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Collet Closers 101

What they are, how they work, what it takes to make them function.



Lexair is a privately held, American owned corporation committed to the design and manufacturing of industrial products. We are a World Class Manufacturer of Fluid Power Products, Valves, and Machine Tool Accessories, delivering the best products possible for today's global market needs.



The History of Lexair

Lexair was founded in April of 1977 as a manufacturer of high pressure compressors and stainless steel valves for the United States Navy. Mid-year 1985 we acquired all rights to the hydraulic and pneumatic valve lines from Airmatic Allied (a division of Snaptite, Inc) which included the Hi-Cyclic® product line from Beckett-Harcum. These products are now manufactured and distributed under the Lexair name. In addition to previously existing products and these acquisitions, we have continually expanded our Fluid Power Product offerings as we design and manufacture new or modified items to meet the special requirements of our customers. As a world leader in this market segment, we stand ready to meet any challenge.

In 1994 we introduced our first barfeed product, the Rhinobar®. This heavy-duty hydrodynamic bar feeder for CNC lathes launched Lexair firmly into the Machine Tool Accessory marketplace. That same year, we also became the exclusive North American agent for the “Multifeed”, a “magazine style” short bar loader manufactured by Hydrafeed LTD., a major European barfeed manufacturer. In 1996, our patented Mini-Rhinobar® hydrodynamic bar feeder was designed and released specifically for the CNC swiss-type screw machine market. Mid-year 1996 we acquired the complete collet chuck line from Buck Tool Company (formerly part of the Buck Chuck line). Following this acquisition, we developed many new collet workholding devices for the machine tool industry. In August 2002, we acquired the Production Dynamics® line of collet style chucks which includes our popular Full Bore® and Prodyne® models. With the acquisition of these two companies and our continued new product development, Lexair has become a world leader in the Machine Tool Accessory market. In 2012, we were appointed to be the North American importer and master distributor for SYSTEC which is the leading manufacturer of chucks in Brazil. In the spring of 2014 Lexair became the exclusive importer and distributor of Breuning IRCO in North and South America. Breuning IRCO is the premier German manufacturer of lathe automation , offering custom solutions for loaders and unloaders. Our products are distributed by over 100 independent distributors and agents in the United States, Canada and Mexico with exports to the United Kingdom, Europe, and Australia.



Machine Tool Accessories

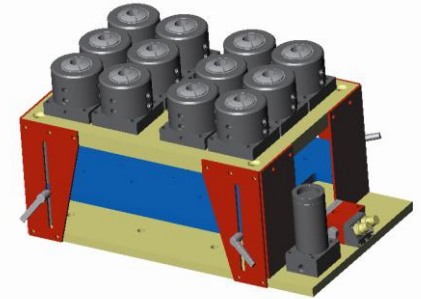
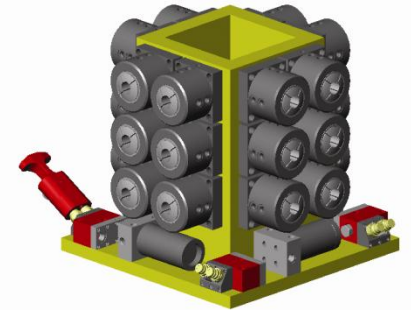
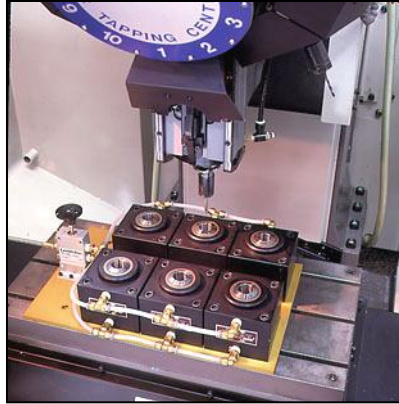
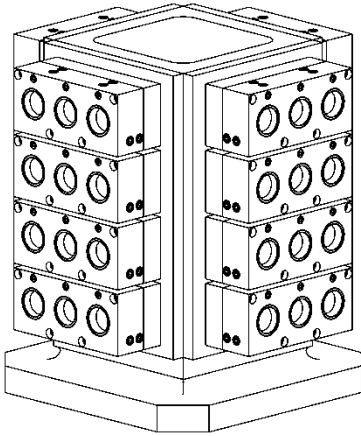
Collet Closers



- Complete family of stationary collet workholding components that can be utilized individually or grouped together form a system
- Double acting pneumatic or hydraulic models are available in fixed-length and pull-back versions

Machine Tool Accessories

Collet Closers



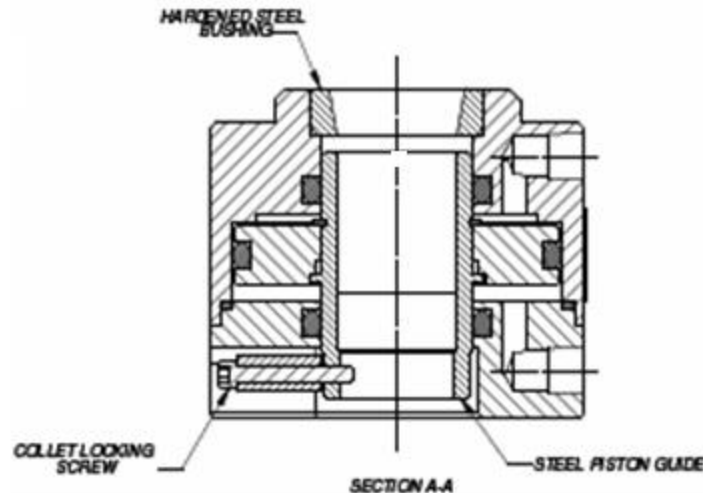
- Complete family of stationary collet workholding components that can be utilized individually or grouped together form a system
- Double acting pneumatic or hydraulic models are available in fixed-length and pull-back versions
- Lexair can custom design and build turnkey solutions for any workholding application

Machine Tool Accessories

Collet Closers

How They Work

There are several models featuring one of two different types of construction for either fixed-length or pull-back operation. Both styles of closers utilize double acting actuation. Very similar in function to a cylinder, pressure is required to close the collet on a part as well as to open it to release the part. Pull-back operation means that the collet (which actually grips the part or tooling) is literally “pulled back” or down into the closer as the part is clamped in place via a threaded tube appropriately called the “draw tube”. Closers of this type are often good choices for use when holding parts for inspection, testing or assembly procedures but may not be the best choice for precision grinding or machining applications.



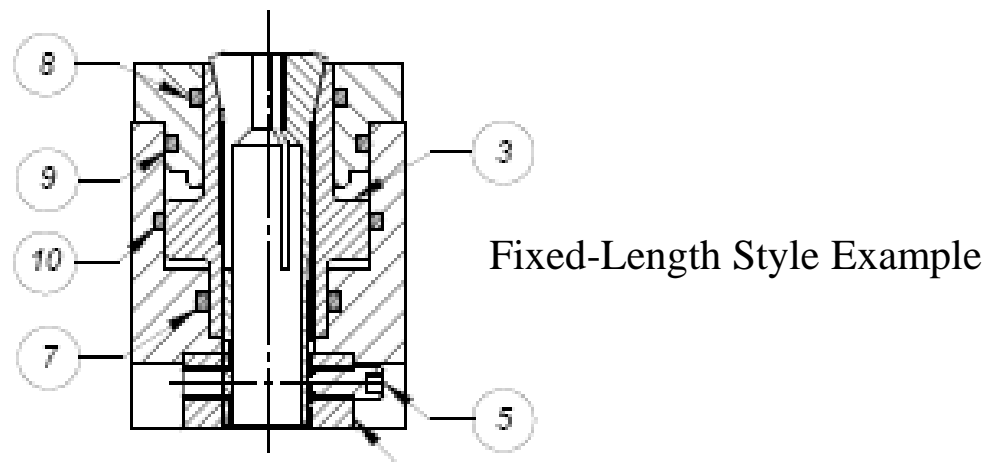
Pull-Back Style Example

Machine Tool Accessories

Collet Closers

How They Work

The second type of construction, the fixed-length models, feature the ability to actually thread the collet into the closer to a precise location and lock it into place. During the operation of this type of closer, the collet remains stationary as the closing mechanism moves toward the taper on the collet to clamp the part or tooling and moves away from the collet to release the part being held. Since the collet itself does not move, the part or fixture being held maintains a fixed position from part-to-part allowing for higher precision to be achieved.

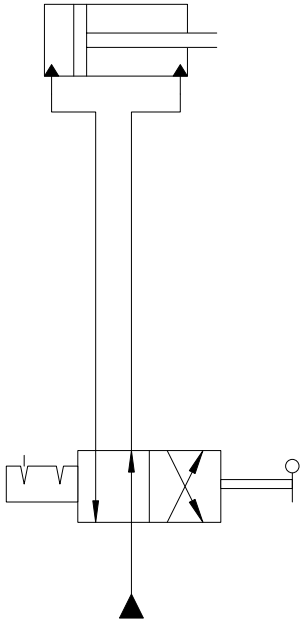


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Collet Closers

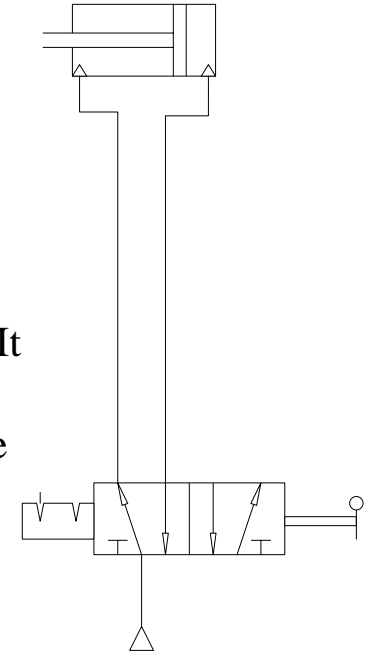
What It Takes To Make Them Function?

Remember the simplistic view of how a collet closer works? It is double acting, therefore it requires energy to move it to the clamp or un-clamp position just like the operation of a double acting cylinder.



In this example, we have a double acting hydraulic cylinder being controlled by a 4-way, 2 position, detented, lever operated hydraulic directional control valve.

Since double acting collet closers function just like double acting cylinders, one port must be exhausted while the opposite port is pressurized to move it in one direction. Movement in the opposite direction requires a device that can reverse the direction of flow. You need a 4-way directional control valve.

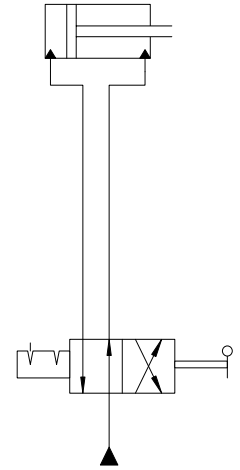


In this example, we have a double acting pneumatic cylinder being controlled by a 4-way, 2 position, detented, lever operated pneumatic directional control valve.

Machine Tool Accessories

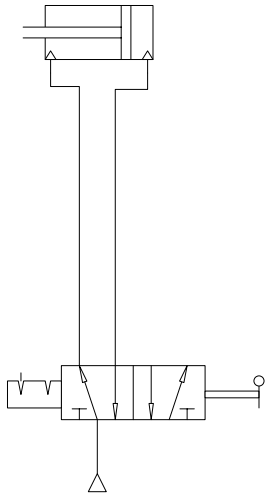
Collet Closers

Many applications for these products are permanently or semi-permanently mounted and do not require that you disconnect the valve and/or pressure supply source during operation.

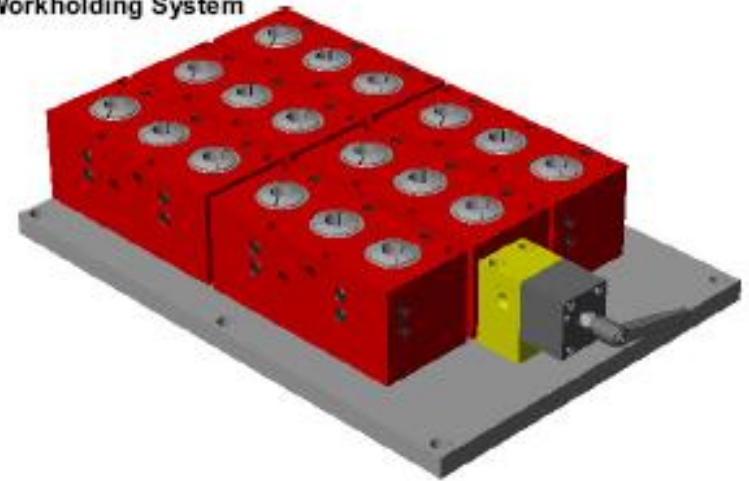


..... or as in this hydraulic example below.

Valves can be mounted directly to the workholding fixture as in the pneumatic example above



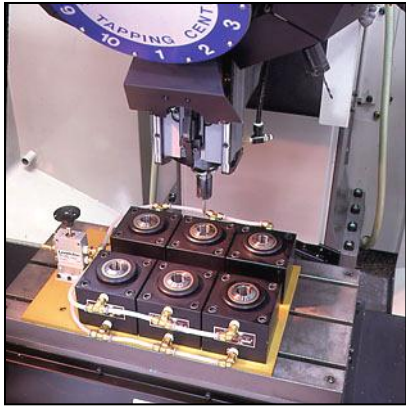
Typical Vertical Workholding System



Machine Tool Accessories

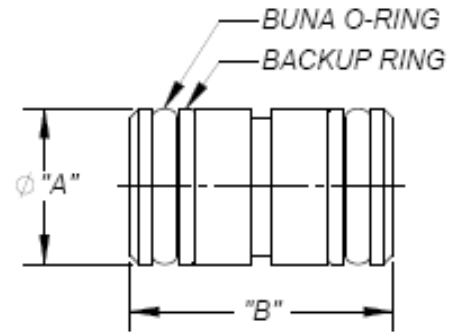
Collet Closers

Plumbing Possibilities



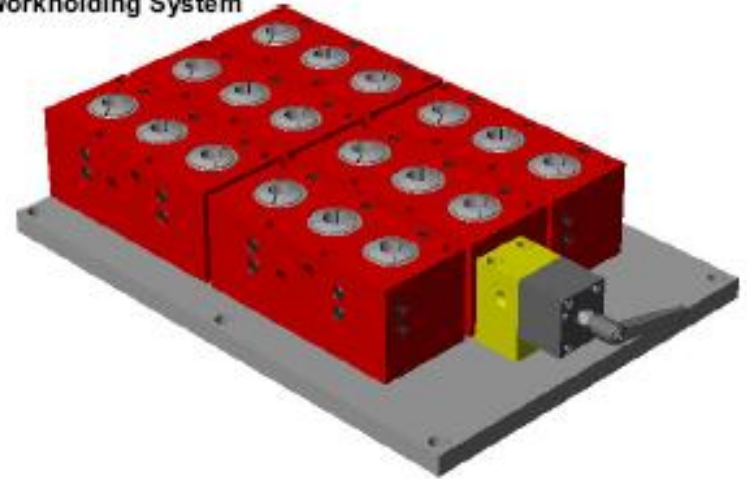
Only one valve is required to operate all the closers on this tooling fixture. Note the external lines to each unit.

Unique connector bushings can be used to eliminate external plumbing and/or allow for higher part density on a fixture by permitting part centerline spacings to be closer together.



Typical connector bushing

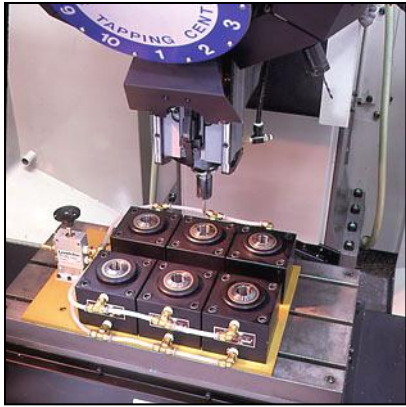
Typical Vertical Workholding System



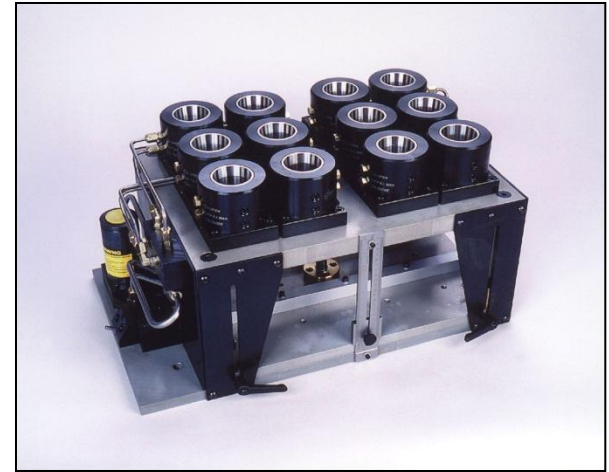
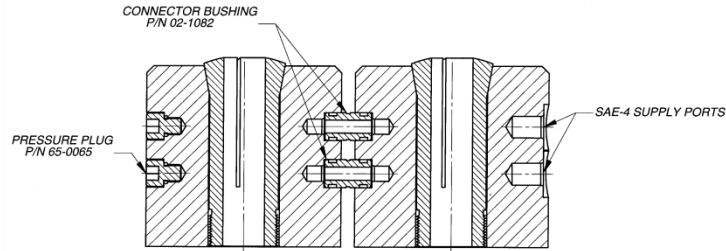
Only one valve is required to operate all the closers on this tooling fixture. Note the absence of external lines.

Machine Tool Accessories

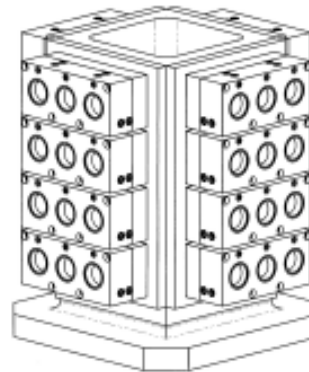
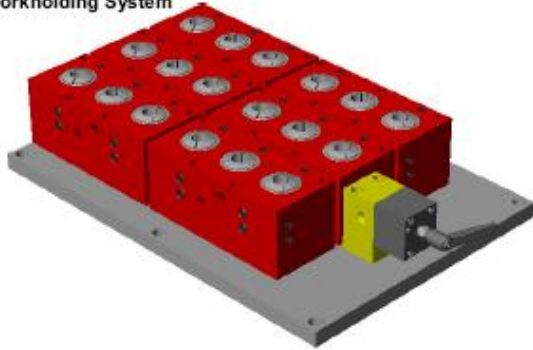
Collet Closers



From many external lines....



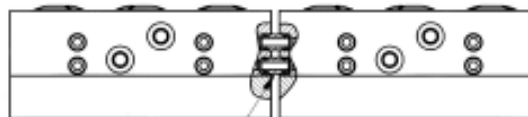
Typical Vertical Workholding System



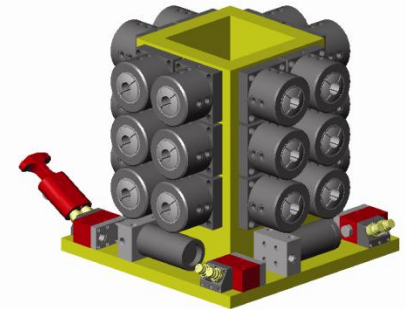
Typical Horizontal Workholding System

.... to no lines

#02-1082 Connector Bushing



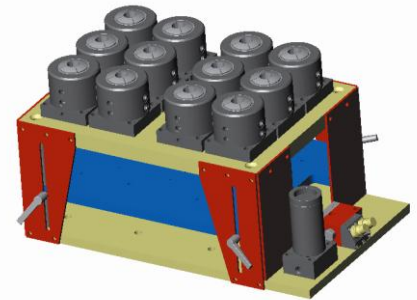
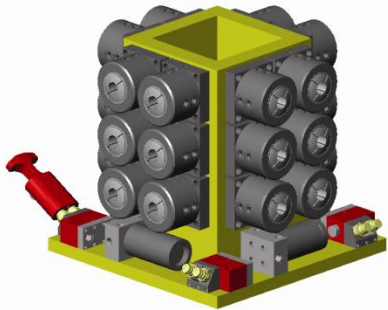
CONNECTOR BUSHINGS MAY BE USED IN ANY OF THE 6 LOCATIONS IN THE TRI-GROUP COLLET CLOSER



Machine Tool Accessories

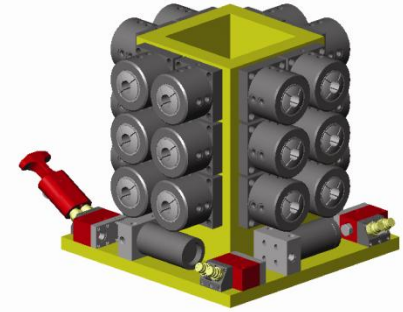
Collet Closers

What if the valve and supply source must be disconnected from the fixture? If the fixture is going to be used in a machining center, there is no possibility for an “umbilical cord” to supply and maintain the clamping pressure. In this case, our patented disconnect handle and manifold block with integrated check valve assembly will be needed.

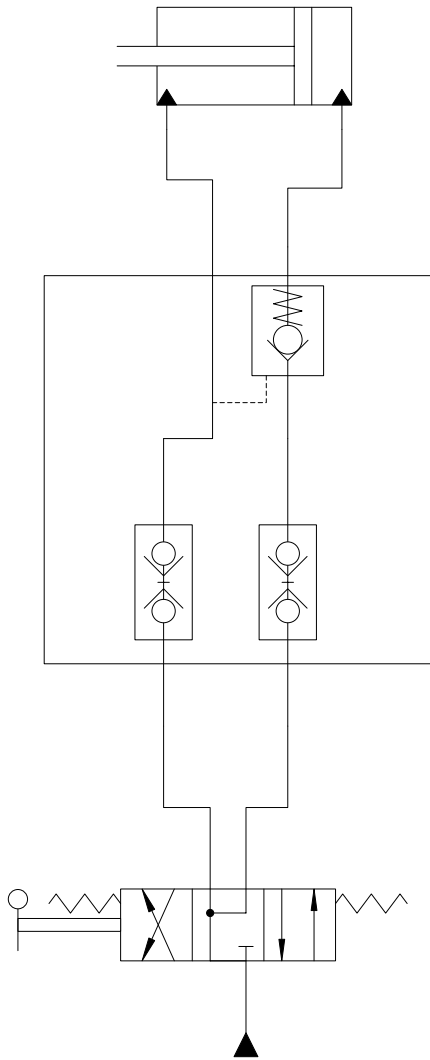
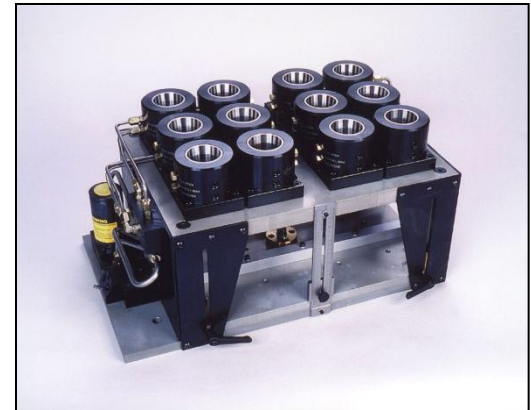


Machine Tool Accessories

Collet Closers



← Box represents manifold block with disconnects and integrated check valve



Taking the manually operated concept a step further (for when the fixture or pallet must be disconnected from the supply to be loaded into a machining center). The manifold with check valve requires the use of a 4-way, 3 position, exhaust open center valve for proper operation.

Machine Tool Accessories

Collet Closers

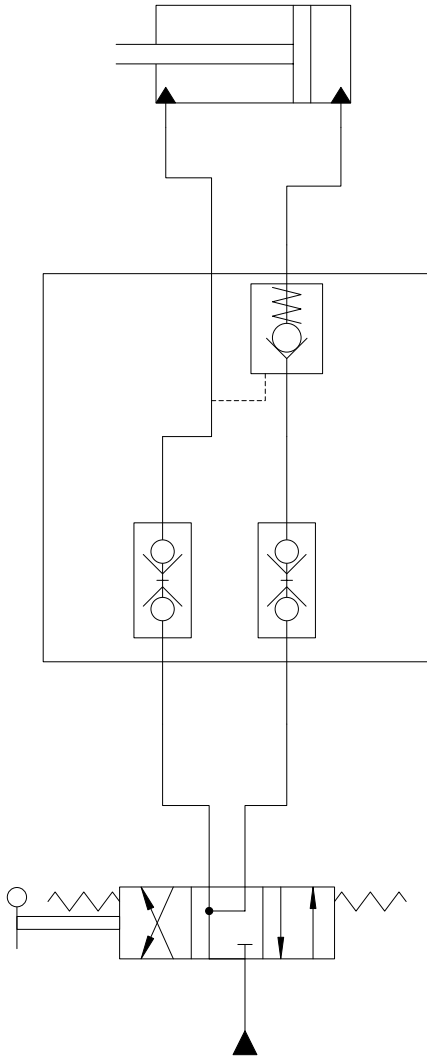
What if the valve and power unit can stay attached during operation, say for example on a mill? What if different configurations of tooling fixtures are used for different parts that are manufactured on the same mill? In this case, the manifold with disconnects and the handle would make the connections to/from the tooling fixtures much easier. No internal check valve would be required in this case. The manifold and disconnect handle would facilitate quick and clean tooling fixture change outs.



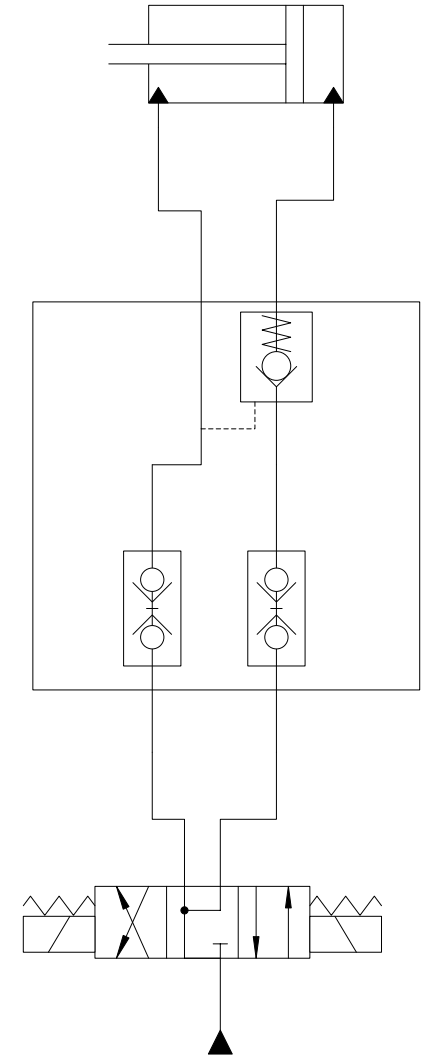
Machine Tool Accessories

Collet Closers

What if electrical control is desired?
Simply replace the manually operated directional control valve with a 4-way, 3 position, solenoid operated, exhaust open center valve.



Manual Operation

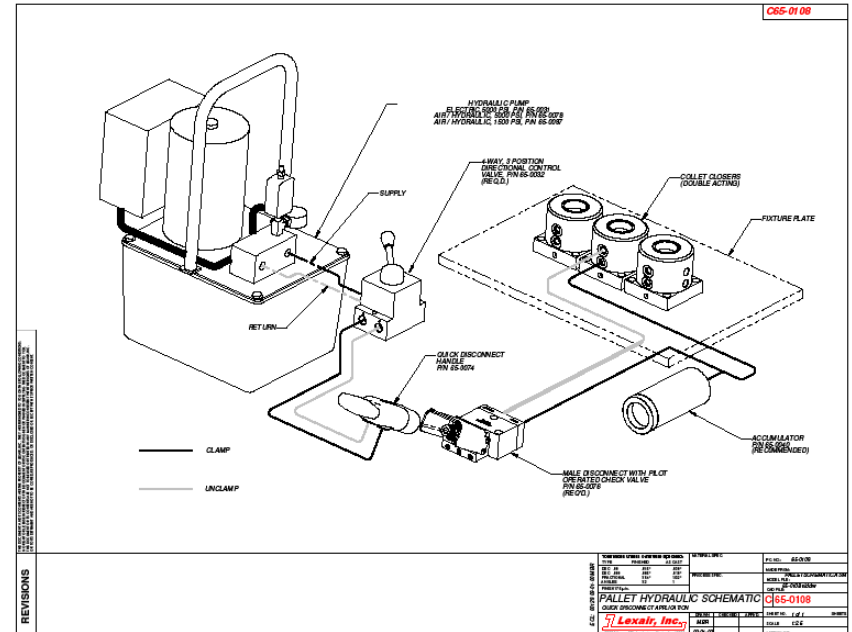
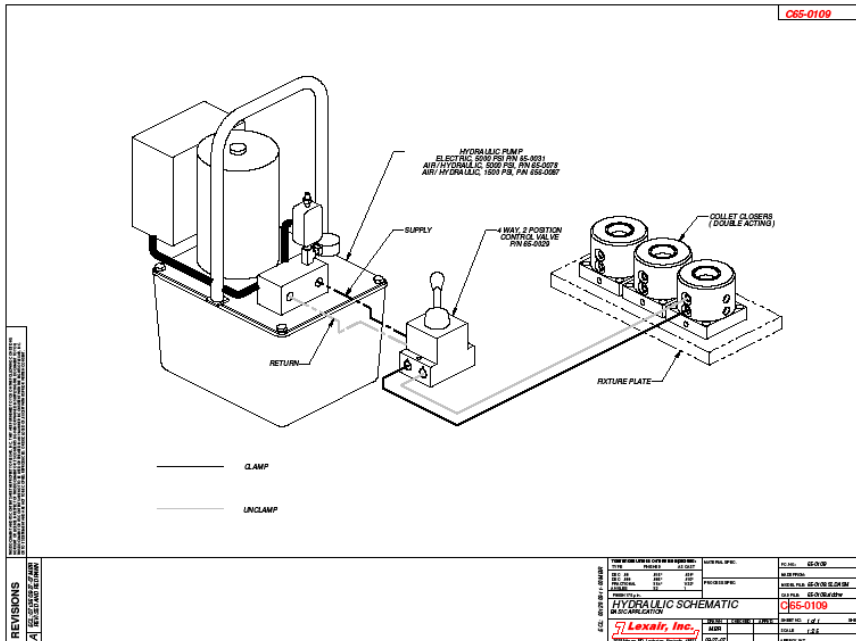


Electrical Operation

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Collet Closers

Typical hydraulic operation with direct plumbing



Typical hydraulic operation using disconnect handle and manifold with integrated check valve

Machine Tool Accessories

Low Pressure Pneumatic Collet Closers



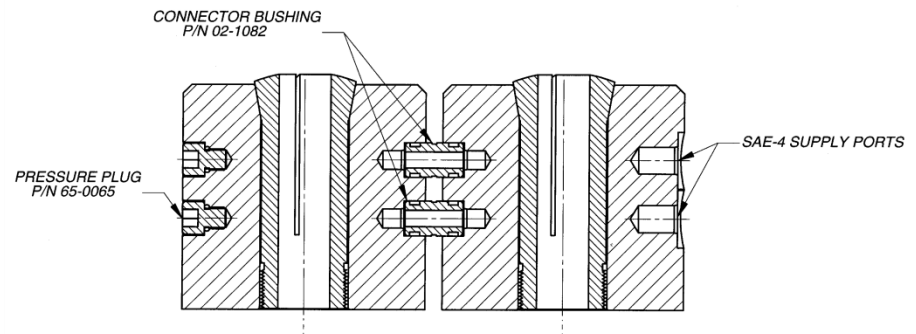
- Double acting, pull-back operation
- Designed for use with 5C collets
- Drawtube force generated is 7.5 times the inlet pressure applied
- Maximum working pressure is 150 PSI
- Made from aircraft quality aluminum
- Supplied with a 5C collet wrench



Machine Tool Accessories

Pneumatic/Low Pressure Hydraulic Collet Closers

- Double acting, fixed-length operation
- Designed for use with 1C, 3C, 5C or 16C collets
- Reamed orientation holes in the base for mounting
- Patented “accessible-from-the-top” collet locking screw – allows quick and easy collet or part orientation in infinite positions
- All models feature the ability to be combined into multiple configurations by use of connector bushings – eliminates the external plumbing between units
- Constructed from aircraft quality aluminum
- Drawtube force generated ranges from .73 (1C) to 7.5 (5C) times the inlet pressure applied
- Maximum pneumatic pressure rating of 150 PSI or 250 PSI depending upon the model
- Maximum hydraulic pressure rating of 750 PSI or 2000 PSI depending upon the model



Machine Tool Accessories

Pneumatic/Low Pressure Hydraulic Collet Closers

- Double acting, fixed-length operation
- Designed for use with 1C, 3C, 5C or 16C collets
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- Constructed from aircraft quality aluminum
- Drawtube force generated ranges from .73 (1C) to 7.5 (5C) times the inlet pressure applied
- Maximum pneumatic pressure rating of 150 PSI or 250 PSI depending upon the model
- Maximum hydraulic pressure rating of 750 PSI or 2000 PSI depending upon the model
- All units are supplied with a matching collet

Lexair, Inc. wrench

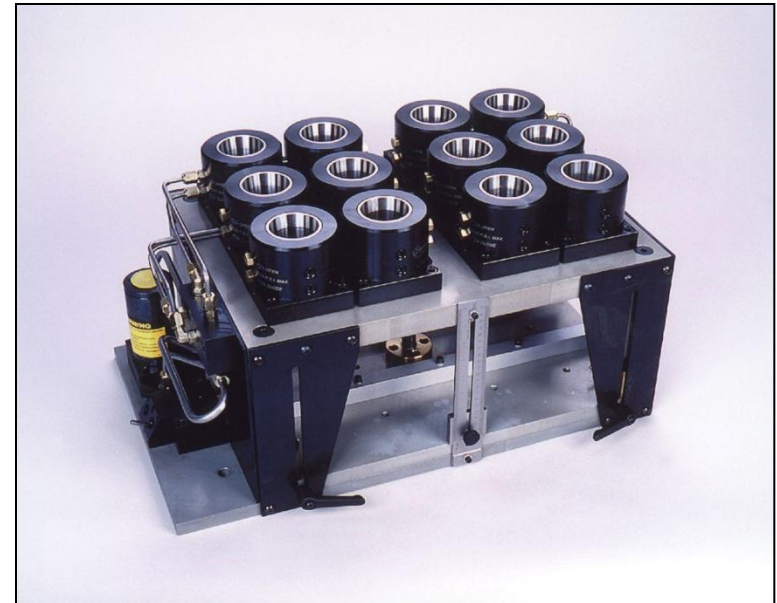


Machine Tool Accessories

High Pressure Hydraulic Collet Closers



- Double acting, fixed-length operation
- Designed for use with 5C, 16C, 3J, 22J or 35J collets
- Reamed orientation holes in the base for mounting
- Ability to be combined into multiple configurations by use of connector bushings – eliminates the external plumbing between units



Machine Tool Accessories

High Pressure Hydraulic Collet Closers



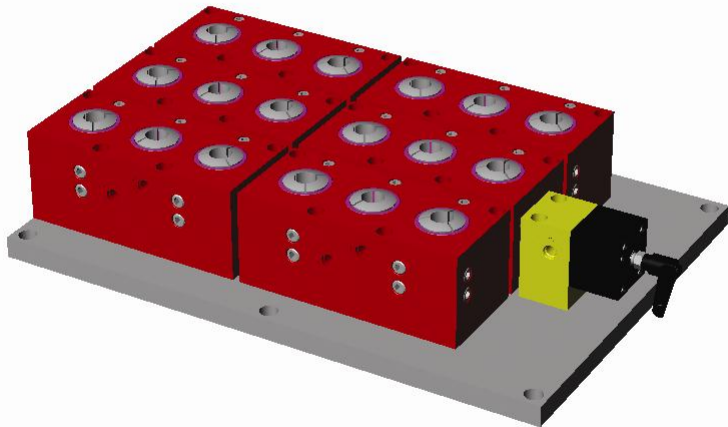
- Double acting, fixed-length operation
- Designed for use with 5C, 16C, 3J, 22J or 35J collets
- Reamed orientation holes in the base for mounting
- Ability to be combined into multiple configurations by use of connector bushings – eliminates the external plumbing between units
- Heavy duty all steel construction
- Drawtube force generated is 1.9 times the inlet pressure applied
- Hydraulic working pressure to 5000 PSI
- All units are supplied with a matching collet wrench



Machine Tool Accessories

High Pressure Hydraulic Tri-Grip Collet Closers

- Double acting, fixed-length operation
- Compact design features three 5C collet closers in one body
- Ability to be combined into multiple configurations by use of connector bushings – eliminates the external plumbing between units



Machine Tool Accessories

High Pressure Hydraulic Tri-Grip Collet Closers

- Double acting, fixed-length operation
- Compact design features three 5C collet closers in one body
- Ability to be combined into multiple configurations by use of connector bushings – eliminates the external plumbing between units
- Patented “accessible-from-the-top” collet locking screw – allows quick and easy collet or part orientation in infinite positions
- Drawtube force generated is 1.1 times the inlet pressure applied
- Hydraulic working pressure to 5000 PSI
- All units are supplied with a matching 5C collet wrench



Machine Tool Accessories

Pneumatic/Hydraulic Step Chuck Collet Closers

Models 5C and 16C

5C Details



- Double acting, pull-back operation
- All steel construction
- Holds standard collets, step chucks and closers, plus expanding collets for I.D. holding of parts up to 6" in diameter



Machine Tool Accessories

Pneumatic/Hydraulic Step Chuck Collet Closers

Models 5C and 16C

5C Details



- Double acting, pull-back operation
- All steel construction
- Holds standard collets, step chucks and closers, plus expanding collets for I.D. holding of parts up to 6" in diameter
- Drawtube force generated is 7.5 times the inlet pressure applied
- Pneumatic pressures to 250 PSI, hydraulic pressures to 750 PSI
- Ability to be combined into multiple configurations by use of connector bushings – eliminates external plumbing
- Supplied with a 5C collet wrench



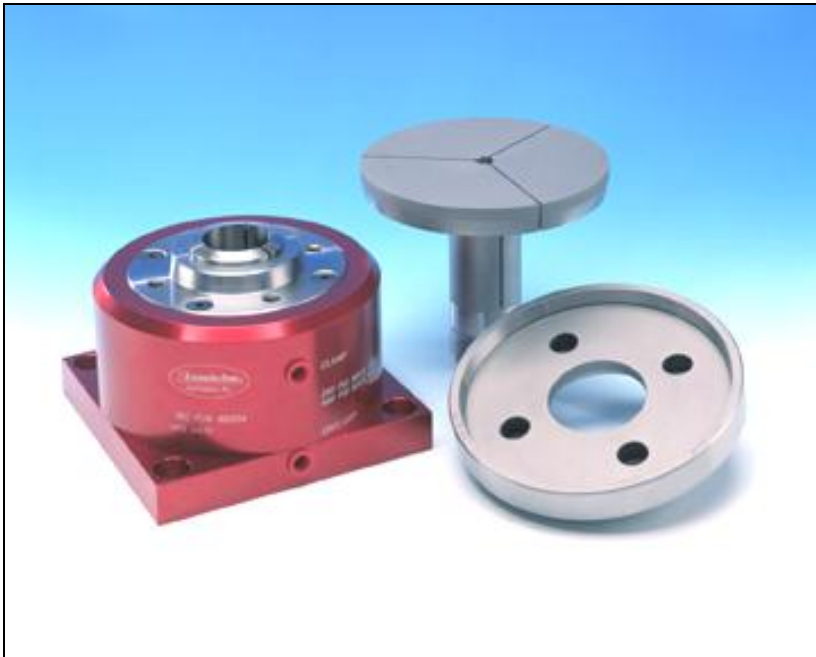
Machine Tool Accessories

Pneumatic/Hydraulic Step Chuck Collet Closers

Models 5C and 16C - continued

16C Details

- Double acting, pull-back operation
- Aircraft aluminum body with hardened steel bushings for long, trouble free life
- A2-5 spindle nose accepts 16C collets to 1-5/8” or 16C step chucks up to 6” in diameter plus expanding nose collets for I.D. holding of parts



Machine Tool Accessories

Pneumatic/Hydraulic Step Chuck Collet Closers

Models 5C and 16C - continued

16C Details

- Double acting, pull-back operation
- Aircraft aluminum body with hardened steel bushings for long, trouble free life
- A2-5 spindle nose accepts 16C collets to 1-5/8" or 16C step chucks up to 6" in diameter plus expanding nose collets for I.D. holding of parts
- Drawtube force generated is 22.5 times the inlet pressure applied
- Pneumatic working pressures to 250 PSI, hydraulic pressures to 400 PSI
- Supplied with a 16C collet wrench



Machine Tool Accessories

Applications and Industries Serviced by Our Collet Closers

- Part holding for assembly applications
- Part holding for machining or grinding applications
- Part holding for inspection and test procedures
- High force units can be used for crimping operations
- Models available are excellent for tool room and production environments
- Modular units are easily combined into fixtures - We can design and manufacture custom turnkey solutions to meet the demands of all your workholding requirements

Industries served include:

- Electronics
- Dental
- Heavy Equipment
- Automotive
- Aerospace
- Power and Hand Tools
- Medical
- Machine Tool
- General Industrial

Machine Tool Accessories

Disconnect Handles

- Patented disconnect handle quickly and conveniently allows for connection/disconnection of hydraulic lines to/from machine tool pallets or in other hydraulic applications
- Designed for use in double acting applications
- The unit automatically latches when pressure above 2500 PSI is present on either hose preventing accidental disconnects
- Ergonomic design helps minimize operator hand fatigue
- Can be integrated with all Lexair, Inc. hydraulic collet closers
- To be used in conjunction with a matching Lexair manifold. If used with the manifold that features the integrated check valve, a momentary hydraulic pump or a 4-way, 3-position, exhaust open center valve must be used – please contact the factory to get the correct plumbing arrangement for your application



Machine Tool Accessories

Collets

Lexair offers a complete line of collets available in all sizes and types to fit our entire line of collet closers and chucks. Please consult the factory for assistance and further information for all your collet applications.



Machine Tool Accessories

Collet Wrenches

- Complete line of high quality, light-weight, aluminum collet wrenches
- Anodized red with our logo and collet size laser engraved – assures that markings will not wear off
- Available in sizes that fit our wide range of collet closers – including 1C, 3C, 5C, 16C, 3J, 22J and 35J sizes
- One of our durable units is supplied in the correct size with any collet closer that we manufacture



Please visit www.lexairinc.com for more information on our products