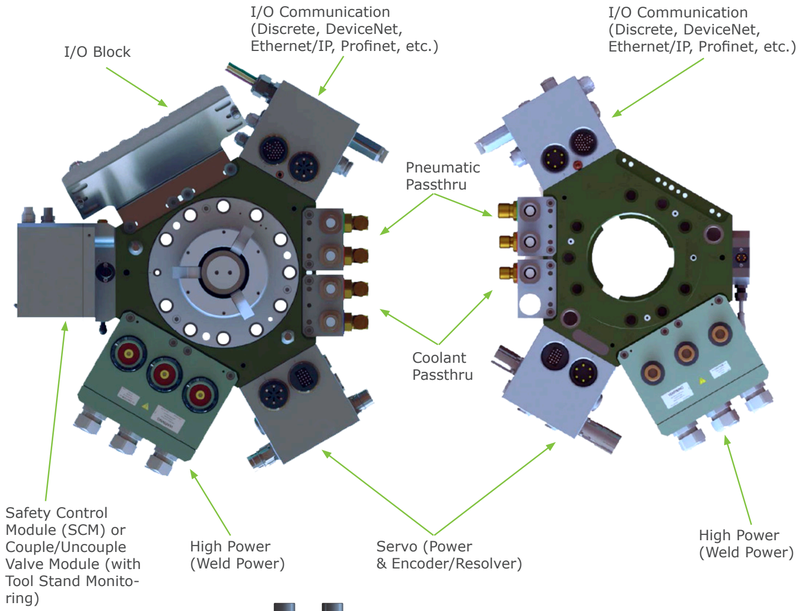
SUPERIOR FEATURES FOR TODAY'S PRODUCTION ENVIRONMENTS

- **Locking mechanism as secure at 5 million cycles as first cycle**
- **Positive retract**
- **Improved size to payload ratio**
- **Minimal maintenance**
- **Couple/uncouple sensing**
- **Direct bolt to ISO 9409-1 patterns**
- **Noise Emissions <70 dB(A)**
- **Lifetime warranty on coupling m chanism parts**

Epsilon™ Heavy Duty Utility Modules

A host of support items complement our automatic tool changers. From high power to pneumatics to coolant and data communications, we offer everything needed to automatically connect seamlessly. Epsilon™ has what you need to control these connections, all packaged in attractive utility modules that mount neatly to the side bosses of the tool changers.

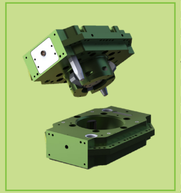


Hardware Kit

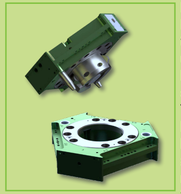
Tool Present Kit

SPECIALTY MODELS

ONE THING HOLDS TRUE in robotic automation…work spaces keep getting tighter and loads keep getting heavier. Here are some highlights of three models that address this trend.



E125 — The Epsilon™ 125 is easy to spot because of its rectangular profile. Although not as slim as the E125LP, the shape of the E125 addresses an ever increasing market need. Not only is a fully loaded E125 capable of lifting up to 350kg (770lbs), the unique profile allows it to fit through an automobile window, facilitating in cabin welding. Another advantage to this package is the ability to tuck neatly into the end of arm shroud now being delivered on some popular robots.

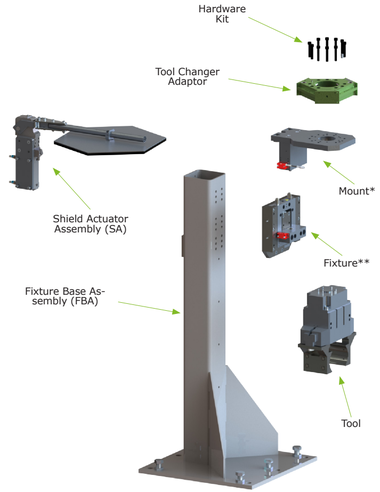


ES160 — The standard E160 package is similar to the Sigma 3, the undisputed "go to" work horse of automatic tool changers for years. The Sigma 3 footprint and high payload capacity have been extremely popular, but again following the trend, requests have come in for the same package size with a slightly higher capacity. Hence the ES160, which retains the E160 footprint, but upgrades to a steel sender that jumps capacity to a stout 800kg (1760lbs).

ACCESSORIES

Tool Stands — Applied Robotics tool stands feature a compact, universal design with the high moment capacity required to safely and securely hold tooling when not in use.
Spring loaded compliancy and tool presence sensing are available as well as specialized heavy-payload versions.

Cover Assemblies — Even the cleanest production areas are still subject to airborne debris. Extend the life of your investment by always using a cover assembly with your tool changer.
Outfitted with an adjustable power clamp, the cover will automatically open and close allowing easy access for the robot when picking up or dropping off a tool.



Examples of configuration.

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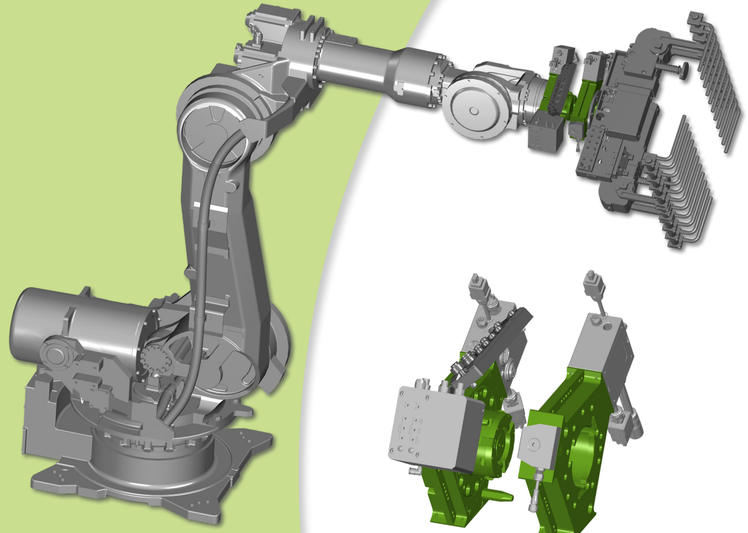
EFFECTO®

Epsilon™
Heavy Duty Automatic Tool Changers



- THE ORIGINAL TOOL CHANGER -
Providing Reliable Solutions Since 1984

EFFECTO®

EPSILON™ — THE BEST ENGINEERED TOOL CHANGERS ARE NOW EVEN BETTER

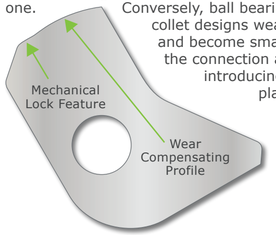
Automatic Tool Changers reside between a robotic arm and its tooling allowing the robot to change tools and support utilities on the fly, with no work stoppage.
A tool changer is productivity. The new Epsilon™ incorporates advantages of three previous generations tool changers with enhancements for today's faster and stronger robots.

- **Higher strength materials** improves size to payload ratio
- **Minimal required maintenance** provides low cost of ownership
- **Direct bolt to ISO 9409-1 patterns** limit the need for robot adaptor plates
- **Couple/uncouple sensing** available on all models
- **Optional tool present sensing**
- **Compatible with our existing utility modules**
- **Many units share spare parts** for reduced stock requirements
- **Best-in-class locking mechanism** with self-centering cams
- **Mechanical locking feature** ensures robot and tool remain connected under loss of power or air pressure
- **I/O Link** communication interface (optional)

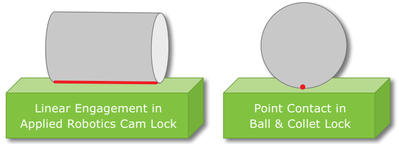
CAM LOCK VS. COMPETITORS' BALL AND COLLET

The Engineered Cam: The Applied Robotics cam lock design has stood the test of time and is known to provide superior reliability and performance.
An engineered part, not just an off the shelf ball bearing, Our purpose built cam lock will outperform ball and collet configurations in every way.
Reduced maintenance requirements and longevity of service ensure a lifetime cost of ownership far lower than any other design. In fact, the cam lock is so robust and reliable, it has a life time guarantee.
Here's why.

Wear: Over time, the Epsilon™ cam's progressive profile continuously compensates for wear, maintaining a rigid connection. At 5 million cycles the cam design locks as securely as it did on cycle one.
Conversely, ball bearings in ball and collet designs wear out with use and become smaller, degrading the connection and potentially introducing a gap and/or play between the robot and tool.



①The Applied Robotics engineered cam locks as securely at 5 million cycles as cycle one.



②Line vs. Point contact, provides more surface area for engagement and also resists rotational movement along the length of the red line, Illustrated above.

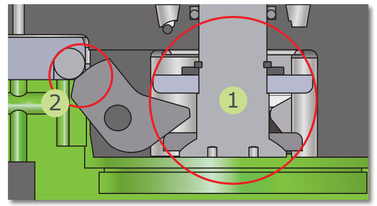
Retract & Release: Epsilon™ cams are controlled by a double-acting piston and drive mechanism.
This double acting cylinder arranged with the cam design enables a "positive retract." Air pressure is applied to one chamber forcing the cams out and into the coupled position while a second chamber is pressurized to move the piston in the opposite direction pulling the cams back in and releasing the connection. This level of control and confidence is not provided by the ball and collet method, which does not allow for "positive retract." A ball and collet design relies on gravity to allow the balls to release the collet.

Disadvantages of Ball and Collet

- Inherently very heavy
- Point to point contact is inherently weaker
- Tool and tool changer will gap with wear
- Rotational stability in axis direction only given by guide pins

When introduced to dirt and debris that exist in a factory, it's possible for the balls to jam in the locked position, potentially pulling a tool unintentionally out of the stand.

Rotational Repeatability: In addition to providing a positive lock/unlock between the robot and tool, it is of the utmost importance the two sides of a tool changer remain precisely aligned. If the mechanism has mechanical variance due to wear, the repetitive task the robot is performing will lose its repeatability.

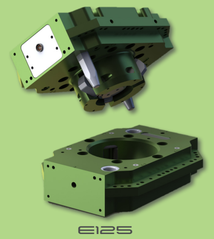


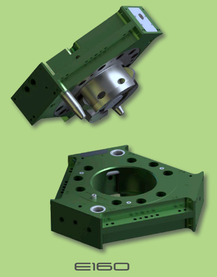
③Floating driver (1) ensures full contact every time it couples & mechanical lock (2) on the larger models (E80 to ES200) prevents tool separation during a loss of power or air pressure

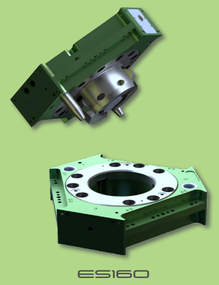
This is another area where the cam clearly and consistently outperforms a ball and collet arrangement. As seen in Figure ③, the cam provides a line contact that will resist rotation. In this scenario the guide pins in the master (robot side) of a cam unit are only responsible for guiding the two halves together, not for preventing rotation of the assembly. The rotational stress is largely absorbed by the cams and associated dowel, not by the guide pins.
Conversely, a ball and collet design is essentially a bearing race. In order to keep the assembly from rotating, the guide pins are forced to shoulder the rotational inertia building up in the assembly as the robot moves. Rotational stresses wear the guide pins prematurely and begin to introduce play between the joined halves of a ball and collet tool changer, destroying repeatability. In time, the pins must be replaced which leads to downtime and expense.
In the worst case scenario, the pins could shear off allowing the entire assembly, tooling and materials to freewheel, damaging products, equipment and potentially causing an injury.
This simply does not happen with the positive locking cam system found in the Epsilon.™

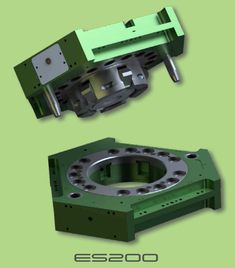
OUR ENGINEERING ADVANTAGES ARE YOUR PRODUCTIVITY ADVANTAGES.

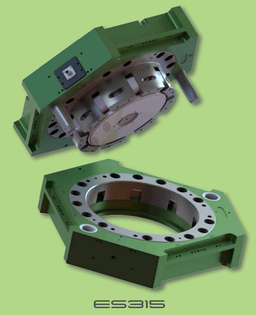
Lab Automation > Docking & Utility Connection > Pick and Place > Dispensing > Small Part Material Handling > Part Feeding > Machining > Stamping > Assembly > Welding > Heavy Load Material Handling


E125


E160


ES160


ES200


ES315

The Epsilon™ line covers all sizes and applications from life science to automotive

Note: Epsilon™ part names correspond to the robot bolt patterns. I.e. use part E100 for a robot with a 100mm mounting surface.

SPECIFICATIONS

Model	Rated payload	Operating moment (Mx, My)	E-Stop moment (Mx, My)	Operating torque (Mz)	E-Stop torque (Mz)	Width x length	Coupled height	Rotational repeatability	Weight
E125	350 kg 770 lb	2576 Nm 22800 in-lb	4817 Nm 42631 in-lb	4180 Nm 36995 in-lb	5110 Nm 45225 in-lb	175.0 x 224.0 mm 6.89 x 8.82 in	120 mm 4.72 in	± 0.01°	9.22 kg 0.36 lb
E160	525 kg 1155 lb	3775 Nm 33405 in-lb	5787 Nm 51220 in-lb	4800 Nm 42480 in-lb	5945 Nm 52615 in-lb	242.9 x 280.5 mm 9.56 x 11.04 in	120 mm 4.72 in	± 0.01°	13.86 kg 0.55 lb
E160 (STL)*	600 kg 1320 lb	4300 Nm 38060 in-lb	9095 Nm 80490 in-lb	4800 Nm 42480 in-lb	5945 Nm 52615 in-lb	242.9 x 280.5 mm 9.56 x 11.04 in	120 mm 4.72 in	± 0.01°	13.89 kg 0.55 lb
ES160	800 kg 1760 lb	5649 Nm 50000 in-lb	11322 Nm 100215 in-lb	5280 Nm 46730 in-lb	6690 Nm 59210 in-lb	242.9 x 280.5 mm 9.56 x 11.04 in	120 mm 4.72 in	± 0.01°	18.03 kg 0.71 lb
ES200	1500 kg 3300 lb	15097 Nm 133620 in-lb	17998 Nm 159300 in-lb	11660 Nm 103200 in-lb	14590 Nm 129130 in-lb	310.0 x 358.0 mm 12.20 x 14.09 in	120 mm 4.72 in	± 0.01°	28.53 kg 1.12 lb
ES315	2300 kg 5140 lb	43135 Nm 381773 in-lb	75533 Nm 668525 in-lb	31144 Nm 275645 in-lb	48882 Nm 432640 in-lb	425.0 x 490.8 mm 16.73 x 19.32 in	171 mm 6.73 in	± 0.01°	103.24 kg 4.06 lb

*E160 (STL) utilizes a steel tool side and an aluminum robot side.
Operating pressure **5 - 7 bar**
Ambient temperature **5 - 60°C**
Sound emissions (sound pressure) **≤ 70 dB(A) in each direction**