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C. Control and Signal Modules

Air Adapters

1. Product Overview

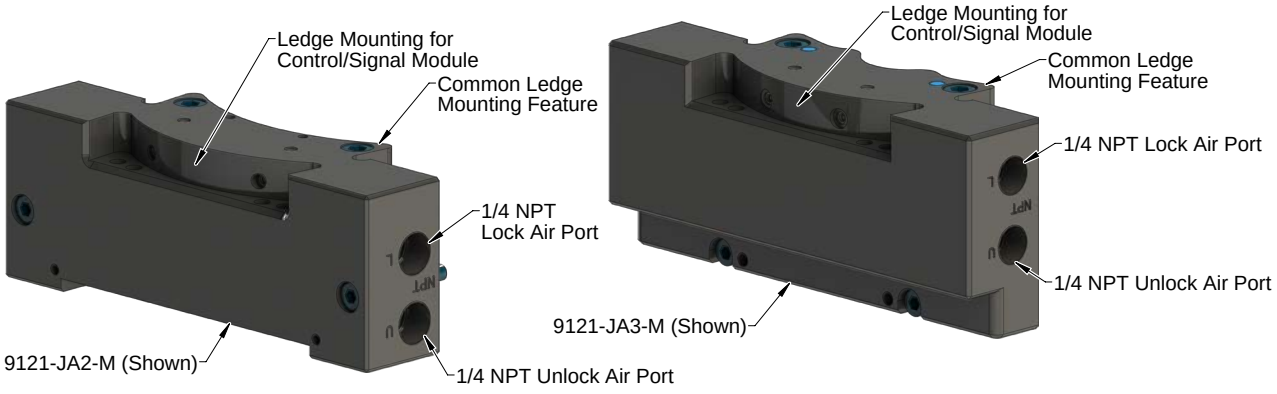
Air adapters are required to provide an air supply to the compatible Tool Changer or Utility Coupler Master for actuation of the locking mechanism. Air adapters mount to Flat 'A'. Many variations of the air adapter are available, depending upon the Tool Changer size and type of porting required by the customer (see *Table 1.1* and *Section 8—Drawings* for a complete listing of available adapters and customer drawings)

Table 1.1—Air Adapters

Air Adapter	Description	Air Port Size	Compatible Tool Changer or Utility Coupler models
9121-JA2-M	Air Adapter	1/4" NPT	QC-113, QC-210, QC-213, GL6L, GL7L
9121-JA3-M	Air Adapter	1/4" NPT	QC-310, QC-313, QC-510, QC-1210
9121-JB2-M	Air Adapter	(BSPP) G 1/4	QC-113, QC-210, QC-213, GL6L, GL7L
9121-JB3-M	Air Adapter	(BSPP) G 1/4	QC-310, QC-313, QC-510, QC-1210
9121-JB4-M	Air Adapter W/ SST Mounting screws	(BSPP) G 1/4	QC-310, QC-313, QC-510, QC-1210
9121-JB8-M	Air Adapter W/ Reversed Air Ports	(BSPP) G 1/4	QC-113, QC-210, QC-213, GL6L, GL7L
9121-JP2-M	Air Adapter	1/4 BSPT	QC-113, QC-210, QC-213, GL6L, GL7L
9121-JP3-M	Air Adapter	1/4 BSPT	QC-310, QC-313, QC-510, QC-1210

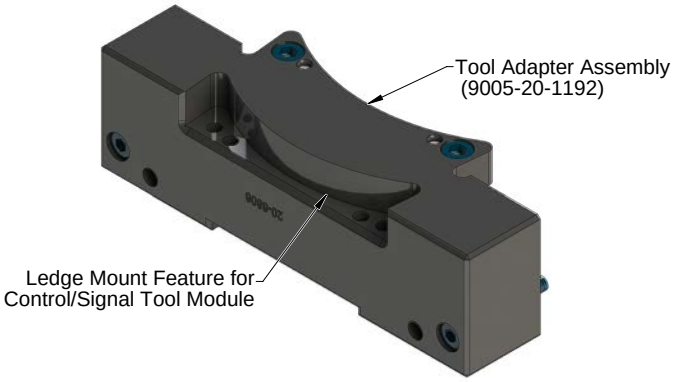
The air adapter provides a ledge mount for the control/signal Master module and provides a Lock and Unlock air port connection for the customer air supply. Lock and Unlock air connections to the Tool Changer or Utility Coupler are provided through ports in the ledge mount, O-rings in the body seal the connection. The customer is require to supply a 2-position 4-way or 5-way air valve for the Lock and Unlock air connection, refer to *Section 2.7—Pneumatic Connections* for more information, refer to *Figure 1.2.*

Figure 1.2—Air Adapters



A tool adapter assembly (9005-20-1192) is required for the Tool side which provides the proper spacing and a ledge mount for the control/signal Tool module.

Figure 1.3—Tool Adapters Assembly



2. Installation

Air adapters and tool adapter assemblies are typically installed by ATI prior to shipment. The steps below outline the field installation or removal as required.

> **WARNING:** Do not perform maintenance or repair on Tool Changer or modules unless the Tool is safely supported or docked in the tool stand, all energized circuits (e.g. electrical, air, water, etc.) are turned off, pressurized connections purged and power discharged from circuits in accordance with the customer's safety practices and policies. Injury or equipment damage can occur with Tool not docked and energized circuits on. Dock the Tool safely in the tool stand, turn off and discharge all energized circuits, purge all pressurized connections, verify all energized circuits are de-energized before performing maintenance or repair on Tool Changer or modules.

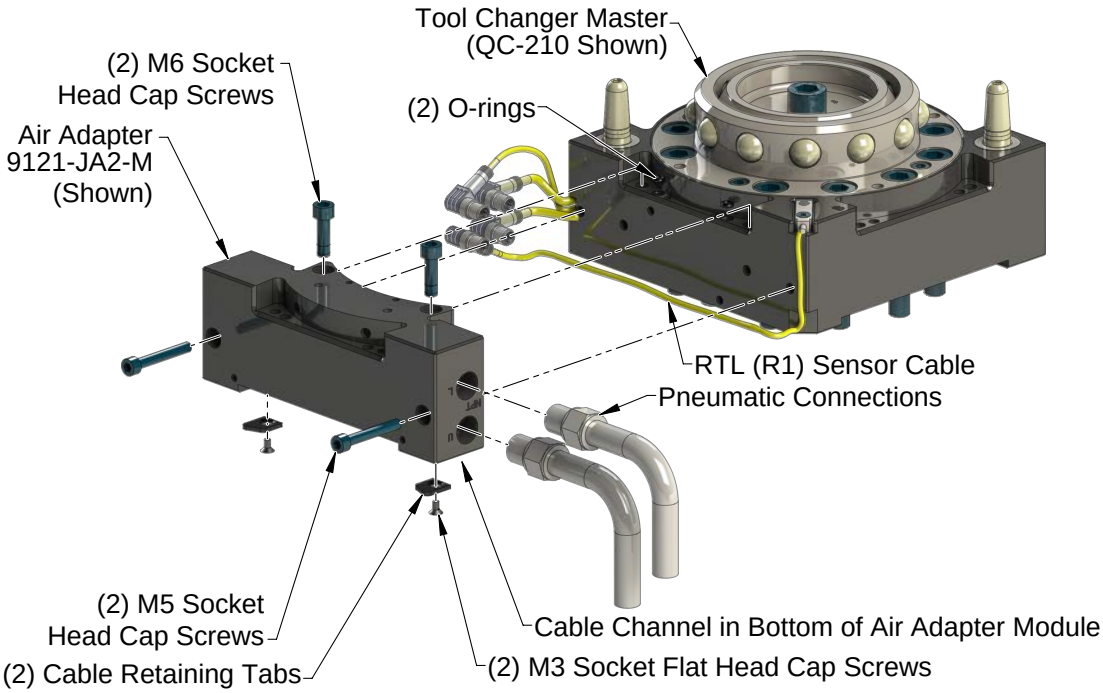
2.1 Air Adapter Installation for QC-113, QC-210, QC-213, GL6L, GL7L

Tools required: *5 mm Allen wrench (hex key), , 4 mm Allen wrench (hex key), torque wrench*

Supplies required: *clean rag*

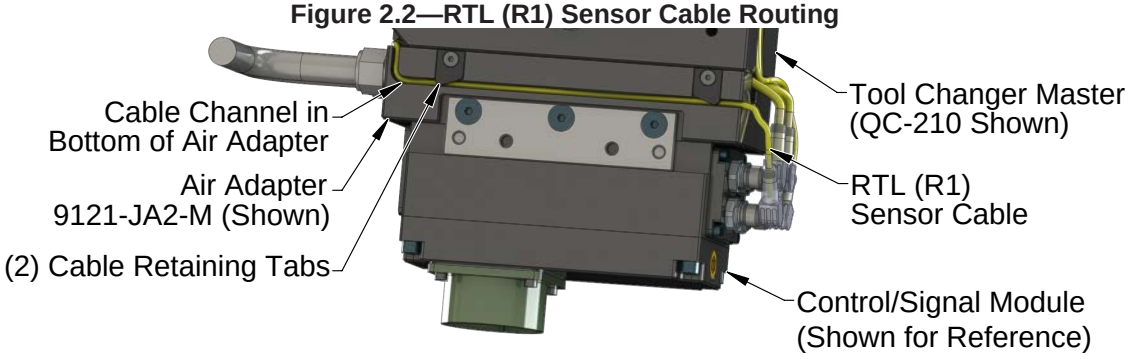
1. If the Tool Changer is already installed, dock the Tool side of the Tool Changer safely in the tool stand and uncouple the Tool Changer to allow clear access to the Master and Tool plates of the Tool Changer.
2. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
3. It may be necessary to clean the mounting surface on the Tool Changer prior to installing the valve adapter in order to remove any debris that may be present.
4. (2) O-rings are required on the Master side Flat 'A' interface. Make sure these O-rings are present and lightly lubricated (refer to *Figure 2.1*).
5. Using the ledge feature as a guide place the air adapter adjacent to the 'Flat A' mounting surface. Align the air adapter using the dowels in the bottom of the ledge feature. Apply Loctite 242 to the supplied M6 socket head cap screws. Secure the air adapter using the M6 socket head cap screws and tighten to 70 in-lbs (7.9 Nm).
6. Apply Loctite 222 to the (2) supplied M5 socket head cap screws. Secure the air adapter using the fasteners, tighten to 55 in-lbs (6.2 Nm).

Figure 2.1—Air Adapter Installation (QC-210 Shown)



7. Route the RTL (R1) sensor cable through the cable channel in the bottom of the air adapter. Refer to *Figure 2.2*.
8. Install the (2) M3 socket flat head screws and the (2) cable retaining tabs from the bottom of the air adapter to secure the RTL (R1) cable. Tighten to 24 in-oz.
9. Make pneumatic connections to the air adapter housing as required. Ensure that the connectors are cleaned prior to being secured as appropriate. ATI recommends using a thread sealant such as Loctite 569 or similar.

Figure 2.2—RTL (R1) Sensor Cable Routing



2.2 Air Adapter Removal for QC-113, QC-210, QC-213, GL6L, GL7L0

NOTICE: Depending on maintenance or repair being performed, utilities to modules and Master plate may need to be disconnected.

Tools required: *5 mm Allen wrench (hex key), 4 mm Allen wrench (hex key)*

1. If the Tool Changer is already installed, dock the Tool side of the Tool Changer safely in the tool stand and uncouple the Tool Changer to allow clear access to the Master and Tool plates of the Tool Changer.
2. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
3. Remove the control/signal module off the air adapter. Refer to the control /signal module manual for instructions.
4. Remove the (2) M3 socket flat head cap screws and the (2) cable retaining tabs from the bottom of the air adapter.
5. Remove the RTL (R1) sensor cable from the cable channel in the bottom of the air adapter.
6. Remove the (2) M5 socket head cap screws and the (2) M6 socket head cap screws and lift the air adapter off the Tool Changer.
7. Make sure that the O-rings are retained at the Master side Flat ‘A’ mounting interface.

2.3 Air Adapter Installation for QC-310, QC-313, QC-510, QC-1210

Tools required: *5 mm Allen wrench (hex key), 4 mm Allen wrench (hex key), torque wrench*

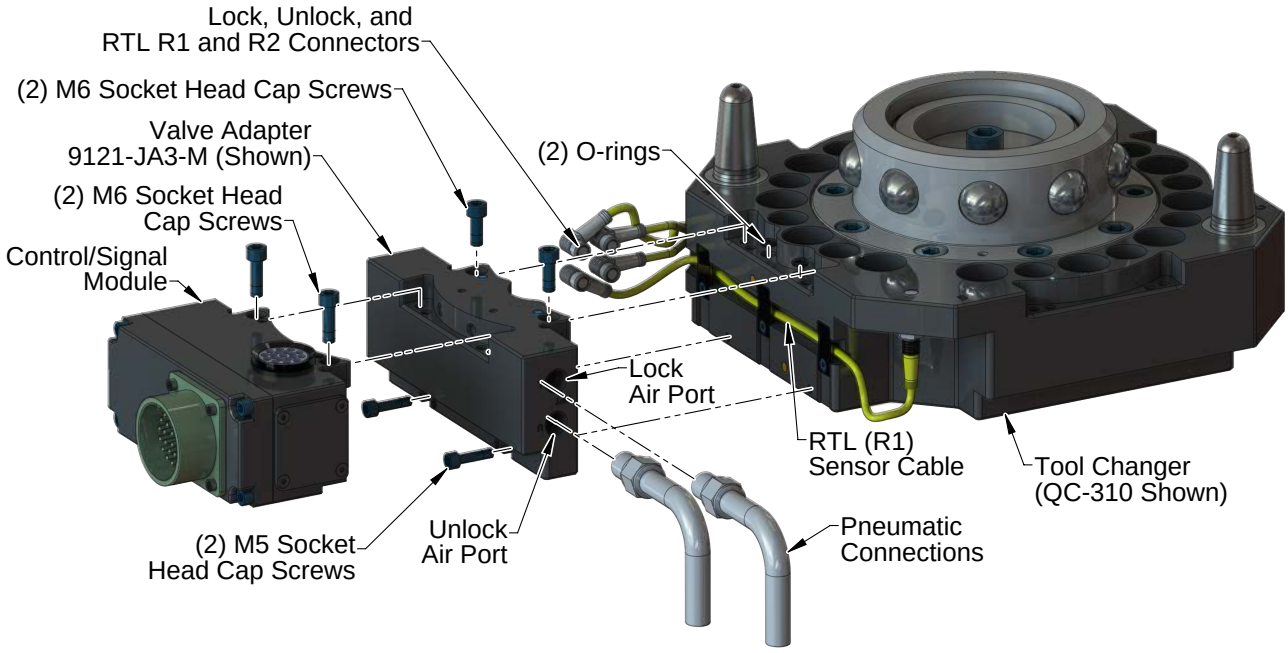
Supplies required: *clean rag*

1. If the Tool Changer is already installed, dock the Tool side of the Tool Changer safely in the tool stand and uncouple the Tool Changer to allow clear access to the Master and Tool plates of the Tool Changer.
2. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
3. It may be necessary to clean the mounting surface on the Tool Changer or Utility Coupler prior to installing the air adapter in order to remove any debris that may be present.
4. (2) O-rings are required on the Master side Flat 'A' interface. Make sure these O-rings are present and lightly lubricated (refer to *Figure 2.3*).

NOTICE: Makes sure the RTL (R1) sensor cable is completely in the cable channel in the Tool Changer body, so it will not get pinched when installing the air adapter.

5. Using the ledge feature to place the air adapter adjacent to the 'Flat A' mounting surface. Align the air adapter using the dowels in the bottom of the ledge feature. Apply Loctite 242 to the supplied M6 socket head cap screws. Secure the air adapter using the M6 socket head cap screws and tighten to 70 in-lbs (7.9 Nm).
6. Apply Loctite 222 to the (2) supplied M5 socket head cap screws. Secure the air adapter using the fasteners and tighten the M5 socket head cap screws to 55 in-lbs (6.2 Nm).
7. Make pneumatic connections to the air adapter housing as required. Ensure that the connectors are cleaned prior to being secured as appropriate. ATI recommends using a thread sealant such as Loctite 569 or similar.

Figure 2.3—Air Adapter Installation (QC-310 Shown)



2.4 Air Adapter Removal for QC-310, QC-313, QC-510, QC-1210

NOTICE: Depending on maintenance or repair being performed, utilities to modules and Master plate may need to be disconnected.

Tools required: *5 mm Allen wrench (hex key), 4 mm Allen wrench (hex key)*

1. If the Tool Changer is already installed, dock the Tool side of the Tool Changer safely in the tool stand and uncouple the Tool Changer to allow clear access to the Master and Tool plates of the Tool Changer.
2. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
3. Remove the control/signal module off the air adapter. Refer to the control /signal module manual for instructions.
4. Remove the (2) M5 socket head cap screws and the (2) M6 socket head cap screws and lift the air adapter off the Tool Changer.
5. Make sure that the O-rings are retained at the Master side Flat 'A' mounting interface.

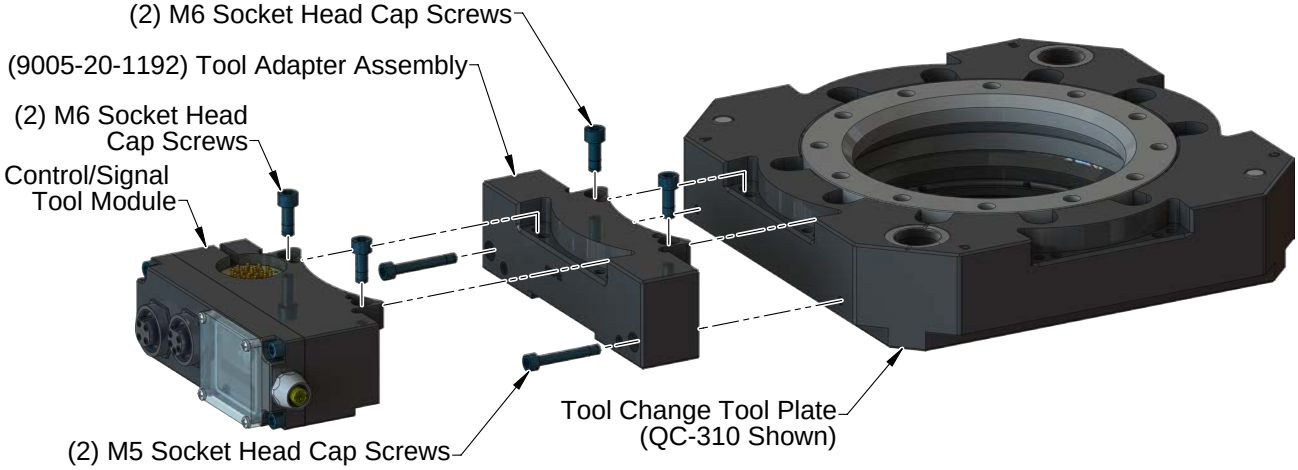
2.5 Tool Adapter Assembly Installation

Tools required: *5 mm Allen wrench (hex key), 4 mm Allen wrench (hex key), torque wrench*

Supplies required: *clean rag*

1. If the Tool Changer is already installed, dock the Tool side of the Tool Changer safely in the tool stand and uncouple the Tool Changer to allow clear access to the Master and Tool plates of the Tool Changer.
2. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
3. It may be necessary to clean the mounting surface on the Tool Changer or Utility Coupler prior to installing the air adapter in order to remove any debris that may be present.
4. Using the ledge feature as a guide, place the tool adapter assembly adjacent to the 'A' mounting surface. Align the tool adapter assembly using the dowels in the bottom of the ledge feature. Apply Loctite 242 to the supplied M6 socket head cap screws. Secure the tool adapter assembly using the M6 socket head cap screws and tighten to 89 in-lbs (10.0 Nm).
5. Apply Loctite 222 the (2) supplied M5 socket head cap screws. Secure the tool adapter assembly using the M5 socket head cap screws and tighten to 55 in-lbs (6.2 Nm).

Figure 2.4—Tool Adapter Assembly Installation



2.6 Tool Adapter Assembly Removal

NOTICE: Depending on maintenance or repair being performed, utilities to modules may need to be disconnected.

Tools required: *5 mm Allen wrench (hex key), 4 mm Allen wrench (hex key)*

1. If the Tool Changer is already installed, dock the Tool side of the Tool Changer safely in the tool stand and uncouple the Tool Changer to allow clear access to the Master and Tool plates of the Tool Changer.
2. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
3. Remove the control/signal module off the tool adapter assembly. Refer to the control /signal module manual for instructions.
4. Remove the (2) M5 socket head cap screws and the (2) M6 socket head cap screws and lift the tool adapter assembly off the Tool Changer or Utility Coupler. (refer to *Figure 2.4*).

2.7 Pneumatic Connections

The air supply used for coupling and uncoupling the Tool Changer should be clean, dry, and non-lubricated. 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 40 micron or better.

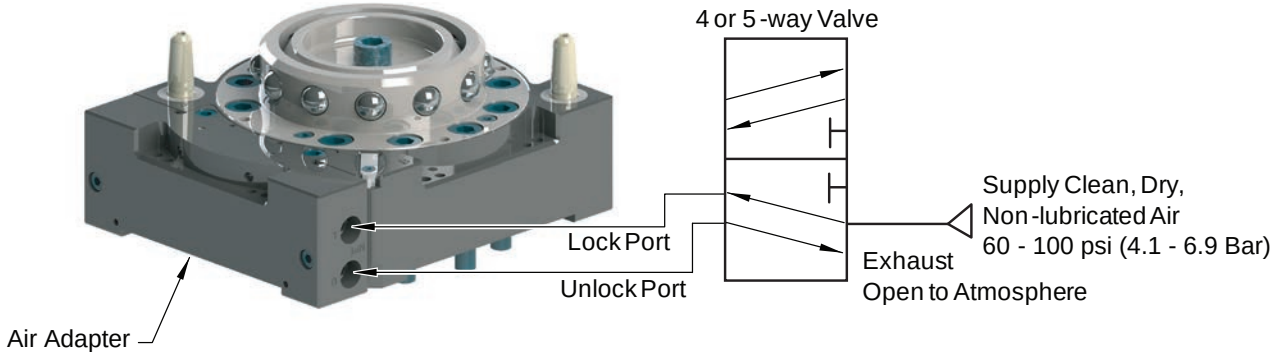
CAUTION: Do not use the Tool Changer in a fail-safe condition. Do not transport the Tool Changer in a fail-safe condition. Possible damage to the locking mechanism could occur. Re-establish air pressure to Tool Changer before returning to normal operations.

2.7.1 Valve Requirements and Connections for the Locking Mechanism

When an air adapter is utilized that does not contain an integrated solenoid valve, it is required that a customer supplied 2-position 4-way or 5-way valve be used to actuate the locking mechanism in the Master plate. 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 may inhibit proper shuttling of the valve and prevent coupling and/or uncoupling from occurring.

CAUTION: The locking mechanism will not function properly when connected to a 3-way valve as this type of valve is incapable of venting trapped air pressure from within the Tool Changer. This could result in damage to the product, attached tooling, or personnel. Connect the Lock and Unlock supply air to a 2-position 4-way or 5-way valve.

Figure 2.5— Lock and Unlock Pneumatic Connections



3. Operation

It is important that the air adapter be supplied with clean, dry, non-lubricated air supplied between 60 and 100 psi (4.5–6.9 Bar) and filtered at 40 microns or better. The Tool Changer is operated by supplying air to the lock port or the air adapter to lock the Tool Changer. The Lock air must be maintained during operation and the unlock air must be vented to the atmosphere using a 2-position 4-way or 5-way valve, refer to *Section 2.7—Pneumatic Connections* for more information. To Unlock the Tool Changer air must be supplied to the unlock port on the air adapter and the lock air must be vented to the atmosphere.

4. Maintenance

Air adapters should require no maintenance. There are no wear components, the sensor connections should be inspected for looseness and tighten if necessary. Pneumatic connection should be inspected for leaks or damage to hoses.

WARNING: Do not perform maintenance or repair on Tool Changer or modules unless the Tool is safely supported or docked in the tool stand, all energized circuits (e.g. electrical, air, water, etc.) are turned off, pressurized connections purged and power discharged from circuits in accordance with the customer's safety practices and policies. Injury or equipment damage can occur with Tool not docked and energized circuits on. Dock the Tool safely in the tool stand, turn off and discharge all energized circuits, purge all pressurized connections, verify all energized circuits are de-energized before performing maintenance or repair on Tool Changer or modules.

5. Troubleshooting and Service Procedures

The following section provides troubleshooting information to help diagnose conditions with the Tool Changer or air adapter and service procedures to help resolve these conditions.

5.1 Troubleshooting

Follow the suggested actions listed in *Table 5.1* when attempting to troubleshoot the air adapter. If issues persist, contact your closest ATI representative.

Table 5.1—Troubleshooting

Symptom	Cause	Resolution
Tool Changer will not Lock / Unlock or operates slowly.	Customer supplied exhaust muffler is clogged.	Check/Replace exhaust muffler; ensure clean air supply.
	No or not enough air pressure on the pneumatic connection.	Make sure Pneumatic connection has minimum pressure, refer to *Section 2.7—Pneumatic Connections*.
	Loose air adapter or O-rings leaking or missing.	Verify that the fasteners connecting the control/signal Module to the air adapter are properly tightened. If air still leaking, remove the air adapter from the Tool Changer and check for air leaks, damaged or missing O-rings., Refer to *Section 2.2—Air Adapter Removal for QC-113, QC-210, QC-213, GL6L, GL7L0* or *Section 2.4—Air Adapter Removal for QC-310, QC-313, QC-510, QC-1210*
	Customer supplied solenoid valve not operating properly	Check customer supplied solenoid valve for damage, proper venting, refer to *Section 2.7—Pneumatic Connections*.

5.2 Service Procedures

There are no specific service procedures for the air adapter.

6. Serviceable Parts

6.1 Air Adapters

Refer to *Section 8—Drawings* for Air Adapter serviceable parts.

6.2 Tool Adapter Assembly

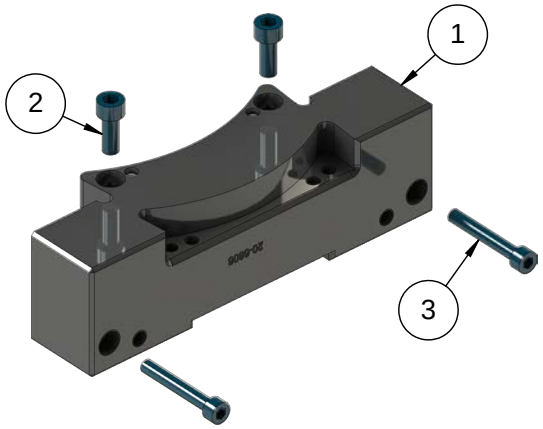


Table 5.2—Tool Adapter Assembly			
ITEM NO.	**QTY**	**PART NUMBER**	**DESCRIPTION**
1	1	9005-20-1192	Tool Adapter Assembly
2	2	3500-1066016-15A	M6 x 16mm SHCS MB ND Microspheres
3	2	3500-1064035-15A	M5 x 35mm SHCS MB, ND Microspheres

7. Specifications

Table 5.3—Air Adapter Specifications	
All Air Adapter Models	Specification
Air Pressure	60 - 100 psi (4.1 – 6.9 Bar) clean, dry, non-lubricated air
Air Filtration	50 microns
9121-JA2-M	Air Adapter NPT, QC-113, QC-210, QC-213, GL6L, GL7L
Pneumatic Connection	1/4” NPT
Weight	1.64 lbs (0.744 kg)
9121-JA3-M	Air Adapter NPT, QC-310, QC-313, QC-510, QC-1210
Pneumatic Connection	1/4” NPT
Weight	1.92 lbs (0.87 kg)
9121-JB2-M	Air Adapter G, QC-113, QC-210, QC-213, GL6L, GL7L
Pneumatic Connection	G 1/4
Weight	1.66 lbs (0.75 kg)
9121-JB3-M	Air Adapter G, QC-310, QC-313, QC-510, QC-1210
Pneumatic Connection	G 1/4
Weight	1.94 lbs (0.88 kg)
9121-JB4-M	Air Adapter with SST Mounting Screws G, QC-310, QC-313, QC-510, QC-1210
Pneumatic Connection	G 1/4
Weight	1.94 lbs (0.88 kg)
9121-JB8-M	Air Adapter with Revered Air Ports G, QC-113, QC-210, QC-213, GL6L, GL7L
Pneumatic Connection	G 1/4
Weight	1.66 lbs (0.75 kg)
9121-JP2-M	Air Adapter BSPT, QC-113, QC-210, QC-213, GL6L, GL7L
Pneumatic Connection	1.64 lbs (0.744 kg)
Weight	xxx lbs (xxx kg)
9121-JP3-M	Air Adapter BSPT, QC-310, QC-313, QC-510, QC-1210
Pneumatic Connection	1/4” BSPT
Weight	1.92 lbs (0.87 kg)

Table 5.4—Tool Adapter Assembly Specifications	
9005-20-1192	**Tool Adapter Assembly, QC-210, QC-213, QC-310, QC-313, QC-510, QC-1210, GL6L, or GL7L**
Weight	1.33 lbs (0.603 kg)

8. Drawings

8.1 Air Adapter for QC-210

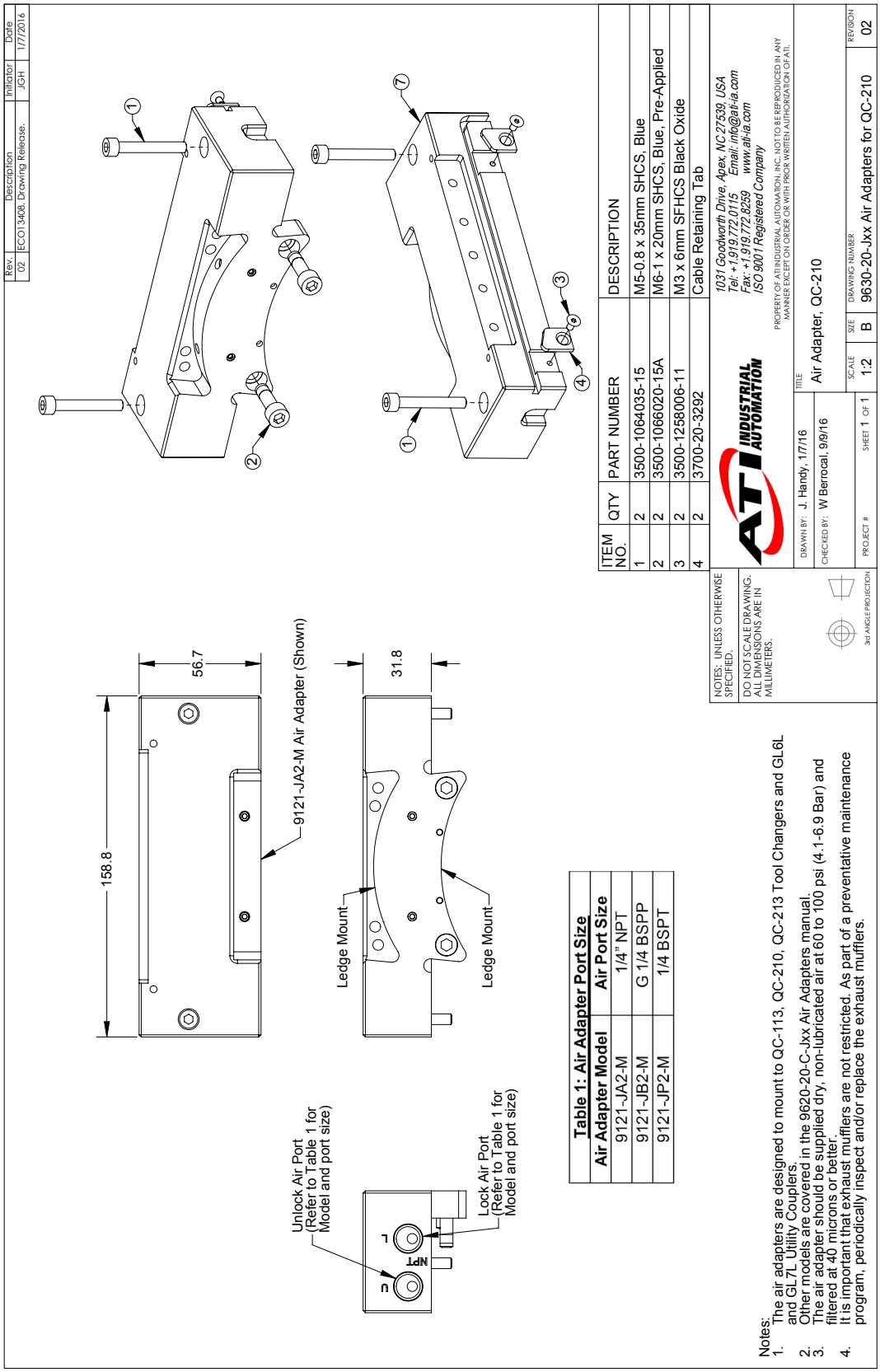


Table 1: Air Adapter Port Size	
Air Adapter Model	**Air Port Size**
9121-JA2-M	1/4" NPT
9121-JB2-M	G 1/4 BSPP
9121-JP2-M	1/4 BSPT

Notes:
1. The air adapters are designed to mount to QC-113, QC-210, QC-213 Tool Changers and GL6L and GL7L Utility Couplers.
2. Other models are covered in the 9620-20-C-Jxx Air Adapters manual.
3. The air adapter should be supplied dry, non-lubricated air at 60 to 100 psi (4.1-6.9 Bar) and filtered at 40 microns or better.
4. It is important that exhaust mufflers are not restricted. As part of a preventative maintenance program, periodically inspect and/or replace the exhaust mufflers.

8.2 Air Adapter for QC-310

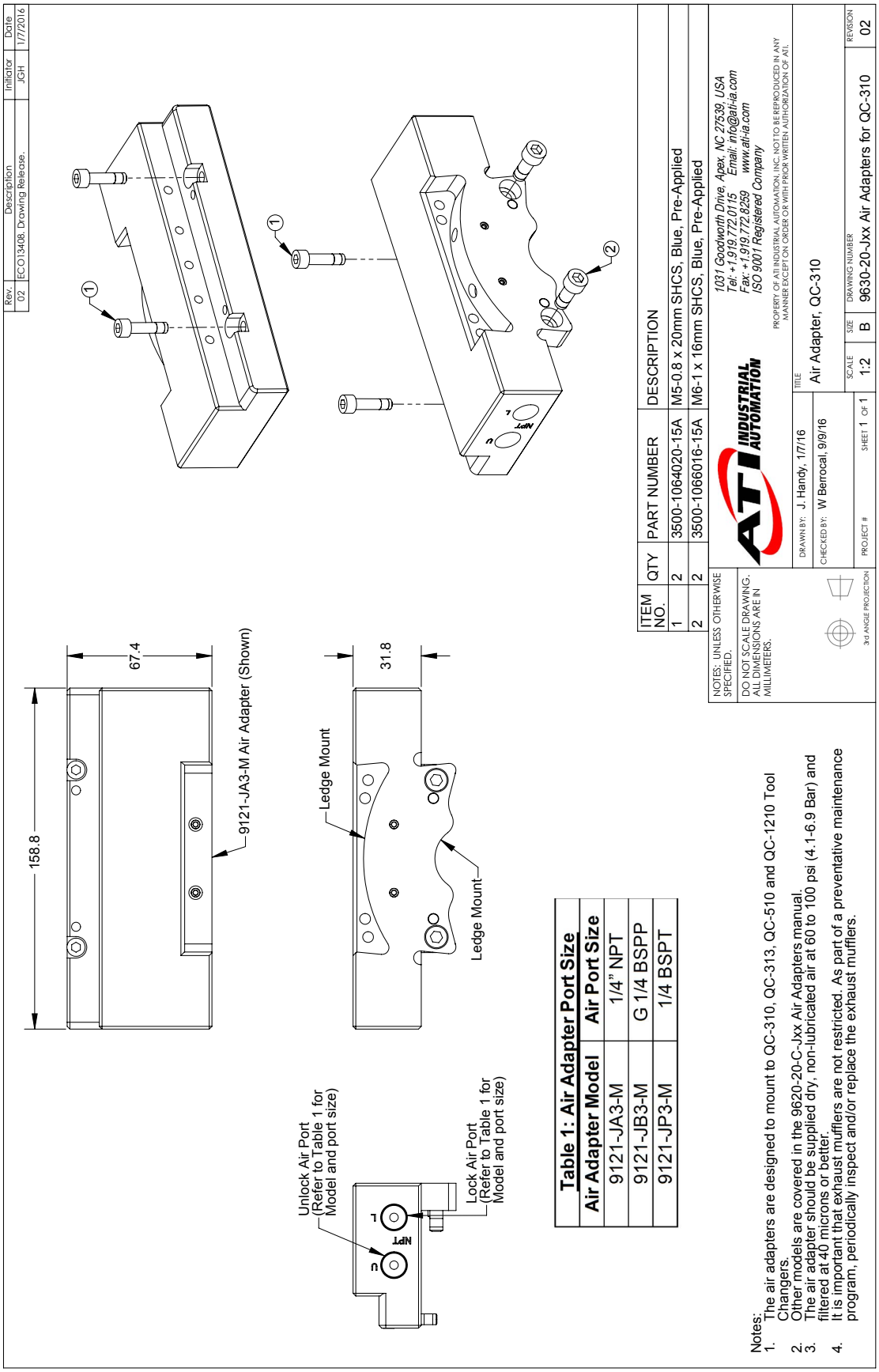


Table 1: Air Adapter Port Size

Air Adapter Model	Air Port Size
9121-JA3-M	1/4" NPT
9121-JB3-M	G 1/4 BSPP
9121-JP3-M	1/4 BSPT

Notes:
1. The air adapters are designed to mount to QC-310, QC-313, QC-510 and QC-1210 Tool Changers.
2. Other models are covered in the 9620-20-C-Jxx Air Adapters manual.
3. The air adapter should be supplied dry, non-lubricated air at 60 to 100 psi (4.1-6.9 Bar) and filtered at 40 microns or better.
4. It is important that exhaust mufflers are not restricted. As part of a preventative maintenance program, periodically inspect and/or replace the exhaust mufflers.