

# Table of Contents

|   |             |
|---|-------------|
| <b>B. Base Tool Changer</b> .....   | <b>B-2</b>  |
| <b>MC-10—Manual Tool Changer</b> .....  | <b>B-2</b>  |
| <b>1. Product Overview</b> .....  | <b>B-2</b>  |
| 1.1 Master Plate Assembly .....   | B-2         |
| 1.2 Tool Plate Assembly .....   | B-3         |
| 1.3 Optional Modules .....  | B-3         |
| <b>2. Installation</b> .....  | <b>B-4</b>  |
| 2.1 Master Interface .....  | B-5         |
| 2.2 Master Plate Installation .....   | B-6         |
| 2.3 Master Plate Removal .....  | B-7         |
| 2.4 Tool Interface .....  | B-8         |
| 2.5 Tool Plate Installation .....   | B-9         |
| 2.6 Tool Plate Removal .....  | B-9         |
| 2.7 Optional Module Installation .....  | B-10        |
| 2.7.1 Installing Optional Modules .....                                       | B-10        |
| 2.7.2 Removing Optional Modules .....   | B-10        |
| <b>3. Operation</b> .....   | <b>B-11</b> |
| 3.1 Coupling Sequence .....   | B-11        |
| 3.2 Uncoupling Sequence .....   | B-11        |
| <b>4. Maintenance</b> .....   | <b>B-12</b> |
| 4.1 Cleaning and Lubrication of the Master and Tool Plate .....               | B-13        |
| 4.2 Optional Electrical Module Pin Block Inspection and Cleaning .....        | B-16        |
| <b>5. Troubleshooting and Service Procedures</b> .....                        | <b>B-17</b> |
| 5.1 Troubleshooting .....   | B-17        |
| 5.2 Service Procedures .....  | B-18        |
| 5.2.1 O-ring Seal Replacement .....   | B-18        |
| 5.2.2 Optional Electrical Module V-ring Seal Inspection and Replacement ..... | B-19        |
| <b>6. Serviceable Parts</b> .....   | <b>B-20</b> |
| 6.1 MC-10 Master Plate Serviceable Parts .....                                | B-20        |
| 6.2 MC-10 Tool Plate Serviceable Parts .....                                  | B-20        |
| <b>7. Specifications</b> .....  | <b>B-21</b> |
| <b>8. Drawings</b> .....  | <b>B-22</b> |
| 8.1 9630-20-MC10 .....  | B-22        |
| 8.2 9630-20-MC10-B .....  | B-25        |

## B. Base Tool Changer

### MC-10—Manual Tool Changer

#### 1. Product Overview

The Manual Tool Changer provides flexibility to enhance collaborative robot applications by enabling users to change tooling manually. In addition, Manual Tool Changers provide a method for quick tool change for maintenance purposes.

The Tool Changer consists of a Master plate assembly and a Tool plate assembly. The Master plate, installed on the robot arm, locks to the Tool plate with a manually driven locking mechanism. The Tool Changer has the following features:

- Lock and unlock visual indicators
- Tactile “click” for lock and unlock
- (4) Pass-through ports for air utility
- Ergonomic collar design
- (1) Flat for mounting optional module

#### 1.1 Master Plate Assembly

The Master plate assembly includes an anodized aluminum body, a manual locking mechanism, and a hardened stainless steel alignment bushing (refer to [Figure 1.1](#)). The Master includes an anodized aluminum interface plate with an ISO 50 BC mounting pattern.

(4) pass-through air ports with M5 customer connections are provided in the body. O-rings provide the seal between the Master and Tool plates. The Master plate has one flat side for mounting optional modules. A customer interface is provided with a 0.7 in (17.78 mm) boss for accurate positioning, a dowel pin to prevent rotation, and (1) M6 socket head cap screw for mounting.

The locking mechanism consists of a set of hardened steel ball bearings and a Master coupling. When the Master and Tool are brought together, the user applies the tightening torque by twisting the collar until a tactile “click” is felt. The ball bearings slide on the tapered surfaces of the Tool plate to apply the locking force. An alignment pin on the Tool plate mates with a bushing on the Master body to ensure repeatable alignment when coupling. Extreme pressure grease is applied to the ball bearings to enhance performance and maximize the life of the Master assembly.

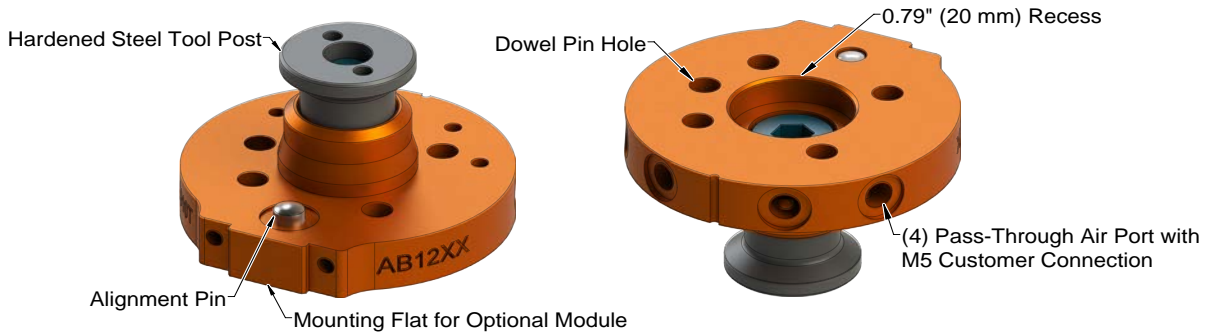
**Figure 1.1—Master Plate Assembly (Shown Locked)**



## 1.2 Tool Plate Assembly

The Tool plate consists of an aluminum body, a hardened steel tool post, and a hardened steel alignment pin (4) pass-through air ports with M5 customer connections are provided on the body. A customer interface is provided with a 0.79" (20 mm) recess for accurate positioning, a dowel pin hole for a customer supplied dowel pin to prevent rotation, and (4) M5 mounting holes on a 31.5 mm bolt circle. The Tool plate has one flat side for mounting optional modules; refer to [Section 8—Drawings](#) for more information.

Figure 1.2—Tool Plate



## 1.3 Optional Modules

There is (1) flat available for mounting optional modules that support utility passthrough, such as electrical signals. Some modules might require an adapter plate.

For assistance in choosing the right modules for your application, visit the ATI website or contact an ATI sales representative.

For installation of optional modules, refer to [Section 2.7—Optional Module Installation](#).




## 2. Installation

The Master plate of the Tool Changer mounts to the robot arm using a robot interface plate. Custom interface plates are available from ATI upon request. Refer to [Section 2.1—Master Interface](#) for more information.

The customer tooling is typically attached to the Tool plate with a tool interface plate. Custom tool interface plates are available from ATI upon request. Refer to [Section 2.4—Tool Interface](#) for more information.

All fasteners used to mount the Tool Changer to the robot and to the customer’s tooling should be tightened to a torque value as indicated in [Table 2.1](#) or in the following procedure steps. Use removable (purple) Loctite® 222 or 242 on fasteners. [Table 2.1](#) contains recommended values based on engineering standards.

Pneumatic lines and electrical cables must be attached, bundled, and strain-relieved in a manner that allows for freedom of movement during operation.

|   |   |
|---|---|
|    | <b>WARNING:</b> Do not perform maintenance or repair(s) on the Tool Changer or modules unless the Tool is safely supported or placed in the tool stand, all energized circuits (for example: electrical, air, water, etc.) are turned off, pressurized connections are purged and power is discharged from circuits in accordance with the customer’s safety practices and policies. Injury or equipment damage can occur with the Tool not placed and energized circuits on. Place the Tool in the tool stand, turn off and discharge all energized circuits, purge all pressurized connections, and verify all circuits are de-energized before performing maintenance or repair(s) on the Tool Changer or modules. |
|    | <b>WARNING:</b> All pneumatic fittings and tubing must be capable of withstanding the repetitive motions of the application without failing. The routing of electrical and pneumatic lines must minimize the possibility of over stressing, pullout, or kinking the lines. Failure to do so can cause critical electrical and/or pneumatic lines to malfunction and might result in injury to personnel or damage to equipment.   |
|  | <b>CAUTION:</b> Thread locker applied to fasteners must not be used more than once. Fasteners might become loose and cause equipment damage. Always apply new thread locker when reusing fasteners.   |

**Table 2.1—Fastener Size, Torque, and Thread Locker Specifications**

| Mounting Conditions   | Fastener Size              | Recommended Torque  | Thread Locker                       |
|---|----------------------------|---------------------|-------------------------------------|
| Optional module to Master and Tool plate, customer supplied fasteners | M3                         |                     | Pre-applied Adhesive or Loctite 222 |
|   | Socket head cap screw      | 10 in-lbs (1.13 Nm) |                                     |
|   | Socket flat head cap screw | 8 in-lbs (0.90 Nm)  |                                     |

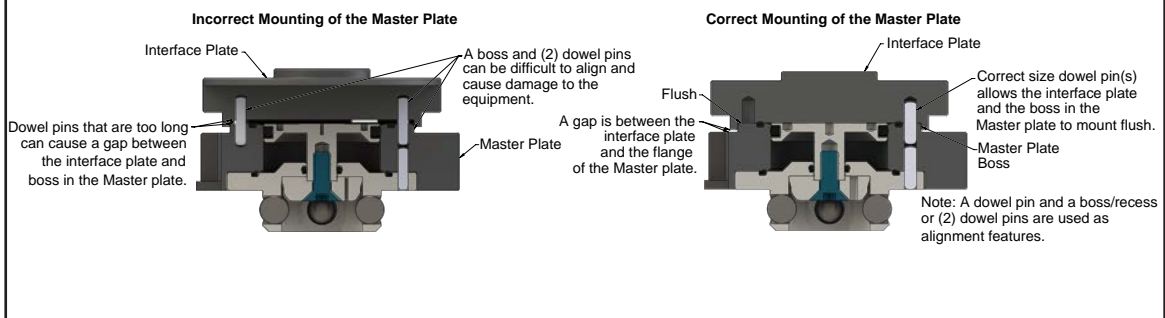
## 2.1 Master Interface

The Master plate is typically attached to the robot arm. An interface plate can adapt the Master plate to a specific robot arm. Alignment features (dowel holes and bosses) accurately position and bolt holes secure the Master plate to the robot arm or an interface plate. Custom interface plates are available from ATI upon request (Refer to the Drawing Section for technical information on mounting features.)



**CAUTION:** Do not use more than two alignment features when securing a Master plate to a robot interface plate. Using more than two alignment features can cause damage to equipment. Use either two dowel pins or a single dowel pin along with a boss/recess feature to align the Master plate with the robot interface plate.

**CAUTION:** Do not use dowel pins that are too long that will not allow the interface plate and the Master body's boss to mate flush with each other. Using dowel pins that are too long will cause a gap between the interface plate and the Master body's boss causing damage to the equipment. Use the proper size dowel pins that will not extend further than allowed by the Master body.



If the customer chooses to design and build an interface plate, consider the following points:

- The interface plate should include bolt holes for mounting and either (2) dowel pins or (1) dowel pin and a boss for accurate positioning on the robot and Master plate. The dowel and boss features prevent unwanted rotation. Refer to the robot manual for robot mounting features.
- The thickness of the interface plate must be sufficient to provide the necessary thread engagement for the mounting bolts.
- Dowel pins must not extend out from the surface of the interface farther than the depth of the dowel holes in the boss of the Master plate.
- A recess of proper depth and diameter must be machined into the interface plate to correspond with the boss on the Master plate.
- Mounting bolts that are too long can create a gap between the interface plate and the Master plate, which can damage the equipment.
- The interface plate must provide rigid mounting to the Master plate.
- The interface plate design must account clearances required for Tool Changer module attachments and accessories.

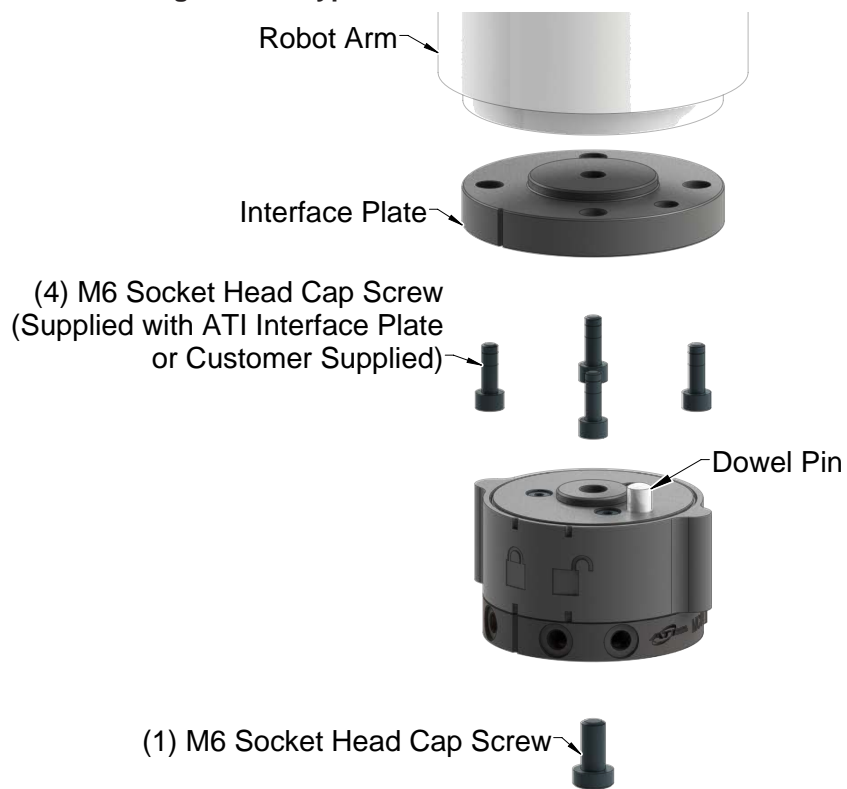
## 2.2 Master Plate Installation

**Tools required:** 5 mm hex key, torque wrench

**Supplies required:** Clean rag, Loctite 242

1. Wipe down the mounting surfaces with a clean rag.
2. Apply Loctite 242 to threads of the (4) M6 socket head cap screws (customer supplied) that secure the interface plate to the robot.
3. Align the interface plate to the robot arm using a dowel pin and secure using (4) M6 socket head cap screws (customer supplied).
4. Apply Loctite 242 to threads of the (1) M6 socket head cap screw that secures the Master plate to the interface plate.
5. Align the dowel pin to the corresponding hole in the interface plate and secure the Master plate with the (1) M6 socket head cap screw using a 5 mm hex key. Tighten to 90 in-lbs (10.2 Nm).
6. If required, install optional modules. Refer to [Section 2.7.1—Installing Optional Modules](#).
7. Connect utilities to the optional modules and the Master plate.
8. If installation is complete, the Master plate can be put into normal operation.

**Figure 2.1—Typical Master Plate Installation**



## 2.3 Master Plate Removal



**WARNING:** Do not perform removal unless the Master is safely supported. Injury or equipment damage can occur with Master not supported. Support the Master safely before performing removal.

*Tools required:* 5 mm hex key

1. Turn off and de-energize all energized circuits; for example, electrical, air, water, etc.
2. While supporting the Tool, uncouple the Master and Tool plates.
3. Place the Tool in a secure location.
4. Disconnect all utilities; for example, electrical, air, water, etc. from the Master plate and optional modules.
5. While supporting the Master plate, remove the (1) M6 socket head cap screw that connects the Master plate to the robot interface plate using a 5 mm hex key.
6. Remove the Master plate from the robot interface plate.

## 2.4 Tool Interface

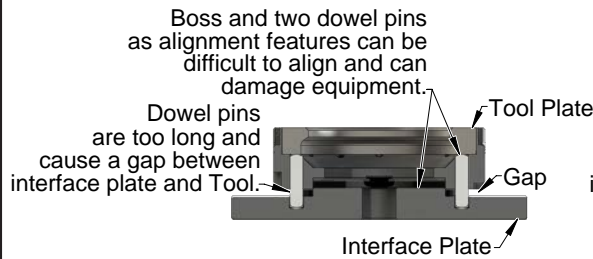
The Tool plate is attached to the customer's tooling. An interface plate can adapt the Tool plate to customer tooling. Alignment features (dowel holes and a recess) accurately position and bolt holes to secure the Tool plate to customer tooling. Custom interface plates can be supplied by ATI (refer to the application drawing).



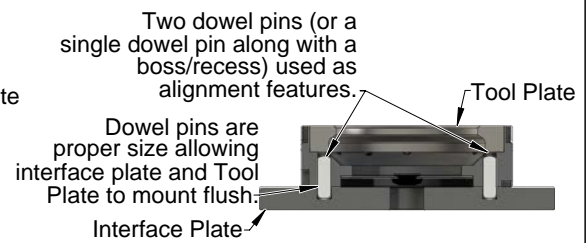
**CAUTION:** Do not use more than two alignment features when securing a Tool plate to an interface plate. Using more than two alignment features can cause damage to equipment. Use either two dowel pins or a single dowel pin, along with a boss/recess feature to align the Tool plate with the interface plate.

**CAUTION:** Do not use dowel pins that are too long or do not allow the interface plate and Tool body to mate flush. Using dowel pins that are too long will cause a gap between the interface plate and Tool body and damage the equipment. Use dowel pins that will not extend further than allowed by the Tool body.

### Incorrect Mounting of Tool Plate



### Correct Mounting of Tool Plate



If the customer chooses to design and build a tool interface plate, consider the following points:

- The interface plate should include bolt holes for mounting and either two dowel pins or a dowel pin and a boss for accurate positioning on the customer tooling and Tool plate. The dowel and boss features prevent unwanted rotation.
- Dowel pins must not extend out from the surface of the interface plate farther than the depth of the dowel holes in the Tool plate.
- The thickness of the interface plate must be sufficient to provide the necessary thread engagement for the mounting bolts. Fasteners should meet minimum recommended engagement lengths while not exceeding the maximum available thread depth. Use of bolts that are too long can cause damage to the tool side changer.
- The plate design must account for clearances required for Tool Changer module attachments and accessories.
- If a boss is to be used on the interface plate, a boss of proper height and diameter must be machined into the interface plate to correspond with the recess in the Tool plate.
- The interface plate must have a hole in its center for manually returning the locking mechanism to the unlocked position under adverse conditions (i.e. unintended loss of power and/or air pressure). The center access hole with a minimum diameter of 1" (25.4 mm) prevents debris from contaminating the locking mechanism. Greater protection is provided by leaving the race cover and grommet in place.



## 2.5 Tool Plate Installation

In most applications, the customer end-effector attaches to the Tool plate with a custom interface plate. Refer to [Section 2.4—Tool Interface](#).

**Tools required:** Hex key wrenches, Torque wrench

**Supplies required:** Clean rag, Loctite 222

1. Wipe down the mounting surfaces with a clean rag.
2. If using a tool interface plate, apply Loctite 222 to customer supplied (4) M5 screws that secure the Tool plate to the interface plate.
3. If required, install the tool interface plate to the Tool Plate using the alignment features as a guide. Secure with customer supplied (4) M5 screws.
4. Apply Loctite 222 to customer supplied (4) M5 screws that secure the Tool plate and interface plate (if required) to the customer tooling.
5. Using the alignment features, position the tool interface plate or customer tooling to the Tool plate and secure with customer supplied mounting fasteners.
6. If required, install optional modules. Refer to [Section 2.7.1—Installing Optional Modules](#).
7. Connect utilities to the optional modules and the Tool plate.
8. If installation is complete, the Tool plate can be put into normal operation.

## 2.6 Tool Plate Removal

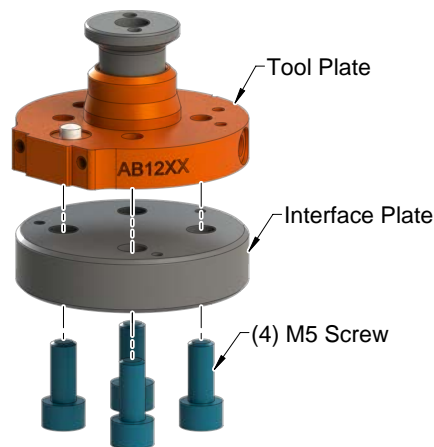


**WARNING:** Do not remove the Tool plate unless the Tool and customer tooling is safely supported. Injury or equipment damage can occur with Tool and tooling not supported. Support the Tool and tooling safely before removing.

**Tools required:** Hex key wrenches

1. Turn off and de-energize all energized circuits; for example, electrical, air, water, etc.
2. While supporting the Tool, uncouple the Master and Tool plates.
3. Place the Tool in a secure location.
4. Disconnect all utilities from the Tool plate and optional module; for example, electrical, air, water, etc.
5. Remove the customer supplied (4) M5 screws that secure the Tool plate to the customer tooling or interface plate.
6. Remove the Tool plate from the customer tooling interface plate.

**Figure 2.2—Standard Tool Plate Installation**



## 2.7 Optional Module Installation

The optional modules are typically installed by ATI prior to shipment. Use the following steps to install or remove optional modules.

### 2.7.1 Installing Optional Modules

**Tools required:** 2 mm or 2.5 mm hex key, torque wrench

**Supplies required:** Clean rag, Loctite 222

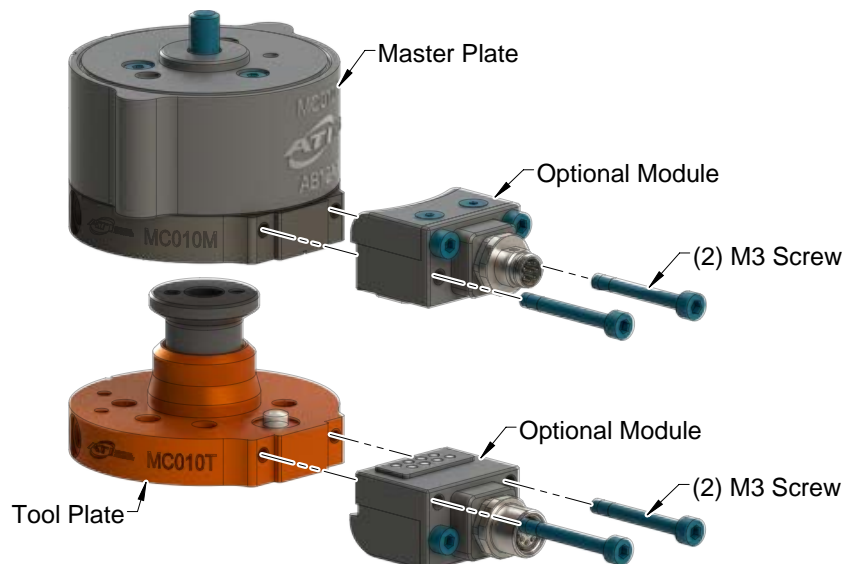
1. Turn off and de-energize all energized circuits; for example, electrical, air, water, etc.
2. While supporting the Tool, uncouple the Master and Tool plates.
3. Place the Tool in a secure location.
4. Wipe down the mounting surfaces with a clean rag.
5. Align the module to the mounting flat as shown in [Figure 2.3](#).
6. If fasteners do not have pre-applied adhesive, apply Loctite 222 to the supplied (2) M3 screws.
7. Install the (2) M3 screws and secure the module to the Master or Tool plate using a 2 mm or 2.5 mm hex key. Refer to [Table 2.1](#) for proper torque for your specific mounting fasteners.
8. Remove all protective caps, plugs, tape, etc from the module prior to operation.
9. Connect the utilities.
10. Safely resume normal operation.

### 2.7.2 Removing Optional Modules

**Tools required:** 2 mm or 2.5 mm hex key

1. Turn off and de-energize all energized circuits; for example, electrical, air, water, etc.
2. While supporting the Tool, uncouple the Master and Tool plates.
3. Place the Tool in a secure location.
4. Disconnect cables, air lines, etc., if required.
5. Remove the (2) M3 screws using a 2 mm or 2.5 mm hex key and lift the module from the Master or Tool plate. Refer to [Table 2.1](#).

**Figure 2.3—Installing and Removing Optional Modules**



### 3. Operation

The Master locking mechanism is manually-driven to couple and uncouple with the Tool plate. The Master plate utilizes mechanical action from the collar to provide lock and unlock force to the locking mechanism.

**NOTICE:** All Tool Changers are initially lubricated using Mobilgrease XHP™ 222 Special grease, an NLGI #2 lithium complex grease with molybdenum disulfide additive. The end user must apply additional lubricant to the locking mechanism components and alignment pins prior to start of service (Refer to [Section 4.1—Cleaning and Lubrication of the Master and Tool Plate](#)). Tubes of lubricant for this purpose are shipped with every Tool Changer. Note: Mobilgrease XHP 222 Special type of lubrication is suited for the locking mechanism and alignment pins.

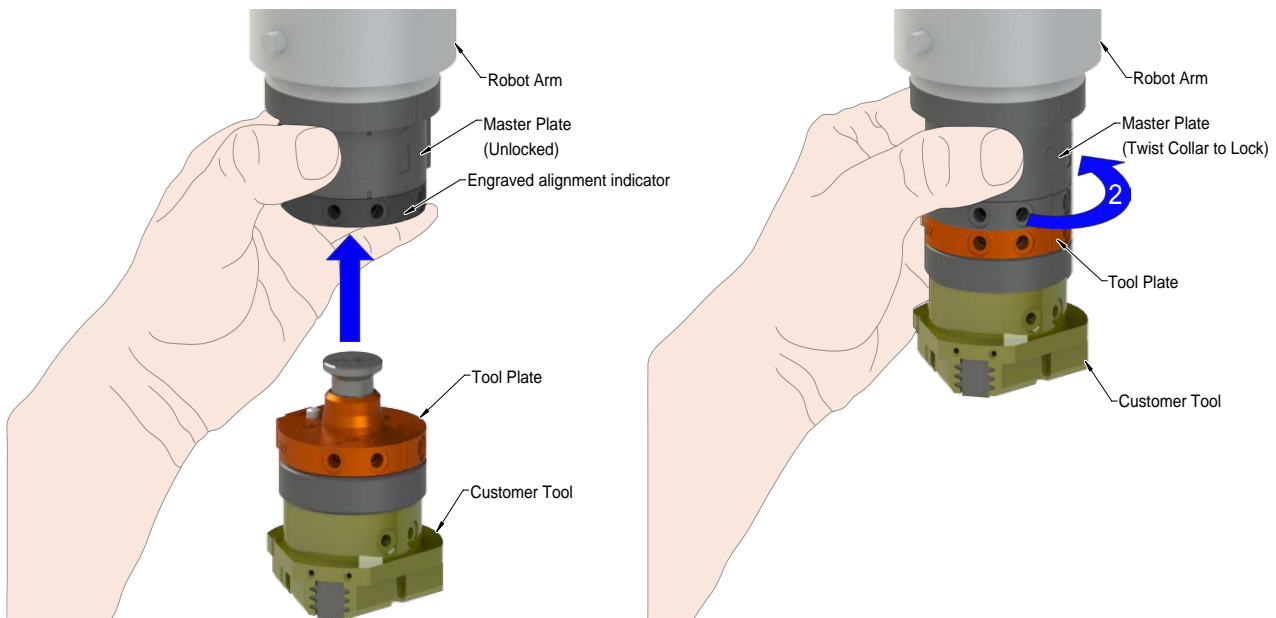
#### 3.1 Coupling Sequence

The locking mechanism must be in the unlocked position when attempting to couple the Tool Changer.

Manually move the Master plate toward the Tool plate and begin to engage the alignment features. Make sure the alignment pin from the Tool plate enters the alignment bushing on the Master plate.

Turn the collar to the locked position until you feel a tactile “click.” The locking balls engage with the tool post. To ensure that the Tool is engaged with the Master, check that there is no gap between the Master and Tool mating surfaces and the locking collar indicates that it is in the Lock position.

Figure 3.1—Coupling Sequence



#### 3.2 Uncoupling Sequence



**CAUTION:** The tool must be supported before attempting to uncouple the Tool Changer. Failure to adhere to this condition will result in damage to the Tool and/or the robot. Securely support the Tool before uncoupling the Tool Changer.

While supporting the Tool, rotate the locking collar to the unlocked position. An engraved visual alignment indicator alerts the user that the locking mechanism is disengaged. It is safe to remove the Tool only when the unit is in the fully unlocked position. Refer to [Figure 3.1](#).

## 4. Maintenance

Once installed, the operation of the Tool Changer is generally trouble free. Regular preventative maintenance can extend the life and provide trouble-free operation of the Tool Changer.



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

Detailed assembly drawings are provided in [Section 8—Drawings](#) of this manual. A visual inspection and preventive maintenance schedule is provided in the following table.

**Table 4.1—Preventive Maintenance Check List**

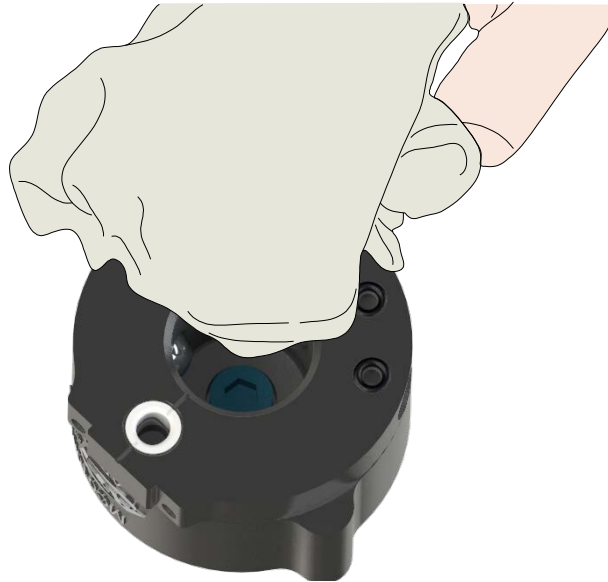
| Application(s)  | Inspection Schedule |
|---|---------------------|
| General Usage Material Handling Docking Station   | Monthly             |
| Welding/Servo/Deburring, Foundry Operations (Dirty Environments)  | Weekly              |
| Checklist   |                     |
| <p><b>Mounting Fasteners/Interface Connections</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Inspect fasteners for proper torque, interferences, and wear. Tighten and correct as required. Refer to <a href="#">Section 2—Installation</a>.</li> </ul> <p><b>Balls/Alignment Pins/Bushing/Bearing Race</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Inspect for wear and proper lubrication. Mobilgrease XHP 222 Special, an NLGI #2 lithium complex grease with molybdenum disulfide additive, is suggested for locking mechanism and alignment pin lubrication. Over time, lubricants can become contaminated with debris. Therefore, it is recommended to thoroughly clean the existing grease and replace with new as needed. Refer to <a href="#">Section 4.1—Cleaning and Lubrication of the Master and Tool Plate</a>.</li> </ul> <p><b>Electrical Contacts/Pin Block (Modules)</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Inspect for damage, debris, and stuck/burnt pins. Clean pin blocks as required, Refer to <a href="#">Section 4.2—Optional Electrical Module Pin Block Inspection and Cleaning</a>.</li> </ul> <p><b>Seals</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Inspect for wear, abrasion, and cuts. Refer to <a href="#">Section 5.2.2—Optional Electrical Module V-ring Seal Inspection and Replacement</a> and <a href="#">Section 5.2.1—O-ring Seal Replacement</a>.</li> </ul> |                     |

## 4.1 Cleaning and Lubrication of the Master and Tool Plate

**Supplies required:** Cotton swabs, clean rag, Mobilgrease XHP 222 Special, an NLGI #2 lithium complex grease with molybdenum disulfide

1. Turn off and de-energize all energized circuits; for example, electrical, air, water, etc.
2. While supporting the Tool, uncouple the Master and Tool plates.
3. Place the Tool in a secure location.
4. Use a clean rag to thoroughly remove the existing lubricant and debris from the ball bearings on the Master.

**Figure 4.1—Cleaning Ball Bearings**



5. Use a cotton swab to thoroughly remove the existing lubricant and debris from the alignment bushing on the Master.

**Figure 4.2—Cleaning Alignment Bushing**



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

**Figure 4.3—Check Ball Bearing Movement**



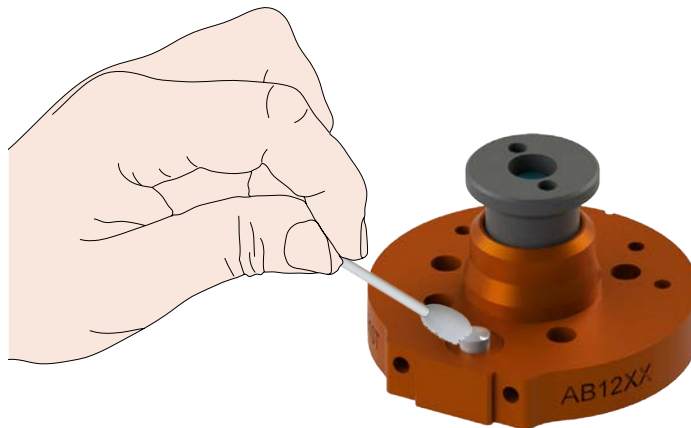
7. Use a clean rag to thoroughly remove the existing lubricant and debris from the tool post on the Tool plate.

**Figure 4.4—Cleaning Tool Post**



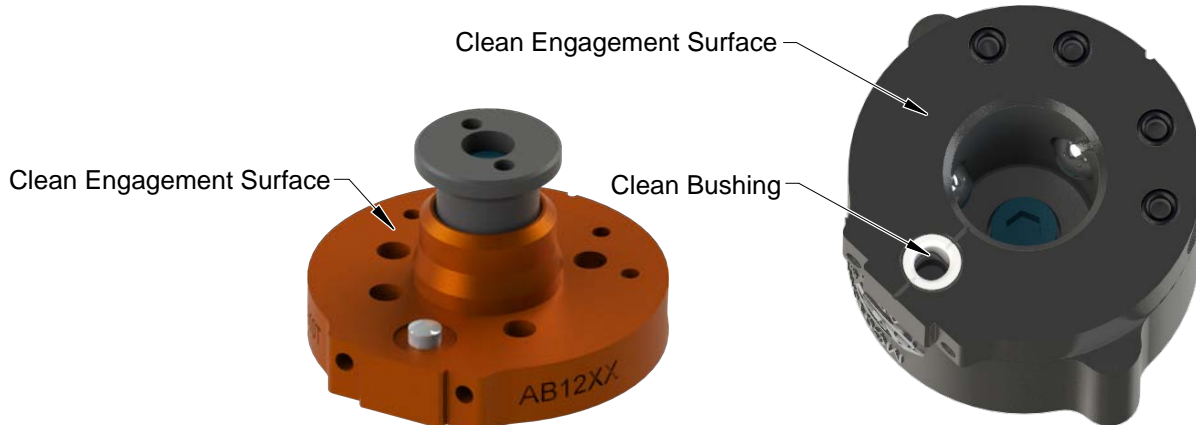
8. Use a cotton swab to thoroughly remove the existing lubricant and debris from the alignment pin.

**Figure 4.5—Cleaning Alignment Pin**



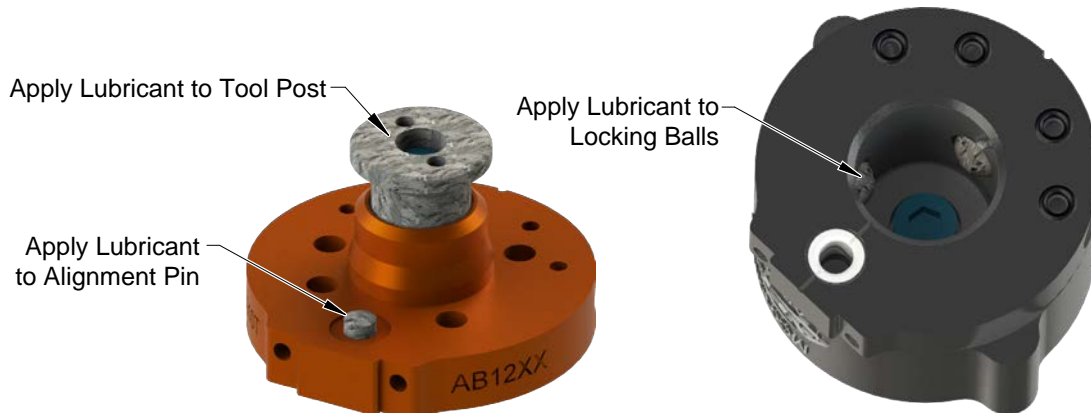
9. Use a clean, lint free rag to remove lubricant and debris from the engagement surfaces and alignment bushing in the Tool plate and Master plate.

**Figure 4.6—Removing Lubricant from Engagement Surfaces of Master and Tool Plates**



10. Apply a light coating of Mobilgrease XHP 222 Special grease to the locking balls, tool post, and the alignment pin.

**Figure 4.7—Applying Lubricant to Master and Tool Plates**



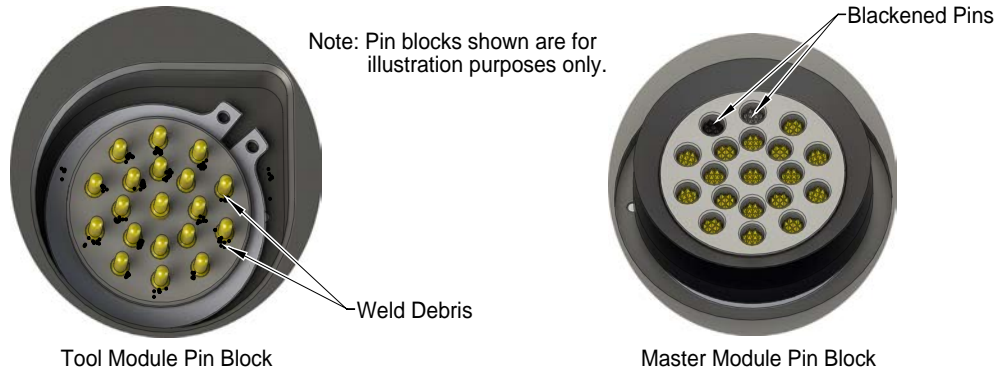
11. Safely resume normal operation.

## 4.2 Optional Electrical Module Pin Block Inspection and Cleaning

**Tools required:** Nylon Brush (ATI part number 3690-0000064-60)

1. Turn off and de-energize all energized circuits; for example, electrical, air, water, etc.
2. While supporting the Tool, uncouple the Master and Tool plates.
3. Place the Tool in a secure location.
4. Inspect the Master and Tool pin blocks for any debris or darkened pins.

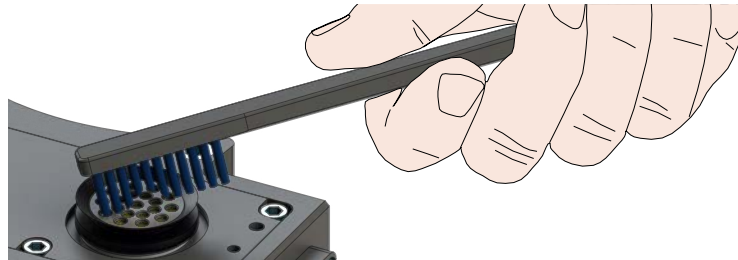
**Figure 4.8—Inspect Master and Tool Pin Blocks**



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

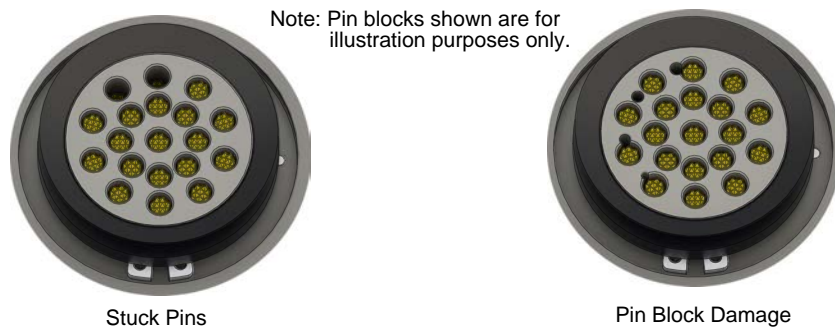
**NOTICE:** Do not use an abrasive media, cleaners, or solvents to clean the contact pins. Using abrasive media, cleaners, or solvents will cause damage to the contact surface or cause pins to stick. Clean contact surfaces with a vacuum or non-abrasive media such as a nylon brush (ATI part number 3690-0000064-60)

**Figure 4.9—Clean Pin Blocks with a Nylon Brush**



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

**Figure 4.10—Stuck Pin and Pin Block Damage**



7. If stuck pins or pin block damage exists, contact ATI for possible pin replacement procedures or module replacement.
8. Safely resume normal operation.



## 5. Troubleshooting and Service Procedures

The following section provides troubleshooting and service information to help diagnose conditions and repair the Tool Changer.



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

### 5.1 Troubleshooting

Refer to the following table for troubleshooting information:

| Table 5.1—Troubleshooting              |  |  |
|--|--|--|
| Symptom                                | Cause  | Resolution   |
| Unit does not lock or unlock.          | The locking collar is difficult to turn or does not reach the locked position. | Clean and lubricate as needed to restore smooth operation. Refer to <a href="#">Section 4.1—Cleaning and Lubrication of the Master and Tool Plate</a> .          |
|  |  | Verify there is no debris between the Master and Tool prior to locking.  |
|  |  | Check the Tool is properly oriented in the Master.   |
|  |  | Ensure the Master is in the Unlocked position.   |
| Loss of air pressure to tooling.       | O-ring seal worn or damaged.   | Replace O-ring seals. Refer to <a href="#">Section 5.2.1—O-ring Seal Replacement</a> .   |
| Units Equipped with Electrical Modules |  |  |
| Contamination in electrical contacts.  | V-ring seal damaged.   | Inspect V-ring seal for damage, replace damaged seal. Refer to <a href="#">Section 5.2.2—Optional Electrical Module V-ring Seal Inspection and Replacement</a> . |

## 5.2 Service Procedures

Component replacement and adjustment procedures are provided in the following section.

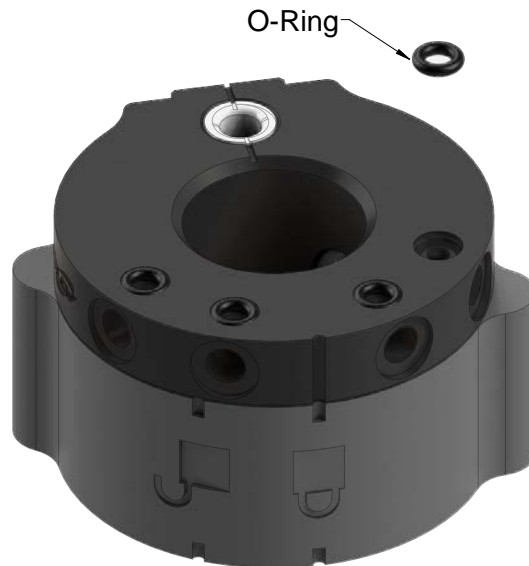
### 5.2.1 O-ring Seal Replacement

When the Master and Tool plates are coupled, the O-rings ensure a seal for air utility pass-through. O-rings are seated in the Master body.

**Parts required:** Refer to [Section 6.1—MC-10 Master Plate Serviceable Parts](#).

1. Turn off and de-energize all energized circuits; for example, electrical, air, water, etc.
2. While supporting the Tool, uncouple the Master and Tool plates.
3. Place the Tool in a secure location.
4. To remove the existing seal, pinch the edge of the seal with your fingers and pull the seal away from the body of the Master.
5. To install a new seal, stretch the new seal into the machined seal seat of the Master body.
6. Push the seal hub down using your finger tip.
7. Safely resume normal operation.

**Figure 5.1—Replacing O-rings**

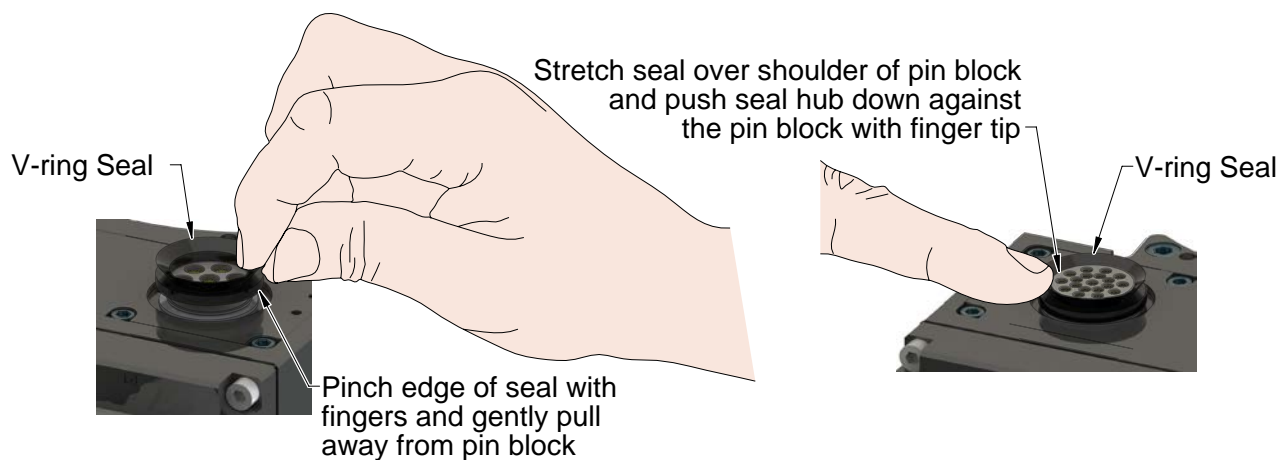


## 5.2.2 Optional Electrical Module V-ring Seal Inspection and Replacement

The seal protects the electrical connection between the Master and Tool module. If the seal becomes worn or damaged, it must be replaced.

1. Turn off and de-energize all energized circuits; for example, electrical, air, water, etc.
2. While supporting the Tool, uncouple the Master and Tool plates.
3. Place the Tool in a secure location.
4. To remove the existing seal, pinch the edge of the seal with your fingers and pull the seal away from the pin block on the Master.
5. To install a new seal, stretch the new seal over the shoulder of the pin block.
6. Push the seal hub down against the pin block using your finger tip.
7. Safely resume normal operation.

**Figure 5.2—V-ring Seal Replacement**



## 6. Serviceable Parts

### 6.1 MC-10 Master Plate Serviceable Parts

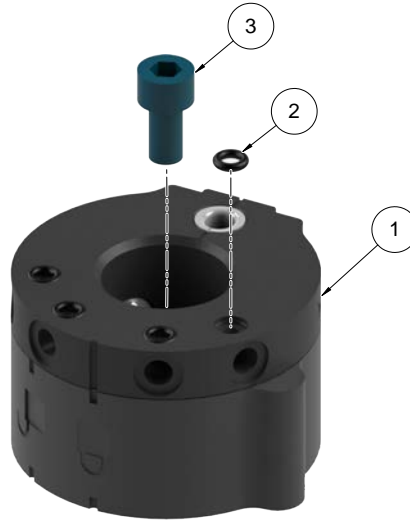


Table 6.1—MC-10 Master Plate

| Item No. | Qty | Part Number      | Description   |
|----------|-----|------------------|---|
| 1        | 1   | 9122-010M-000    | MC-10 Manual Coupler Base Master with (4) M5 Ports, Orange                          |
|          |     | 9122-010M-000-B  | MC-10 Manual Coupler Base Master with (4) M5 Ports, Black                           |
| 2        | 4   | 3410-0001016-01  | O-ring AS568-006 Buna-N D70   |
| 3        | 1   | 3500-1066012-15A | M6X12 Socket Head Cap Screw, 12.9, ISO4762/DIN912, ES-ATI-007, YL M-spheres/IFI 525 |

### 6.2 MC-10 Tool Plate Serviceable Parts

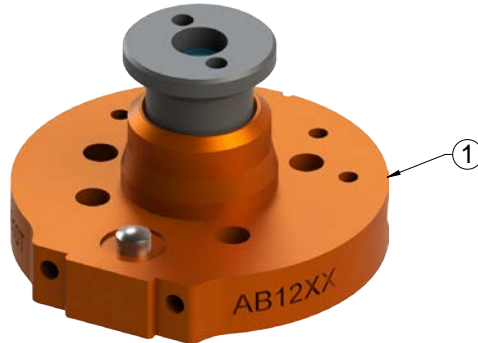


Table 6.2—MC-10 Tool Plate

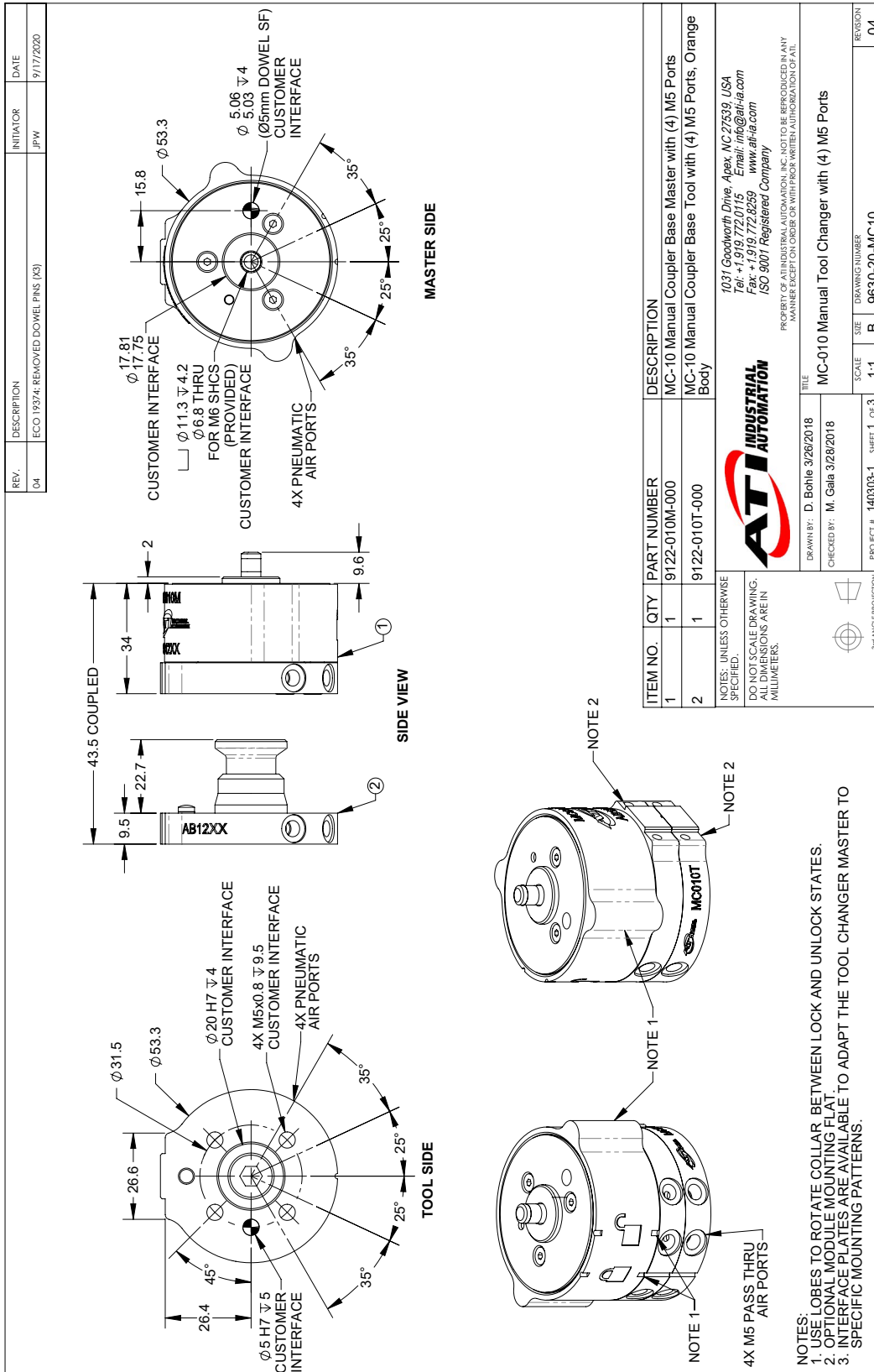
| Item No. | Qty | Part Number     | Description  |
|----------|-----|-----------------|--|
| 1        | 1   | 9122-010T-000   | MC-10 Manual Coupler Base Tool with (4) M5 Ports, Orange |
|          |     | 9122-010T-000-B | MC-10 Manual Coupler Base Tool with (4) M5 Ports, Black  |

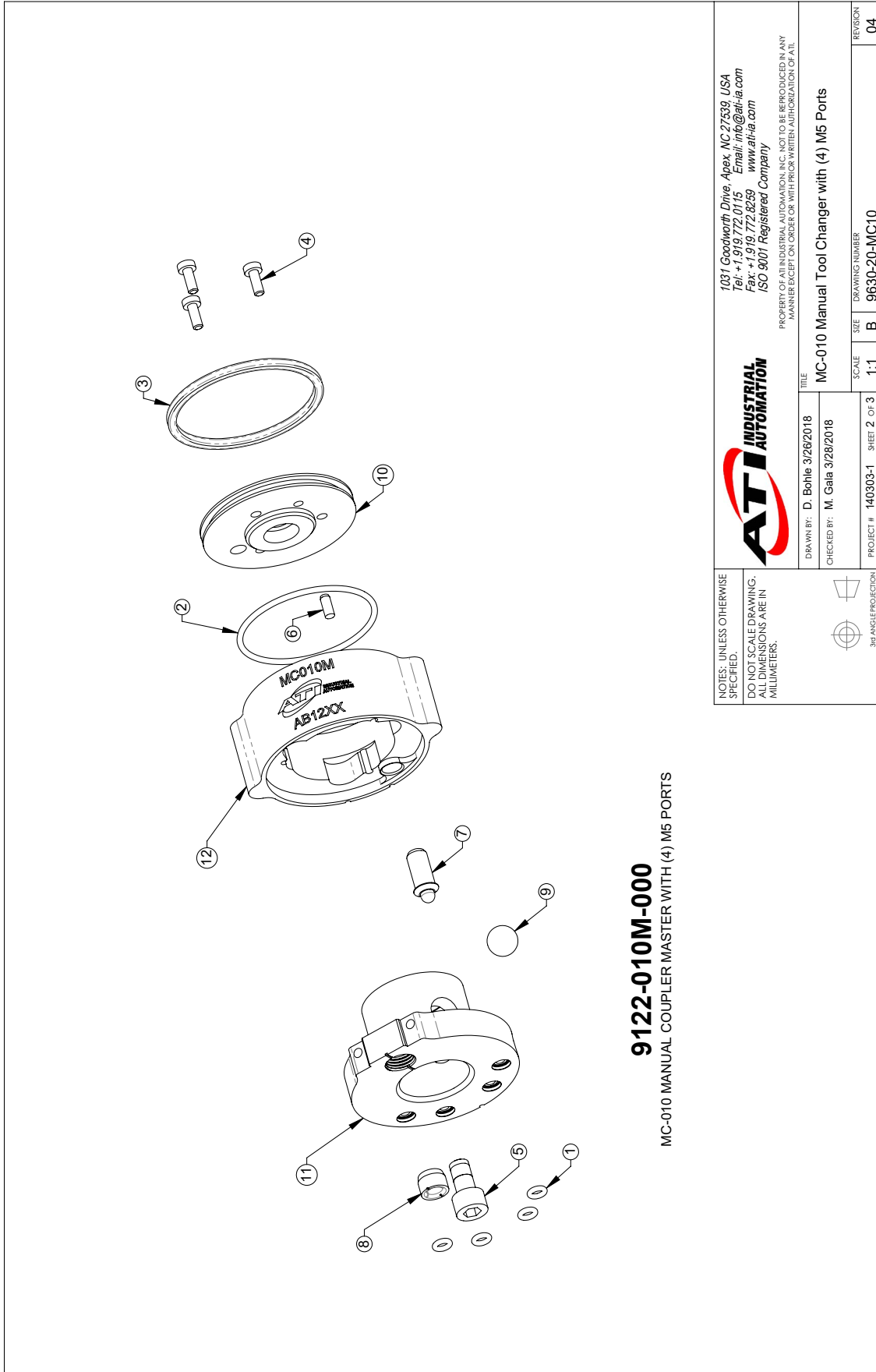
## 7. Specifications

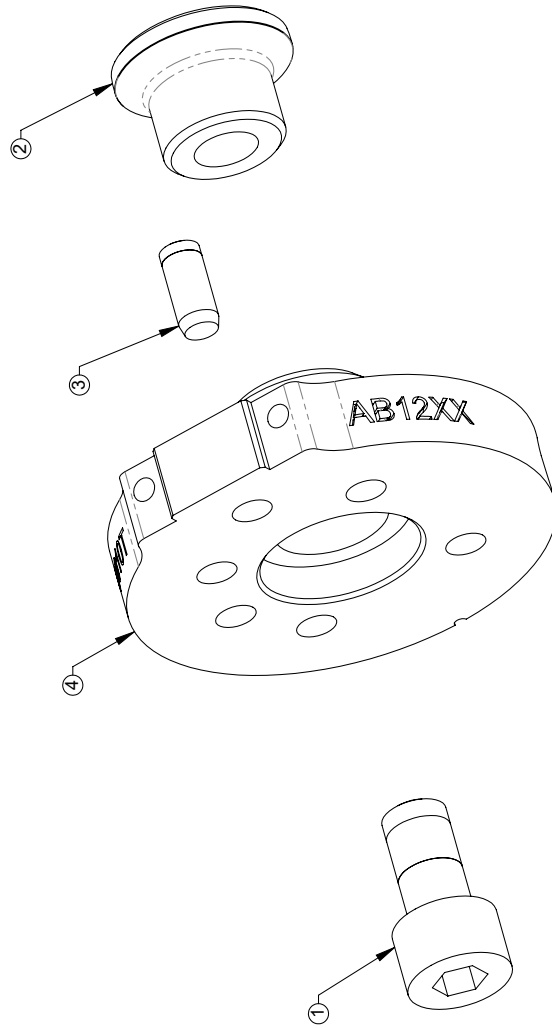
| Table 7.1—Master and Tool Plate Specifications |                            |   |
|--|----------------------------|---|
| <b>Recommended Max Payload</b>                 | 11 lbs (5 kg)              | The mass attached to the Tool Changer.  |
| <b>Operating Temperature Range</b>             | -20–150°F<br>(-30–66°C)    | Optimal operating temperature range.  |
| <b>Recommended Max Moment X-Y (Mxy)</b>        | 33 lbf-in                  | Maximum recommended working load for optimum performance of the Tool Changer. |
| <b>Recommended Static Moment Z (Mz)</b>        | 110 lbf-in                 | Maximum recommended static load for optimum performance of the Tool Changer.  |
| <b>Positional Repeatability</b>                | ± 0.0035 in                | Repeatability tested at rated load at 30,000 cycles.                          |
| <b>Weight</b>                                  | 0.84 lbs (0.381 kg)        | Master 0.65 lbs (0.295 kg) / Tool 0.19 lbs (0.086 kg).                        |
| <b>Pneumatic Pass-Through Ports</b>            | (4) M5 Air Only            | Optional. Specify –NP for version with No Ports.                              |
| <b>Mounting/Customer Interface</b>             | Master plate               | ISO 50.   |
|  | Tool plate                 | ISO 31.5. Refer to <a href="#">Section 8—Drawings</a> .                       |
| <b>Torque to Lock/Unlock</b>                   | 20-25 in-lbs (2.25-2.8 Nm) |   |
| <b>Rated Cycle Life</b>                        | 30,000                     |   |

## 8. Drawings

### 8.1 9630-20-MC10







**9122-010T-000**  
 MC-010 MANUAL COUPLER TOOL WITH (4) M5 PORTS

NOTES: UNLESS OTHERWISE SPECIFIED:  
 DO NOT SCALE DRAWING.  
 ALL DIMENSIONS ARE IN MILLIMETERS.



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DRAWN BY: D. Bohle 3/26/2018  
 CHECKED BY: M. Gala 3/28/2018

TITLE  
 MC-010 Manual Tool Changer with (4) M5 Ports



PROJECT # 140303-1 SHEET 3 OF 3

SCALE 2:1

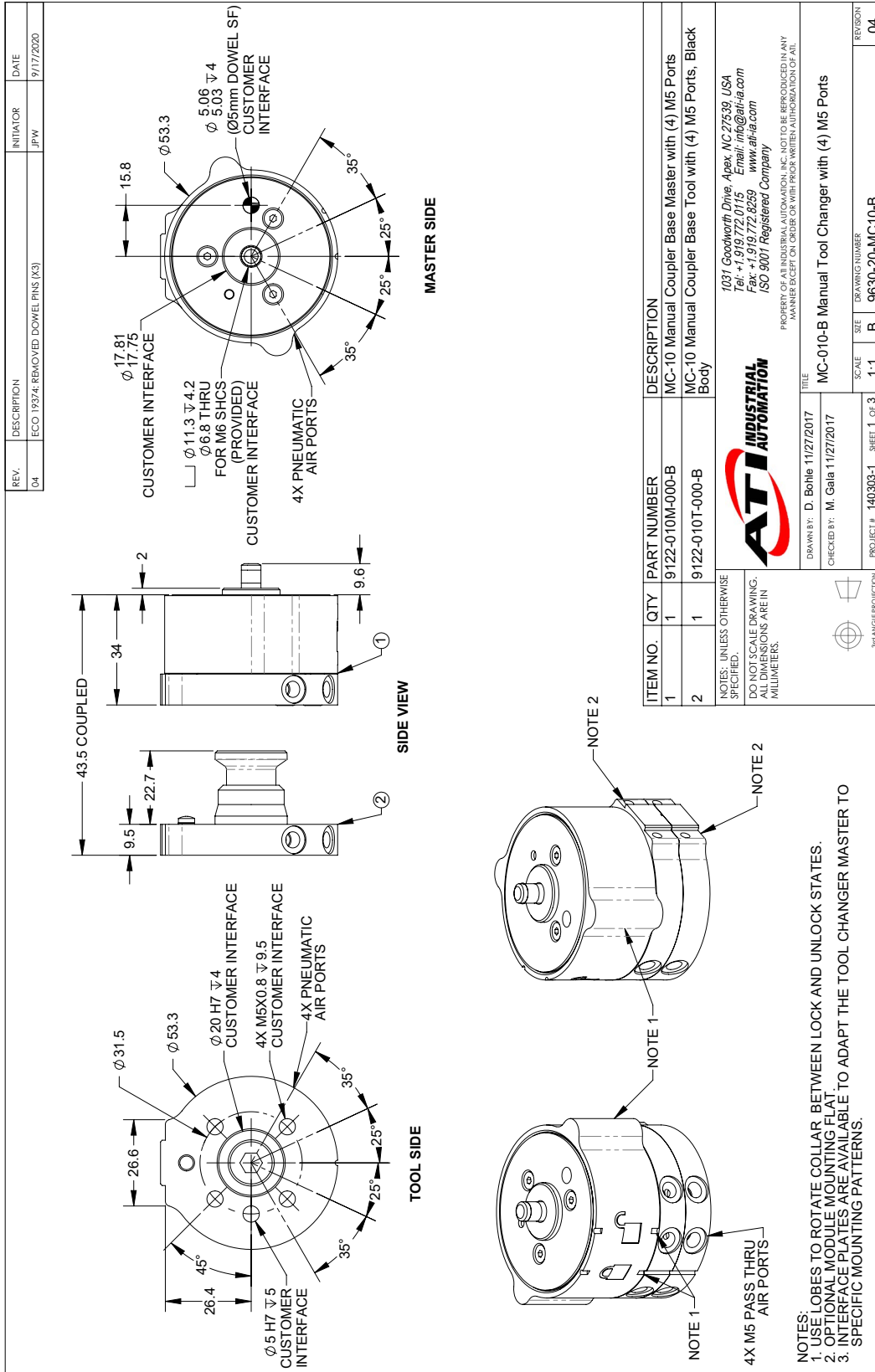
SIZE B

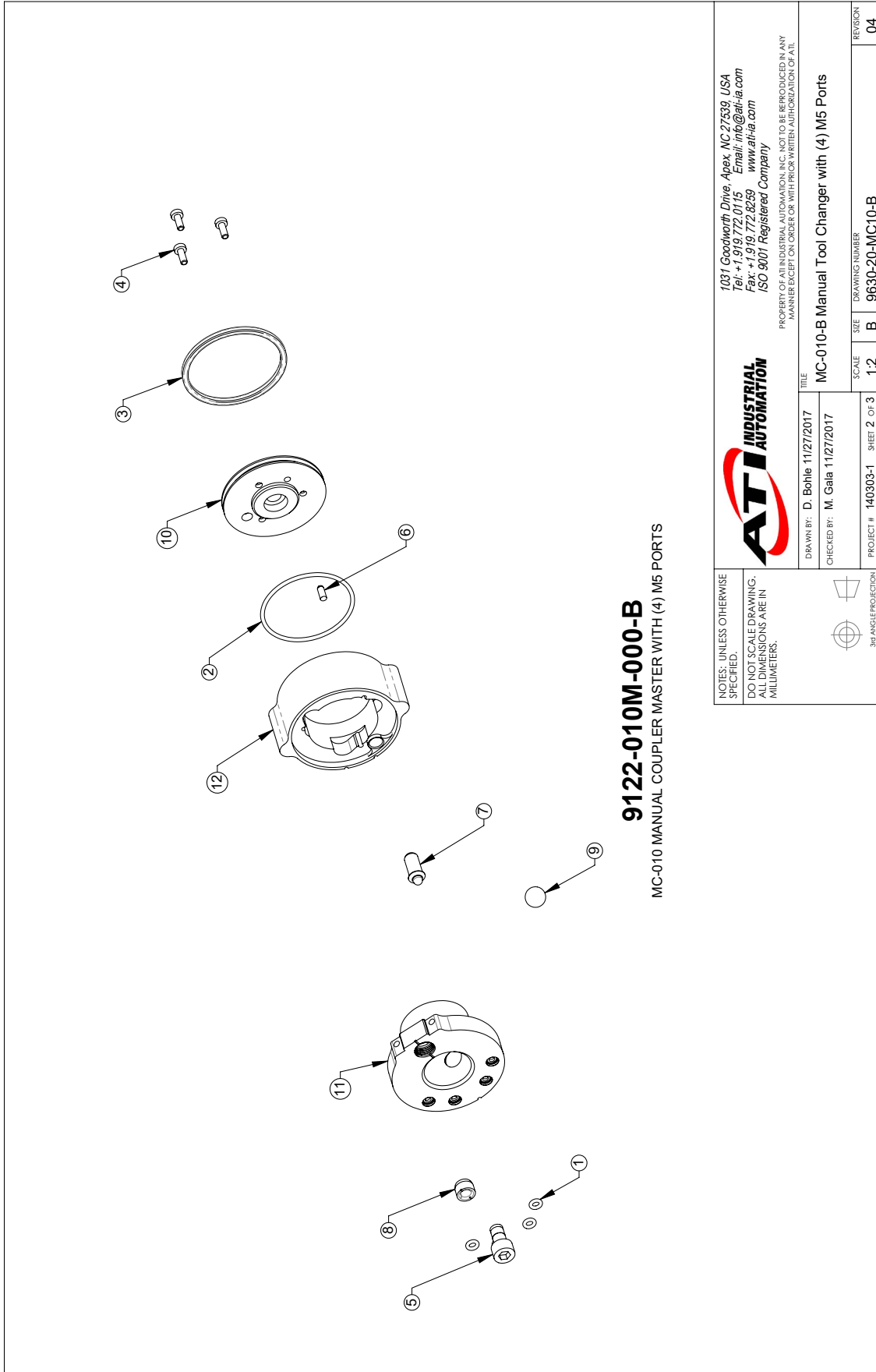
DRAWING NUMBER 9630-20-MC10

REVISION 04



8.2 9630-20-MC10-B





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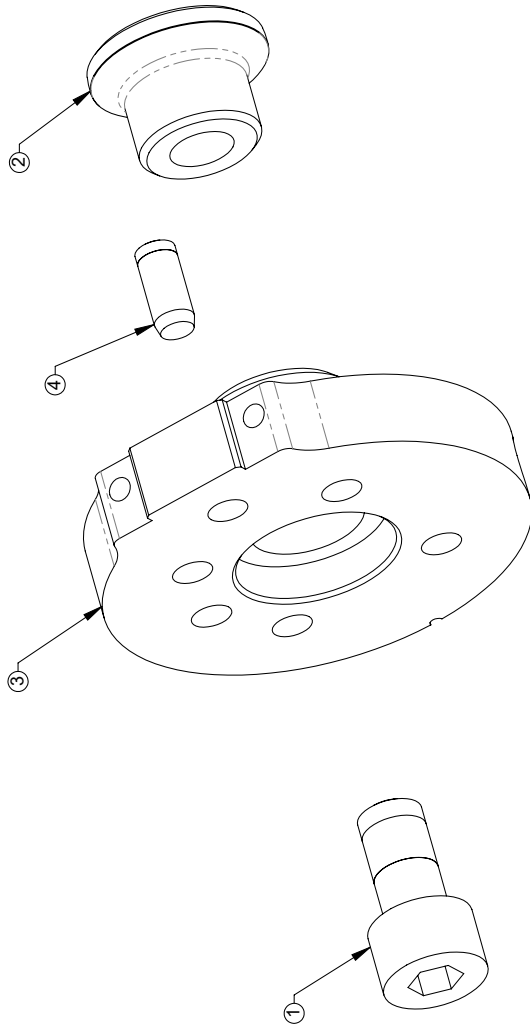
3RD ANGLE PROJECTION

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|                                 |   |                    |                                |              |
|---------------------------------|---|--------------------|--------------------------------|--------------|
| DRAWN BY: D. Bohle 11/27/2017   | TITLE: MC-010-B Manual Tool Changer with (4) M5 Ports | SCALE: 1:2         | DRAWING NUMBER: 9630-20-MC10-B | REVISION: 04 |
| CHECKED BY: M. Galia 11/27/2017 |   | PROJECT # 140303-1 | SHEET 2 OF 3                   |              |



**9122-010T-000-B**  
 MC-010 MANUAL COUPLER TOOL WITH (4) M5 PORTS

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 PROJECT # 140303-1 SHEET 3 OF 3

TITLE MC-010-B Manual Tool Changer with (4) M5 Ports  
 SCALE 2:1  
 SIZE B  
 DRAWING NUMBER 9630-20-MC10-B

REVISION 04