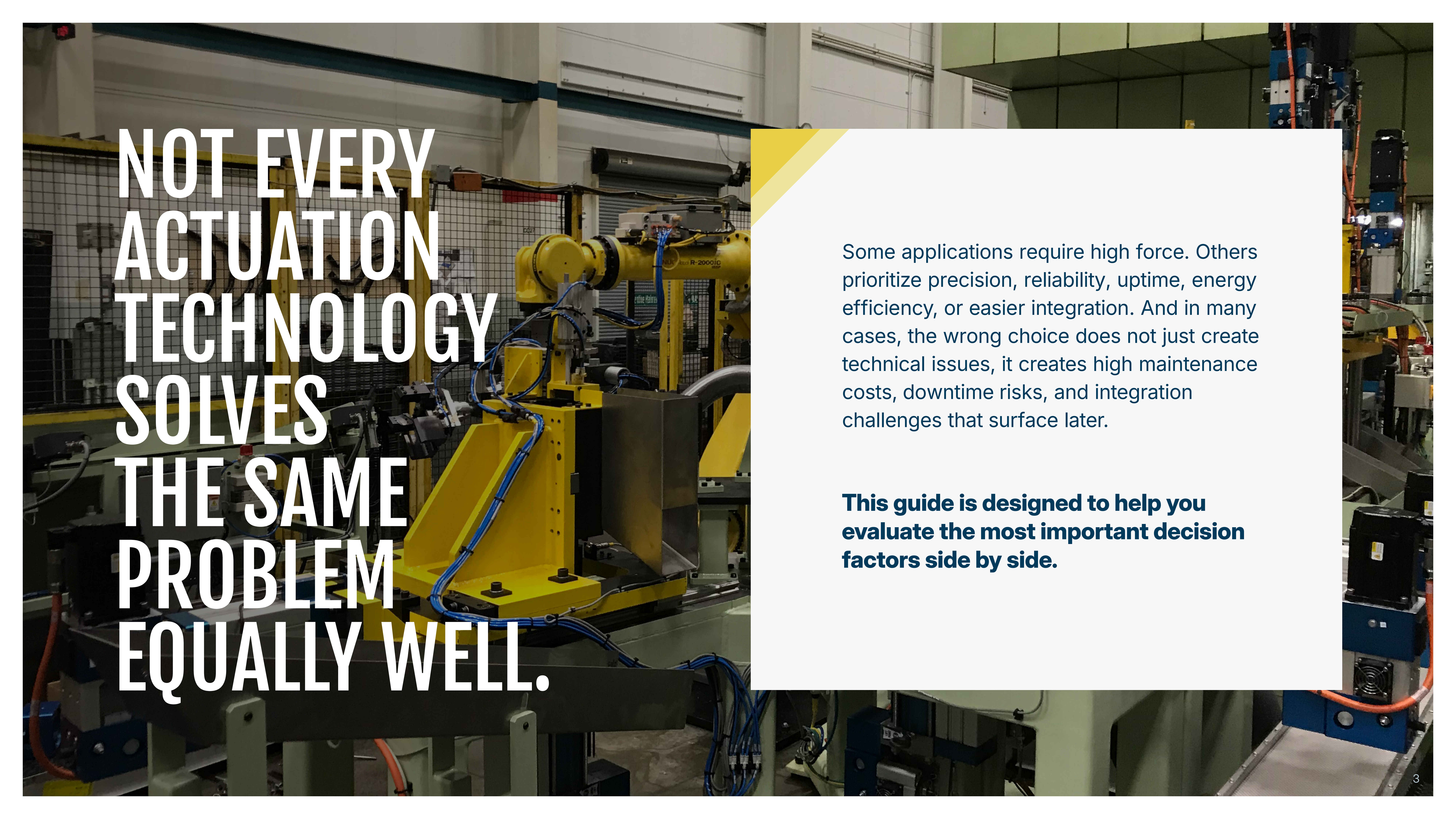
A practical guide to comparing Hybrid SHA, traditional hydraulic systems, and electro-mechanical actuators, so you can choose with more confidence and less complexity.

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Make a smarter actuator decision before you lock in cost, maintenance burden, and downtime risk.

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A yellow industrial robotic arm is positioned in a factory setting, surrounded by various mechanical components and wiring. The background shows a large industrial facility with high ceilings and structural beams.

NOT EVERY ACTUATION TECHNOLOGY SOLVES THE SAME PROBLEM EQUALLY WELL.

Some applications require high force. Others prioritize precision, reliability, uptime, energy efficiency, or easier integration. And in many cases, the wrong choice does not just create technical issues, it creates high maintenance costs, downtime risks, and integration challenges that surface later.

This guide is designed to help you evaluate the most important decision factors side by side.

KYNTRONICS HYBRID ACTUATOR (SHA)

Kyntronics' Hybrid Actuator combines servo control with an integral pump and hydraulic cylinder in a sealed unit. It is an all-electric hybrid solution that combines the strengths of hydraulics and electro-mechanical actuation while reducing the respective drawbacks of both. Hybrid SHA is the best of both worlds for operators looking for efficient, reliable, and clean operations at a variety of force ranges.

KEY ACTUATION NEEDS

- Wide force range scalability
- Precision position and force control
- Desire for lower maintenance
- Concern about leaks or contamination
- Concern about energy use
- Concern about integration complexity
- Concern about shock-loads or EMA durability



Your final actuator selection should balance performance, durability, serviceability, and lifetime cost—not just upfront cost.



ACTUATOR TECHNOLOGY MATRIX

Use this summary to compare the three most common actuator options across the criteria that usually matter most in real applications.

Kyntronics is the high-value option for operators needing an energy-efficient, durable, and low-maintenance actuation solution. Engineered as a **compact, comprehensive actuation system**, it is the strongest all-around option with its broad force range, unmatched control, and precision, making operation **simple, clean, and reliable**.

CRITERIA	► KYNTRONICS HYBRID SHA	HYDRAULIC CYLINDERS	ELECTRO-MECHANICAL ACTUATORS
ENERGY EFFICIENCY	Power-on-demand operation, designed to reduce energy use significantly vs. traditional hydraulics	Continuous pump operation and efficiency losses drive higher energy usage	Power-on-demand, but mechanical friction can reduce efficiency
FORCE CAPABILITY	Broad range from low force up to 150,000 lbs.	Very high force capability	Can work well at lower force, but becomes expensive at higher forces
MAINTENANCE	Minimal routine maintenance; no fluid changes; long travel before rod seal service	Regular fluid changes, filter replacement, hose maintenance, leak management	Regular lubrication required Repairs can be expensive
ENVIRONMENTAL CLEANLINESS	Sealed system helps prevent leaks and contamination	Leak-prone Requires fluid handling and disposal	Clean operation, but wear-related failures still possible
PRECISION & FEEDBACK	Integrated position and pressure/force feedback sensors	Precision control can be more difficult and costly to achieve	Position control uses motor encoder, less precise and accurate force measurement may require added sensors
RELIABILITY & DURABILITY	No metal-to-metal wear points, suited for heavy-duty use	Robust, but noisy and leak-prone	Vulnerable to shock loads and side load damages and mechanical wear
CONTROLS SIMPLICITY & SYSTEM COORDINATION	Integrated controls architecture for coordinated motion, force control, and repeatable sequencing	More complex controls with added hardware and tuning for coordinated automated operation	Advanced control possible, with performance dependent on system integration
INTEGRATION & AUTOMATION FLEXIBILITY	PLC- and fieldbus-ready for synchronized multi-axis control and programmable operation	More difficult to integrate into synchronized, feedback-driven automation	Electrically suited for automation, with flexibility dependent on controls configuration
TOTAL COST OF OWNERSHIP	Higher value over time through lower energy use, maintenance, downtime, and spoilage risk	Often higher operating cost over time due to maintenance, energy use, and downtime	Can carry high upfront and repair costs in demanding applications
MAINTENANCE SKILL SET	Typically serviced by electrical maintenance personnel	Typically requires a shrinking cohort of hydraulic maintenance personnel	Typically serviced by electrical maintenance personnel

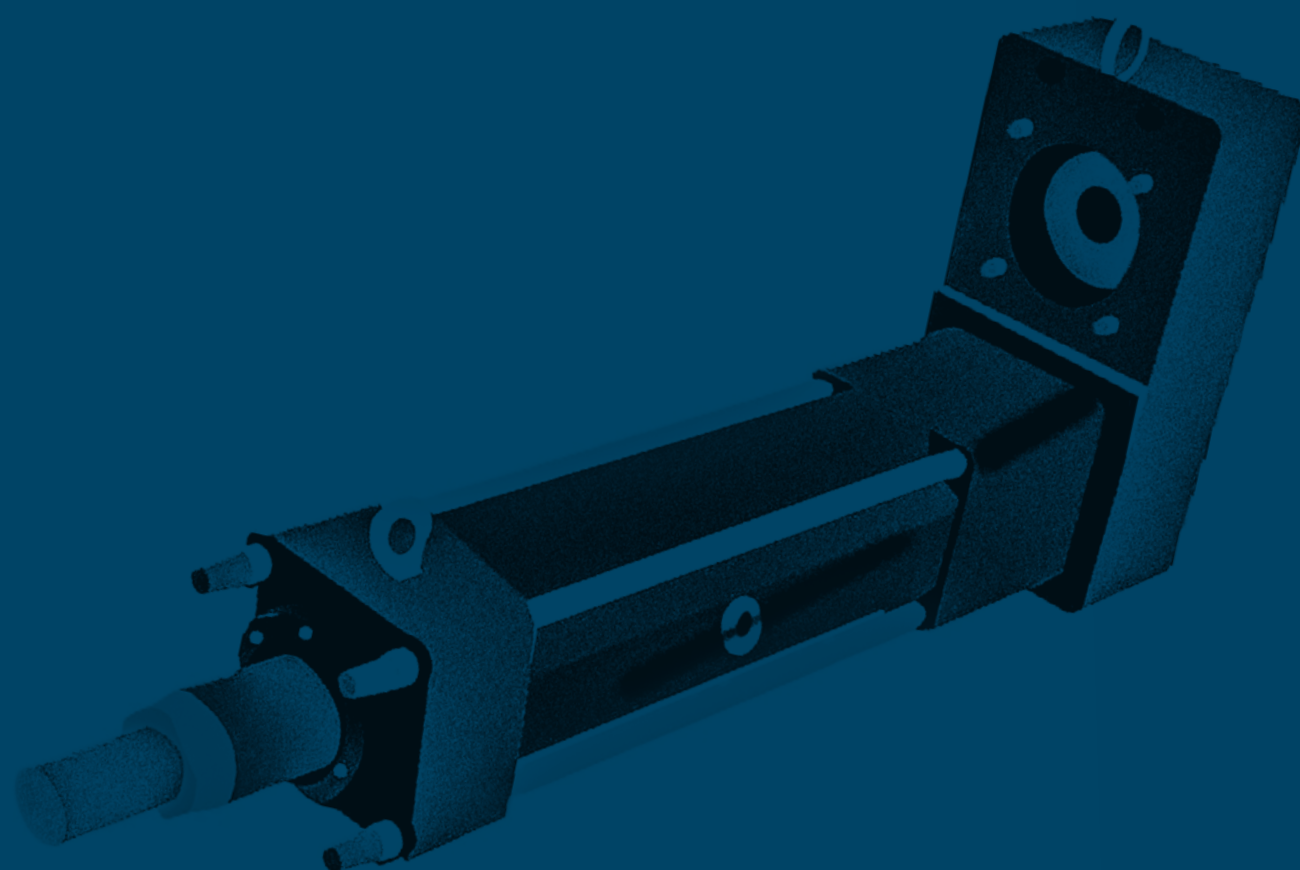
TECHNOLOGY BENEFITS CHART

Every business's operations have unique force demands, efficiency needs, and budget requirements, and it is crucial that when choosing an actuator, you pick the one that is right for you. For those looking for the most efficient, all-in-one system with a wide range of force capabilities, Kyntronics Hybrid SHA is the actuator for you.

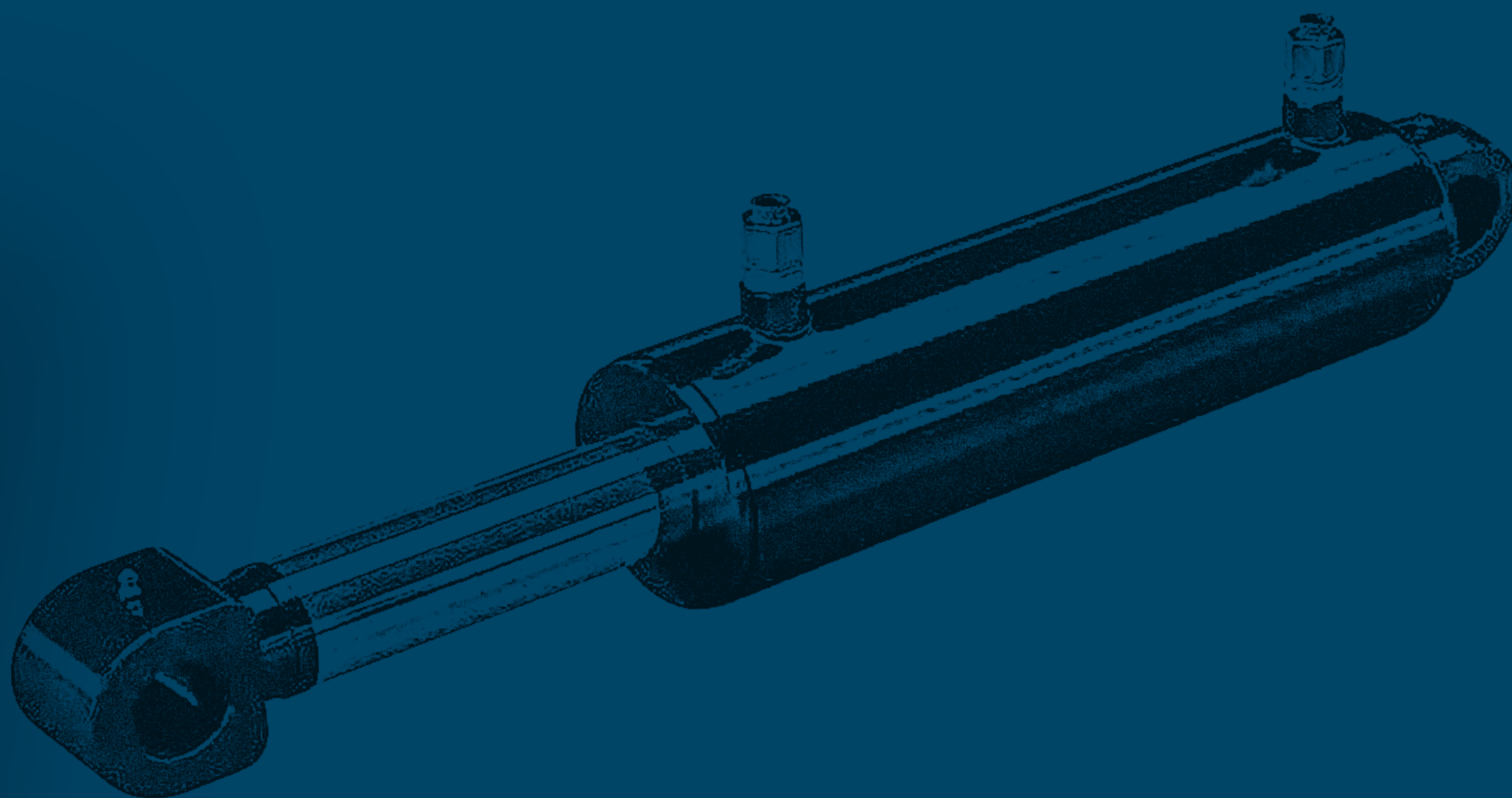
KYNTRONICS HYBRID SHA

TRADITIONAL HYDRAULIC

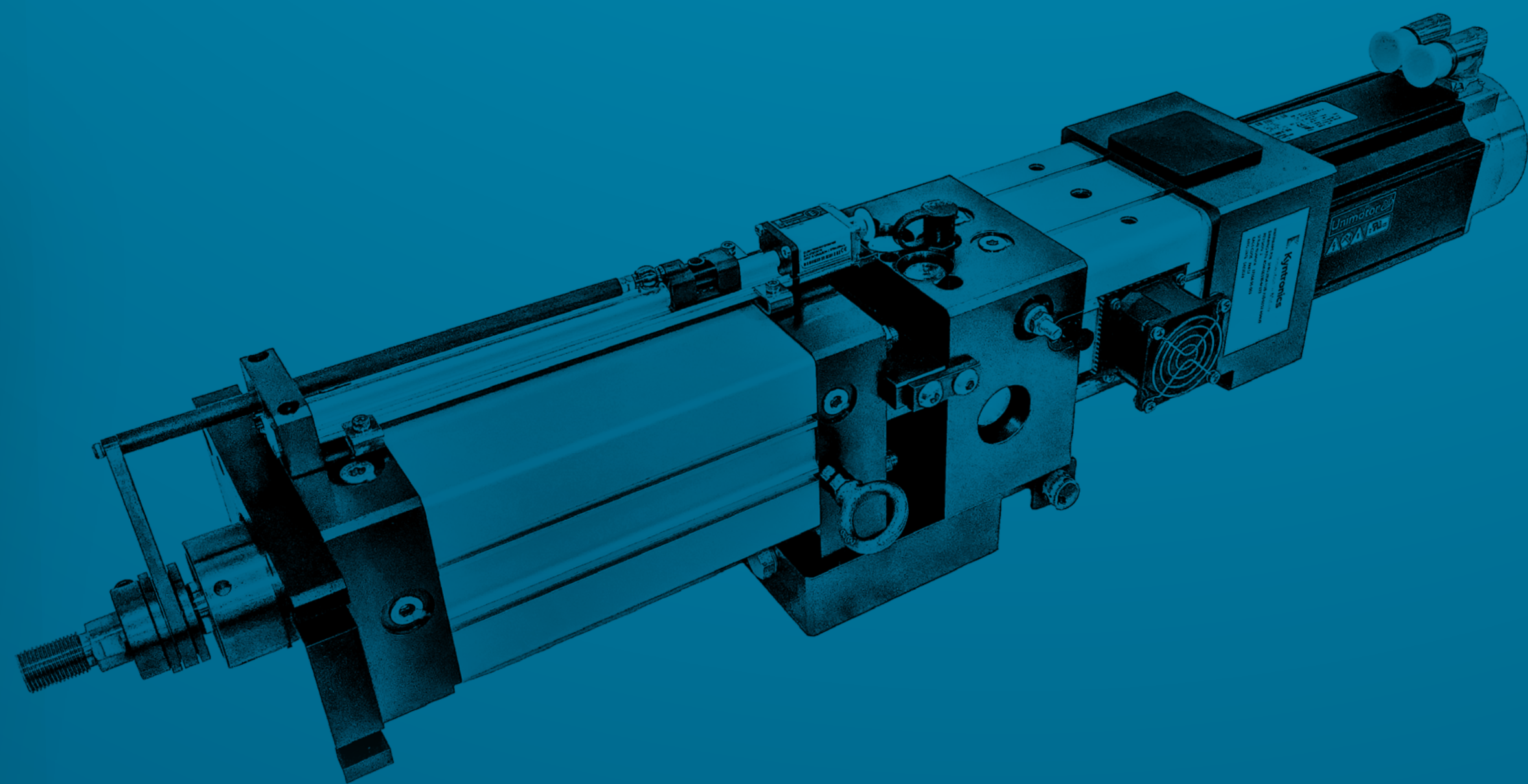
EMA



Power on Demand
Ease of Control
Fieldbus
Diagnostics
Easy to Reconfigure



Shock Tolerance
High Force Density
Fluid Characteristics
Ingress Protection
Cost Effective



ALL EMA & TRADITIONAL HYDRAULIC BENEFITS PLUS:

Up to 150,000 lbs of Actuation
Energy Efficient with Power on Demand
Shock-load and Side-load Resistant
Low Maintenance
Quiet
No Metal to Metal Wear
No Leaks
All-in-One, Compact Control "Total Solution"

GLOSSARY

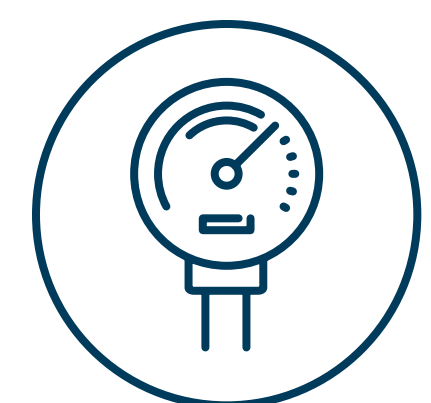


ENERGY EFFICIENCY

If energy usage matters, actuator technology matters.

Traditional hydraulic systems typically keep pumps running continuously so pressurized fluid is always available. That can create unnecessary energy consumption, heat, and operating cost. Hybrid SHA operates differently: it uses power only when performing work and mitigates efficiency losses due to friction when using EMA systems. It can deliver up to 90% energy savings compared with traditional hydraulics.

What this means for buyers: Less wasted energy translates into lower operating costs, less heat generation, and a more efficient machine overall.

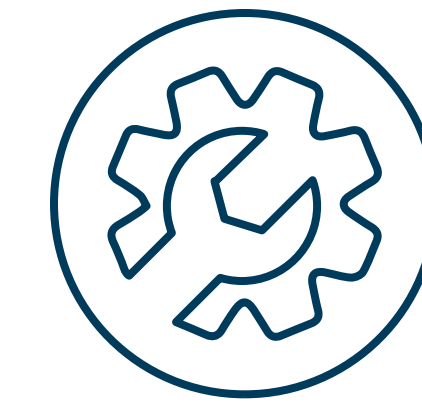


FORCE CAPABILITY

Not all “electric” solutions scale equally.

Kyntronics' Hybrid SHA is scalable across a very broad range, from low force <100 lbs. up to 150,000 lbs. The guide also notes EMAs can become relatively expensive above 5,000 lbs. and with longer strokes over 36 inches. Traditional hydraulics remain strong on force capability, but often bring added system complexity and maintenance burden.

What this means for buyers: If you need serious force without defaulting to a large, leak-prone hydraulic system, hybrid is worth a closer look.



MAINTENANCE BURDEN

Maintenance is not just a service issue. It is a productivity issue.

Traditional hydraulic systems require fluid changes, filter replacements, and hose maintenance. EMAs require regular lubrication and can be costly to repair when wear or damage occurs. Kyntronics' Hybrid SHA requires minimal maintenance and may only need a rod seal change after 50 million inches of travel.

What this means for buyers: Less routine maintenance can mean fewer interruptions, lower service labor, and more predictable uptime.



CLEANLINESS AND ENVIRONMENTAL RISK

Leaks are not always acceptable.

Traditional hydraulics rely on larger fluid systems and external plumbing, which creates leak risk and fluid disposal concerns. Kyntronics' Hybrid SHA is a sealed system with very low fluid usage and no required fluid changes. EMAs avoid hydraulic fluid, but still face wear-related reliability issues depending on the application.

What this means for buyers: Cleaner operations can be especially valuable in food, packaging, sensitive manufacturing, or any environment where leaks create risk, mess, or product loss. With environmental regulations tightening year after year and operators being rewarded for efficiency and cleanliness, these reduced risks are more important than ever.

GLOSSARY

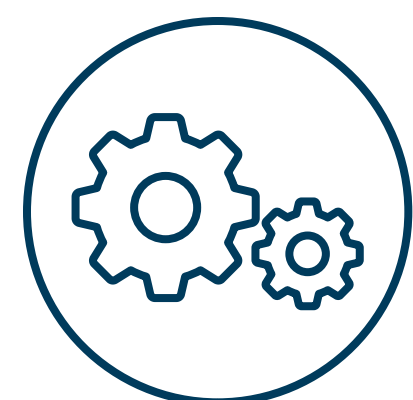


PRECISION AND CONTROL

High-precision control improves automation efficiency and consistency.

Kyntronics' Hybrid SHA includes integrated position and force sensing, supporting real-time feedback and precise control. Precision in hydraulic systems can be more difficult and costly to achieve, while EMAs often rely on motor feedback for position and may require added load cells for accurate force measurement.

What this means for buyers: When motion quality, repeatability, or process control matters, built-in feedback can simplify system design and improve performance.



RELIABILITY IN REAL-WORLD CONDITIONS

Lab conditions do not tell the whole story.

EMAs are more vulnerable to damage from shock loads, side-loading, and wear because of metal-to-metal contact in the power transmission path. By contrast, Kyntronic' Hybrid SHA is shock-load tolerant and designed without metal-to-metal wear points. Traditional hydraulics are robust, but the overall system can still suffer from leaks, heat, and unplanned downtime.

What this means for buyers: If your application is demanding, inconsistent, or subject to shock, durability should carry more weight in the selection process.



INTEGRATION COMPLEXITY

A technology can look good on paper and still be hard to deploy.

Traditional hydraulic systems often require multiple sourced components, including the HPU, hoses, filtration, reservoirs, valves, and cylinders. EMAs are often sold as an actuator only, with motor, drive, cables, and software handled separately. Kyntronics' Hybrid SHA is available in a fully tested "Total Solution" package including actuator, motor, drive/control, cables, and software.

What this means for buyers: A more complete solution can shorten engineering time, simplify the supply chain, and lower integration risk.



TOTAL COST OF OWNERSHIP

Upfront cost is only part of the story.

A Hybrid SHA can sometimes carry a slightly higher upfront cost than a simple hydraulic system, but a lower total cost over time through reduced energy use, lower maintenance, less downtime, and reduced spoilage risk. Hydraulic systems often become the highest total-cost option over time, and EMAs can become expensive in both upfront cost and repair cost in more demanding applications.

What this means for buyers: The lowest purchase price does not automatically equal the best business decision.

A photograph of a large industrial machine, likely a conveyor system or material handler, featuring multiple Kyntronics actuators. The actuators are blue and silver, mounted on a metal frame. The background shows a factory setting with yellow safety barriers and various industrial components.

THE KYNTRONICS DIFFERENCE

*KYNTRONICS ACTUATOR DESIGN COMBINES THE BENEFITS OF BOTH
SCREW-TYPE ACTUATORS (EMAS) AND HYDRAULIC CYLINDERS WHILE
ELIMINATING THEIR SHORTCOMINGS.*

WHERE HYBRID ACTUATOR TECHNOLOGY CREATES THE MOST VALUE

PRESSING & FORCE-CONTROLLED APPLICATIONS



- Metal forming
- Assembly presses
- Coining and piercing
- Thermal welding
- Glulam
- Die cutting / laminating

Value: Precise position and force control with shock-load tolerance, low maintenance requirements, and energy-efficient operations.

MATERIAL HANDLING & LIFTING



- AGVs / AMRs
- Scissor lifts
- Roll handling
- Lift platforms
- Machine positioning
- Military / Defense

Value: Provides synchronized multi-axis motion, long-stroke capability, and shock-load tolerance while minimizing machine footprint.

CLAMPING & PROCESS CONTROL



- Work holding
- Leak testing
- Grinding machine clamps
- Chassis assembly
- Gas meter testing
- Valve actuation

Value: Repeatable clamp force and closed-loop control deliver consistent results while reducing energy consumption and ongoing maintenance requirements.

TESTING & VALIDATION SYSTEMS



- Fatigue testing
- Reliability testing
- Aerospace testing
- Component validation

Value: Wide force range capability, servo control, and integrated data collection support repeatable test cycles and performance monitoring.

HARSH & WASHDOWN ENVIRONMENTS



- Food processing
- Packaging equipment
- Lumber processing
- Mining equipment
- Security barrier systems
- Metals manufacturing

Value: Sealed operation helps reduce leaks and maintenance in demanding environments.

QUESTIONS TO ASK ACTUATOR SUPPLIERS

A supplier should not just tell you what their product does. They should help you understand how it will perform in your application, how it will be integrated, and what it will cost to own over time.

Use these questions to compare suppliers more effectively.

A strong supplier conversation should leave you with more than a quote. It should leave you with confidence in performance, integration, serviceability, and long-term value.

Performance and fit

1. What force range and stroke range can this solution support in my application?
2. Can the system provide accurate position control, force feedback, or both?
3. How well does the actuator handle shock loads, side-loading, or other non-ideal conditions?

Energy and operating cost

4. How does the system consume energy during operation and idle time?
5. What are the expected energy savings compared with a traditional hydraulic setup?
6. Does the system generate excess heat, and if so, how is that managed?

Footprint and installation

7. How much machine space will this solution require?
8. Are there external hoses, reservoirs, or support hardware to account for?

Maintenance and reliability

9. What routine maintenance is required?
10. Does the system require lubrication, oil changes, filter changes, or hose replacement?
11. What are the most common failure modes?

Integration and controls

12. Is this sold as a complete solution or as separate parts that my team must integrate?
13. How does the actuator connect to my controls architecture?
14. What software, drive, or commissioning support is provided?

Cost and support

15. What is the expected total cost of ownership, not just upfront purchase price?
16. What support is available for sizing and application engineering?
17. Will the supplier help validate fit before purchase?

TALK TO AN ENGINEER ABOUT YOUR APPLICATION

If you are still comparing options, the fastest next step is often a technical conversation.

When it comes to choosing an actuator, Kyntronics provides engineering support for selection and sizing, offers fully tested “Total Solution” actuator systems, and can tailor solutions to application needs. The company invites buyers to schedule a consultation and request a quote through its site. Bring us your force, stroke, control, and integration requirements, and we’ll help you evaluate the right-fit solution.

1. Review your application requirements
2. Compare technology fit
3. Discuss force, stroke, and control needs
4. Reduce integration guesswork
5. Explore a complete tested solution



SCHEDULE AN APPLICATION REVIEW WITH A KYNTRONICS ENGINEER



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