

Table of Contents

C. Control and Signal Modules	C-2
SA10—Control Module.....	C-2
1. Product Overview	C-2
1.1 SA10 Master.....	C-3
1.2 SA10 Tool.....	C-3
2. Installation	C-4
2.1 Master Module Installation	C-4
2.2 Master Module Removal	C-5
2.3 Tool Module Installation	C-6
2.4 Tool Module Removal	C-6
3. Operation	C-7
3.1 Lock, Unlock, and RTL Sensor Cable LED Behavior	C-8
3.2 Recommended Sequence of Operations	C-9
4. Maintenance.....	C-11
4.1 Pin Block Inspection and Cleaning	C-12
5. Troubleshooting and Service Procedures	C-13
5.1 Troubleshooting	C-13
5.2 Service Procedures.....	C-14
5.2.1 Seal Replacement.....	C-14
6. Serviceable Parts	C-15
6.1 Master Serviceable Parts.....	C-15
6.2 Tool Serviceable Parts	C-15
6.3 Accessories	C-16
7. Specifications	C-16
8. Drawings	C-17

C. Control and Signal Modules

SA10—Control Module

1. Product Overview

The control modules are required to provide a means for the customer to communicate with and control the Tool Changer.

NOTICE: The SA10 supports the use of NPN sensors only.

MS-style connectors allow interfacing on the Master and Tool modules. When the Tool Changer is coupled, the Master and Tool modules communicate across their interface using a spring-loaded pin block. A flexible boot surrounds the pin block to seal the connection from moisture and liquid while coupled. This V-ring seal is water resistant but not waterproof.



DANGER: This module has a voltage of 50 V or greater; NO contact should be attempted before removing power. This especially includes separation or insertion of the mating connectors or any contact with the Tool Changer, Utility Coupler, or its components. Arcing and damage will occur if this is not observed. Remove power before attaching, disconnecting any cables or attempting any maintenance of Tool Changer or Utility Coupler.



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.

1.1 SA10 Master

The SA10 Master module uses (4) M8 3-pin female connectors to connect to the Lock, Unlock, and RTL sensors on the Tool Changer. The customer interface connection is a DDK 24-pin male connector which supplies signals and power to the end-of-arm tooling. Refer to [Section 8—Drawings](#) for more information.

The SA10 Master module is compatible with air adapter modules. The customer must supply the air adapter with both a Lock and Unlock air supply. The Lock and Unlock air supply must be connected to a 2-position 4-way or 5-way valve, refer to the air adapter or Tool Changer manual for detailed information.

1.2 SA10 Tool

The S10 Tool customer interface connection is a DDK 24-pin female connector which supplies signal and power to the end-of-arm tooling. Refer to [Section 8—Drawings](#) for more information.

Figure 1.1—SA10 Modules



2. Installation

The control/signal modules are typically installed by ATI prior to shipment. The steps below outline the field installation or removal as required. For wiring information refer to [Section 8—Drawings](#).



DANGER: This module has a voltage of 50 V or greater; NO contact should be attempted before removing power. This especially includes separation or insertion of the mating connectors or any contact with the Tool Changer, Utility Coupler, or its components. Arcing and damage will occur if this is not observed. Remove power before attaching, disconnecting any cables or attempting any maintenance of Tool Changer or Utility Coupler.



WARNING: Do not perform maintenance or repair on 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 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 placed and energized circuits on. Place 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.



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.

2.1 Master Module Installation

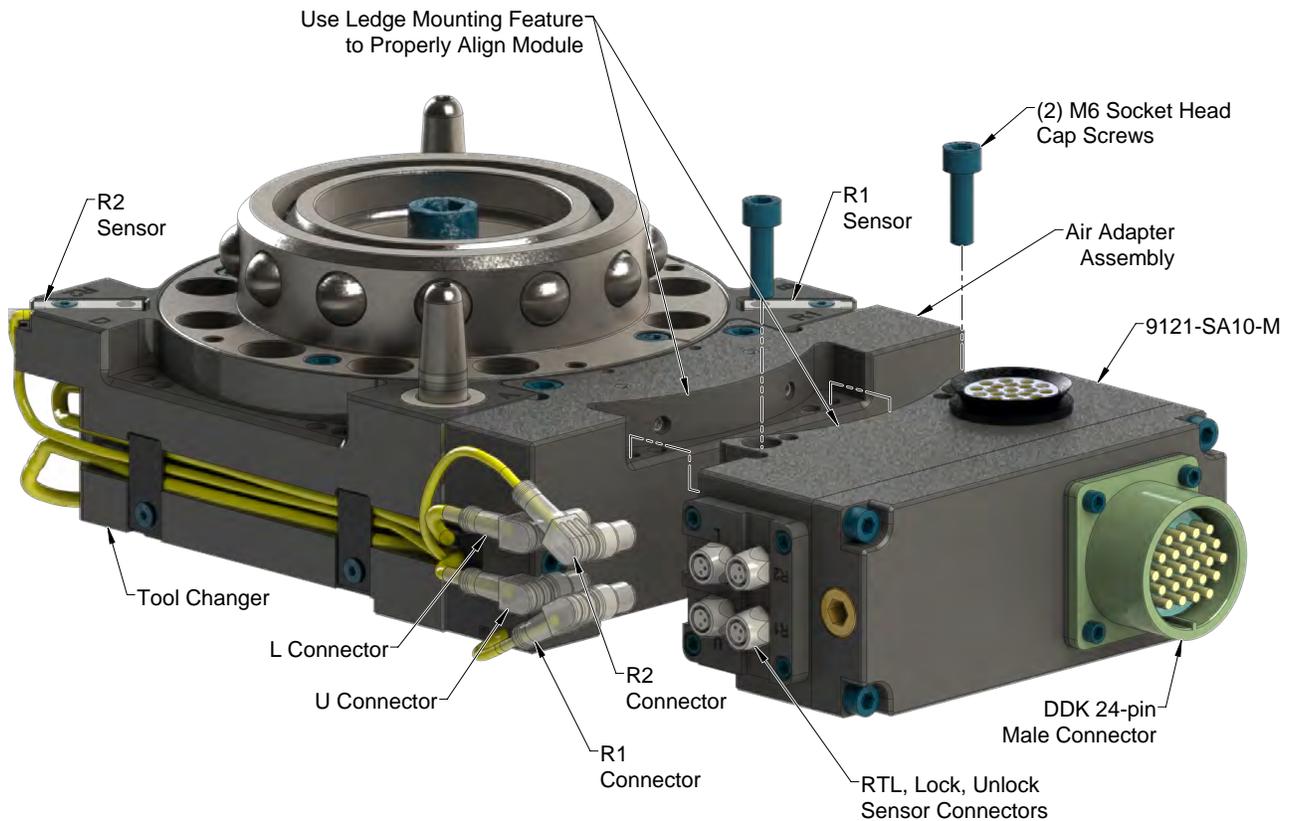
Refer to [Figure 2.1](#) for Master module installation instructions.

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

Supplies required: Clean rag, Loctite® 242 (if fasteners do not have pre-applied adhesive)

1. If the Tool Changer is already installed, place the tool 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 circuits (e.g. electrical, air, water, etc.).
3. It may be necessary to clean the mounting surface on the valve adapter prior to installing the module in order to remove any debris that may be present.
4. Using the ledge feature, place the module into the appropriate location on the air adapter. Align the module with the valve adapter using the dowels in the bottom of the ledge feature.
5. If fasteners do not have pre-applied adhesive, apply Loctite 242 to the supplied M6 socket head cap screws. Install the (2) M6 socket head cap screws securing the module to the valve adapter using a 5 mm Allen wrench. Tighten to 70 in-lbs (7.9 Nm).
6. Connect the Lock (L), Unlock (U), RTL (R1), and RTL (R2) sensor cable to the control/signal module. Ensure that the connectors are cleaned prior to being secured.
7. Connect (e.g. power, signal, auxiliary, etc.) cables to the module. Ensure that the connectors are cleaned prior to being secured.
8. After installation is complete, module may be put into normal operation.

Figure 2.1—Master Module Installation and Removal



2.2 Master Module Removal

Refer to [Figure 2.1](#) for Master module removal instructions.

Tools required: 5 mm Allen wrench

1. If the Tool Changer is already installed, place the tool 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.).

NOTICE: Mark the Lock, Unlock, and RTL sensor cables prior to disassembly so the cables can be reinstalled to the appropriate sensor.

3. Disconnect the Lock (L), Unlock (U), and RTL (R1), and RTL (R2) sensor cable connectors from the module.
4. Disconnect (e.g. power, signal, auxiliary, etc.) cables from the control/signal module.
5. Support the control/signal module, remove the (2) M6 socket head cap screws using a 5 mm Allen wrench and lower the module until it clears the guide pin.

2.3 Tool Module Installation

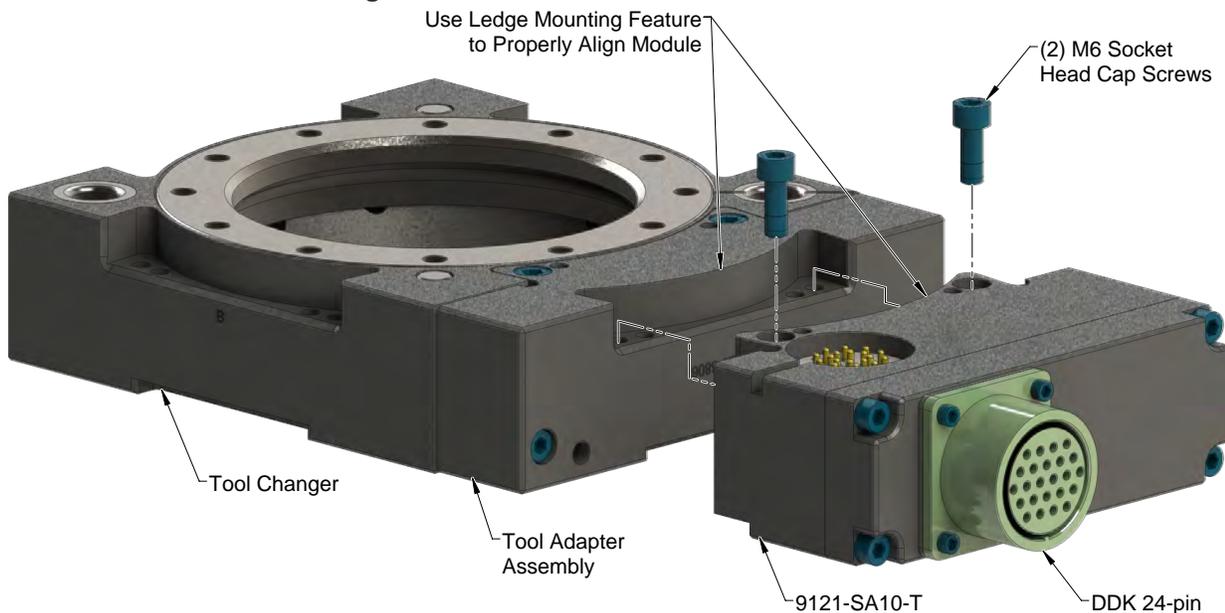
Refer to [Figure 2.2](#) for Tool module installation instructions.

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

Supplies required: Clean rag, Loctite® 242 (if fasteners do not have pre-applied adhesive)

1. If the Tool Changer is already installed, place the tool 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 circuits (e.g. electrical, air, water, etc).
3. It may be necessary to clean the mounting surface on the air adapter prior to installing the module in order to remove any debris that may be present.
4. Using the ledge feature as a guide, place the module onto the air adapter. Align the module with the air adapter using the dowels in the bottom of the ledge feature.
5. If fasteners do not have pre-applied adhesive, apply Loctite 242 to the supplied M6 socket head cap screws. Install the (2) M6 socket head screws securing the module to the air adapter using a 5 mm Allen wrench. Tighten to 70 in-lbs (7.9 Nm).
6. Connect (e.g. power, signal, auxiliary, etc.) cables to the module. Ensure that the connectors are cleaned prior to being secured as appropriate.
7. After installation is complete, module may be put into normal operation.

Figure 2.2—Tool Module Installation and Removal



2.4 Tool Module Removal

Refer to [Figure 2.2](#) for Tool module removal instructions.

Tools required: 5 mm Allen wrench

1. If the Tool Changer is already installed, place the tool 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. Disconnect (e.g. power, signal, auxiliary, etc.) cables from the control/signal module.
4. Support the control/signal module, remove the (2) M6 socket head cap screws using a 5 mm Allen wrench and lift the module from the valve adapter.

3. Operation

Various Tool Changer I/O are provided to the customer through the military-style connector on the control/signal Master module. Lock, Unlock, and Ready-to-Lock proximity sensor inputs are provided for confirmation of the Tool Changer and locking mechanism positions. Other, customer assigned discrete I/O points are available through the connector.

NOTICE: The 0 and 24 VDC supply lines are required to be on certain pin locations of the customer interface connector. Refer to [Section 8—Drawings](#) for pin out information and location of the I/O signals.

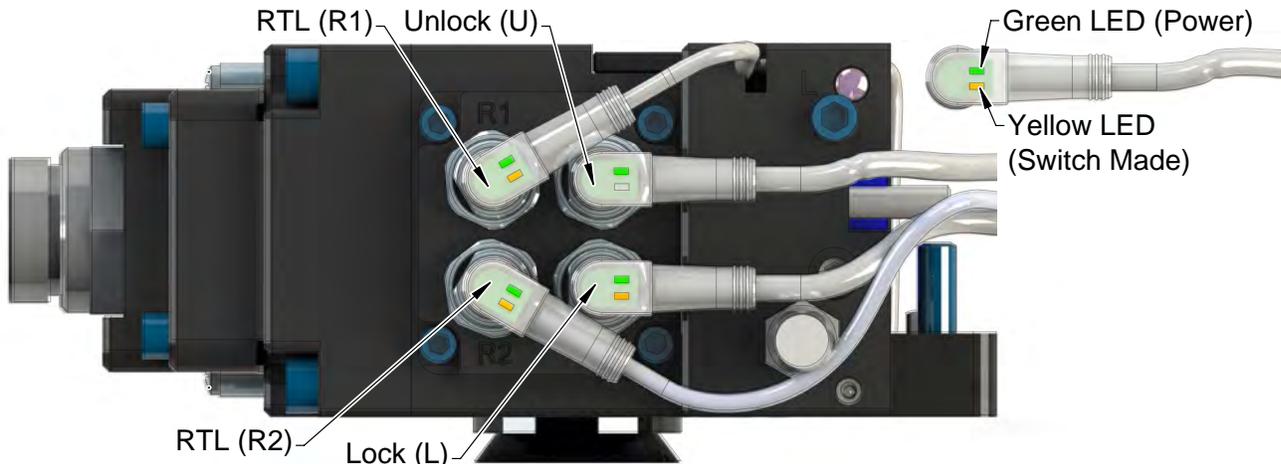
Refer to the specific Tool Changer manual for conditions for coupling of the Tool Changer and [Section 3.1—Lock, Unlock, and RTL Sensor Cable LED Behavior](#). When coupled, the discrete module Tool can be communicated with and attached end-effectors can be used.

3.1 Lock, Unlock, and RTL Sensor Cable LED Behavior

The Lock, Unlock, and RTL sensor cables are equipped with (2) LEDs. The green LED indicates the sensor has power and the yellow LED indicates the switch has been made. The LED behavior is affected by the control/signal module. The behavior shown is specific for the Tool Changer with a control/signal module equipped with RTL sensors wired in series.

Table 2.1—Sensor Cable LED Behavior for Common Tool Changer Positions				
Tool Changer Position	Sensor Cable LED Behavior			
Unlocked (Tool Changer Master plate free of stand with no Tool plate attached)	RTL (R1)	<input type="checkbox"/> OFF <input type="checkbox"/> OFF	<input checked="" type="checkbox"/> ON <input checked="" type="checkbox"/> ON	Unlock (U)
	RTL (R2)	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	Lock (L)
Ready to Lock (Tool Changer Master plate with Tool plate parallel and at a distance of 1.22 mm or less from each other)	RTL (R1)	<input checked="" type="checkbox"/> ON <input checked="" type="checkbox"/> ON	<input checked="" type="checkbox"/> ON <input checked="" type="checkbox"/> ON	Unlock (U)
	RTL (R2)	<input checked="" type="checkbox"/> ON <input checked="" type="checkbox"/> ON	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	Lock (L)
Locked (Tool Changer Master plate with Tool plate attached in fully locked position)	RTL (R1)	<input checked="" type="checkbox"/> ON <input checked="" type="checkbox"/> ON	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	Unlock (U)
	RTL (R2)	<input checked="" type="checkbox"/> ON <input checked="" type="checkbox"/> ON	<input checked="" type="checkbox"/> ON <input checked="" type="checkbox"/> ON	Lock (L)
Missed Tool (Tool Changer Master plate locked with no Tool plate attached)	RTL (R1)	<input type="checkbox"/> OFF <input type="checkbox"/> OFF	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	Unlock (U)
	RTL (R2)	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	Lock (L)

Figure 2.3—Lock, Unlock, and RTL Sensor Cable LED Behavior (Shown in Locked Position)



(Control module shown for reference only)

3.2 Recommended Sequence of Operations

This recommended sequence of operations procedure is a general guide when programming a robot or PLC for use with a Tool Changer and a control/signal module. This procedure is intended for “automatic” modes used during normal application processes.

1. Start→ The robot and Tool Changer Master are free of the stand or storage location. The Tool Changer is uncoupled and the Tool Changer locking mechanism may be fully retracted (unlocked condition) or fully extended (missed Tool condition, i.e., Locked and Unlocked inputs are OFF). The Tool is by itself in the Tool Stand.
 - a. The **RTL** input is OFF
 - b. The ATI Tool and any downstream device(s) are offline.
2. Ensure the Master is Unlocked. (The Master must be unlocked prior to entering the Tool to prevent the ball bearings from impinging on the Tool bearing race.)
 - a. A pneumatic air source is sent to the “unlock” port of the Tool Changer.
 - b. The “lock” port of the Tool Changer should be properly exhausted.
 - c. The **Unlocked** input goes ON and remains ON, indicating that the Tool Changer locking mechanism is fully retracted and the unlock operation is complete.
3. Robot and Master move parallel towards the Tool and are within 0.06” of the Tool (i.e., the module contact pins are touching, the **RTL** sensors have sensed the targets on the Tool).
 - a. ‘Input’ power connections become available on the Tool.
 - b. The **RTL** inputs is ON, indicating that it is okay to couple the Tool.
 - c. Communications with downstream device(s) should now be established.
4. Couple the Tool Changer.
 - a. A pneumatic air source is sent to the “lock” port of the Tool Changer.
 - b. The “unlock” port of the Tool Changer should be properly exhausted.
 - c. The **Unlocked** input goes OFF a short time later, indicating piston travel. Subsequently, the **Locked** input goes ON and remains ON, indicating that the coupling operation is complete.
5. Robot moves away from the tool stand with the Tool Changer coupled.

6. Normal operation:
 - a. The following inputs are ON:
 - i. **Locked**
 - ii. **RTL**
 - b. The following inputs are OFF:
 - i. **Unlocked**
7. Robot moves into the tool stand with the Tool Changer coupled.
8. Uncouple the Tool Changer. **IMPORTANT: It is critical that the Tool be nested securely in the tool stand prior to uncoupling the Tool Changer.**
 - a. A pneumatic air source is sent to the “unlock” port of the Tool Changer.
 - b. The “lock” port of the Tool Changer should be properly exhausted.
 - c. The **Locked** input goes OFF a short time later and subsequently the **Unlocked** input goes ON and remains ON, indicating that the uncoupling operation is complete.
9. Robot and Master move up and away and are at a distance greater than 0.048” (1.22 mm) from the Tool (the module contact pins are no longer touching).
 - a. The **RTL** inputs goes OFF.
 - b. ‘Input’ power connections become unavailable on the Tool.
 - c. Communications with downstream device(s) should now be lost.
10. Robot and Master in free space.
 - a. The following input is ON:
 - i. **Unlocked**
 - b. The following inputs are OFF:
 - i. **Locked**
 - ii. **RTL**

4. Maintenance

Once installed, the operation of the control modules are generally trouble free. The modules are not designed to be field serviced as all point-to-point wiring connections are soldered. Component replacement is limited to the V-ring seal on the Master.



DANGER: This module has a voltage of 50 V or greater; NO contact should be attempted before removing power. This especially includes separation or insertion of the mating connectors or any contact with the Tool Changer, Utility Coupler, or its components. Arcing and damage will occur if this is not observed. Remove power before attaching, disconnecting any cables or attempting any maintenance of Tool Changer or Utility Coupler.



WARNING: Do not perform maintenance or repair on 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 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 placed and energized circuits on. Place 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.

If the Tool Changer is being used in dirty environments (e.g., welding or deburring applications), care should be taken to limit the exposure of the Tool Changer. Idle Tool assemblies should be covered to prevent debris from settling on the mating surface. Also, the Master assembly should be exposed for only a short period of time during Tool change and down time.

Under normal conditions, no special maintenance is necessary; however, it is recommended that periodic inspections be performed to assure long-lasting performance and verify that unexpected damage has not occurred. Perform the following visual inspection monthly:

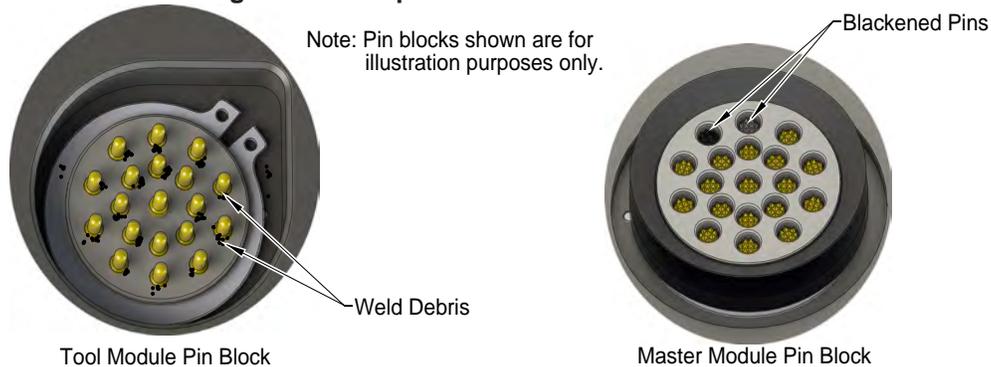
- Inspect mounting fasteners to verify they are tight and if loose; then tighten to the proper torque. Refer to [Section 2—Installation](#).
- Cable connections should be inspected during maintenance periods to ensure they are secure. Loose connections should be cleaned and re-tightened as appropriate. 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.
- Inspect the Master and Tool pin blocks for any pin damage, debris or darkened pins. Refer to [Section 4.1—Pin Block Inspection and Cleaning](#).
- Inspect V-ring seals for wear, abrasion, and cuts. If worn or damaged, replace. Refer to [Section 5.2.1—Seal Replacement](#).

4.1 Pin Block Inspection and Cleaning

Tools required: Nylon Brush (ATI Part Number 3690-0000064-60)

1. For a Tool Changer, if the Tool Changer is installed place the Tool safely in the tool stand. Uncouple the Tool Changer or Utility Coupler to allow clear access to the Master and Tool plates.
2. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
3. Inspect the Master and Tool pin blocks for any debris or darkened pins.

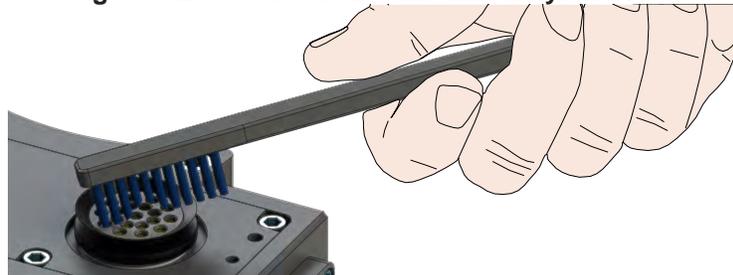
Figure 3.1—Inspect Master and Tool Pin Blocks



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

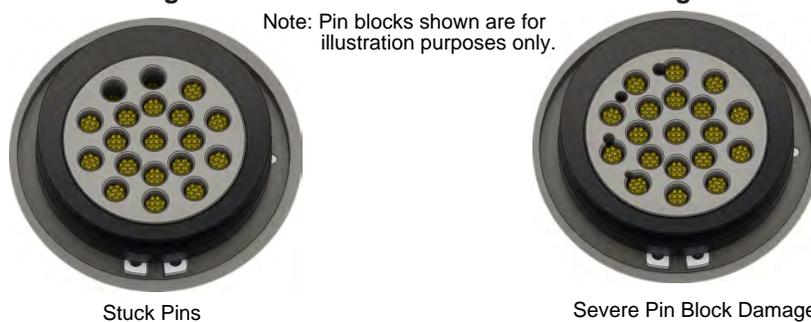
NOTICE: Do not use an abrasive media, cleaners, or solvents to clean the contact pins. Using abrasive media, cleaners, or solvents will cause erosion to the contact surface or pins to stick. Clean contact surfaces with a vacuum or non-abrasive media such as a nylon brush (ATI Part Number 3690-0000064-60)

Figure 3.2—Clean Pin Blocks with a Nylon Brush



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

Figure 3.3—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. If repairs are complete, return circuits to normal operation.

5. Troubleshooting and Service Procedures

This troubleshooting section provides information to help diagnose conditions with the Tool Changer or control module.



DANGER: This module has a voltage of 50 V or greater; NO contact should be attempted before removing power. This especially includes separation or insertion of the mating connectors or any contact with the Tool Changer, Utility Coupler, or its components. Arcing and damage will occur if this is not observed. Remove power before attaching, disconnecting any cables or attempting any maintenance of Tool Changer or Utility Coupler.



WARNING: Do not perform maintenance or repair on 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 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 placed and energized circuits on. Place 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.

5.1 Troubleshooting

Refer to the table below for troubleshooting information.

Symptom	Possible Cause	Correction
Unit will not lock or unlock	Verify that ball bearings are moving freely. Clean and lubricate as needed.	Verify that ball bearings are moving freely. Clean and lubricate as needed. Refer to the <i>Maintenance section of the Tool Changer Manual</i> for instructions.
	Air supply not to specifications.	Check air supply. Refer to the Installation section of the <i>Tool Changer Manual</i> for specifications.
	Check that exhaust port is properly vented.	Check that exhaust port is properly vented. Refer to <i>Pneumatic Connection section of the Base Tool Changer Manual</i> for valve requirements.
	Master and Tool are within the specified No-Touch zone.	Verify that the Master and Tool are within the specified No-Touch zone when attempting to lock. Refer to the <i>Installation – Tool Stand Design Section of the Tool Change Manual</i> for specifications.
	Air is trapped in the Unlock (U) port.	Ensure that there is no air trapped in the Unlock (U) air port. Refer to the <i>Air and Valve adapter section</i> for pneumatic specification and requirements.
Sensors not operating properly	Sensor cables damaged or incorrectly connected.	Verify that cables are connected correctly and not damaged, replace if damaged. Refer to the <i>Troubleshooting Section of the Tool Change Manual</i> .
	Tool Plate is not secured properly or debris is trapped between surfaces.	Ensure that the Tool Plate is securely held to the Master plate, that nothing is trapped between their surfaces.

Table 4.1—Troubleshooting Procedures		
Symptom	Possible Cause	Correction
Loss of Communication	Damaged signal cabling	Check/Replace signal cabling upstream and downstream of Tool Changer modules.
	Worn or damaged contact pins	Inspect module contact pins for debris/wear/damage. Refer to Section 4.1—Pin Block Inspection and Cleaning . V-ring seal damaged and allowing debris in the contact pins. Replace V-ring seal, refer to Section 5.2.1—Seal Replacement .
	Product upstream and downstream of Tool Changer failed or is damaged	Check product upstream and downstream of Tool Changer for failure. This failure can “appear” to be caused by the Tool Changer or affect Tool Changer performance.

5.2 Service Procedures

The following service procedures provide instructions for component replacement and adjustment.

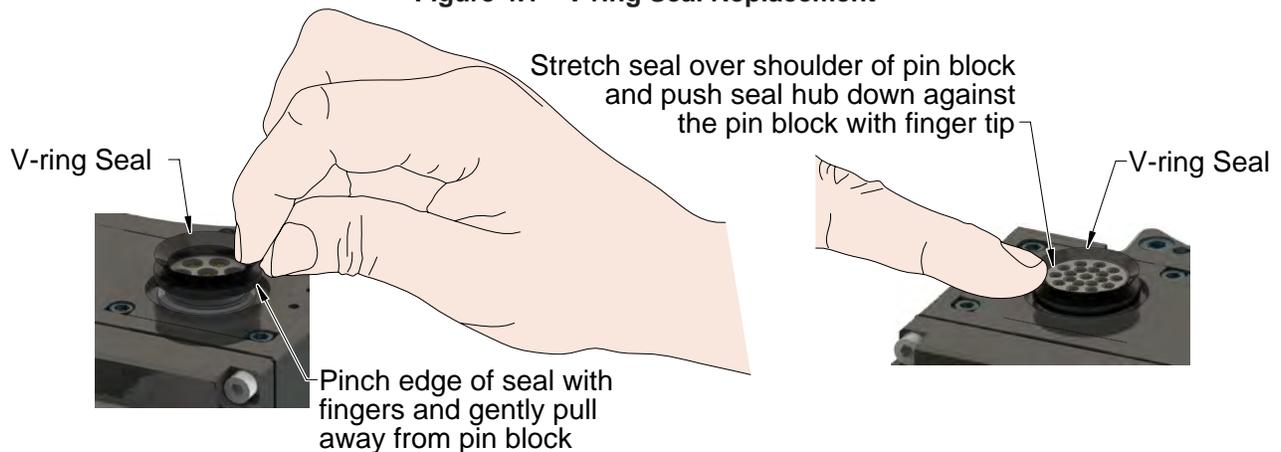
5.2.1 Seal Replacement

Parts Required: Refer to [Section 8—Drawings](#).

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

1. For a Tool Changer, place the Tool safely in the tool stand. Uncouple the Tool Changer or Utility Coupler to allow clear access to the Master and Tool plates.
2. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
3. To remove the existing seal, pinch edge of seal with fingers and gently pull the seal away from the pin block on the Master.
4. Pull the seal off the pin block.
5. To install a new seal, stretch the new seal over the shoulder of the pin block.
6. Push the seal’s hub down against the pin block using finger tip.
7. If repairs are complete, return circuits to normal operation.

Figure 4.1—V-ring Seal Replacement



6. Serviceable Parts

6.1 Master Serviceable Parts

Figure 5.1—Master Serviceable Parts



Table 5.1—Master Module Serviceable Parts

Item No.	Qty	Part Number	Description
1	1	9121-SA10-M	Discrete Signal Master module with 24-Pin MS3102 Connector, NPN Sensors, RTL in Series, No Integrated Valve
2	2	3500-1066020-15	M6 x 20 SHCS, Class 12.9, Blue dyed Magni-565
3	1	4010-0000030-01	V-ring Seal

6.2 Tool Serviceable Parts

Figure 5.2—Tool Serviceable Parts



Table 5.2—Master Module Serviceable Parts

Item No.	Qty	Part Number	Description
1	1	9121-SA2-M	Discrete Signal Tool module with 24-Pin MS3102 Connector, No Tool-ID or TSI
2	2	3500-1066016-15A	M6x16 SHCS, Class 12.9, Blue dyed Magni-565, ND Microspheres Epoxy, Yellow

6.3 Accessories

Table 5.3—Accessories			
Item No.	Qty	Part Number	Description
*	*	3690-0000064-60	Brush, Blue Nylon All Purpose (Contact Pin Cleaning)

7. Specifications

Table 6.1—Master Module Specifications	
9121-SA10-M	Discrete Signal Master module with 24-Pin MS3102 Connector, Supports NPN Lock, Unlock, and RTL Sensors (RTL in Series), and No Integrated Valve Control
Interface Connections	<p>Customer Interface: 24-pin male connector for power and signal</p> <p>Integrated Tool Changer I/O: (4X) 3-Pin M8 female connectors supporting Tool Changer Lock, Unlock, and Ready-to-Lock proximity sensors.</p>
Electrical Rating	<p>Pass Through to Tool: 5 A 250 V maximum</p> <p>Tool Changer Control: 24 VDC</p>
Weight	1.6 lbs (0.7 kg)

Table 6.2—Tool Module Specifications	
9121-SA10-T	Discrete Signal Tool module with 24-Pin MS3102 Connector, No Tool-ID or TSI
Interface Connections	<p>Customer Interface: 24-pin female connector for power and signal</p>
Electrical Rating	<p>Pass Through to Tool: 5 A 250 V maximum</p>
Weight	1.3 lbs (0.6 kg)

8. Drawings

"DANGER!" - Electrical Shock Hazard

This module has a voltage of 50V or greater. NO contact should be attempted before removing power. This especially includes separation or insertion of the mating connectors or any contact with the tool changer or its components.

SA10 Master and Tool Coupled

133.4

102.4 Approx. Coupled

24-Pin Male Connector
DDK DMS 3102 A24-28P
Note connector orientation

4010-000030-01, V-Ring Seals Serviceable Parts

9121-SA10-M

149.5

85.8

60.3

RTL Lock and Unlock Sensor Connectors
4X Turck MFKS 3

9121-SA10-I

133.4

45.6

24-Pin Female Connector
DDK DMS 3102 A24-28S
Note connector orientation

Table 1

19-Pin Pin Block	
A	0V
B	Spare 1
C	Spare 2
D	Spare 3
E	Spare 4
F	Spare 5
G	Spare 6
H	Spare 7
J	Spare 8
K	Spare 9
L	Spare 10
M	Spare 11
N	Spare 12
P	Spare 13
R	Spare 14
S	Spare 15
T	Spare 16
U	Spare 17
V	Spare 18

Tool Side Pin Block (See Table 1)

DETAIL B

SCALE 2 : 1

Master Side Pin Block (See Table 1)

DETAIL A

SCALE 2 : 1

Notes:

- Connector details and pin assignment information on Sheet 2.
- Electrical schematic and functional notes on Sheet 3.
- Pin A is first-mate last-break.

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

3rd ANGLE PROJECTION

Rev. 01

Rev.	Description	Initiator	Date
01	Initial design	WB	3/19/2010
02	Per customer request, change location of the 24-Pin connector on the Master and Tool.	WB	4/29/2010
03	Corrected schematic of NPN sensors on Sheet 3; Changed Note 2 on Sheet 3 to refer to the correct sensor locations.	WB	6/14/2010
04	ECN 1344; Added Electrical Shock Hazard Note.	CF	4/12/2016

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SA10 Module Customer Drawing

DRAWN BY: W. Berrocal, 3/19/10
 CHECKED BY: D. Muehlow, 3/19/10

SCALE 2:3
 DRAWING NUMBER 9630-20-SA10
 PROJECT # 100315-2 SHEET 1 OF 3

REVISION 04

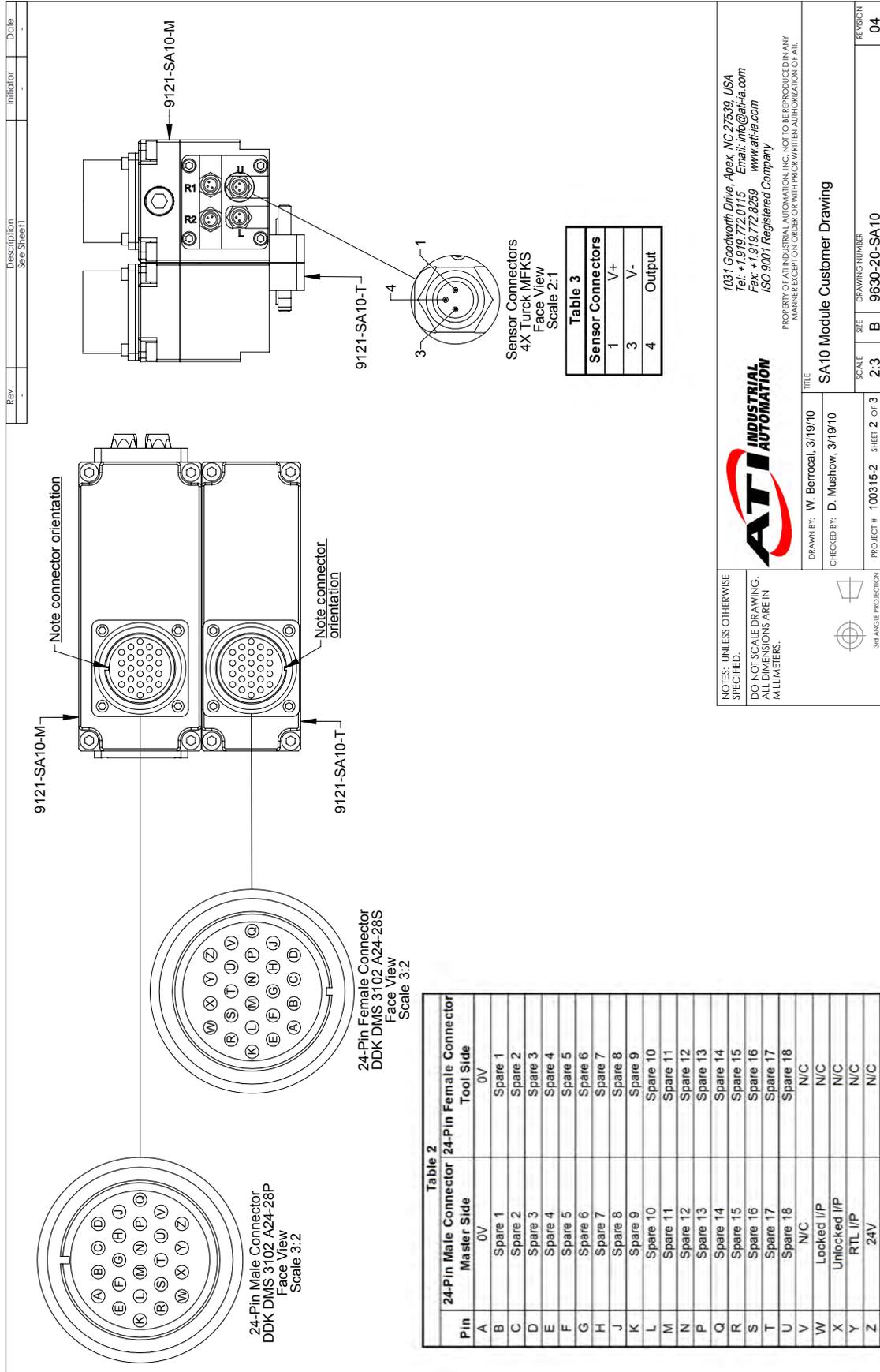
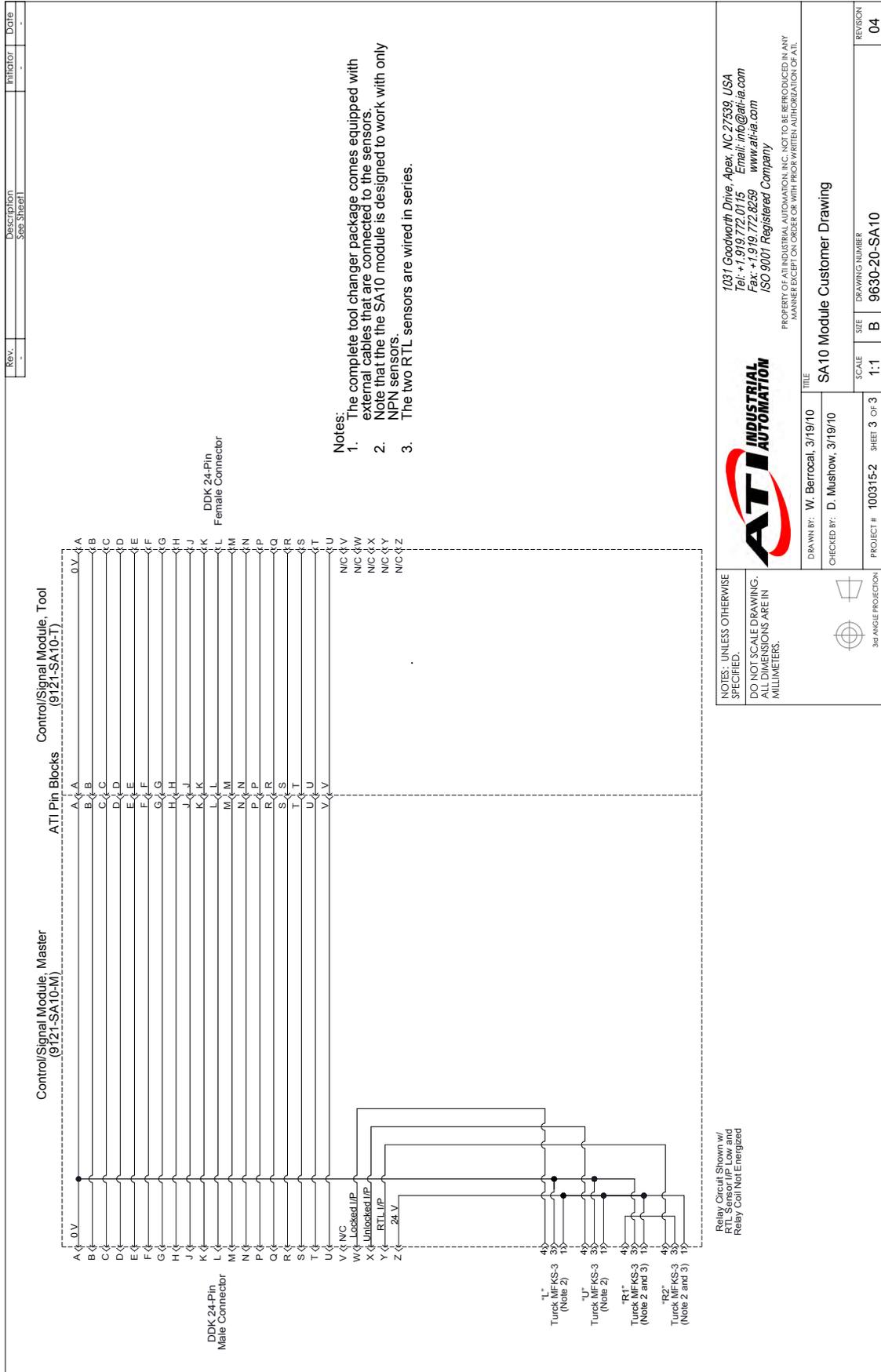


Table 2

Pin	24-Pin Male Connector Master Side	24-Pin Female Connector Tool Side
A	0V	0V
B	Spare 1	Spare 1
C	Spare 2	Spare 2
D	Spare 3	Spare 3
E	Spare 4	Spare 4
F	Spare 5	Spare 5
G	Spare 6	Spare 6
H	Spare 7	Spare 7
J	Spare 8	Spare 8
K	Spare 9	Spare 9
L	Spare 10	Spare 10
M	Spare 11	Spare 11
N	Spare 12	Spare 12
P	Spare 13	Spare 13
Q	Spare 14	Spare 14
R	Spare 15	Spare 15
S	Spare 16	Spare 16
T	Spare 17	Spare 17
U	Spare 18	Spare 18
V	N/C	N/C
W	Locked I/P	N/C
X	Unlocked I/P	N/C
Y	RTL I/P	N/C
Z	24V	N/C



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DRAWN BY: W. Berrocal, 3/19/10 CHECKED BY: D. Mustow, 3/19/10	TITLE SA10 Module Customer Drawing	REVISION 04
PROJECT # 100315-2 SHEET 3 OF 3	SCALE 1:1 SIZE B DRAWING NUMBER 9630-20-SA10	

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