Table of Contents

B. Base Utility Coupler 3
GLxL Series—Utility Couplers with Locking Mechanism 3
1. Product Overview 3
1.1 GLxL Utility Coupler Master 4
1.2 GLxL Utility Coupler Tool 4
1.3 GLxL Compliance Assembly 5
1.4 9123-GL6LM Utility Coupler 5
1.4.1 9123-GL6LM Utility Coupler Master 5
1.4.2 9123-GL6LT Utility Coupler Tool 6
1.5 9123-GL7LM Utility Coupler 6
1.5.1 9123-GL7LM Utility Coupler Master 6
1.5.2 9123-GL7LT Utility Coupler Tool 7
2. Installation 8
2.1 Utility Coupler Master 8
2.2 Utility Coupler Master Removal 9
2.3 Utility Coupler Tool Assembly Installation 9
2.4 Utility Coupler Tool Assembly Removal 10
2.5 Wiring and Electrical Connections 10
2.6 Pneumatic Connections and Pneumatic Valves 11
2.6.1 Air Requirements 11
2.6.2 Valve Requirements and Connections 11
2.7 Guided Cylinder Sensor Adjustment Procedure 12
2.7.1 Adjust the Sensor Height 12
2.7.2 Adjust the Sensor Position 12
3. Operation 13
3.1 Coupling Sequence 13
3.1.1 Coupling Sequence for Utility Couplers 13
3.2 Uncoupling 14
3.2.1 Uncoupling the Utility Coupler 14
4. Maintenance 14
4.1 Preventative Maintenance 14
4.2 Clean, Inspect, and Lubricate Thrust Bearings for Utility Couplers 15
4.3 Inspect Compression Springs for Utility Couplers 17
4.4 Pin Block Inspection and cleaning 17
4.5 Cleaning and Lubrication 18
4.6 Clear Dust and Debris from Compliance Springs Area 20
4.7 Clean, Inspect, Lubricate, Replace Component for Master-side Pass-through Air Port 21
4.8 Replacement Procedures 21
4.8.1 V-ring Seal Replacement for Optional Electrical Modules 21
4.8.2 RTL Sensor Replacement 22
4.8.3 Lock and Unlock Sensor Replacement 22
4.8.4 Compliance Spring Replacement 23
4.8.5 Alignment Pin Replacement 24
5. Troubleshooting 26

6. Recommended Spare Parts 28
7. Specifications 29
8. Drawings 30
9. Guided Cylinder Proximity Sensor Information 30
9.1 9123-GL-GC-B80S100-SG Guided Cylinder Proximity Sensor 30
9.2 9123-GL-GC-B80S100-SR Guided Cylinder Proximity Sensor 31

B. Base Utility Coupler

GLxL Series—Utility Couplers with Locking Mechanism

1. Product Overview

The GLxL Utility Coupler is designed for heavy-duty industrial applications. The Utility Coupler provides pass through utilities such as air, fluids, and electrical signals from both integrated ports within the body and standard ATI add-on ledge mounted modules. Consult ATI for further details. Refer to *Table 1.1* for Utility Couplers, the Master, Tool, and Compliance assemblies are group into compatible modules.

The Utility Couplers are comprised of a Master and Tool side, refer to *Figure 1.1*. The unit may be equipped with a Compliance Assembly that allows for large tooling misalignments. The Utility Coupler depends on brute force from the Guided Cylinder Assembly to bring the Master and Tool Plates together, before the locking mechanism can be actuated. Once the Master and Tool are locked the air pressure can be relieved from the Guided Cylinder Assembly.

The interface between the drive cylinder and the Master side may require an adapter plate. Refer to *Section 8—Drawings* for mounting pattern information. The Master side requires an air adapter mounted to flat A to provide supply air to the locking mechanism and electrical connections for the Lock, Unlock and RTL sensors if so equipped.

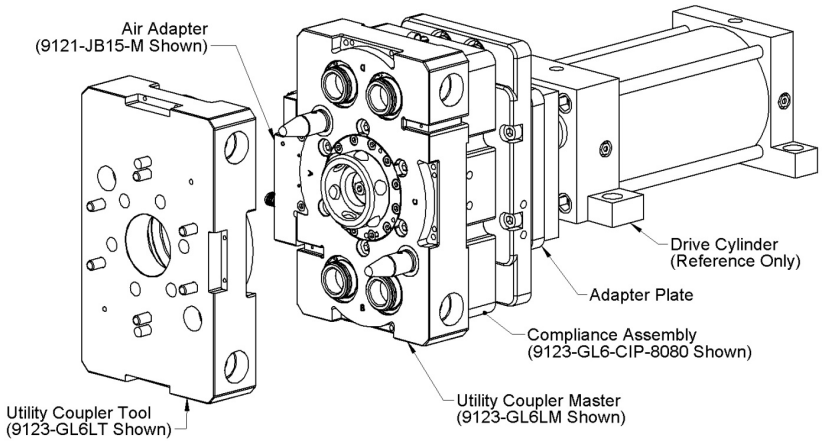
The recommended operating pressure for the guided cylinder is 80 psi. The unit will work in operating pressures between 60–120 psi. A supply pressure in the range of 60 to 100 psi is acceptable for operation of the locking mechanism, with a setting of 80 psi suggested. The air should be filtered 50 micron or better.

The Compliance Assembly can be installed to either the Master or the Tool assembly to provide the proper compliance. Refer to *Section 1.3—GLxL Compliance Assembly* for more information.

Table 1.1—GLxL Utility Couplers

Part number	Description
9123-GL6LM-0-0-0-0-N	GL6 Utility Coupler Master, Locking Mechanism Option, (4) 1" NPT Pass Through Ports
9123-GL6LT-0-0-0-0-N	GL6 Utility Coupler Tool, Locking Mechanism Option, (4) 1" NPT Pass Through Ports
9123-GL6-CIP-8080	Compliance Assembly, +/- 7.5mm XY, 5 Degree Angular
9123-GL7LM-0-0-0-N	GL7 Utility Coupler Master, Locking Mechanism Option, (1) 3" NPT Pass Through Port No Sensors
9123-GL7LT-0-0-0-N	GL7 Utility Coupler Tool, Locking Mechanism,(1) 3" NPT Pass Through Port with Straight Fitting
9123-GL6-CIP-8080	Compliance Assembly, +/- 7.5mm XY, 5 Degree Angular

Figure 1.1—GLxL Utility Coupler with Guided Cylinder Assembly

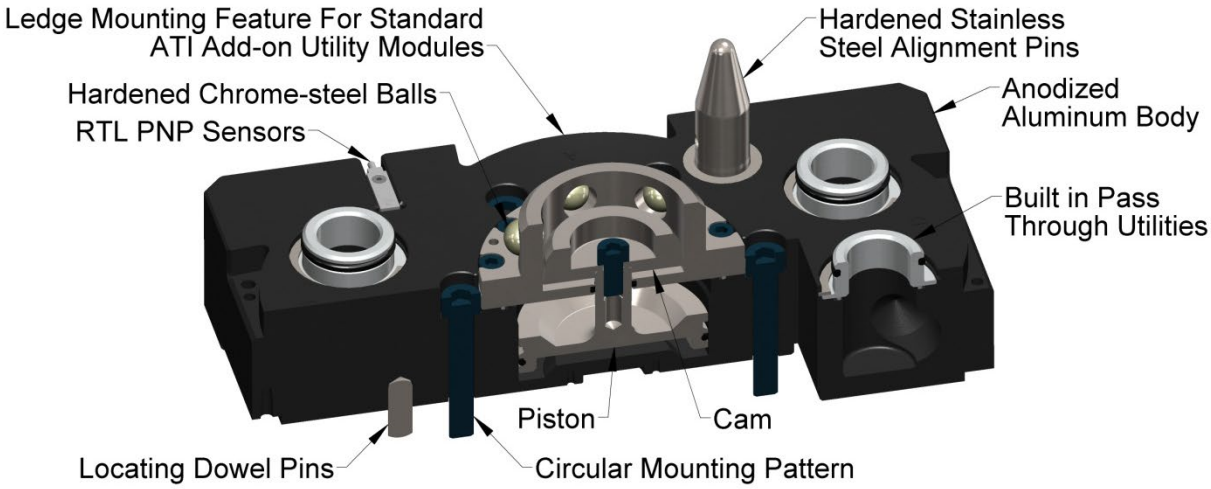


1.1 GLxL Utility Coupler Master

The Master assembly includes an anodized aluminum body and hardened stainless-steel alignment pins. Two dowel pins are provided for accurate location and a circular mounting pattern for installation to customer tooling. The Master body contains the locking mechanism, consisting of steel balls, ball cage, cam, and piston.

The Master housing plate has built-in features to pass utilities on to the Tool-side, in addition the Master and Tool bodies are equipped with up to four module ledge mount flats that provide support for additional Tool Changer utility modules. Consult ATI for further details.

Figure 1.2—GLxL Utility Coupler Master (9123-GL6LM Shown)

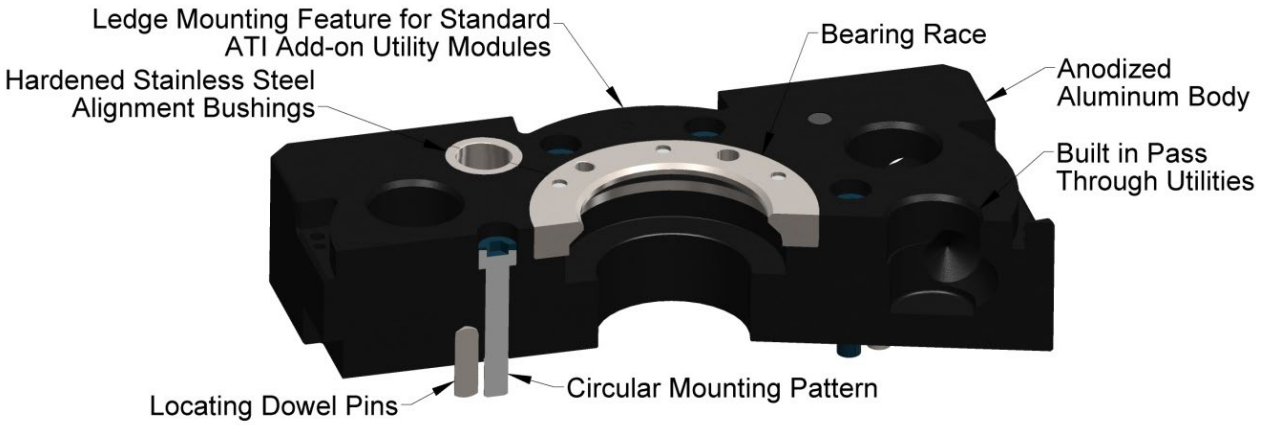


1.2 GLxL Utility Coupler Tool

The Tool block assembly includes an anodized aluminum body and hardened-steel alignment bushings. The Tool block also includes a circular mounting pattern for direct customer tool mounting and two locating dowel pins.

The Tool housing plate has built in features to receive utilities from the Master-side. The Tool bodies are equipped with up to four module ledge mount flats that provide support for additional Tool Changer utility modules. Consult ATI for further details.

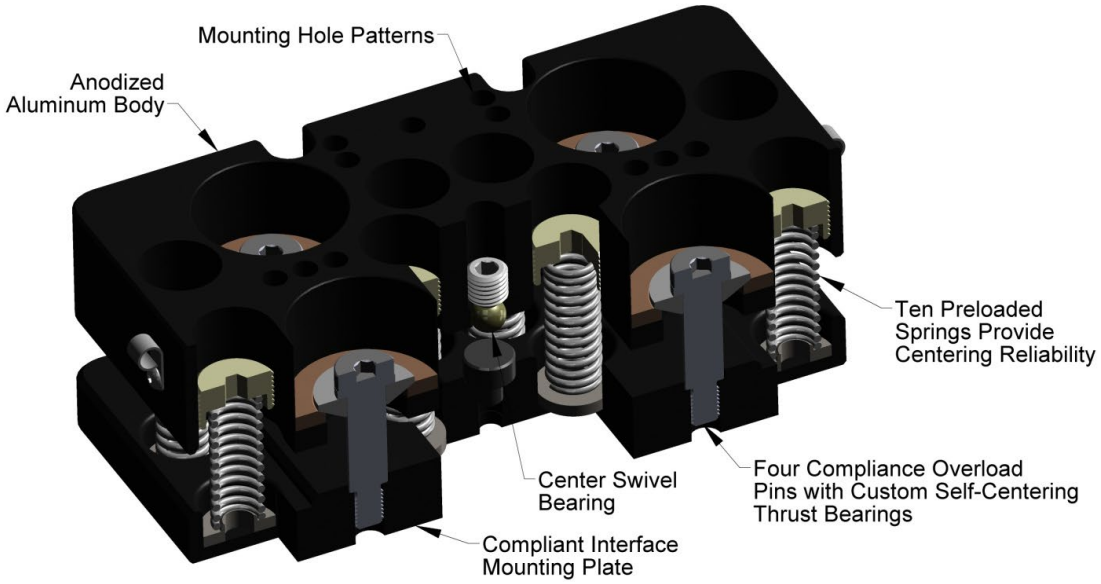
Figure 1.3—GLxL Utility Coupler Tool (9123-GL6T Shown)



1.3 GLxL Compliance Assembly

The Compliance Assembly has a unique feature in that it allows for ± 7.5mm compliance in the X and Y direction in the coupling plane. Also it allows for 5 degrees angular compliance. There are ten preloaded springs internal to the housing that forces the main body to self-center on custom chamfered thrust bearings. This system allows for a relatively large misalignment of the Master and Tool prior to coupling. Four hardened-steel overload pins provide for the compliance limits.

Figure 1.4—GLxL Compliance Assembly (9123-GL6-CIP-8080 Shown)



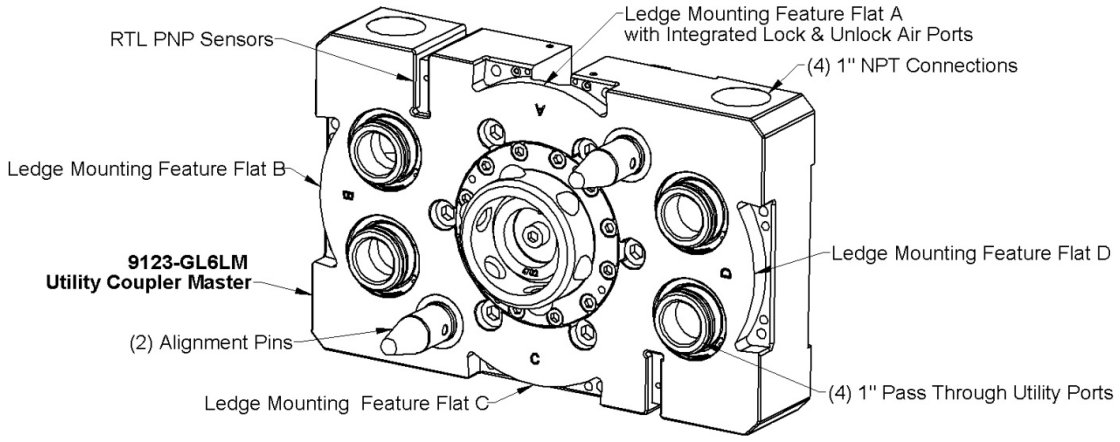
1.4 9123-GL6LM Utility Coupler

The Master and Tool bodies are equipped with four ledge mount flats that enable the coupler to accept up to four additional utility modules. Contact ATI for further details.

1.4.1 9123-GL6LM Utility Coupler Master

The GL6M model provides four 1″ NPT integrated pass through ports and four ledge mounting flats. Flat A has integrated Lock and Unlock air ports and requires an Air Adapter module for the locking mechanism. Refer to *Table 1.1* for specific model numbers and compatible Tool models. The Utility Coupler is equipped with hardened stainless-steel alignment pins and integrated RTL, lock, and Unlock PNP sensors to detect Tool presence and locking mechanism position.

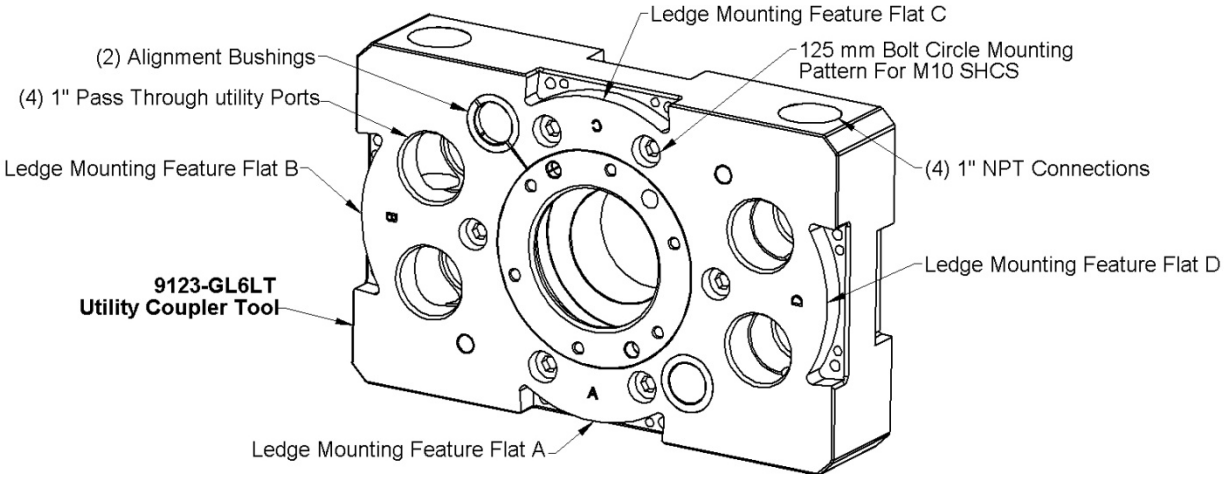
Figure 1.5—9123-GL6LM Utility Coupler Master



1.4.2 9123-GL6LT Utility Coupler Tool

The GL6T model provides four 1″ NPT integrated pass through utility ports and four ledge mounting flats. Mounting a utility module to Flat A will require a spacer to offset for the air adapter on the Master module. Refer to *Table 1.1* for specific model numbers and compatible Master models.

Figure 1.6—9123-GL6T Utility Coupler Tool



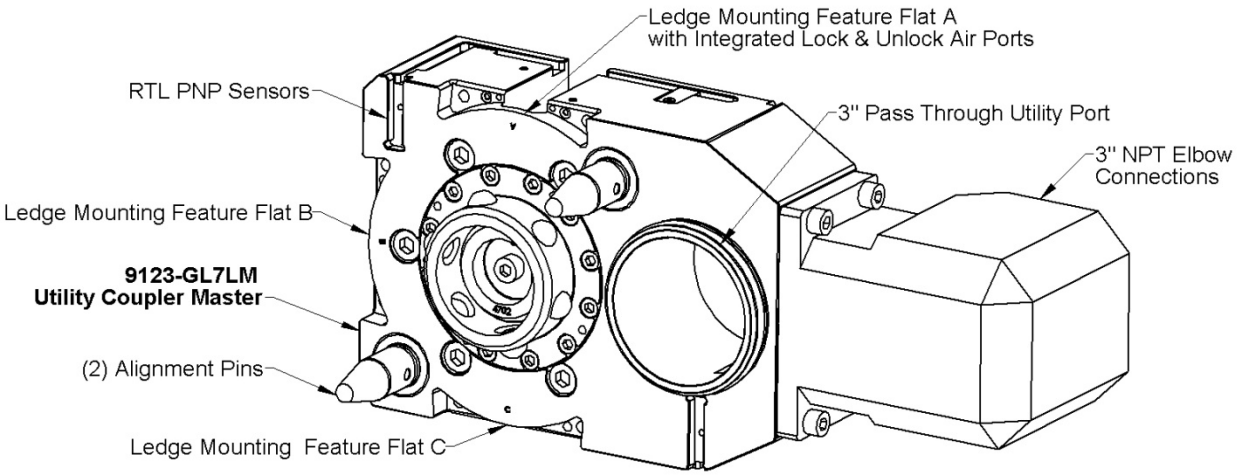
1.5 9123-GL7LM Utility Coupler

The Master and Tool bodies are equipped with four ledge mount flats that enable the coupler to accept up to four additional utility modules. Contact ATI for further details.

1.5.1 9123-GL7LM Utility Coupler Master

The GL7LM model provides a 3″ NPT integrated pass through ports with a 90° elbow fitting block and three ledge mounting flats. Flat A has integrated Lock and Unlock air ports and requires a Air Adapter module to actuate the locking mechanism. Refer to *Table 1.1* for specific model numbers and compatible Tool models. The Utility Coupler is equipped with hardened stainless-steel alignment pins and integrated RTL, lock, and Unlock PNP sensors to detect Tool presence and locking mechanism position.

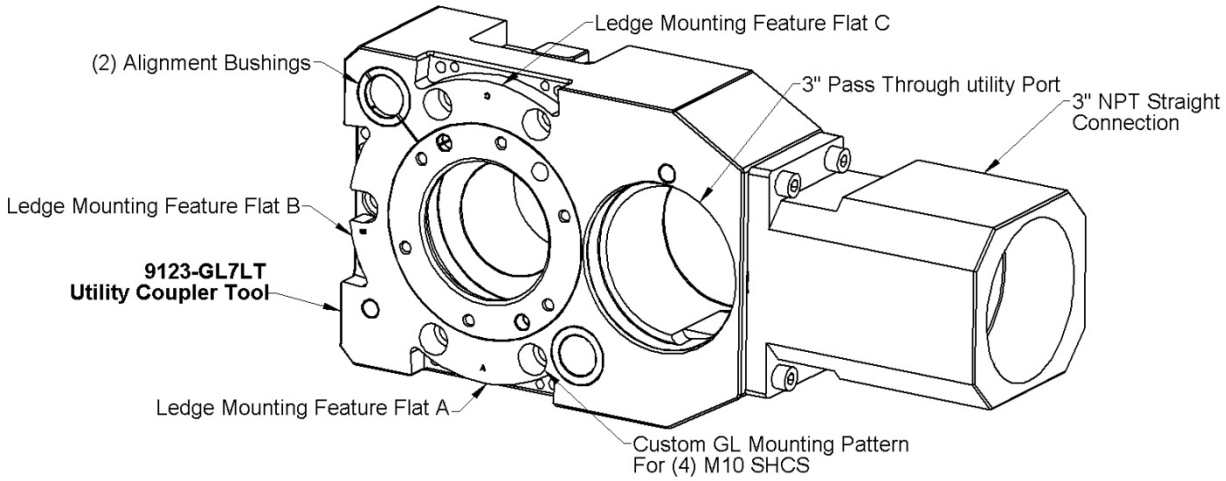
Figure 1.7 —9123-GL7LM Utility Coupler Master



1.5.2 9123-GL7LT Utility Coupler Tool

The GL7LT model provides a 3″ NPT integrated pass through utility ports with a straight fitting block and four ledge mounting flats. Mounting a utility module to Flat A will require a spacer to offset for the air adapter on the Master module. Refer to *Table 1.1* for specific model numbers and compatible Master models.

Figure 1.8—9123-GL7T Utility Coupler Tool



2. Installation

The GLxL Utility Coupler and add-on modules are typically installed by ATI prior to shipment. The steps below outline the field installation or removal of the Master and Drive Cylinder.

WARNING: Do not perform maintenance or repair on Utility Coupler or modules unless all energized circuits (e.g. electrical, air, water, etc.) have been turned off. Injury or equipment damage can occur with energized circuits on. Turn off all energized circuits and discharge electrical power from upstream and downstream modules before performing maintenance or repair on the Utility Coupler or modules.

NOTICE: ATI does not guarantee the proper functionality of utility couplers that are installed under the following conditions:

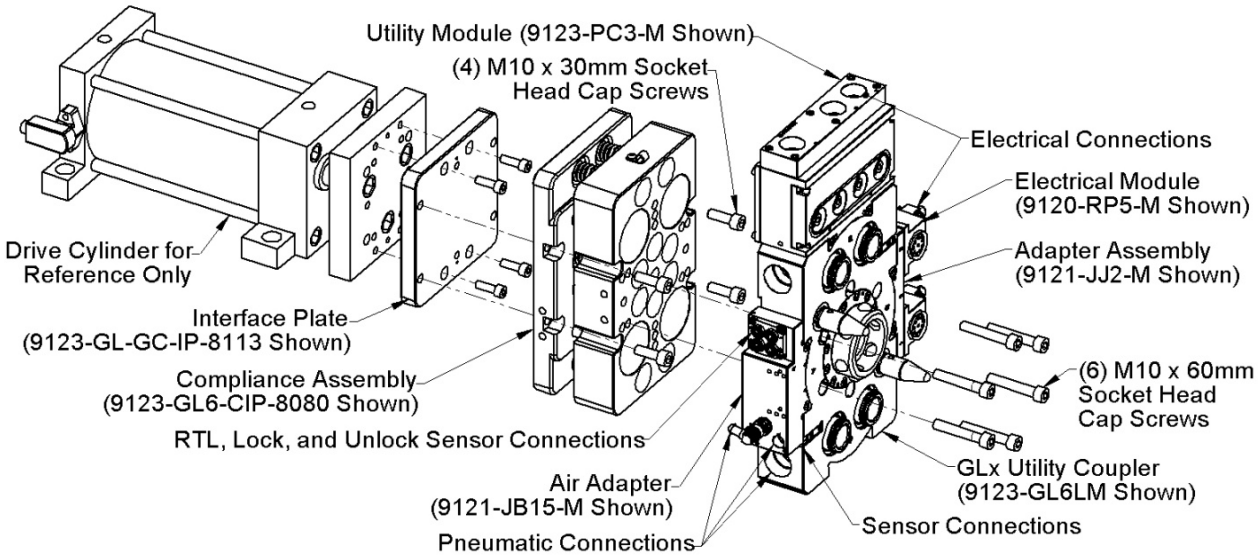
- Utility couplers that are mounted in alignment with the drive cylinder axis of travel.
- Utility couplers that are mated by retracting the drive cylinder versus extending the drive cylinder.

2.1 Utility Coupler Master

The Utility Coupler Master assembly is normally attached to the Guided Drive Cylinder. The Master housing is designed with a circular mounting pattern to accommodate six M10 socket head cap screws.

1. Attach the Interface plate to the Drive Cylinder using the M8 socket head cap screws. Tighten to 200 in-lbs.
2. Attach the Compliance Assembly to the Interface plate using the M10 x 30mm socket head cap screws. Tighten to 38 ft-lbs.
3. Attach the Utility Coupler Master Assembly to the Compliance Assembly. Align the Master Assembly using the dowels in the Utility Coupler.
4. Secure the Master Assembly using the Six M10 x 60mm socket head cap screws provided. Tighten to 38 ft-lbs. **Note:** If fasteners do not have pre-applied thread locker, apply Loctite 242®.
5. If add-on modules have not been installed, refer to the module manual for installation instructions.
6. Attach the pneumatic hoses to the Master body and Drive Cylinder as required.
7. Power, signal, and sensor cables can be connected to the module and Drive Cylinder after attaching the module to the Utility Coupler. Ensure that the connectors are cleaned prior to being secured as appropriate. Refer to *Section* 9*—Guided Cylinder Proximity Sensor Information.*

Figure 2.1—Utility Coupler Master Installation



2.2 Utility Coupler Master Removal

1. Depending upon the service or repair being done, the customer connections may or may not need to be disconnected. Remove customer connection as required.
2. Remove the six M10 x 60mm Socket head cap screws securing the Utility Coupler Master to the Compliance Assembly.

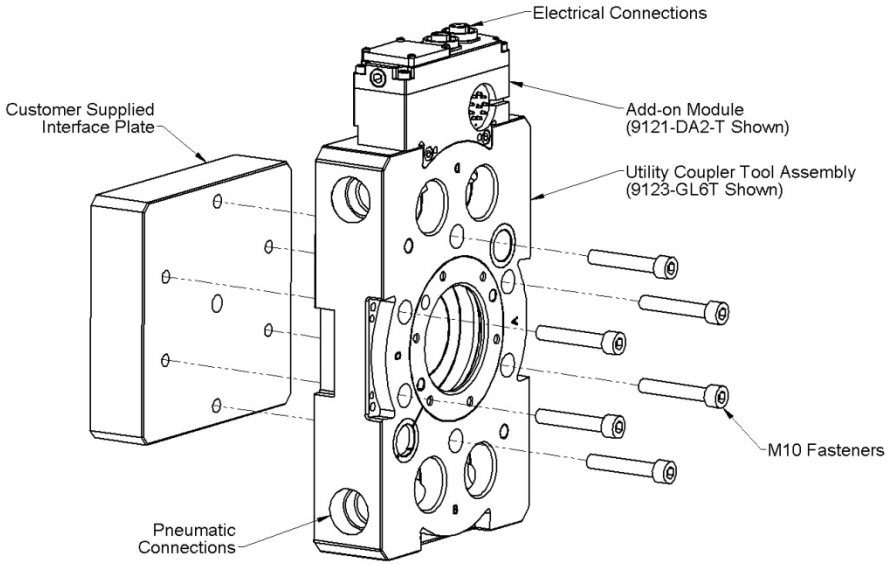
> **CAUTION:** It is recommended not to use fasteners with pre-applied adhesive more than three times. Fasteners used more than three times may come loose and cause equipment damage. Discard fasteners used more than three times and install new fasteners with pre-applied adhesive.

2.3 Utility Coupler Tool Assembly Installation

The GLxL Utility Coupler add-on modules are typically installed by ATI prior to shipment. The Tool block is attached to a customer-supplied fixture. The Tool block is designed with a 100mm mounting pattern for M10 socket head cap screws and 2 dowel holes. These features are used to accurately position and secure the Utility Coupler Tooling.

1. Attach the Utility Coupler Tool Assembly to the customer supplied interface plate using the M10 fasteners supplied. Tighten fasteners to 400 in-lbs.
2. If add-on modules have not been installed, refer to the module manual for installation instructions.
3. Attach the hoses to the Tool body as required.
4. Power and signal cables can be connected to the modules after attaching the module to the Utility Coupler Tool. Ensure that the connectors are cleaned prior to being secured as appropriate.

Figure 2.2—Utility Coupler Tool Installation



2.4 Utility Coupler Tool Assembly Removal

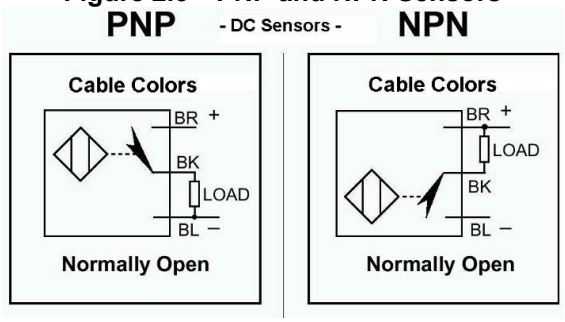
1. Depending upon the service or repair being done, the customer connections may or may not need to be disconnected. Remove customer connection as required.
2. Remove the four M10 Socket head cap screws securing the Tool Assembly to the customer supplied fixture.

> **CAUTION:** It is recommended, not to use fasteners with pre-applied adhesive more than three times. Fasteners used more than three times may come loose and cause equipment damage. Discard fasteners used more than three times and install new fasteners with pre-applied adhesive.

2.5 Wiring and Electrical Connections

The Utility Coupler Master utilizes proximity sensors to detect the position of the piston inside the Master body. The type of sensor is specified by the customer at the time of order. Sensors should be selected to work with the controls used on the customer's equipment. Available sensors include DC PNP sourcing and NPN sinking. The DC sensors operate at a nominal 24 volts (check the labels attached to the installed sensors prior to connecting to any control circuit). Regardless of sensor type specified, ALL sensors must be installed in series with a resistive load to limit current flow. The figures below show the connections for the DC sensors.

Figure 2.3—PNP and NPN Sensors



2.6 Pneumatic Connections and Pneumatic Valves

2.6.1 Air Requirements

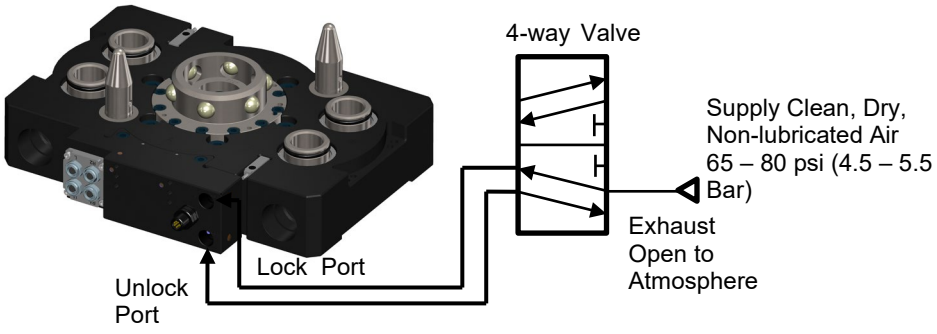
The air supply used for coupling and uncoupling the device should be clean, dry, and non-lubricated. A supply pressure in the range of 60–100 psi is acceptable for operation of the guided cylinder and the Utility Coupler locking mechanism, with a setting of 80 psi suggested. The air should be filtered 50 micron or better.

2.6.2 Valve Requirements and Connections

As with all pneumatic piston arrangements, smooth operation requires proper porting of the supplied and vented air. It is recommended that a single 4-way valve be used to actuate the locking mechanism in the Master Plate. The valve may be of either 4-port or 5-port configuration. It is imperative that when air is supplied to the Lock or Unlock Port on the Master Plate, that the opposite port be vented to atmosphere (i.e., when air is supplied to the Lock Port, the Unlock Port must be open to the atmosphere.) Failure to vent trapped air or vacuum on the inactive port will negate the locking force of the locking mechanism.

> **CAUTION:** The locking mechanism **will not function properly** when connected to a **single** 3-way valve as this type of valve is incapable of venting trapped air pressure from within the Tool Changer. Connect the Lock and Unlock supply air to a single 4-way valve with either 4 or 5 port configuration. This could result in damage to the product, attached tooling, or personnel.

Figure 2.4—Lock and Unlock Pneumatic Connections



The Utility coupler requires an air adapter module mounted to Flat A, to provide the pneumatic air supply to the Utility couplers internal locking mechanism. The air adapter also provides pneumatic air ports and electrical connections for the RTL, Lock, and Unlock sensors.

2.7 Guided Cylinder Sensor Adjustment Procedure

The sensors for the guided cylinder assembly are supplied pre-adjusted to detect the fully retracted and fully extended states (see *Figure 2.5*). The sensor is adjusted to be 0.2″ to 0.25″ away from the top of the fastener. For wiring information refer to *Section* 9*—Guided Cylinder Proximity Sensor Information.* To adjust the sensors height or position:

2.7.1 Adjust the Sensor Height

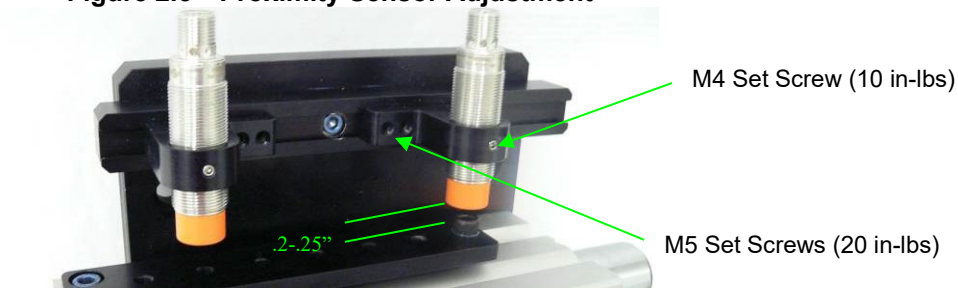
1. Loosen the small M4 set screws that clamp against the prox barrels.
2. Rotate the sensors as needed to move it up or down. The standard distance from the sensor face to the target is about 0.2 to 0.25″.
3. Re-tighten the M4 set screw to 10 in-lbs, using Loctite 222®.

2.7.2 Adjust the Sensor Position

The sensors are captured in a sensor holder that can slide inside a dovetail groove, if needed. To adjust the horizontal position:

1. Loosen the 2 M5 set screws.
2. Reposition to the desired position by sliding the holder in the dovetail groove.
3. Re-tighten to approximately 20 in-lbs, using Loctite 222®.

Figure 2.5—Proximity Sensor Adjustment



3. Operation

The Master coupling plate is pneumatically-driven to couple and uncouple with the Tool-side plate. The Master plate is driven by a Guided Cylinder assembly.

WARNING: During operation, the area between the Master and Tool must be kept clear. Failure to keep area clear will result in damage to Utility Coupler, Add-on modules, or end-of-arm tooling and could cause injury to personnel.

WARNING: During operation, the area between the Driver Cylinder mounting plate and body must be kept clear. Failure to keep area clear will result in damage to Drive cylinder or could cause injury to personnel.

3.1 Coupling Sequence

CAUTION: The Guided Cylinder must be in the retracted position when attempting to couple the device. Failure to adhere to this condition may result in damage to the unit and/or the machine.

CAUTION: Never couple or uncouple the unit without first disconnecting and discharging the power that passes through the contacts. This is especially true if high voltage circuits are involved. Arcing and contact damage will occur if this is not observed. Always disconnect and discharge electrical power from both upstream and downstream modules.

Position the Tool to within the extendable reach of the Master and move the Master into coupling position. The mating surfaces of the Master and Tool should be parallel and not touching. Make sure that the tapered alignment pins from the Master side enter the alignment bushings on the Tool side. The alignment pins should be relatively concentric with the alignment holes such that they do not rub against the edge.

For some applications, Cylinder Stroke Proximity sensing is included, providing the ability to sense Cylinder Retracted and Extended States. The target for the Cylinder and Prox sensors face on the Master housing must be positioned within approximately 5mm of each other for the sensor to detect target. A signal is not required to couple the Master and Tool, but is recommended as further confirmation of coupling.

3.1.1 Coupling Sequence for Utility Couplers

CAUTION: The Utility Coupler Master locking mechanism must be fully retracted prior to the Master entering the Tool. Failure to do so will cause ball bearings to damage the Tool Bearing Race. Supply air to the Air Adapters unlock air port until the unlock sensor indicates master locking mechanism is fully retracted and is safe to couple the Master and Tool together.

Verify the Master locking mechanism is fully retracted using the unlock sensor before attempting to couple the Master and Tool together. The Utility Couplers with a locking mechanism must be forced together by the drive cylinder. Air pressure must be supplied to the lock side of the drive cylinder and maintained to keep the Master and Tool plate coupled and the utilities connected until the locking mechanism has been actuated. The RTL sensors indicate when the Master and Tool are within the maximum offsets prior to actuating the locking mechanism. To actuate the locking mechanism supply air must be provided to the Air Adapters lock port. After the Lock sensor indicates the master locking mechanism is in the locked position air pressure can be relieved from the drive cylinder.

3.2 Uncoupling

The Utility Coupler should be positioned in the **same location** as that when coupling took place.

3.2.1 Uncoupling the Utility Coupler

After the Utility coupler is in the proper location, Air must be supplied to the unlock air port on the Air Adapter. The locking mechanism must be fully retracted prior to uncoupling. The Unlock sensor will indicate when the locking mechanism is fully retracted.

4. Maintenance

The GLxL Compliant Utility Coupler is designed to provide a long life with little maintenance required. A visual inspection and maintenance schedule is provided in *Section 4.1—Preventative Maintenance*. Assembly details are provided in *Section* 8*—Drawings* of this manual.



WARNING: Do not perform maintenance or repair on the Utility Coupler or modules unless the all energized circuits (e.g. electrical, air, water, etc.) have been turned off. Injury or equipment damage can occur with energized circuits on. Turn off all energized circuits before performing maintenance or repair on Tool Changer or modules.

4.1 Preventative Maintenance

The preventative maintenance schedule is based on a general use application with a tool change frequency of less than one per minute. More frequent tool changes or dirty environments will require an increased frequency of the inspection schedule.

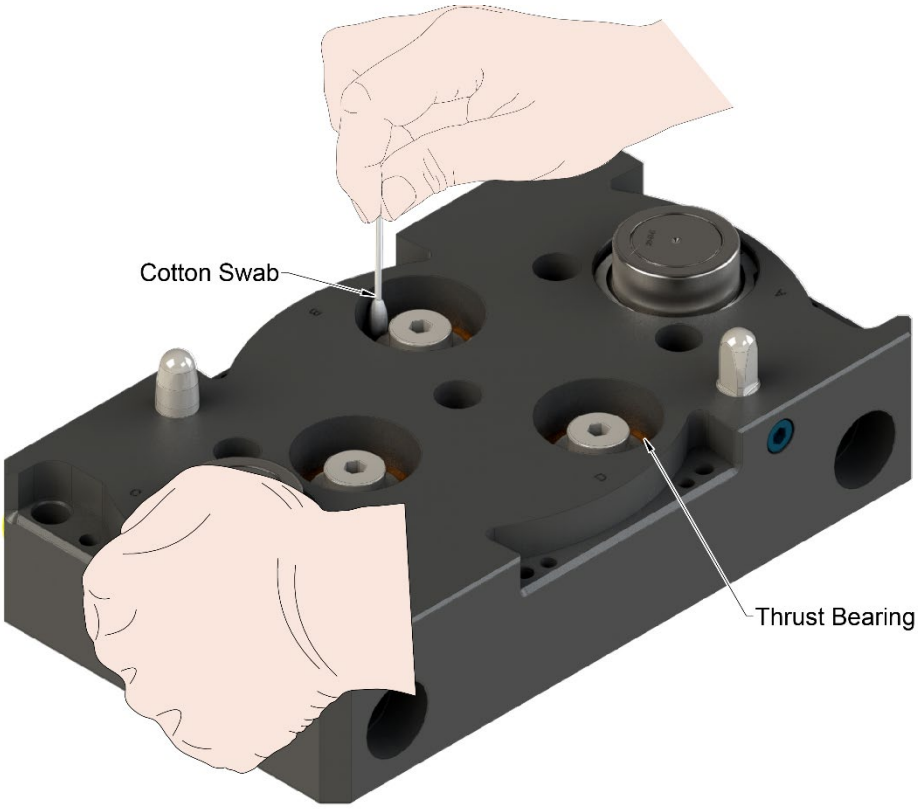
- **NOTICE:** All Utility Couplers with locking mechanism are initially lubricated using *MobilGrease® XHP222 Special* grease. The end user must apply additional lubricant to the locking mechanism components and alignment pins prior to start of service (See Section 4.2). Tubes of lubricant for this purpose are shipped with every tool changer. Note: *MobilGrease® XHP222 Special* is a NLGI #2 lithium complex grease with molybdenum disulfide.

Table 4.1—Preventative Maintenance	
Inspection Schedule	**Checklist**
Weekly	**Thrust Bearings, Compression Springs, Alignment Pins and Bushings, refer to *Section 4.3—Inspect Compression Springs for Utility Couplers.*** □ Clean, Inspect for wear and lubricate Bronze Thrust Bearing in Master body. □ Inspect /Test compliance springs in Master body. □ Inspect alignment pins for wear or damage and proper lubrication in Master body. □ Inspect alignment bushing in Tool body.
	Pin Blocks, Electrical Contacts, and V-ring seals, refer to *Section 4.4—Pin Block Inspection and cleaning.* □ Clean, and inspect pin block and electrical contacts for wear or damage in Master and Tool bodies. □ Inspect V-ring seals on the Master add-on modules, if worn or damaged replace, refer to *Section 4.8.1—V-ring Seal Replacement.*
Monthly	**Locking Mechanism** □ Inspect and Lubricate Locking Mechanism (Balls, Bearing Race, Alignment pin, and Bushings) Over time, lubricants can become contaminated with process debris. Therefore, it is recommended to thoroughly clean the existing grease and replace with new as needed. Refer to *Section 4.5—Cleaning and Lubrication.* **Note:** Locking mechanism components are subject to corrosion from water. If these components get wet, they must be dried and greased immediately.
	Mounting Fasteners and Interface Connections in the Master and Tool Modules □ Inspect mounting fasteners to verify they are tight and if loose, then tighten to the proper torque. □ Cable connections should be inspected during maintenance periods to ensure they are secure. Loose connections should be cleaned and re-tightened as appropriate. □ Inspect cable sheathing for damage, repair or replace damaged cabling. Loose connections or damaged cabling are not expected and may indicate improper routing and/or strain relieving.
	Clean Compliance Springs in the Master □ Clean compliance spring area, refer to *Section 4.6—Clear Dust and Debris from Compliance Springs Area.*
6 Months	**Check Ports and Pass Through ports,** □ Clean, Inspect and Lubricate O-ring seals on pass-through ports on GL6 and GL7 Master Units. Replace if worn or damaged. Refer to *Section 4.7—Clean, Inspect, Lubricate, Replace Component for Master-side Pass-through Air Port*.

4.2 Clean, Inspect, and Lubricate Thrust Bearings for Utility Couplers

1. Uncouple the Utility Coupler to allow clear access to the Master and Tool plates.
2. Turn off and de-energize all energized circuits (for example: electrical, pneumatic, hydraulic).
3. For the GL6, remove the Utility Coupler from the compliance mechanism to access the thrust bearings. For other models, press on Utility Coupler Master to compress the springs and expose the bronze thrust bearing. Note: This also tests the compliance springs, if springs do not return the Master to the neutral position replace springs. Refer to *Section 4.8.4—Compliance Spring Replacement*.

Figure 4.1—Press on Utility Coupler Master



4. With the thrust bearing exposed from pressing on the Master plate, remove all the grease from the (3) thrust bearings with a cotton swab or clean rag.
5. Inspect the thrust bearings. If thrust bearing is not worn, apply MobilGrease XHP222 Special grease to thrust bearings chamfered edge. If thrust bearing or other components are worn, replace worn components.
6. Inspect the (2) alignment pins in the Master body for wear or damage. If pins are not worn, apply MobilGrease XHP222 Special grease to alignment pins. If pins are worn or damaged, replace. Refer to *Section 4.8.5—Alignment Pin Replacement*.
7. Safely resume normal operation.

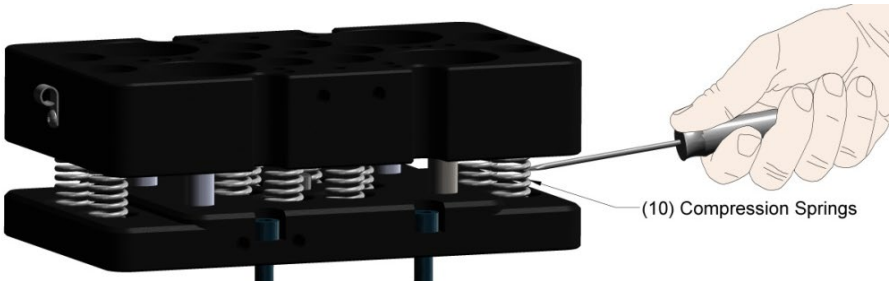
4.3 Inspect Compression Springs for Utility Couplers

1. Uncouple the Utility Coupler and space to allow clear access to the Master and Tool.
2. Turn off all energized circuits (e.g. electrical, air, water, etc.).
3. Visually inspect compression springs to make sure they are not broken or damaged. Using a screw driver, push on compression springs and make sure spring is stiff and not loose, see *Figure 4.2*. If springs are loose, damaged or broken, refer to *Section 4.8.4—Compliance Spring Replacement.*
4. Inspect the two alignment pins in the Master body for wear or damage. If Pin are not worn apply MobilGrease® XHP222 Special grease to alignment pins, if pins are worn or damaged replace, refer to *Section 4.8.5—Alignment Pin Replacement.*

> - **NOTICE:** Excessive alignment pin/bushing wear may be an indication of poor tool-side position during coupling / uncoupling. Adjust position as needed.

5. Inspect the two alignment bushings in the Tool body for wear or damage.
6. Turn on all energized circuits (e.g. electrical, air, water, etc.) and coupler Utility Coupler.

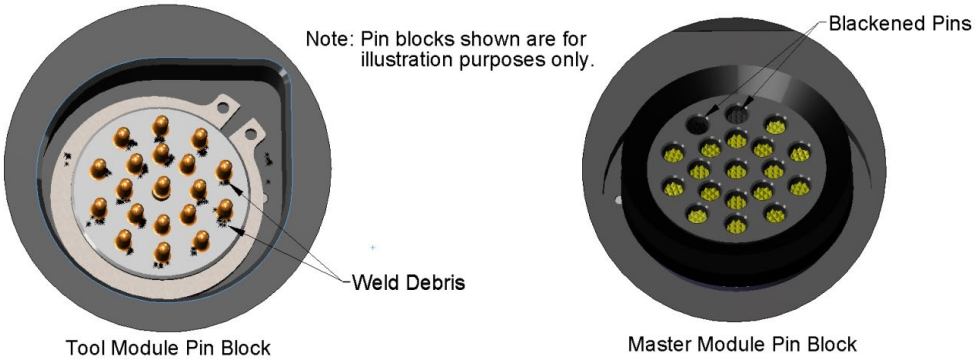
Figure 4.2—Inspect Compression Springs



4.4 Pin Block Inspection and cleaning

1. Uncouple the Utility Coupler and space to allow clear access to the Master and Tool.
2. Turn off all energized circuits (e.g. electrical, air, water, etc.)
3. Inspect the Master and Tool pin blocks for any debris or darkened pins.

Figure 4.3—Inspect Master and Tool Pin Blocks

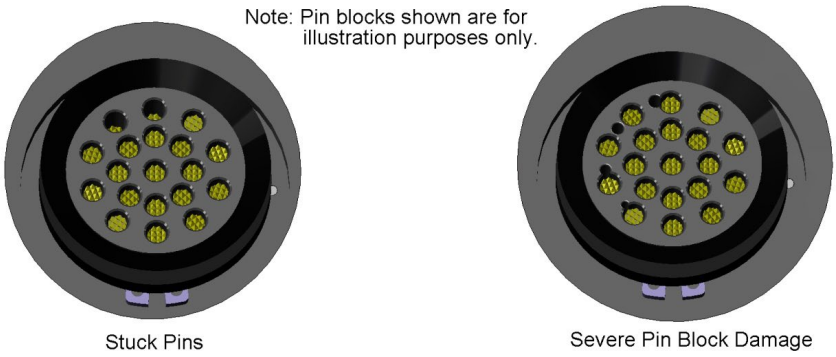


4. If debris or darkened pins exist, remove debris using a vacuum, and clean using a nylon brush (ATI part number 3690-0000064-60).

> - **NOTICE:** Do not use an abrasive media, cleaners, or solvents to clean the contact pins. Using abrasive media, cleaners, or solvents will cause erosion to the contact surface. Clean contact surfaces with a vacuum or non-abrasive media such as a nylon brush (ATI part number 3690-

5. Inspect the Master and Tool pin blocks for stuck pins or severe pin block damage.

Figure 4.4—Stuck Pin and Pin Block Damage

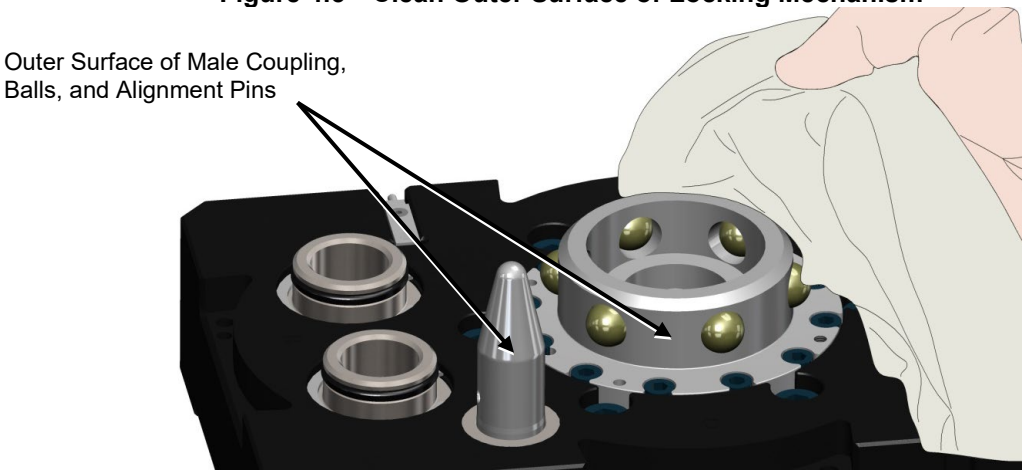


6. If stuck pins or severe pin block damage exists, contact ATI for possible pin replacement procedures or module replacement.
7. Turn on all energized circuits (e.g. electrical, air, water, etc.) and coupler Utility Coupler.

4.5 Cleaning and Lubrication

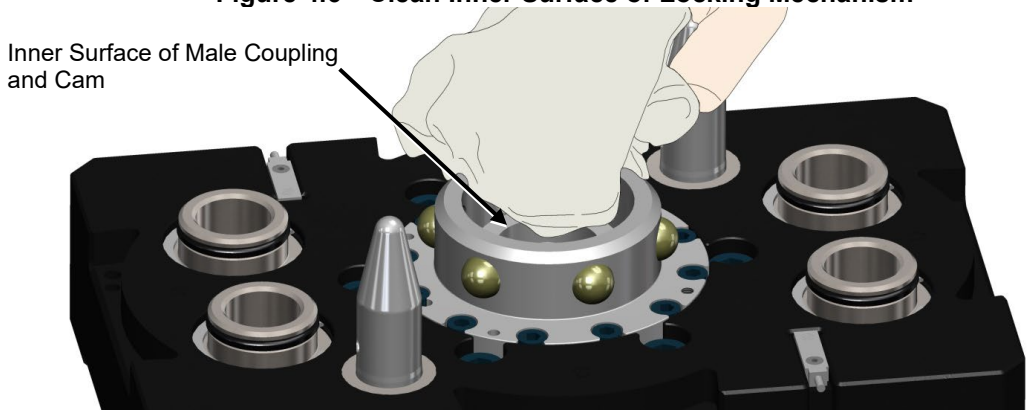
1. The locking mechanism must be in the Unlock state before cleaning.
2. Use a clean rag to thoroughly remove the existing lubricant and debris from the balls, the outer surface of the male coupling, and the alignment pins.

Figure 4.5—Clean Outer Surface of Locking Mechanism



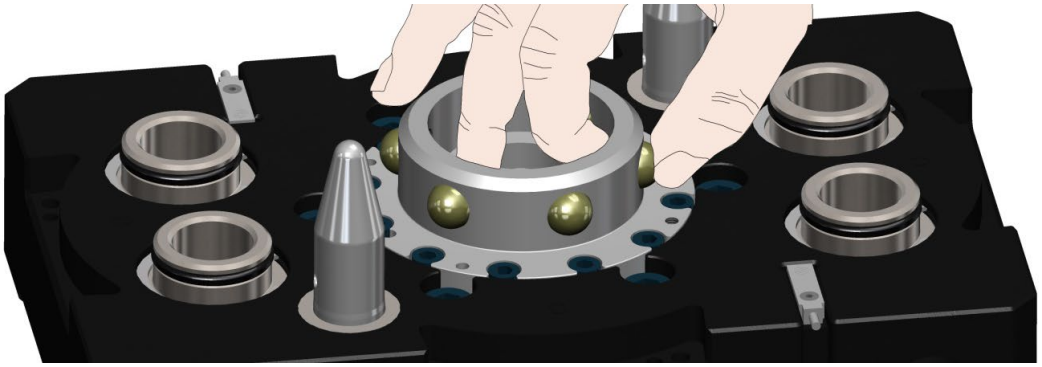
3. Use a clean rag to thoroughly remove the existing lubricant and debris from the inner surface of the male coupling and the cam.

Figure 4.6—Clean Inner Surface of Locking Mechanism



4. Check each ball to make sure it moves freely in the male coupling. Additional cleaning may be necessary to free up any balls that are sticking in place.

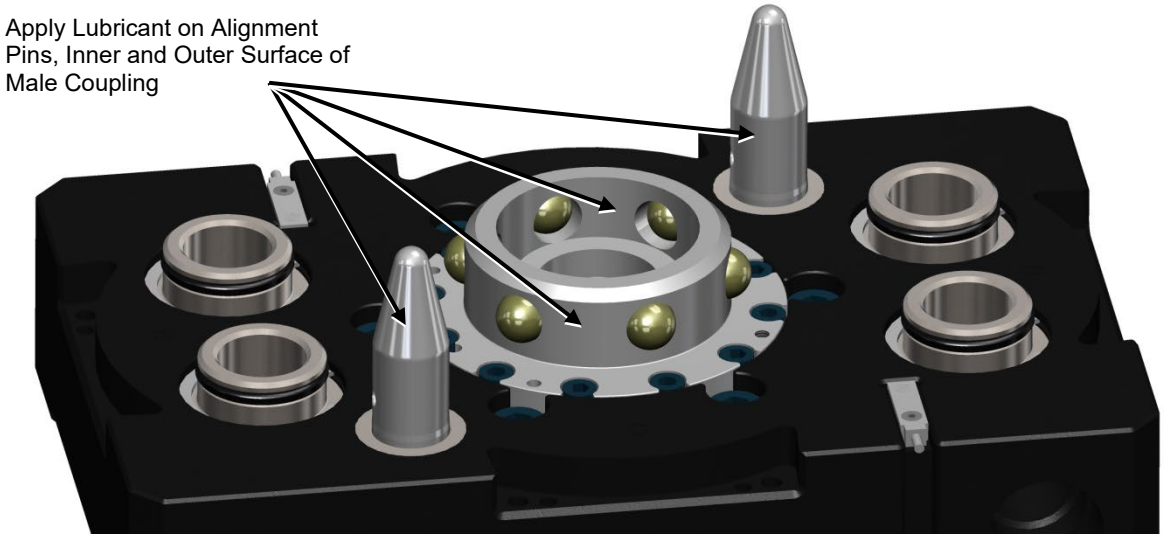
Figure 4.7—Check ball movement



5. Apply a liberal coating of lubricant to the balls, the male coupling (inside and out), and the alignment pins.

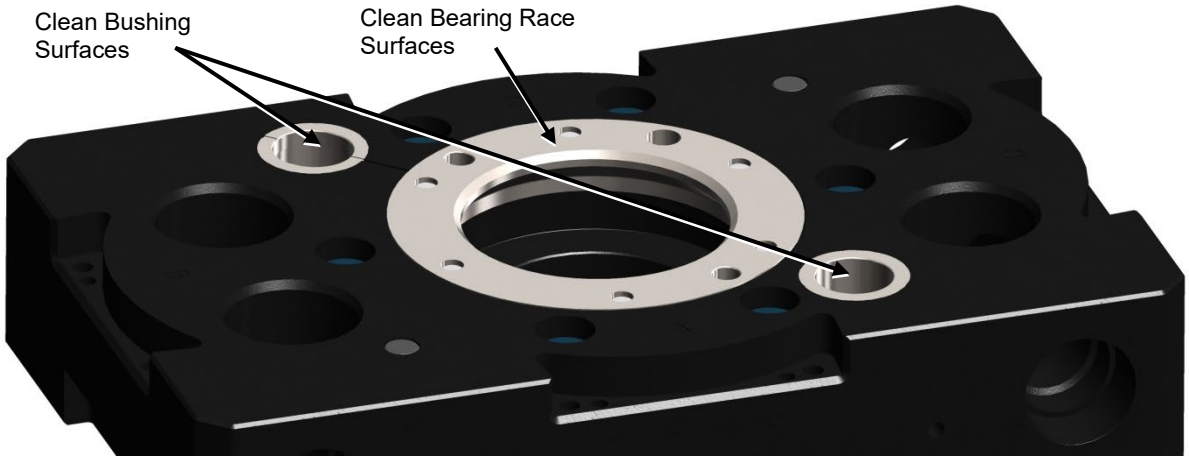
- **NOTICE:** Use *MobilGrease® XHP222 Special* grease to lubricate the locking mechanism. Tubes of lubricant for this purpose are shipped with every Tool Changer. **Note:** *MobilGrease® XHP222 Special* is a NLGI #2 lithium complex grease with molybdenum disulfide.

Figure 4.8—Apply Lubricant to Locking Mechanism (QC-210 shown)



6. Use a clean rag to thoroughly remove the any lubricant and debris from the bearing race and the bushings from the Tool Plate.

Figure 4.9—Clean Tool Plate Surfaces of Locking Mechanism (QC-210 shown)

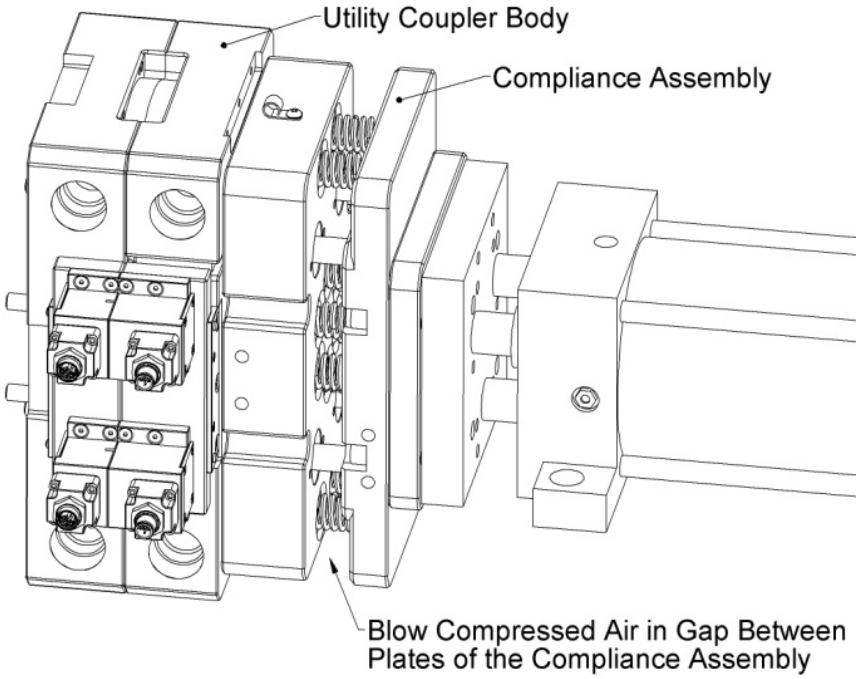


7. No application of lubrication is necessary on the Tool Plate components.

4.6 Clear Dust and Debris from Compliance Springs Area

1. Clear dust and debris out of spring compliance area by blowing with compressed air in the gap between the interface plate and the Utility Coupler body or the Compliance Assembly, as shown in *Figure 4.10*.
2. Wipe off unit with a towel.

Figure 4.10—Clear Dust and Debris from Compliance Springs



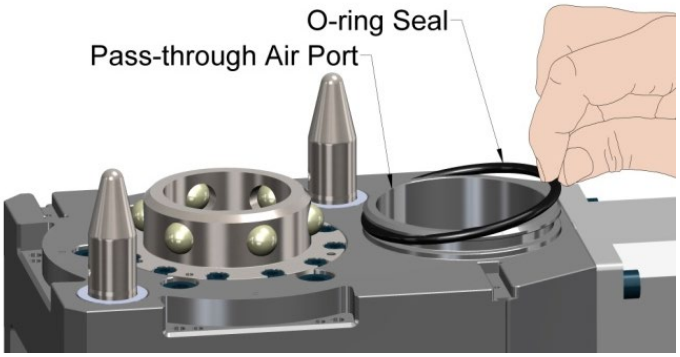
4.7 Clean, Inspect, Lubricate, Replace Component for Master-side Pass-through Air Port

Refer to *Section* 6*—Recommended Spare Parts* for seal kit part numbers for the specific Utility Coupler model being serviced.

Periodically, the condition of the pass through air ports O-ring seals should be checked. Replace any damaged or degraded O-ring seals as necessary. Any contamination in or around the mating surfaces of the modules should be removed using a stiff nylon brush.

1. Uncouple the Utility Coupler and make space to allow clear access to the Master and Tool.
2. Turn off all energized circuits (e.g. electrical, air, water, etc.)
3. Clean the Pass-through air port(s) with a clean dry lint free rag.
4. Inspect the O-ring seal(s), if damaged or worn replace with new O-ring seal(s). To replace use a finger nail or small flat screw driver to pry O-ring off air port. Replace with new O-ring, stretch over air port and make sure O-ring is seated in groove.
5. Lubricate the O-ring seal.
6. Turn on all energized circuits (e.g. electrical, air, water, etc.) and coupler Utility Coupler.

Figure 4.11—Master-side Pass-through Air Port (GL7 Shown)

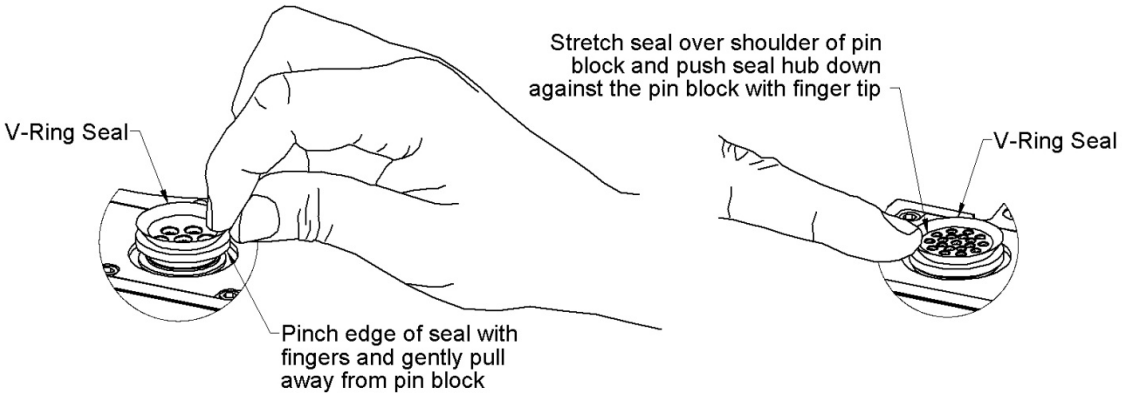


4.8 Replacement Procedures

4.8.1 V-ring Seal Replacement for Optional Electrical Modules

1. To remove the existing seal, pinch edge of seal with fingers and gently pull the seal away from the pin block on the Master.
2. Pull the seal off the pin block.
3. To install a new seal, stretch the new seal over the shoulder of the pin block.
4. Push the seal's hub down against the pin block using finger tip.

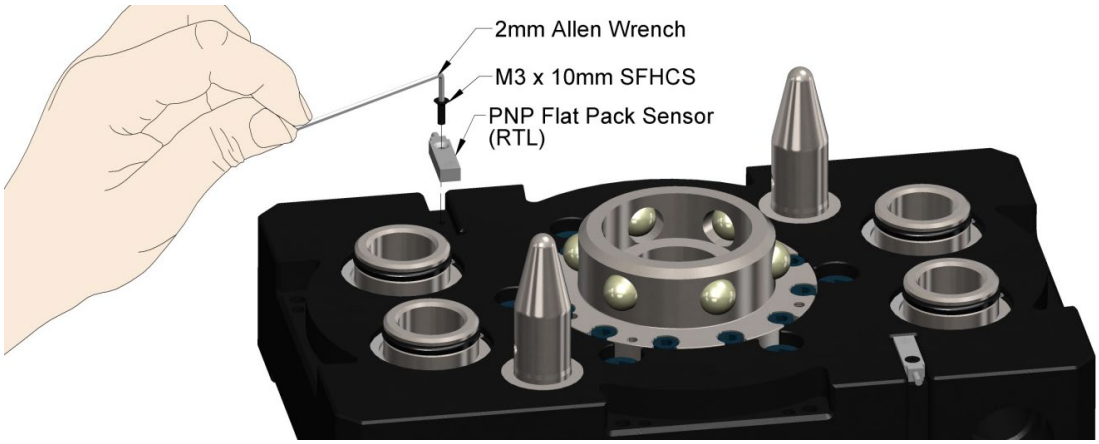
Figure 4.12—V-Ring seal Replacement



4.8.2 RTL Sensor Replacement

1. Uncouple the Utility Coupler and space to allow clear access to the Master and Tool.
2. Turn off all energized circuits (e.g. electrical, air, water, etc.).
3. Disconnect cable from RTL sensor.
4. Remove the M3 socket flat head screw securing the RTL sensor to the housing using a 2 mm Allen wrench.
5. Remove the RTL sensor from the housing and discard.
6. Apply Loctite 222® to the threads of the M3 socket flat head screw.
7. Insert new RTL sensor into housing and secure with M3 socket flat head screw. Tighten to 60 in-oz.
8. Turn on all energized circuits (e.g. electrical, air, water, etc.) and coupler Utility Coupler.

Figure 4.13—RTL Sensor Replacement (GL6LM Shown)

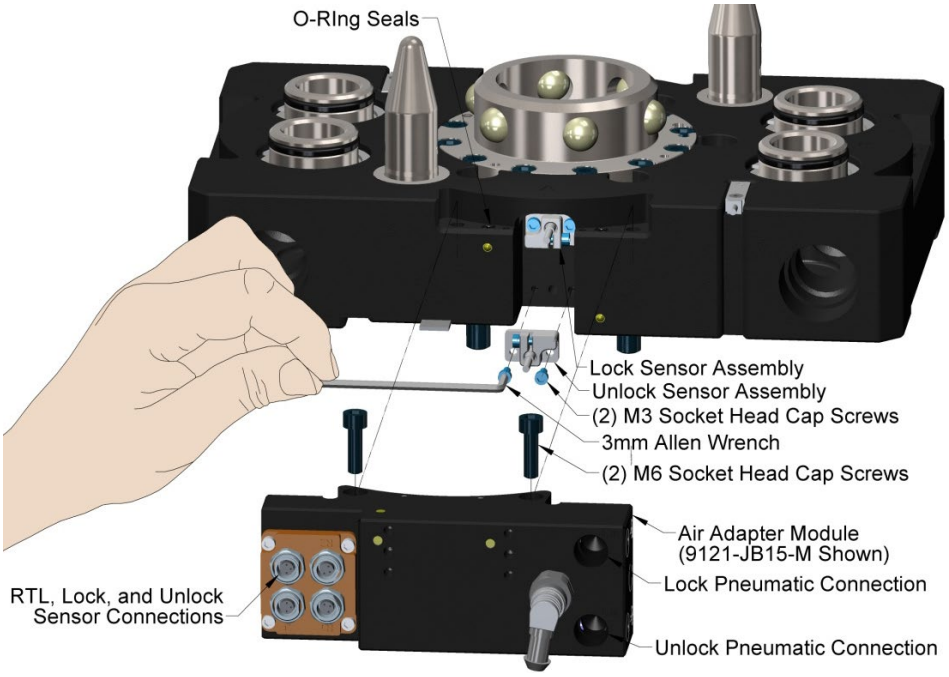


4.8.3 Lock and Unlock Sensor Replacement

1. Uncouple the Utility Coupler and space to allow clear access to the Master and Tool.
2. Turn off all energized circuits (e.g. electrical, air, water, etc.).
3. Disconnect the sensor cables or pneumatic connections from the Air adapter module and any attached modules if necessary. Mark cable and pneumatic connection for re assembly.

4. Remove the two M6 socket head cap screws securing the Air Adapter module to flat A on the Utility Coupler. Remove the Air Adapter module and any attached module from the Utility coupler.
5. Unscrew the cable from Lock or Unlock sensor.
6. Remove the M3 socket head cap screws securing the sensor assembly to the housing using a 3 mm Allen wrench.
7. Remove the sensor assembly from the housing and discard.
8. Apply Loctite 222® to the threads of the M3 socket head screws.
9. Insert new sensor assembly into housing and secure with M3 socket head screws. Tighten to 12 in-lbs. **Note:** Remove labels from sensor assembly before installing. Make sure O-ring Seal is in place on the back side of the sensor assembly before installing.
10. Attach sensor cable to the Lock or Unlock sensor assembly.
11. Using the ledge feature as a guide, place the Air Adapter module on Flat A of the Utility Coupler. Align the module with the Valve Adapter using the dowels in the bottom of the ledge feature
12. If fasteners do not have pre-applied adhesive, apply Loctite 242® to the supplied M6 SHCS fasteners. Install the two (2) M6 socket head screws securing the module to the Valve Adapter and tighten to 40–70 in-lbs.
13. Connect the sensor cables and pneumatic connection if removed.
14. Turn on all energized circuits (e.g. electrical, air, water, etc.) and coupler Utility Coupler.

Figure 4.14—Lock and Unlock Sensor Replacement (GL6LM Shown)

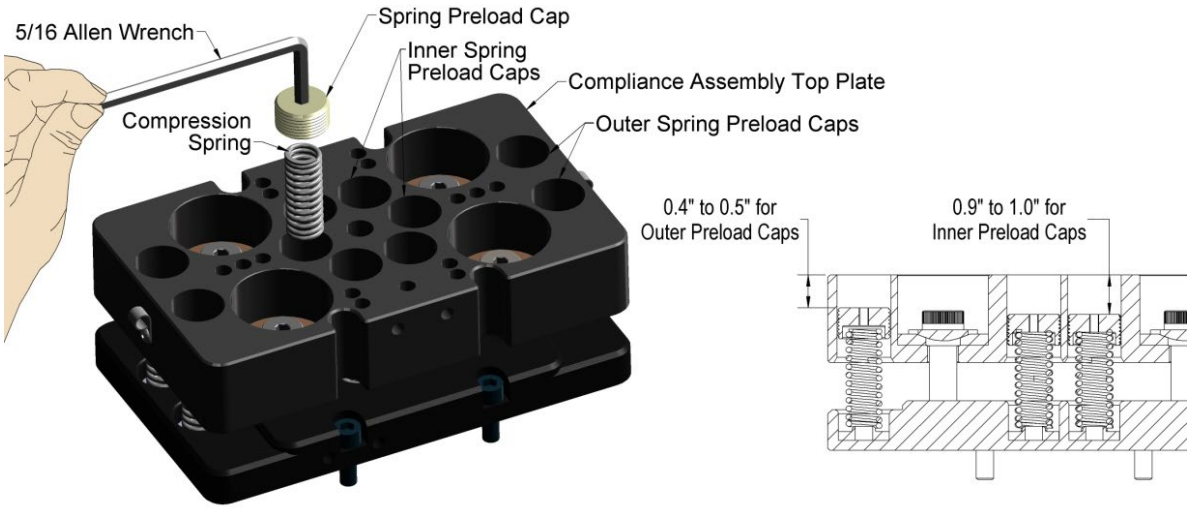


4.8.4 Compliance Spring Replacement

1. Uncouple the Utility Coupler and space to allow clear access to the Master and Tool.
2. Turn off all energized circuits (e.g. electrical, air, water, etc.)
3. Remove Utility Coupler Master from the Compliance Assembly refer to *Section 2.2—Utility Coupler Master Removal.*

4. Clear dust and debris out of spring compliance area by blowing with compressed air in the gap between the two Compliance Assembly plates.
5. Using a 5/16″ Allen wrench, remove the Compliant Preload Cap from the Compliant Assembly.
6. Remove the compression spring.
7. Insert a new compression spring.
8. Apply Loctite 222® to the threads of the new Compliant Preload Cap.
9. Using a 5/16″ Allen wrench, tighten the Compliant Preload Cap:
   For inner six tighten until it is 0.9″ to 1.0″ below the face of the Compliant Assembly top plate.
   For outer four tighten until it is 0.4″ to 0.5″ below the face of the Compliant Assembly top plate.

Figure 4.15—Compliance Springs Replacement

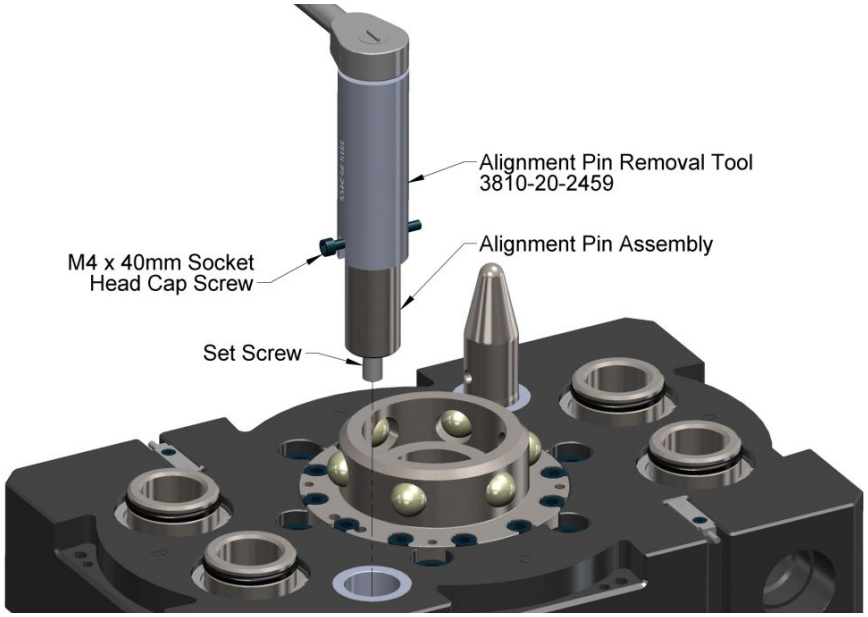


10. Install the Utility Coupler Master to the Compliant assembly refer to *Section 2.1—Utility Coupler Master*.
11. Turn on all energized circuits (e.g., electrical, air, water, etc.) and coupler Utility Coupler.

4.8.5 Alignment Pin Replacement

1. Uncouple the Utility Coupler and space to allow clear access to the Master and Tool.
2. Turn off all energized circuits (e.g., electrical, air, water, etc.)
3. Place a M4 x 40mm socket head cap screw through the hole in the alignment pin.
4. Using the alignment pin removal tool unscrew the alignment pin from the housing.
5. Once the alignment pin has been removed, verify that the sub-assembly (pin and set screw) are intact. If the set screw portion of the sub-assembly did not come out, it will be necessary to remove it separately using the access hole in the back plate of the Master Plate. Discard the alignment pin assembly

Figure 4.16— Alignment Pin Replacement



6. Apply Loctite 242 to the threads on the new alignment pin.
7. Thread the Alignment Pin Assembly into the Bushing on the Utility Coupler. Using the alignment pin Removal tool tighten to 60 in-lbs.
8. Apply MobilGrease® XHP222 Special grease to the Alignment Pin.
9. Turn on all energized circuits (e.g. electrical, air, water, etc.) and coupler Utility Coupler.

5. Troubleshooting

Symptom	Possible Cause	Correction
Unit will not Couple	Object trapped between Master, Tool, add-on modules, or Drive Cylinder body and mounting plate	Clear object from between Master, Tool, add-on modules, or Drive Cylinder Body and mounting plate.
	Drive Cylinder has improper air supply	Verify the air is supplied at a minimum of 60psi (4.1 Bar). Refer to *Section 2.6—Pneumatic Connections.*
	Drive Cylinder not functioning properly	Ensure that the Drive Cylinder pneumatic connections are properly secured and not leaking, if leaking repair connection. Verify that cylinder guide rods are moving freely. Clean and lubricate as needed to restore smooth operation. Verify the Drive Cylinder is not leaking air from rod seals, if leaking repair or replace Drive Cylinder.
	Control Module not functioning properly	Verify the control module is operating correctly and that all proximity sensor cables and signal cables are connected properly and are not cut or damaged.
	Utility Coupler is misaligned beyond the intended specification	Check fixture alignment and make adjustments as necessary.
Unit will not lock or unlock	Object trapped between Master, Tool, or add-on modules	Clear object from between Master, Tool, add-on modules.
	The ball bearings and/or cam are not moving freely in the male coupling.	Clean and lubricate as needed to restore smooth operation, refer to *Section 4.5—Cleaning and Lubrication*.
	Air supplied to Lock (L) or Unlock (U) port is insufficient.	Ensure that air is supplied at a minimum of 60 psi (4.1 bar) to the Air Adapter Unlock (U) or Lock (L) ports. Refer to *Section 2.6—Pneumatic Connections and Pneumatic Valves.*
	The control module is not operating correctly.	Check the troubleshooting section of the manual for the specific module.
	The Master and Tool are not within the specified No-Touch zone when attempting to lock.	Check that the proper air pressure is supplied to the Drive cylinder and that there are no damaged or leaking air lines. Refer to *Section 2.6—Pneumatic Connections and Pneumatic Valves.*
	Ready-To-Lock (RTL) sensors not activated	Check that both RTL sensors are not damaged. Replace damaged RTL sensors as necessary, Refer to *Section 4.8.2—RTL Sensor Replacement* Check all cables for damage and that they are connected properly to the signal control module. Replace damaged cables as necessary.
	Utility Coupler is misaligned beyond the intended specification	Check fixture alignment and make adjustments as necessary.

Symptom	Possible Cause	Correction
Reduced air flow to Tool function	Object trapped between Master and Tool or between modules	Clear object from between Master and Tool or modules.
	Master side (GL6 and GL7) pass-through air port O-ring seals worn or damaged.	Inspect Master side O-ring seals, if worn or damaged replace. Refer to *Section 4.7—Clean, Inspect, Lubricate, Replace Component for Master-side Pass-through Air Port*
	Hose or connector leaking or damage	Inspect hoses and connectors, if damaged or leaking, repair or replace.
Unit is locked but Lock signal does not read “on” (true).	Lock sensor/cable is damaged.	Inspect and test sensor cable replace if damaged. Replace the lock sensor sub-assembly as necessary, refer to *Section 4.8.3—Lock and Unlock Sensor Replacement*
Unit is unlocked but Unlock signal does not read “on” (true).	Unlock sensor/cable is damaged.	Inspect and test sensor cable replace if damaged. Replace the unlock sensor sub-assembly as necessary, refer to *Section 4.8.3—Lock and Unlock Sensor Replacement*
Communications to Tool intermittent or non existent	Object trapped between Master and Tool or between modules	Clear object from between Master and Tool or modules.
	Debris between contacts, worn or damaged contact pins	Inspect pin blocks, refer to *Section 4.4—Pin Block Inspection and cleaning.*
	Cables or connector loose or damage	Inspect cables and connectors, if connectors are loose, tighten. If cables are damaged, repair or replace.

6. Recommended Spare Parts

Table 6.1—Utility Couplers with Locking Mechanism		
Assembly	**Part Number**	**Description**
Common to GLxL Utility Couplers Master Housings	3410-0001016-01	O-ring 1/16 x 1/8 I.D. x 1/4 O.D.
	9005-20-2137	Alignment Pin, 7/8", Two Piece Subassembly
	9005-20-1743	Lock/Unlock Sensor Assembly
	3810-20-2459	Alignment Pin Removal Tool
Common to GLxL Utility Couplers Tool Assemblies	3700-20-3456	Drill Bushing 7/8" ID, 1 1/4 OD, 1 1/2" long
	3700-20-3459	Drill Bushing, Elongated, 7/8" ID
9123-GL6LM Master Housing	3500-1258010-15	M3 x 10mm SFHCS Blue Dyed Magni-565
	3500-1070060-15	M10 x 60mm SHCS Blue Dyed Magni-565
	3410-0001015-01	O-Ring Master AS568-026
	3410-0001392-01	O-Ring, AS568-218, Buna-N, D70
	3690-8500001-11	Retaining Ring, Internal Inverted Truarc # 5008-187
	3700-20-8095	1" Air Pass Through Nipple
	8590-9909999-138	R1 & R2: RTL-LED PNP Flat Pack Sensor .3m Lg (90 Pico) Weld Field Immune
9123-GL6LT Tool Assembly	3500-1070060-15	M10 x 60mm SHCS Blue Dyed Magni-565
9123-GL7LM Master Housing	3500-1258010-11	M3 x 10mm SFHCS Black Oxide
	3500-1070080-11	M10 x 80mm SHCS Black Oxide
	3410-0001388-01	O-Ring, AS568-339, 3/16" x 3 1/4" ID, Buna N
	3410-0001030-01	O-ring AS568-040
	8590-9909999-138	R1: RTL-LED PNP Flat Pack Sensor .3m Lg (90 Pico) Weld Field Immune
	8590-9909999-162	R2: RTL-LED PNP Flat Pack Sensor .4m Lg (90 Pico) Weld Field Immune
9123-GL7LT Tool Assembly	3500-1068065-15	M8 x 65mm Blue Dyed Magni-565
	3410-0001030-01	O-ring AS568-040
9123-GL6-CIP-8080 Compliance Assembly	3500-2072045-11	Socket Cap Shoulder Screw, 16mm Shoulder, M12 Thread, Steel
	3610-1927502-10	Compression Spring, .859" OD, 2.75" Free Length, 83 lb/in, Spring Steel
	3700-20-8082	GL6 Compliance Assembly Chamfered Washer
	3700-20-8083	GL6 Compliance Assembly Bronze Thrust Bearing
	3700-20-8084	GL6 Compliance Assembly Spring Preload Cap

Table 6.2—Guided Drive Cylinders		
Assembly	**Part Number**	**Description**
9123-GL-GC-B80S100 Guided Cylinder[1]	8590-9909999-45	PNP 3-wire DC, normally open, 10–30 VDC 12mm Sensing Range (Efector) See Section 9.2.
	9120-C-4EM-4EF-020	Prox Cable, 2 Meter Long, 4 pin Euro
	3710-20-3349	Modified Guided Cylinder 80mm Bore
	3405-2010004-01	3/8 NPT Flow Control (Ross)
9123-GL-GC-B150S150 Guided Cylinder	3710-20-3384	Triple Rod Cylinder 6" Bore
	8590-9909999-133	Prox Sensor for Guided Cylinder, PNP, NO, Strokemaster M12
Note: 1. 9123-GL-GC-B80S100-S0-N does not have a proximity sensor installed but has a sensor holder for an 18 mm barrel proximity sensor.		

7. Specifications

9123-GLxL- Master and Tool Plates		
Suggested Payload Limit	Not applicable	Total end-effector weight should be supported independently of the Utility Coupler
Max. **Recommended** distance between Master and Tool Plate	TBD	**Recommended distance between Master and Tool Plate is at least 4mm less than cylinder stroke length.
Operating Pressure	60–100 psi (4.5–6.9 bar)	Supply pressure operating range for integrated ports. Supply to be clean, dry, and filtered to 50 micron or better.
Weight*	GL6 Coupler	Master 20.65 lbs, (9.37 kg) Tool 17.11 lbs, (7.76 kg) Coupled 37.76 lbs, (17.13 kg)
	GL7 Coupler	Master 23.38 lbs, (10.60 kg) Tool 19.25 lbs, (8.73 kg) Coupled 42.63 lbs, (19.34 kg)
*Note: Weights do not include add-on modules or Compliance Assembly weight, refer to Compliance Assemblies in this section or specific module manual for weights of add-on modules.		
Pass-through Port, (qty) Size	GL6 Coupler	(4) 1" NPT Ports
	GL7 Coupler	(1) 3" NPT Port
Mounting Patterns	*See Section 8—Drawings*	

9123-GLxL Compliance Assemblies		
Weight	GL6-CIP	19.14 lbs (8.68 kg)

9123-GL Drive Cylinders		
Coupling Force @ 80 psi	620 lbs (2314 N)	Axial holding force. 9123-GL-GC-B80

8. Drawings

Drawings are available on the ATI website or by contacting an ATI representative.

9. Guided Cylinder Proximity Sensor Information

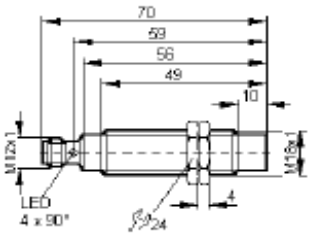
9.1 9123-GL-GC-B80S100-SG Guided Cylinder Proximity Sensor

IGS209

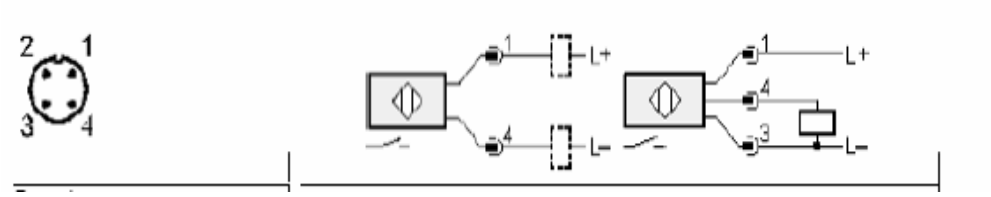
IGKC012-ASKG/M/US
Metal thread M18 x 1
Quick disconnect

Operation as 3-wire or 2-wire possible
Increased sensing range
Optical setting aid (2 LED)
gold-plated contacts

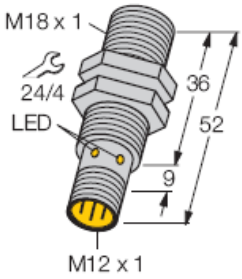
Sensing range 12mm [nf]
non-flush mountable

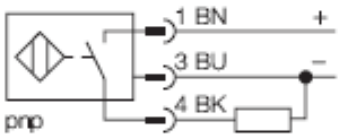


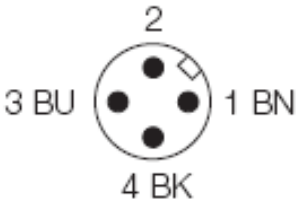
Electrical design	3-wire DC PNP; 2-wire DC PNP/NPN
Output	normally open
Operating voltage [V]	10...30 DC
Current rating [mA]	100
Minimum load current [mA]	4 *)
Short-circuit protection	yes
Reverse polarity protection / overload protection	yes / yes
Voltage drop [V]	< 2.8
Leakage current [mA]	< 0.9 *)
Current consumption [mA]	< 12 (24 V)
Real sensing range [mm]	12 ± 10 %
Operating distance [mm]	0...9.7
Switch-point drift [% / Sr]	-10...10
Hysteresis [% / Sr]	3...15
Switching frequency [Hz]	300
Correction factors	mild steel = 1 / stainless steel approx. 0.7 / brass approx. 0.5 / Al approx. 0 Cu approx. 0.3
Operating temperature [°C]	-25...70
Protection	IP 67
EMC	IEC 1000-4-2 / EN 61000-4-2: 4 kV CD / 8 kV AD IEC 1000-4-3 / EN 61000-4-3: 10 V/m, 80...1000 MHz IEC 1000-4-4 / EN 61000-4-4: 2 kV IEC 1000-4-6 / EN 61000-4-6: 10 V / 0.15...80 MHz EN 55011: class B
Housing material	brass special coated active face: Pocan
Function display Switching status LED Setting aid LED	yellow (4 x 90°) red
Connection	M12 connector
Wiring	



9.2 9123-GL-GC-B80S100-SR Guided Cylinder Proximity Sensor







Type	Bi5U-EM18-AP6X-H1141
Ident-No.	1635340
Rated operating distance Sn	5 mm
Mounting condition	flush
Assured sensing range	≤ (0,81 x Sn) mm
Repeatability	≤ 2 %
Temperature drift	≤ ± 10 % ≤ ± 15 %, ≤ -25 °C v ≥ +70 °C
Hysteresis	3... 15 %
Ambient temperature	-30...+ 85 °C
Operating voltage	10... 30VDC
Residual ripple	≤ 10 % U_{ss}
DC rated operational current	≤ 200 mA
No-load current I_0	≤ 15 mA
Residual current	≤ 0.1 mA
Rated insulation voltage	≤ 0.5 kV
Short-circuit protection	yes / cyclic
Voltage drop at I_e	≤ 1.8V
Wire breakage / Reverse polarity protection	yes / complete
Output function	3-wire, normally open, pnp
Insulation class	⧈
Switching frequency	≤ 2.5 kHz
Housing	threaded barrel, M18 x 1
Dimensions	52 mm
Housing material	metal, AISI 304
Material active face	plastic, PBT
Tightening torque of housing nut	25 Nm
Connection	connectors, M12 x 1
Vibration resistance	55 Hz (1 mm)
Shock resistance	30g (11 ms)
Degree of protection	IP68
Display switch state	LED yellow