

# The Ultimate Guide to Hydra Pneumatic and Servo Cylinders



Industrial assembly, forming, and piercing applications often require the use of actuators or cylinders to generate linear motion during their operating sequence. Hydra-pneumatic cylinders, also known as hydro-pneumatic cylinders, air/oil intensifier cylinders, or air-over-oil cylinders, are hybrid cylinders that produce a medium to high force hydraulic power stroke using compressed air rather than a hydraulic power unit. The power stroke can be initiated through various sensing mechanisms, such as the detection of the cylinder's position or its contact with the workpiece.

By merging the strengths of hydraulics and pneumatics, HyperCyl's hydra-pneumatic cylinders offer the simplicity, reliability, and convenience of a pneumatic cylinder while providing the power density typical of hydraulic cylinders. Using two pneumatic 4-way valves and a plant air supply, our hydra-pneumatic cylinders can achieve output forces of up to 200 tons without the noise, heat, expense, and space constraints of hydraulic power units. These self-contained cylinders are constructed with a combination of steel tubes and 100,000 psi tensile-strength tie rods, and the internal oil reservoirs are prefilled at the factory. The following guide provides an overview of HyperCyl's hydra-pneumatic and servo-driven cylinders and the many applications they support.

## The Features of HyperCyl Hydra-Pneumatic Cylinders

HyperCyl's hydra-pneumatic cylinders are completely self-contained drive units with multiple size options. They also come with a variety of standard features, including:

- Total air/oil separation on both sides of the oil
- Wear bands on pistons
- Operation in any position or attitude
- No external reservoir
- Linear output forces of up to 200 tons
- Only three major moving components
- NFPA medium-duty mounting styles
- 100,000 psi tensile-strength tie rods
- Operations / maintenance manual
- Heavy-duty construction designed for years of trouble-free operation
- 4.5 million MTBF (mean time before failure) and 20 million service life
- Numerous options, such as gauge kits, sensors, total stroke limiters, alignment couplers, etc.
- Limited lifetime warranty



## The Different Types of Hydra-Pneumatic Cylinders

When selecting a hydra-pneumatic cylinder, it is important to make sure the cylinder is a proper match for the requirements of your application. HyperCyl provides a range of hydra-pneumatic cylinder configurations to accommodate various systems and space constraints. Our options include:

- **HPI SERIES.** The HPI INLINE cylinder series is a totally self-contained, reliable, and cost-effective power source built to support a range of assembly and forming applications. This series provides the most force per dollar.



- **HPS SERIES.** Like the HPI series, the HPS SATELLITE cylinder series is a completely self-contained and cost-effective solution for assembly and forming applications. It consists of a two-piece design joined by a hydraulic hose, providing a compact yet robust package for applications where space is limited.

- **HPT SERIES.** The HPT Series tandem cylinder is a totally self-contained, cost-effective power source ideally suited for a wide variety of assembly and forming applications. This cylinder line provides a compact package where space is limited.



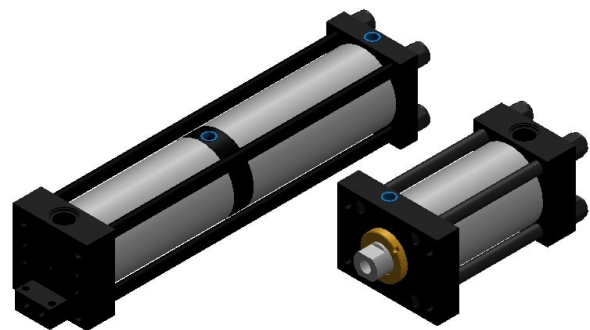
- **NEW HPX SERIES.** The new HPX EXTRA SHORT cylinder series is essentially a satellite cylinder that provides longer strokes with a shorter work cylinder. This is accomplished through its unique design, which pairs a larger booster unit with a smaller work cylinder.



- **HZS SERIES.** Essentially a two-piece satellite version of the HZ, the HZS series design enables a highly compact work section. Like the HZ series, these cylinders are perfect for marking, coining, clamping, piercing, riveting, notching, and assembly applications requiring short-stroke, high-speed, and high-force operation. Their compact design makes them well-suited for applications where a low profile is desirable.



- **HZ SERIES.** The HZ power-stroke-only series is a totally self-contained and cost-effective power source designed for marking, coining, clamping, piercing, riveting, notching, and assembly applications in which short-stroke, high-speed, and high-force operation is required. HZ cylinders provide power stroke only (no approach stroke) and are controlled by a single 4-way pneumatic control valve.



- **INTELLICYL OPTIONS.** Combining HyperCyl's hydra-pneumatic cylinder system with state-of-the-art electronics technology, the innovative IntelliCyl Options supports applications where continuous monitoring of materials and processes is critical to proper component assembly, such as force/distance signatures.

## Electro-Mechanical Actuators

Driven by an electric motor, electromechanical actuators are designed to deliver forces accurately and smoothly. In HyperCyl's robust electro-mechanical actuator (EMA) series, servo-driven actuators capable of  $\pm 0.005$  mm repeatability allow for highly controlled movements in precision assembly applications or other operations requiring alternatives to hydra-pneumatic cylinders. Our EMAs are available in two configurations:

- Ball screw with load ratings of up to 10 tons
- Roller screw with load ratings of up to 25 tons

They can also be paired with the HyperView-Press signature analysis controller for high-precision force/distance monitoring and data logging. HyperCyl-EMA is available as:

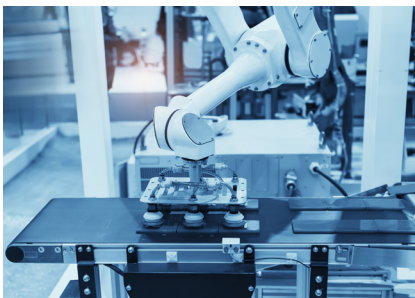
- Actuator only – customer provides their servomotor for HyperCyl to mount and tension. The customer integrates.
- Actuator and drive package – includes motor, Drive, cables, and communication modules. The customer integrates into their enclosure.
- TurnKey package – includes everything, guarding, light curtains, control panel, and all programming.



## Industries and Applications

HyperCyl's products are designed to enable clean, quiet, and precise operations with minimal maintenance requirements. Our diverse product portfolio supports a wide range of industries and applications, including:

- Automotive (engine/transmission, suspension, body)
- Electronic devices
- Office furniture
- Medical devices (clean-room)
- Appliances (washer, dryer, etc.)
- Coining
- Semiconductors (clean-room)
- Munitions
- Hemming



## Why HyperCyl?

Established in 1994, Aries Engineering/HyperCyl is a Michigan-based company specializing in the fabrication of cylinders, presses, and other products for assembly and forming applications in the industrial automation, manufacturing, commercial, and defense industries. Our versatile products cover virtually all segments of industrial production, from medical and electronic device manufacturing to heavy industrial piercing and forming. Whether you need a simple press, high-precision actuator, or fully customized turnkey system, HyperCyl has the manufacturing expertise and problem-solving skills to provide unique solutions for a range of assembly and forming challenges. Our press systems include C-frame, H-frame, and CBG-frame options, and we also offer HyperPierce units available in both equalizing and non-equalizing designs.

HyperCyl cylinders are clean, quiet, and reliable self-contained power sources with versatile designs capable of accommodating various industrial operation requirements. When you choose a HyperCyl for your operation, you can expect:

- The ability to separately regulate the approach and power strokes, providing enhanced control over the process and eliminating the need for cylinder reconfiguration
- Increased retract force, allowing for heavier tooling
- No stored energy hazards as the cylinders do not use mechanical springs to assist the pistons
- Increased value over alternative cylinder options, including multi-stage air cylinders and hydraulic cylinders and power units
- Limited lifetime warranty

In addition to our standard product line, we also accommodate special requests, and can tailor our cylinder and actuator designs around the customer's specific production requirements with reasonable turnaround times and prices.

## HyperCyl For Your Assembly and Forming Needs

Hydra-pneumatic and servo cylinders are integral components of many industrial assembly and forming applications. HyperCyl manufactures a range of hydra-pneumatic cylinder options that serve as cost-effective, reliable, and self-contained power sources for a range of industrial operations with various force requirements. For higher-precision assembly applications, our servo-driven electro-mechanical actuators enable extremely precise movements and tight motion control. Regardless of your operation's specific requirements, we are confident that we can find or design a solution that will minimize costs, and ensure long-lasting success in your application.

**For more information about our products and custom manufacturing capabilities,  
please contact us today or request a quote.**



## About Us

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For more information about our products and custom manufacturing capabilities, please [contact us](#) today or [request a quote](#).



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