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F. High Current Modules

PY41—High Current Module

1. Product Overview

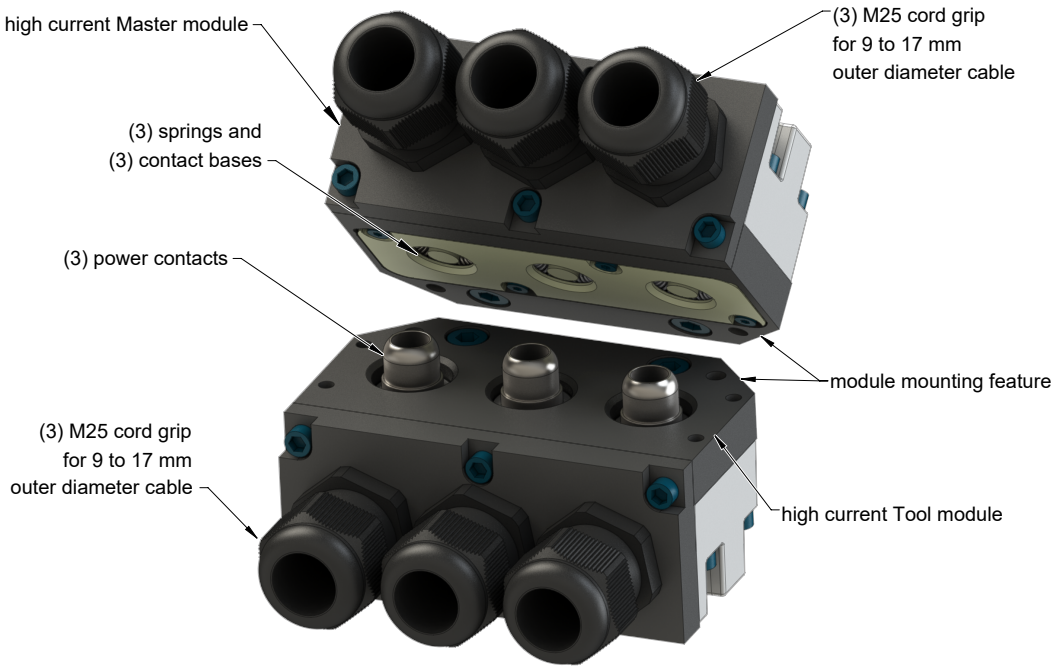
The PY41 module carries high current from a power supply to customer tooling. The module has (3) contacts that are each capable of carrying 210 Amps; the voltage must not exceed 1000 VAC. Power must be off when coupling and uncoupling. Over-current protection in the primary power supply circuit is recommended.

DANGER: This module has a voltage of 50 V or greater; always remove power before contacting the module. Arcing and damage occur if power is not removed from the module during maintenance or service. Always remove power before attaching or disconnecting cables, separating or inserting the mating couplers, or making any contact with the Tool Changer.

The PY41 modules use proprietary electric contacts to transfer current from the Master to the Tool. The contacts allow efficient coupling/uncoupling without high forces. If required, the contact springs on the Master or pins on the Tool can be replaced without removing the wiring. The contacts on the Master side contain a central insulated post and are recessed below the surface. The Master module's contact pins are designed so that an average adult finger cannot reach the metallic parts.

Customers must supply the cables. For cable installation instructions, refer to *Section 2.1—Cable Preparation and Installation.*

Figure 1.1 —PY41 Modules



When a Tool module is not used on the Tool side, a PY4A-T may be installed to protect the Master side power module from dust, debris, and weld spatter.

Figure 1.2—Protective Cover for Tool-side (PY4A)

2. Installation

On the standard model, the prepared cable ends are routed through the cord grips and into the module. The conductors are attached to the contact bases. Ring terminals are supplied for use with #2 AWG and #4 AWG cables.

The following procedures outline installation or removal of the modules and how to connect cables to the contacts.

DANGER: This module has a voltage of 50 V or greater; always remove power before contacting the module. Arcing and damage occur if power is not removed from the module during maintenance or service. Always remove power before attaching or disconnecting cables, separating or inserting the mating couplers, or making any contact with 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 (e.g. 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 in the tool stand 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.

CAUTION: Do not use fasteners with pre-applied adhesive more than once. Fasteners might become loose and cause equipment damage. Always apply new thread locker when reusing fasteners.

2.1 Cable Preparation and Installation

CAUTION: Only use the supplied ATI ring terminals. Using other ring terminals can prevent the module from correctly operating and may result in equipment damage or injury.

Tools required: *3 mm and 4 mm hex keys, torque wrench, wire stripper, manual/hydraulic crimping tool, open wrench*

Supplies required: *Loctite® 222*

1. Using a 3 mm hex key, remove the M4 socket head cap screw, and lift the cover off of the module body.

NOTICE: Module cover requires (5) M4 socket head cap screws. However, on initial shipment, PY41 module has only (1) M4 socket head cap screw installed to module cover. The other (4) M4 socket head cap screws used to secure the module cover are provided in a separate bag.

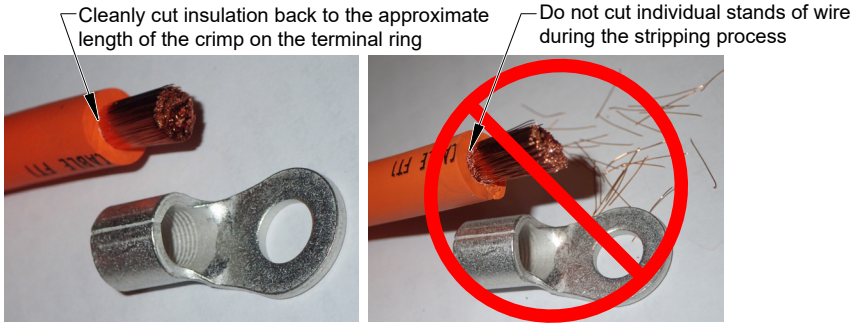
NOTICE: If using larger diameter cables, remove the inner grommet inside of each cord grip, but the outer grommet must remain.

2. Select the proper size ring terminals (supplied by ATI) for the customer supplied cable.
   Note: Where multiple ring terminal sizes are supplied, select the one that best fits the cable.

NOTICE: To determine the proper size hex dies for the ring terminal and cable, refer to the manufacturer's instructions of the customer-supplied crimping tool. For specific wire preparation and crimping instructions, refer to the manufacturer's instructions of the cable.

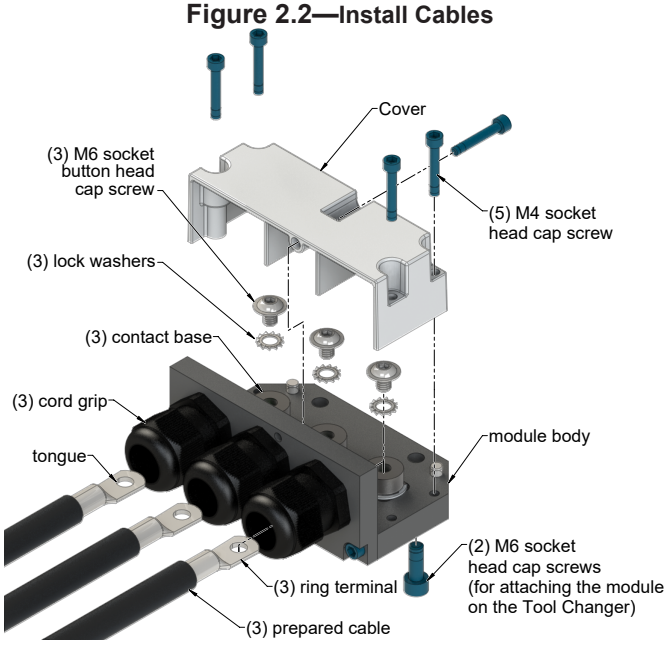
3. Prepare the cable ends by stripping the insulation back to the approximate length of the ring terminal's crimp, about 0.5" (12.7 mm). Avoid cutting wire strands, while stripping the cable insulation.

Figure 2.1—Prepare Cables



4. Slide the ring terminal over the stripped end of the cable. Ensure no wire strands are coming out of the ring terminal.
5. Following the manufacturer's instructions for the customer-supplied crimp tool, crimp the ring terminal onto the cable.
6. If the ring terminal tongue distorts during crimping, flatten and straighten the tongue so that its flat end is parallel to the cable's center axis.

Figure 2.2—Install Cables



7. Using an open wrench, loosen the cord grips, and route the cable through the cord grips.
8. Install all (3) ring terminals and cables so that the flat end of the terminal touches the contact base.
9. Secure the (3) ring terminals to the contact bases with the (3) lock washers and (3) M6 hex head cap screws. Tighten finger tight.
10. Using a 4 mm hex key, tighten the (3) M6 hex head cap screws to 50 in-lbs (5.65 Nm).
11. Beginning with the middle cord grip, tighten the cord grip dome nuts to 44 in-lb (5 Nm) (depending on specific customer cable, the torque value may need to be increased to prevent cable movement).
12. Apply Loctite 222 to (5) M4 socket head cap screws.
13. Using a 3 mm hex key, install the (5) M4 socket head cap screws to secure the cover to the module body. Tighten to 96 in-oz (0.68 Nm).
14. Install the module on the Tool Changer. Use a 5 mm hex key to tighten the (2) M6 socket head cap screws 45 in-lbs (5 Nm). Note: screws have pre-applied adhesive.

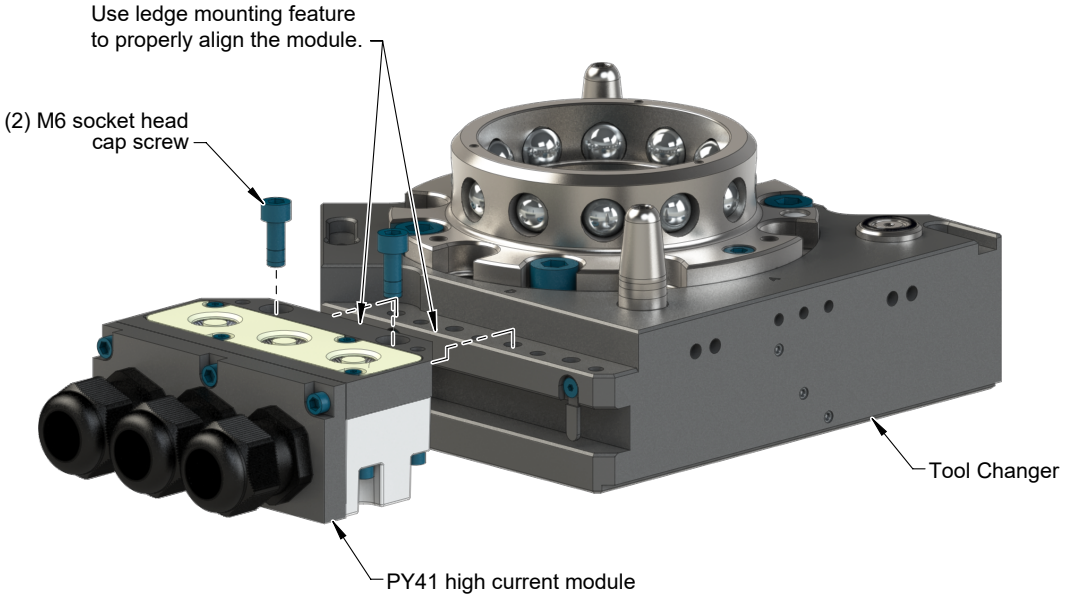
2.2 Module Installation

Tools required: *5 mm hex key*

Supplies required: *Clean lint-free cloth, Loctite® 242*

1. Clean the mating surfaces with a clean, lint-free cloth.
2. Place the module on the Tool Changer body.
3. If fasteners do not have pre-applied adhesive, apply Loctite 242 to the (2) M6 socket head cap screws.
4. Using a 5 mm hex key, install the (2) M6 socket head cap screws to secure the module to the Tool Changer. Tighten to 45 in-lbs (5.1 Nm).
5. After the procedure is complete, resume normal operation.

Figure 2.3—Module Installation



2.3 Module Removal

Tools required: *5 mm hex key*

Supplies required: *marker pen*

1. Place the Tool in a secure location.
2. Uncouple the Master and Tool plates.
3. Turn off and de-energize all energized circuits, for example: power and pneumatics.
4. Use a marker pen to indicate where the module was installed.
5. Disconnect all utility connections.
6. Using a 5 mm hex key, remove the (2) M6 socket head cap screws using a 5 mm hex key and lift the module off the Tool Changer.

3. Operation

The high current modules are designed to carry large currents to various industrial devices, providing a separable joint in the power wiring. To maximize the service life of these components, follow these points:

WARNING: The contacts are not a switch. For safety and to prevent equipment damage, disconnect and drain all power before coupling or uncoupling the Tool Changer or Utility Coupler.

CAUTION: Do not couple or uncouple the high-current modules unless electrical power has been disconnected and discharged both upstream and downstream from the modules. Arcing and contact damage will occur. Remove power and discharge both upstream and downstream modules before coupling or uncoupling modules.

CAUTION: Improper cable routing can result in wires and cables being pinched in the joint between the Tool Changer plates and premature failure of the electrical connectors. Properly route and secure all cables, particularly on the Master side.

CAUTION: Always protect the un-used Tool modules when not coupled to a Master module. Dust, debris, and weld spatter can contaminate the contacts. Contamination can cause arcing and a significant decrease in contact life.

4. Maintenance

The condition of the contacts should be checked periodically. Use an air hose to remove contamination from the contacts. During inspection:

- Ensure the modules are securely fastened to the Tool Changer.
- Visually inspect each spring for damage or debris. Do not touch the spring. If damaged or contaminated, replace the spring with a new one; refer to *Section 5.2.3—Spring Replacement*.

DANGER: This module has a voltage of 50 V or greater; always remove power before contacting the module. Arcing and damage occur if power is not removed from the module during maintenance or service. Always remove power before attaching or disconnecting cables, separating or inserting the mating couplers, or making any contact with 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 (e.g. 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.

CAUTION: Do not touch a spring during inspection. If the spring needs to be replaced, verify a new and spare spring is on-site; refer to *Section 6—Serviceable Parts and Special Tools* for the correct part number. Then replace the old spring per *Section 5.2.3—Spring Replacement*. Touching a spring that is still used for operation may cause permanent damage to the component and cause equipment down-time.

5. Troubleshooting and Service Procedures

For problems that might arise during operation, the following sections provide troubleshooting information to help identify the cause and service procedures to help correct problems.

DANGER: This module has a voltage of 50 V or greater; always remove power before contacting the module. Arcing and damage occur if power is not removed from the module during maintenance or service. Always remove power before attaching or disconnecting cables, separating or inserting the mating couplers, or making any contact with 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 (e.g. 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

The high current modules provide a separable joint in the cabling between power sources and industrial devices. Failure of the industrial devices to operate for any reason must be identified.

Table 5.1—Troubleshooting

Symptom	Possible Cause	Correction
Power is malfunctioning.	An object is trapped between the modules.	Remove the object, and then re-attempt coupling the Tool Changer.
	The contacts have become contaminated from the surrounding environment.	Ensure the Master side contacts are debris free. Clean the Tool side pins.
	The contact pins have separated.	Remove any contamination on the contacts with an air hose. **Do not touch the springs with any tools.**
		The air supplied to the Tool Changer is below the recommended specification or the incorrect valve is being used. For pneumatic requirements, refer to the ATI Tool Changer manual.
	Contacts on a module are damaged from being coupled and uncoupled under a load.	Revise the operating process to only couple and uncouple with power disconnected and discharged. Replace module contacts, refer to *Section 5.2.1—Master Module Insulator Post and Contact Replacement* and *Section 5.2.2—Tool Module Contact Replacement*.
	A cable is pinched, torn, or worn. A contact base or contact spring is worn or damaged.	Inspect cables and contact base for damage. To replace the cables, refer to *Section 2.1—Cable Preparation and Installation*. To replace the contact bases or springs, refer to *Section 5.2—Service Procedures*.

5.2 Service Procedures

Instructions for component replacement are in the following procedures.

CAUTION: Do not use fasteners with pre-applied adhesive more than once. Fasteners might become loose and cause equipment damage. Always apply new thread locker when reusing fasteners.

5.2.1 Master Module Insulator Post and Contact Replacement

NOTICE: Always replace Master and Tool contact tips at the same time (as pairs). Failure to change both halves of a mating pair will result in decreased life of the new component.

Refer to *Figure 5.1*.

Parts required: *Refer to Section 8—Drawings.*

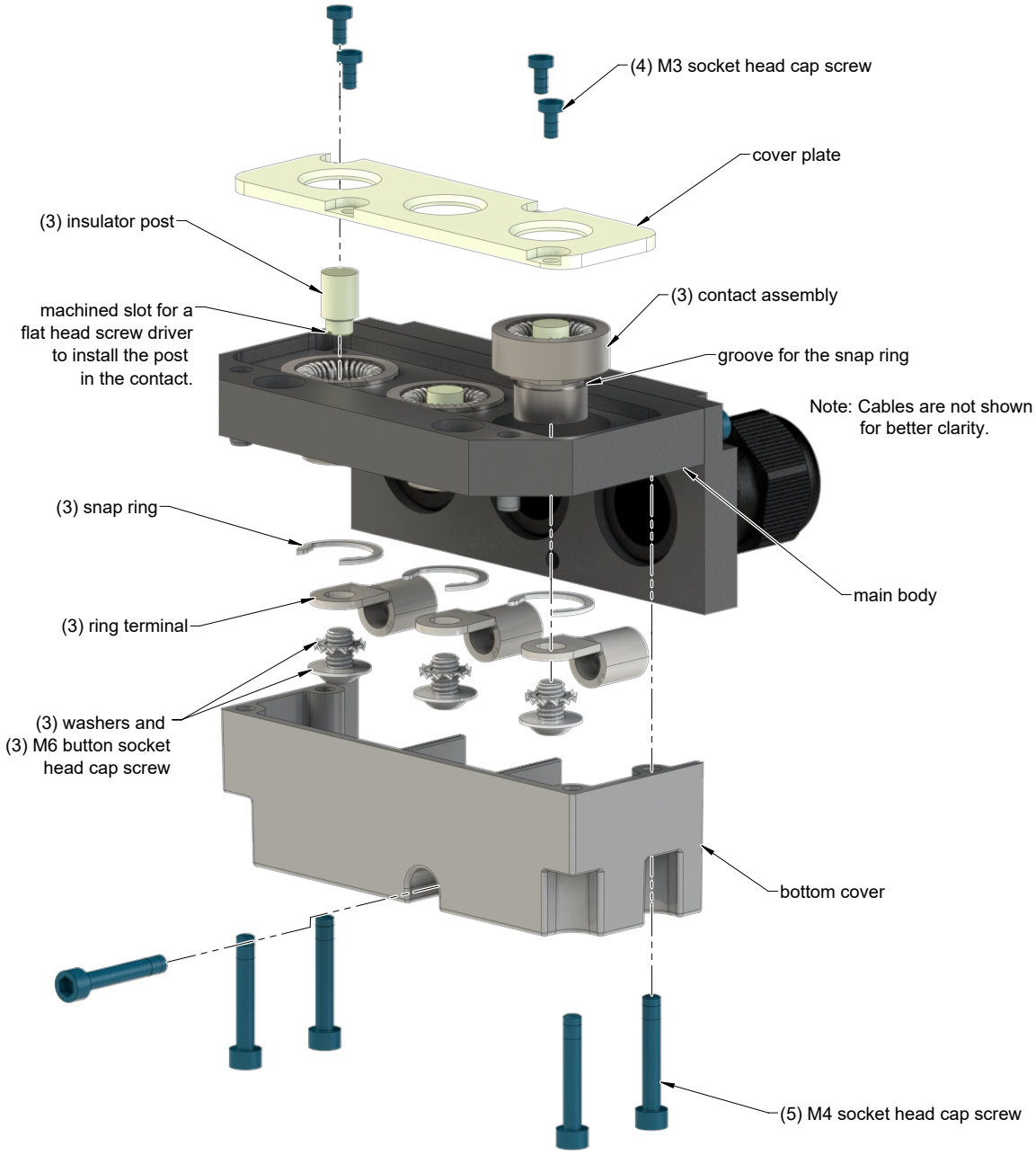
Tools required: *2.5 mm, 3 mm, and 4 mm hex key, torque wrench, pliers, flat head screw driver*

Supplies required: *Loctite® 425 and Loctite® 222*

Removal:

1. Place the Tool in a secure location.
2. Uncouple the Master and Tool plates.
3. Turn off and de-energize all energized circuits, for example: power and pneumatics.
4. Use a 2.5 mm hex key to remove the (4) M3 socket head cap screws that secure the cover plate to the main body.
5. Remove the cover plate, and set aside.
6. Use a 3 mm hex key to remove the (5) M4 socket head cap screws that secure the bottom cover to the main body.
7. Remove the bottom cover, and set aside.
8. Use a 4 mm hex key to remove the (3) M6 button screws and (3) washers from the contact assemblies. Set aside.
9. If only removing the insulator posts and not all of the contact assemblies:
   a. Use a flat head screw driver to remove the insulator posts from the contact assemblies.
   b. Go to step *11*.
10. If removing all of the contact assemblies:
    a. Remove the (3) snap rings from the bases of the contact assemblies.
    b. Use a flat head screw driver to remove the insulator posts.
    c. Remove the contact assemblies.
    d. Go to step *12*.

Figure 5.1—Master Module Insulator Post and Contact Replacement



Installation:

11. If only installing the insulator posts and not all of the contact assemblies:
    a. Apply Loctite 425 to the threads of the insulator posts.
    b. Insert the insulator posts in the contact assemblies.
    c. Use a flat head screw driver to tighten the posts to 96 in-oz (0.67 Nm).
    d. Go to step *13*.

12. If installing all of the contact assemblies:
    a. Apply Loctite 425 to the threads of the insulator posts.
    b. Insert the insulator posts in the contact assemblies.
    c. Use a flat head screw driver to tighten the posts to 96 in-oz (0.67 Nm).
    d. Place the contact assemblies in the main body.
    e. Secure the contact assemblies with the snap rings.
13. Install the cover plate on the main body:
    a. Apply Loctite 222 to the threads of the (4) M3 socket head cap screws.
    b. Use a 2.5 mm hex key to install the (4) M3 socket head cap screws. Tighten to 96 in-oz (0.67 Nm).
14. Secure the ring terminals to the contact assemblies:
    a. Insert (3) M6 button socket hex screws with the (3) washers through the ring terminals and in the contact assembly.
    b. Use a 4 mm hex key to tighten the (3) M6 socket head cap screws 10 in-lb (1.13 Nm).
15. Install the bottom cover on the main body:
    a. Apply Loctite 222 to the (5) M4 socket head cap screws.
    b. Use a 3 mm hex key to install the (5) M4 socket head cap screws and secure the bottom cover to the main body. Tighten 96 in-oz (0.67 Nm).
16. After the procedure is complete, resume normal operation.

5.2.2 Tool Module Contact Replacement

NOTICE: Always replace Master and Tool contact tips at the same time (as pairs). Failure to change both halves of a mating pair will result in decreased life of the new component.

Refer to *Figure 5.2*.

Parts required: *Refer to Section 8—Drawings.*

Tools required: *3 mm and 4 mm hex key, torque wrench, pliers*

Supplies required: *Loctite® 222*

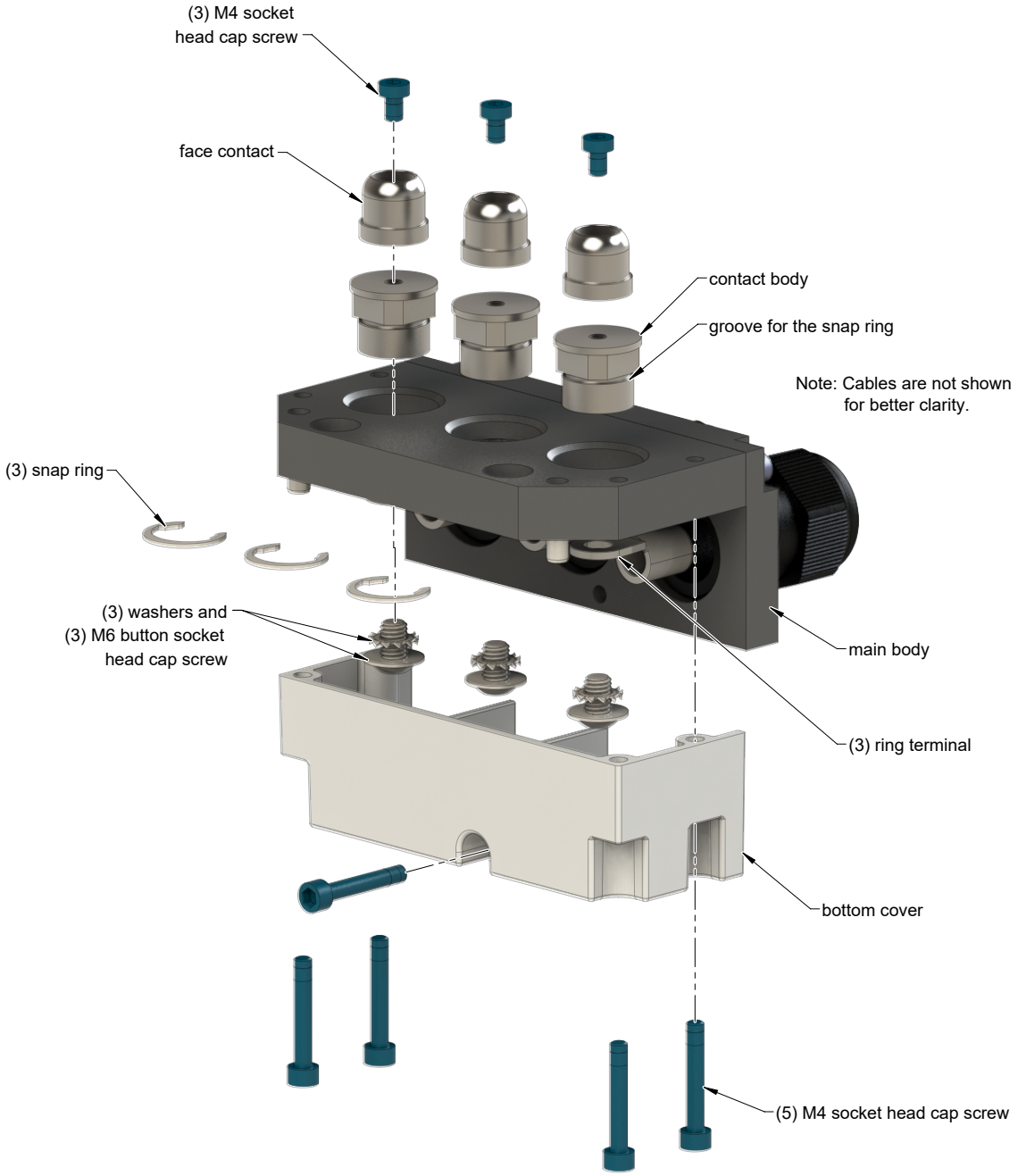
Removal:

1. Place the Tool in a secure location.
2. Uncouple the Master and Tool plates.
3. Turn off and de-energize all energized circuits, for example: power and pneumatics.
4. If only replacing the face contacts:
   a. Use a 3 mm hex key to remove the (3) M4 socket head cap screws from the face contacts. Remove the face contacts.
   b. Go to step *7*.
5. If replacing the contact bodies:
   a. Use a 3 mm hex key to remove the (5) M4 socket head cap screws that secure the bottom cover to the main body.
   b. Remove the bottom cover, and set aside.
   c. Use a 4 mm hex key to remove the (3) M6 button screws. Remove the washers. Set aside.
   d. Remove the (3) snap rings from the bases of the contact bodies.
   e. Remove the contact bodies.

Installation:

6. If installing the contact bodies:
   a. Insert the contact bodies into the main body.
   b. Secure the contact bodies with the snap rings.
   c. Insert (3) M6 button socket hex screws with the (3) washers through the ring terminals and into the contact bodies.
   d. Use a 4 mm hex key to tighten the (3) M6 socket head cap screws 10 in-lb (1.13 Nm).
   e. Place the bottom cover on the main body.
   f. Apply Loctite 222 to the (5) M4 socket head cap screws.
   g. Use a 3 mm hex key to install the (5) M4 socket head cap screws and secure the bottom cover to the main body. Tighten to 96 in-oz (0.67 Nm).
   h. Go to step *8*.

Figure 5.2—Tool Module Insulator Post and Contact Replacement



7. If only installing the face contacts:
   a. Place the face contacts on the contact bodies.
   b. Apply Loctite 222 to the threads of the (3) M4 socket head cap screws.
   c. Use a 3 mm hex key to install the (3) M4 socket head cap screws and secure the contact faces to the contact bodies. Tighten to 96 in-oz (0.67 Nm).
8. After the procedure is complete, resume normal operation.

5.2.3 Spring Replacement

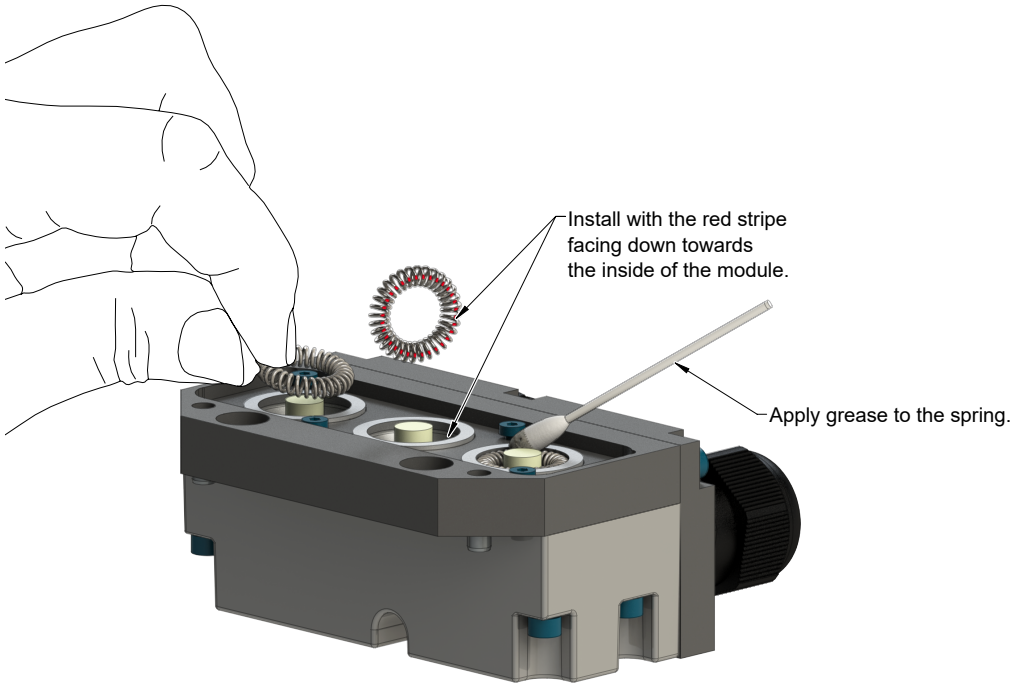
Parts required: *Refer to Section 8—Drawings.*

Tools required: *Clean towel*

Supplies required: *ATI #0290-70-0000-70-014 contact grease*

1. Place the Tool in a secure location.
2. Uncouple the Master and Tool plates.
3. Turn off and de-energize all energized circuits, for example: power and pneumatics.
4. Pick the springs from the module housing.
5. Use a towel to clean the contact surfaces.
6. Insert new springs with the red stripe facing down.
7. Apply ATI #0290-70-0000-70-014 contact grease to the springs.
8. Install the module onto the Tool Changer; refer to *Section 2.2—Module Installation*.
9. After the procedure is complete, resume normal operation.

Figure 5.3—Spring Replacement



6. Serviceable Parts and Special Tools

Refer to *Section 8—Drawings.*

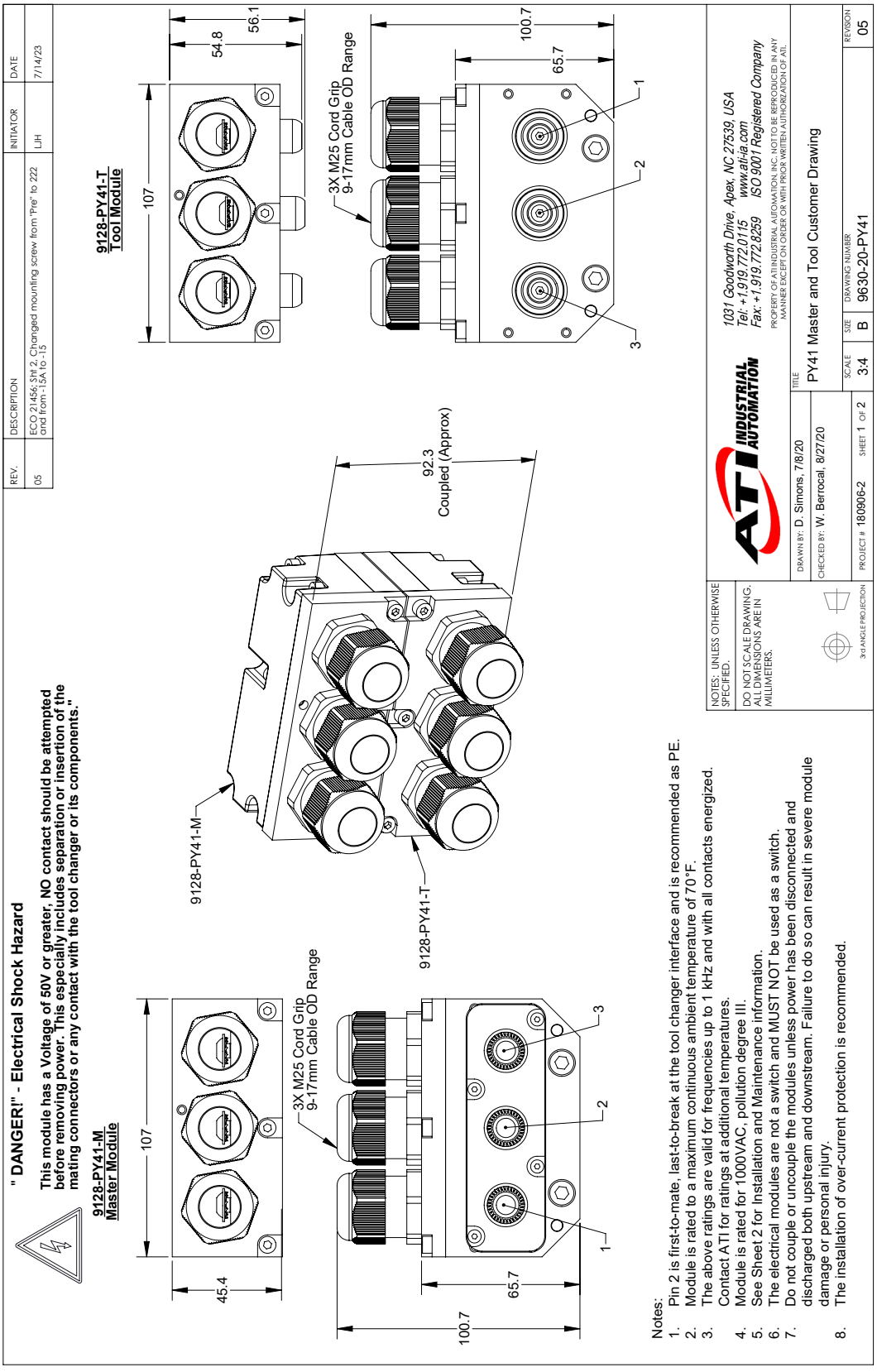
Table 6.1—Master and Tool Module Mounting Fasteners		
Part Number	**QTY**	**Description**
3500-1066016-21A	4	M6 x 16 socket head cap screw, stainless steel, ND microspheres.

7. Specifications

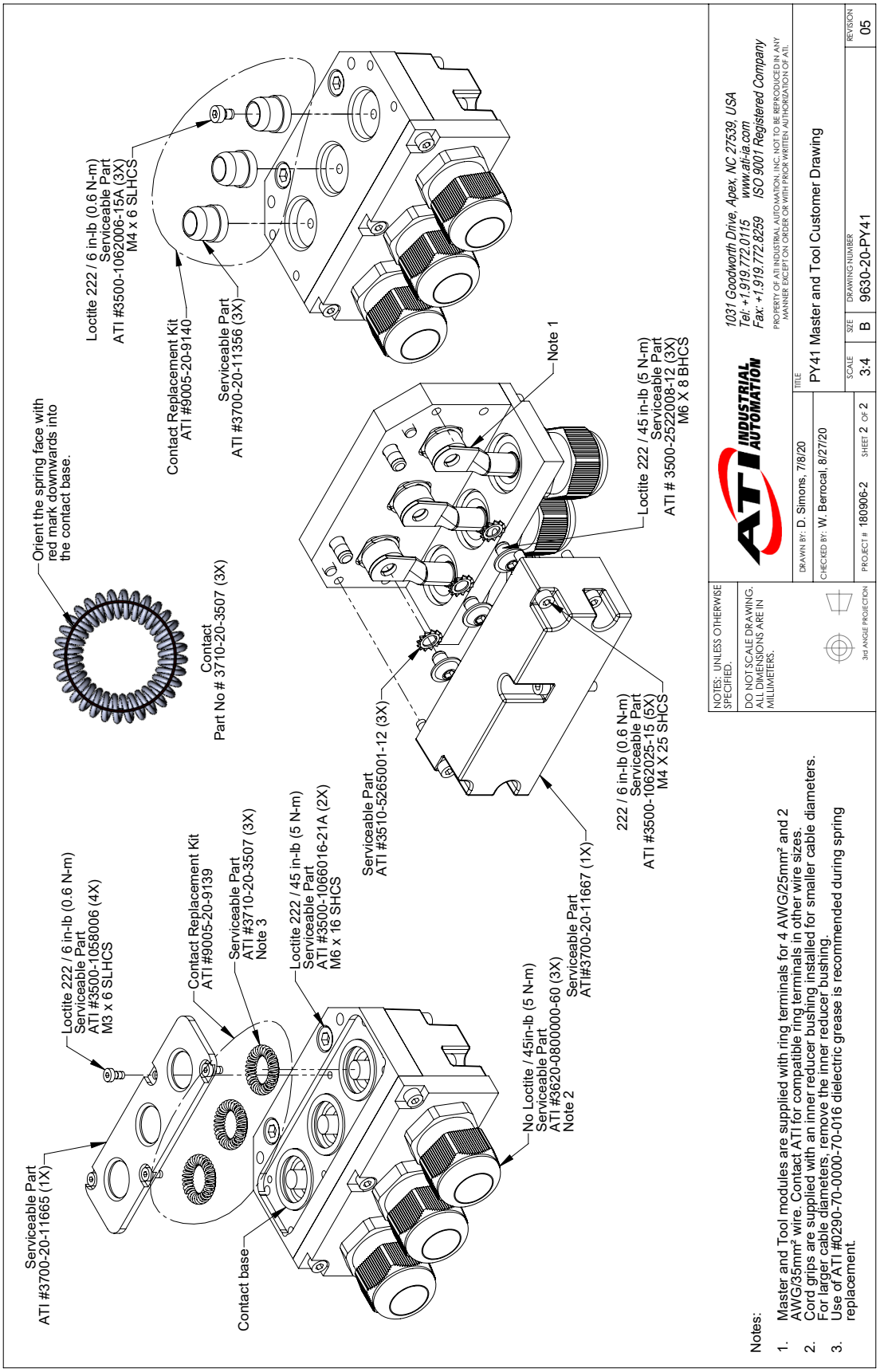
Table 7.1—Master Module	
9128-PY41-M	Primary Current Master Module
Interface Connections	(3) Power Contacts
Electrical Rating	210 A, 1000 VAC Max.
Cable Sizes Supported	#2 and #4 AWG Ring Terminals (included) #1 AWG with an optional M6 Ring Terminal Ring terminals are used to attach the conductor to the contact base.
Weight	0.86 lbs (0.39 kg)

Table 7.2—Tool Module	
9128-PY41-T	Primary Current Tool Module
Interface Connections	(3) Power Contacts
Electrical Rating	210 A, 1000 VAC
Cable Sizes Supported	#2 and #4 AWG Ring Terminals (included) #1 AWG with an optional M6 Ring Terminal Ring terminals are used to attach the conductor to the contact base.
Weight	0.81 lbs (0.37 kg)

8. Drawings



Notes:
1. Pin 2 is first-to-mate, last-to-break at the tool changer interface and is recommended as PE.
2. Module is rated to a maximum continuous ambient temperature of 70°F.
3. The above ratings are valid for frequencies up to 1 kHz and with all contacts energized. Contact ATI for ratings at additional temperatures.
4. Module is rated for 1000VAC, pollution degree III.
5. See Sheet 2 for Installation and Maintenance information.
6. The electrical modules are not a switch and MUST NOT be used as a switch.
7. Do not couple or uncouple the modules unless power has been disconnected and discharged both upstream and downstream. Failure to do so can result in severe module damage or personal injury.
8. The installation of over-current protection is recommended.


Loctite 222 / 6 in-lb (0.6 N-m)
Serviceable Part
ATI #3500-1062006-15A (3X)
M4 x 6 SLHCS
Contact Replacement Kit
ATI #9005-20-9140
Serviceable Part
ATI #3700-20-11356 (3X)
Orient the spring face with
red mark downwards into
the contact base.
Contact
Part No # 3710-20-3507 (3X)
Note 1
Loctite 222 / 45 in-lb (5 N-m)
Serviceable Part
ATI # 3500-2522008-12 (3X)
M6 X 8 BHCS
Serviceable Part
ATI #3510-5265001-12 (3X)
222 / 6 in-lb (0.6 N-m)
Serviceable Part
ATI #3500-1062025-15 (5X)
M4 X 25 SHCS
Loctite 222 / 6 in-lb (0.6 N-m)
Serviceable Part
ATI #3500-1058006 (4X)
M3 x 6 SLHCS
Contact Replacement Kit
ATI #9005-20-9139
Serviceable Part
ATI #3710-20-3507 (3X)
Note 3
Loctite 222 / 45 in-lb (5 N-m)
Serviceable Part
ATI #3500-1066016-21A (2X)
M6 x 16 SHCS
Serviceable Part
ATI #3700-20-11665 (1X)
Contact base
No Loctite / 45in-lb (5 N-m)
Serviceable Part
ATI #3620-0800000-60 (3X)
Note 2
Serviceable Part
ATI#3700-20-11667 (1X)
NOTES: UNLESS OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS.
3rd ANGLE PROJECTION
DRAWN BY: D. Simons, 7/8/20
CHECKED BY: W. Berrocal, 8/27/20
PROJECT # 180906-2
SHEET 2 OF 2
INDUSTRIAL AUTOMATION
1031 Goodworth Drive, Apex, NC 27539, USA
Tel: +1.919.772.0115 www.ati-ia.com
Fax: +1.919.772.8259 ISO 9001 Registered Company
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TITLE
PY41 Master and Tool Customer Drawing
SCALE 3:4
SIZE B
DRAWING NUMBER 9630-20-PY41
REVISION 05
Notes:
1. Master and Tool modules are supplied with ring terminals for 4 AWG/25mm² and 2 AWG/35mm² wire. Contact ATI for compatible ring terminals in other wire sizes.
2. Cord grips are supplied with an inner reducer bushing installed for smaller cable diameters. For larger cable diameters, remove the inner reducer bushing.
3. Use of ATI #0290-70-0000-70-016 dielectric grease is recommended during spring replacement.