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C. Control and Signal Modules

VB19— Discrete Control/Signal Module

1. Product Overview

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

Tool Changer I/O is provided to the customer through the M23-style connector on the control/signal Master module. Lock, Unlock, and Ready-to-Lock proximity sensor inputs are provided for confirmation of Tool Changer and locking mechanism positions. Other customer-assigned discrete I/O points are also available through the connector. Note that 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.

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.

To avoid unintentional Tool release, the power for the unlatch valve is routed through a safety switch connector. A safety switch must be connected to support this function. Refer to *Section 3.1—Tool Side TSI* for detailed information regarding the safety features of the discrete control modules.

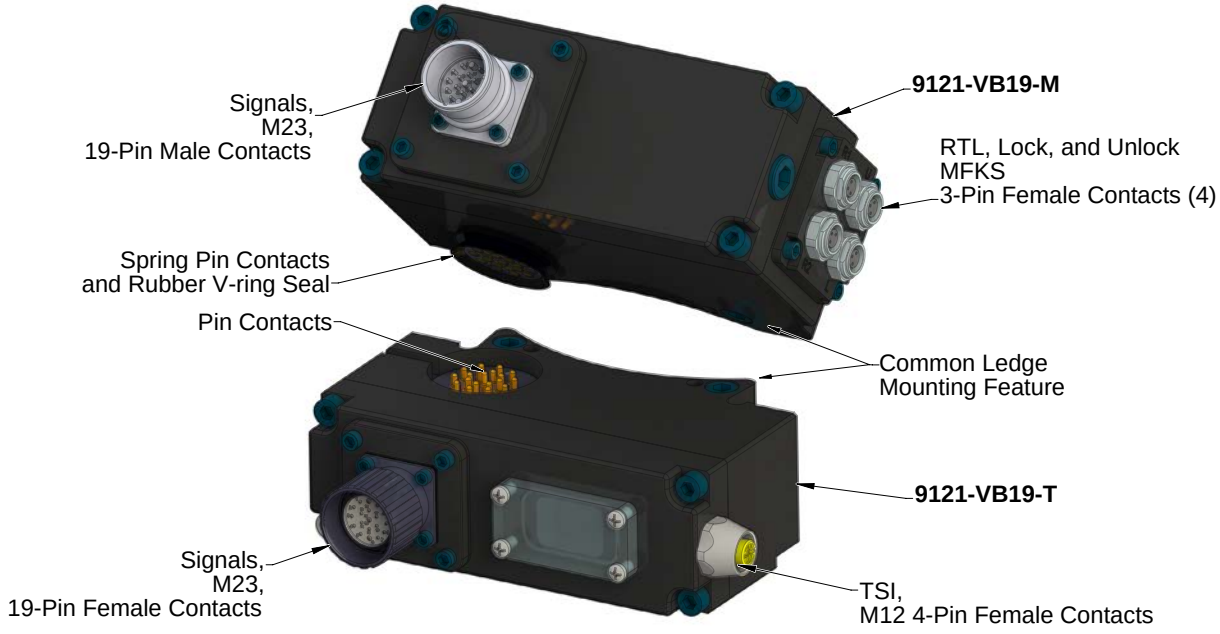
1.1 VB19 Master

The Master module is equipped with a 19-Pin, M23 style connector for interfacing with the Tool Changer's Lock, Unlock, and Ready-to-Lock sensors and for supplying signals to the end-of-arm tooling. Electrical schematics and connector details are provided in *Section 8—Drawings*.

Interface to the Tool Changers integrated RTL, Lock, and Unlock sensors are provided through four M8, 3-Pin connectors on the Master module. Refer to the specific Tool Changer manual for details on the operation of RTL, Lock, and Unlock sensors. The Lock, Unlock, and RTL cables are provided as an integrated part of the Tool Changer.

An electrical interface is provided on the Master module for support of only integrated double solenoid valves (DC Voltage, sourcing-type). The integrated valve can be supplied from ATI as part of the valve adapter block (such as 9121-JR2-M). Refer to the valve adapter block manual for more information (9620-20-C-Jxx Air and Valve Adapters with Valve Signal Pass Through). Electrical interface drawings and connector details are provided in drawings in *Section 8—Drawings*.

Figure 1.1—VB19 Modules



1.2 VB19 Tool

The VB19 Tool module is equipped with a 19-Socket, M23 style connector and provides the interface for supplying signals to the end-of-arm tooling. When the Tool Changer is coupled, the Master and Tool modules interface using a spring-loaded pin blocks. A flexible boot surrounds the pin block to seal the connection from moisture and liquid while coupled.

The safety switch is connected to the Tool module via a 4-Pin, M12 connector mounted to the side of the Tool module. Refer to *Section 3.1—Tool Side TSI* for detailed information regarding the safety features of the discrete control 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; 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 or Utility Coupler.

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 specific 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: 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.

2.1 Master Module Installation

Refer to *Figure 2.1*.

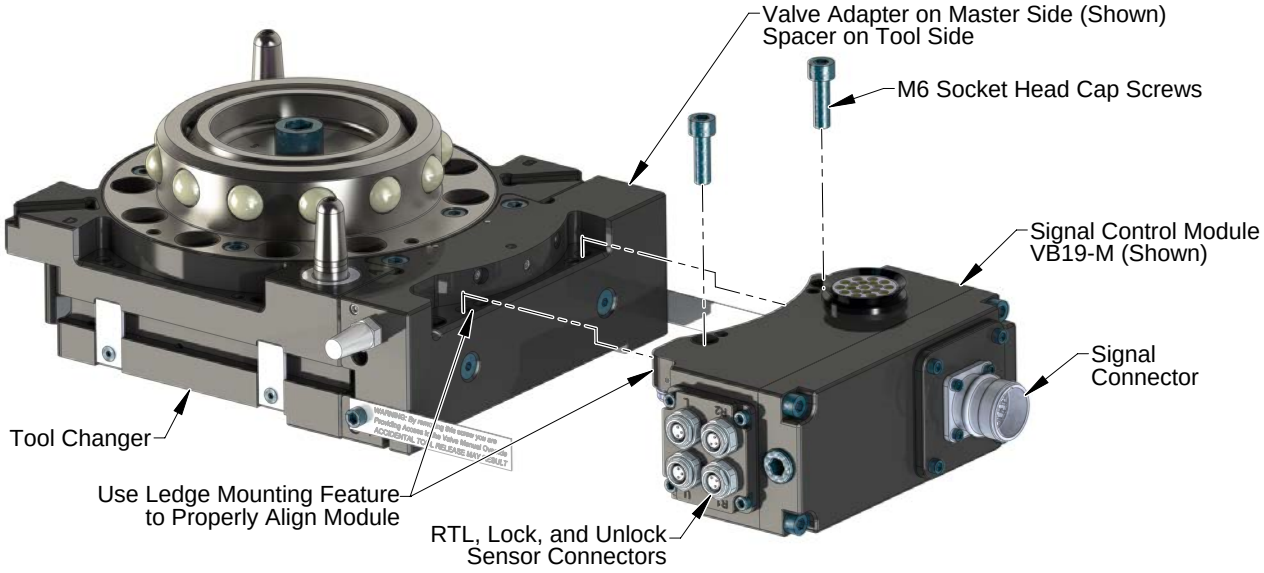
Parts required: *Refer to Section 6—Serviceable Parts.*

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

Supplies required: *Clean rag, Loctite® 242*

1. Place the Tool in a secure location.
2. Uncouple the Master and Tool plates.
3. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
4. Clean the mounting surfaces.
5. Place the module onto the air adapter.
6. 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 hex key. Tighten to 70 in-lbs (7.9 N-m).
7. Connect (e.g. power, signal, auxiliary, etc.) cables to the module. Ensure that the connectors are cleaned prior to being secured.
8. Safely resume normal operation.

Figure 2.1—Installation of the Master Module



2.2 Master Module Removal

Tools required: *5 mm hex key*

1. Place the Tool in a secure location.
2. Uncouple the Master and Tool plates.
3. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
4. Use a marker pen to indicate where the module is to be re-installed.
5. Disconnect air plumbing to the module.
6. Remove the (2) M6 socket head cap screws using a 5 mm hex key.
7. Remove the module.

2.3 Tool Module Installation

Refer to *Figure 2.2*.

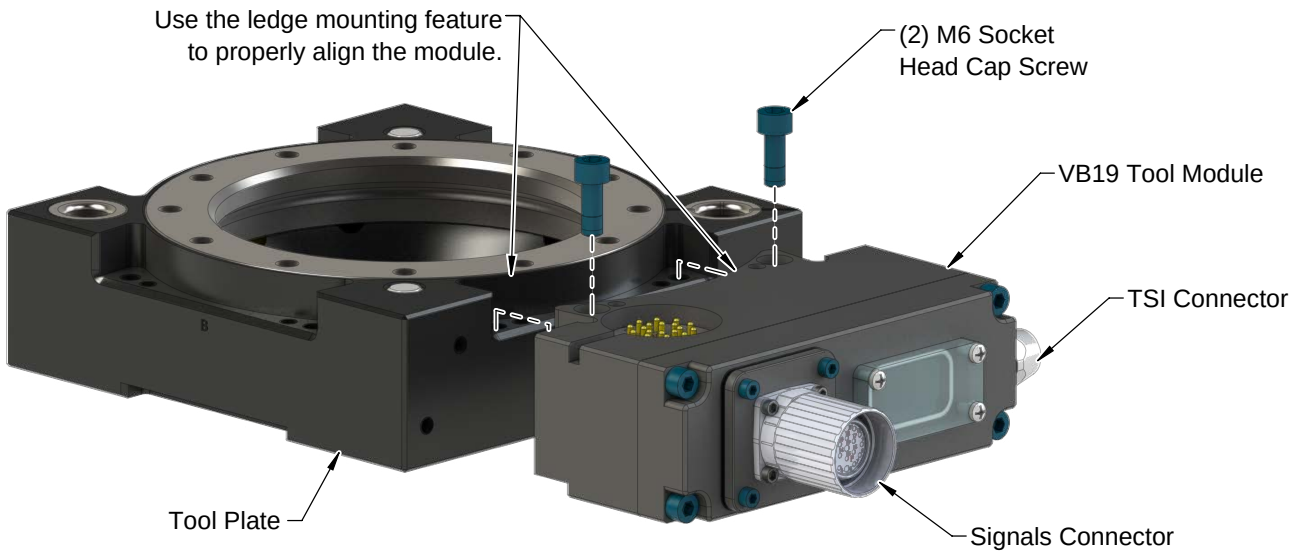
Parts required: *Refer to Section 6—Serviceable Parts.*

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

Supplies required: *Clean rag, Loctite 242*

1. Place the Tool in a secure location.
2. Uncouple the Master and Tool plates.
3. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
4. Clean the mounting surfaces.
5. Place the module onto the air adapter or Tool plate.
6. Apply Loctite 242 to the supplied M6 socket head cap screws. Install the (2) M6 socket head screws and secure the module to the air adapter using a 5 mm hex key. Tighten to 70 in-lbs (7.9 Nm).
7. Ensure the power, signal, auxiliary, and other connectors are clean and connect the cables to the module.
8. Ensure the TSI limit switch connection is clean and connect the cable to the module.
9. After the procedure is complete, resume normal operation.

Figure 2.2—Installation of the Tool Module



2.4 Tool Module Removal

Tools required: *5 mm hex key*

1. Place the Tool in a secure location.
2. Uncouple the Master and Tool plates.
3. Turn off and de-energize all energized circuits (e.g. electrical, air, water, etc.).
4. Disconnect (e.g. power, signal, auxiliary, etc.) cables from the control/signal module.
5. Disconnect the cable from the control/signal module to the TSI limit switch.
6. Support the control/signal module, remove the (2) M6 socket head cap screws using a 5 mm hex key, and lift the module from the valve adapter.

3. Operation

The VB19 Control and Signal module is designed to provide control of the Tool Changer and pass signal connections to the end-of-arm tooling. Various functional characteristics of the module are in the following sections.

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

Refer to the specific Tool Changer manual for conditions for coupling of the Tool Changer and *Section 3.3—Recommended Sequence of Operations*. When coupled, the module Tool can be communicated with, Tool-ID can be read (if equipped), and attached end-effectors can be used.

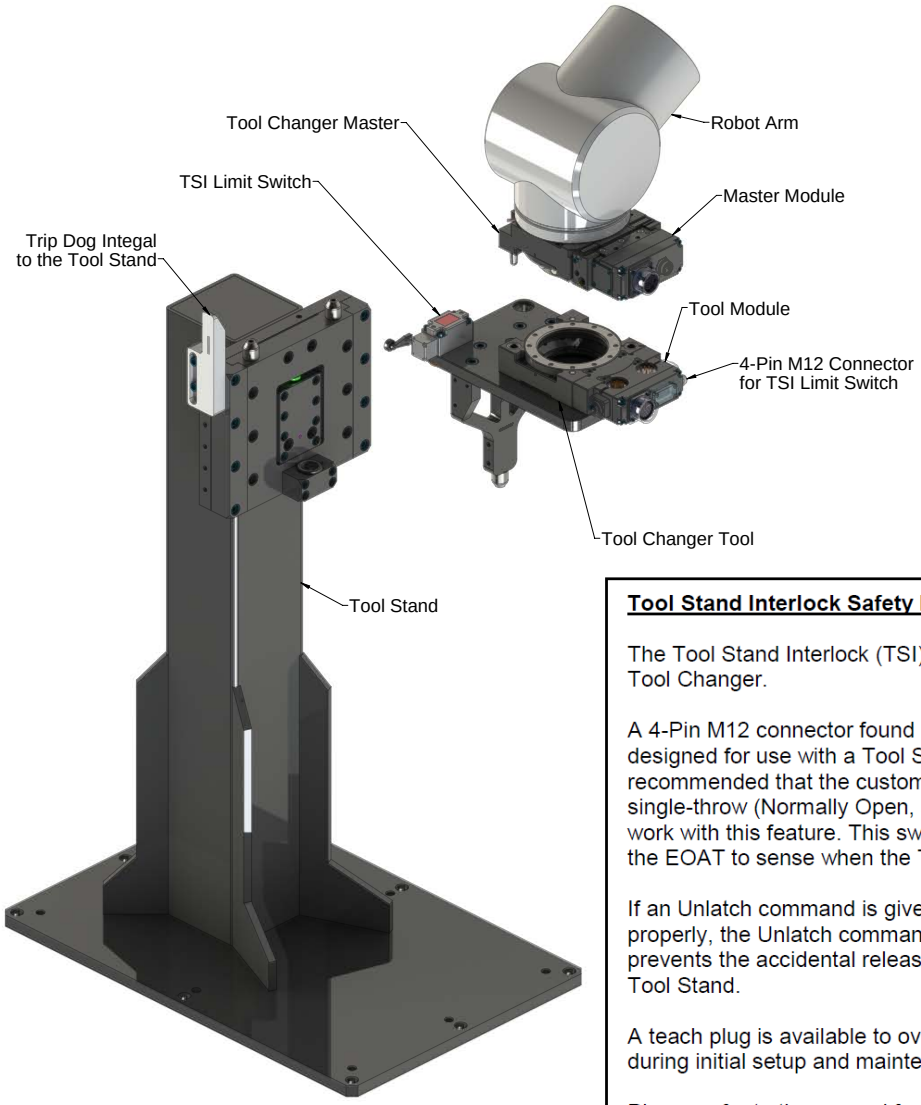
3.1 Tool Side TSI

To prevent an unintended Tool release, the electrical power to the unlatch valve circuit is switched only when a Tool mounted limit switch indicates that the Tool is nested safely in the Tool Stand. The limit switch ensures that a Tool can only be released at the Tool Stand (refer to *Figure 3.1*).

A momentary action normally open, single-pole, single-throw mechanical limit switch is recommended to work with the TSI circuit. The limit switch must be mounted to the Tool in a manner that guarantees that the switch is closed only when the Tool is nested in the Tool Stand (see *Figure 3.2* and *Figure 3.3*). The limit switch is connected to the VB19 Tool module via a 4-Pin M12 female connector.

The function of the VB19 safety circuitry can be more clearly understood by referencing the schematics shown in *Figure 3.2* and *Figure 3.3*.

Figure 3.1—Tool Stand Interlock (TSI)



Tool Stand Interlock Safety Feature:

The Tool Stand Interlock (TSI) Feature is provided with this Tool Changer.

A 4-Pin M12 connector found on the Tool module is designed for use with a Tool Stand present switch. It is recommended that the customer integrate a single-pole, single-throw (Normally Open, spring return) limit switch to work with this feature. This switch should be integrated onto the EOAT to sense when the Tool is in the stand.

If an Unlatch command is given and the Tool is not docked properly, the Unlatch command will not be recognized. This prevents the accidental release of the Tool outside of the Tool Stand.

A teach plug is available to overide the TSI safety feature during initial setup and maintenance situations.

Please refer to the manual for specific details regarding the TSI feature.

CAUTION: The Master locking mechanism must be fully retracted prior to the Master entering the Tool. Failure to do so will cause ball bearings to damage the Tool Bearing Race. If Tool changer is locked, use solenoid valve manual override on the Tool changer to unlock before attempting to latch Master with Tool.

3.2 TSI Operational Function

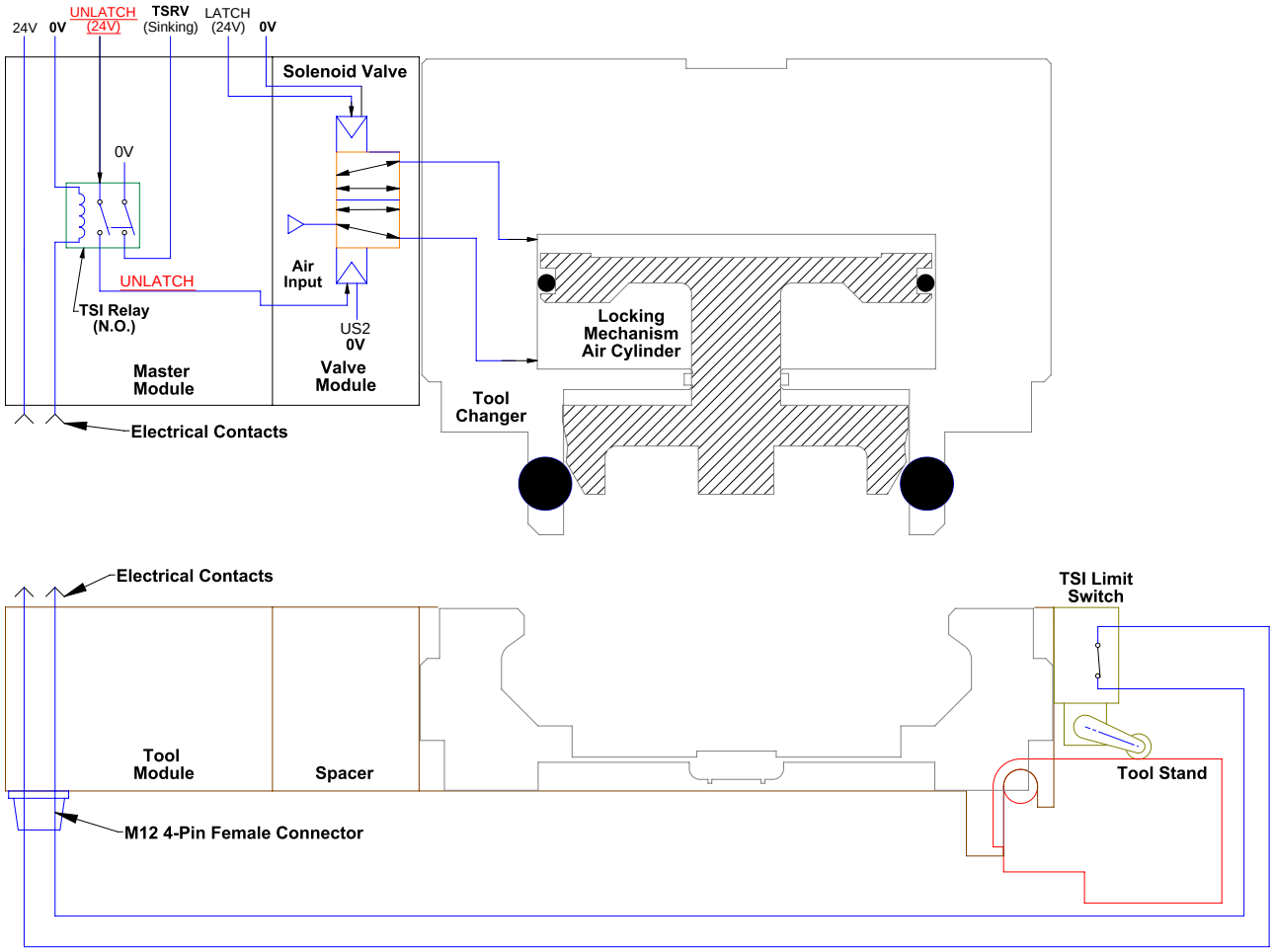
The Master is away from the Tool Stand and the Tool is nested safely in the Tool Stand. The TSI Relay, located in the Master Module, is driven by closure of the mechanical TSI Limit Switch located on the Tool. When closed, the relay passes the unlatch signal from the robot to the Solenoid Valve.

Since the Master and Tool are not coupled and the electrical contacts are not touching, it is not possible to close the TSI Relay and unlock the Tool Changer locking mechanism. Even if an unlatch command is provided by the robot, the Tool Changer will not unlock.

In the event that the Tool Changer is locked without a Tool, it must be unlocked using the manual override button on the valve (refer to *Section 5.1.1—Solenoid Valve Manual Override Procedure*).

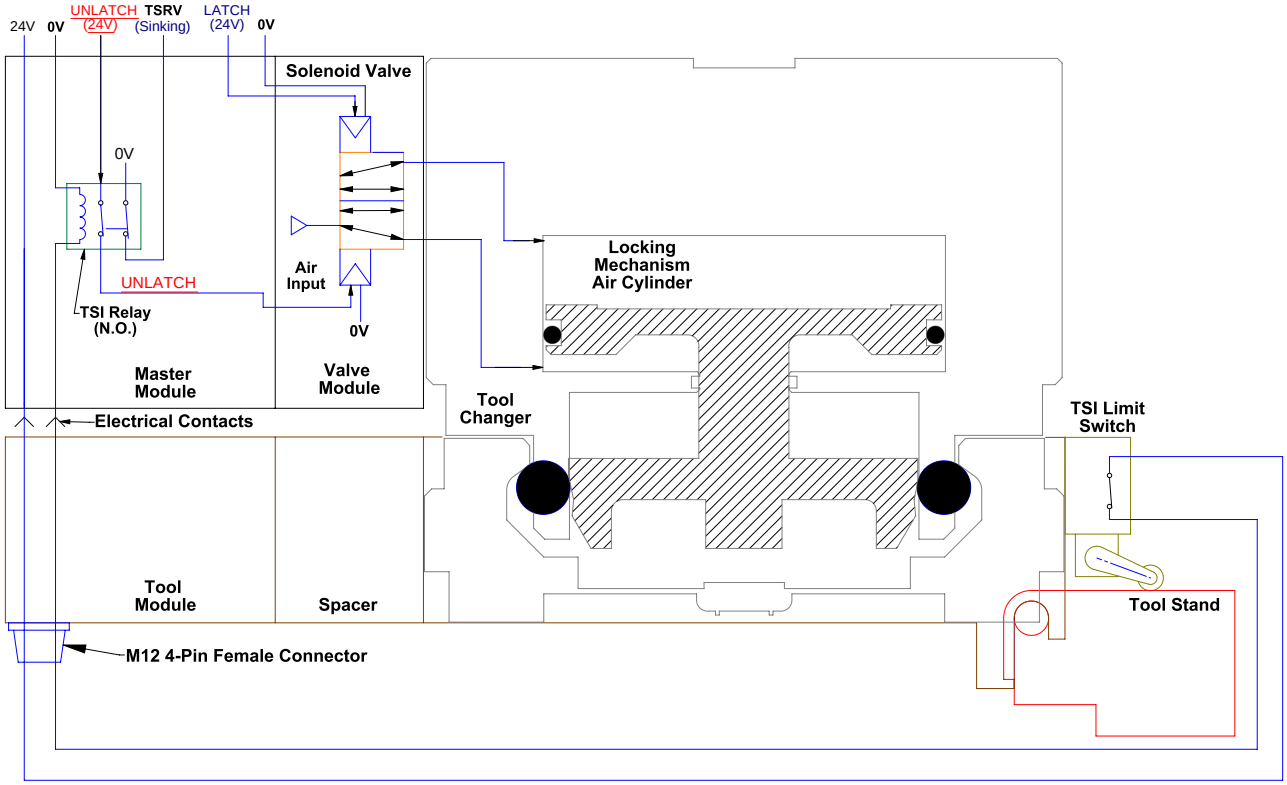
The second set of contacts on the TSI relay is used to provide the TSRV (TSI Relay Verify) diagnostic signal (when the TSI Relay is open, the TSRV signal should be low). (Note: in the VB19 module the TSRV signal is sinking.) The TSRV signal can indicate if there is damage to the TSI relay, cable, or mechanical switch. For maximum safety, the status of the TSRV signal should be monitored in the manner described in *Section 3.3—Recommended Sequence of Operations*.

Figure 3.2—TSI Circuit with Master Free of Stand, Tool in the Stand



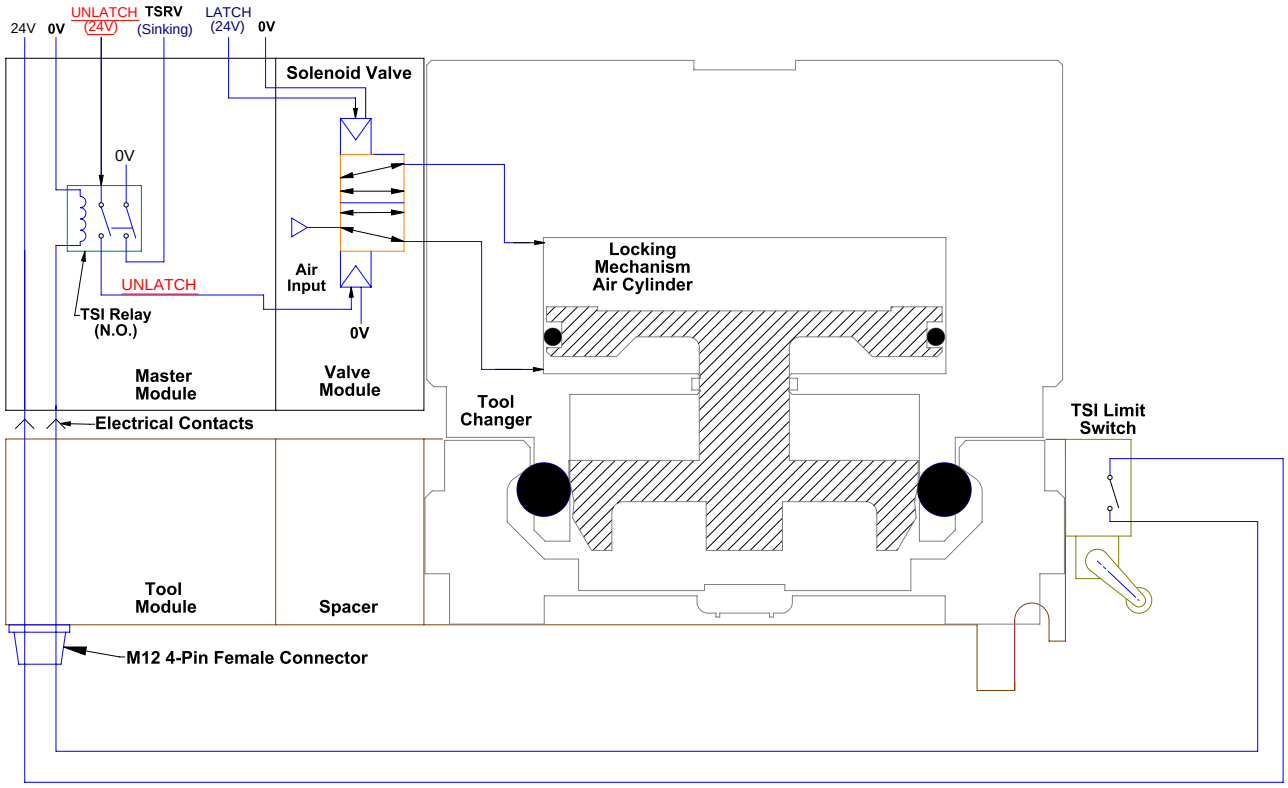
The Master and Tool are within coupling distance and the electrical contacts are touching. The TSI Relay closes because the TSI limit switch is actuated and the electrical contacts are touching. It is now possible for the TSI Relay to pass the unlatch signal from the robot to the Solenoid Valve.

Figure 3.3—TSI Circuit with Master and Tool Locked



The Master and Tool are coupled together and free of the tool stand, the TSI Limit Switch (normally Open) is not tripped breaking the circuit in the TSI relay. It is not possible to close the TSI Relay and unlock the Tool Changer locking mechanism, even if an unlatch command is provided by the robot the Tool Changer will not unlock.

Figure 3.4—TSI Circuit with Master and Tool Locked (free of stand)



3.3 Recommended Sequence of Operations

This Recommended Sequence of Operations procedure is to be used as a general guide when programming a robot or PLC for use with a Tool Changer and VB19 control/signal modules. 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 false). The Tool is by itself in the Tool Stand.

   a. The **RTL1** and **RTL2** inputs are false
   b. The **TSRV** input is true.
   c. 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. The **Latch** output command is false and the Unlatch output command is true.

The **Unlatch** input goes true and remains true, indicating that the Tool Changer locking mechanism is fully retracted and the unlock operation is complete.

NOTICE: For maximum safety, ATI strongly recommends editing the robot program to verify that TSRV is OFF just before tool pick up.

3. Robot and Master move into the Tool are parallel and 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. The **TSRV** input is true.
    b. The **RTL1** and **RTL2** inputs are true, indicating that it is okay to couple the Tool.
    c. ‘Input’ power connections become available on the Tool.
    d. Communications with downstream device(s) should now be established.
4. Coupling the Tool Changer.
    a. The **Unlatch** output is made false.
    b. The **Latch** output is made true.
    c. The **Unlocked** input goes false a short time later, indicating piston travel. Subsequently, the **Locked** input goes true and remains true, indicating that the coupling operation is complete.

NOTICE: For maximum safety, ATI strongly recommends editing the robot program to verify that RTLV is ON at tool pick up.

5. Robot moves away from the Tool Stand with the Tool Changer coupled.

NOTICE: For maximum safety, ATI strongly recommends editing the robot program to verify that TSRV is OFF when the tool is above the stand immediately after tool pickup.

6. Normal operation:
    a. The following inputs are true:
        i. **Locked**
        ii. **RTL1**
        iii. **RTL2**
    b. The following inputs are false:
        i. **Unlocked**
        ii. **TSRV**
    c. The following outputs are false:
        i. **Latch**
        i. **Unlatch**
7. Robot moves into the Tool Stand with the Tool Changer coupled.
8. Uncoupling the Tool Changer. **IMPORTANT: It is critical that the Tool be nested securely in the Tool Stand prior to Uncoupling the Tool Changer.**
    a. The **TSRV** input is true.
    b. The **Unlatch** output is made true.
    c. The **Latch** output is made false.
    d. The **Locked** input goes false a short time later and subsequently the **Unlocked** input goes true and remains true, indicating that the uncoupling operation is complete.

9. Robot and Master move up and away and are at a distance greater than 0.125” from the Tool(the module contact pins are no longer touching).
    a. The **TSRV** input is true.
    b. The **RTL1** and **RTL2** inputs go false.
    c. ‘Input’ power connections become unavailable on the Tool.
    d. Communications with downstream device(s) should now be lost.
10. Robot and Master in free space.
    a. The following inputs are true:
        i. **Unlocked**
        ii. **TSRV**
    b. The following inputs are false:
        i. **Locked**
        ii. **RTL1**
        iii. **RTL2**

4. Maintenance

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; 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 or Utility Coupler.

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 specific 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.

If the Tool Changer is used in dirty environments (e.g., welding or deburring applications), 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, perform periodic inspections to assess for unexpected damage and assure long-lasting performance. 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 2.3—Tool Module 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)*

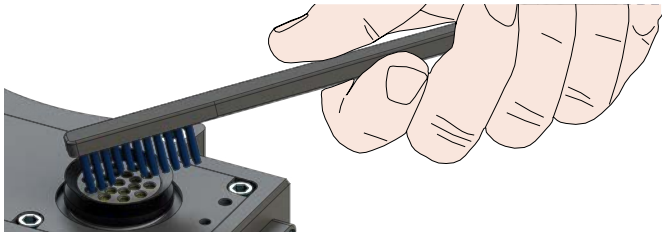
1. Place the Tool in a secure location.
2. Uncouple the Master and Tool plates.
3. Turn off and de-energize all energized circuits (for example: electrical, pneumatic, and hydraulic circuits).
4. Inspect the Master and Tool pin blocks for debris or darkened pins.

Figure 4.1—Inspect Master and Tool Pin Blocks

5. If debris or darkened pins are present, use a vacuum to remove the debris, and clean using a nylon brush (ATI Part Number 3690-0000064-60).

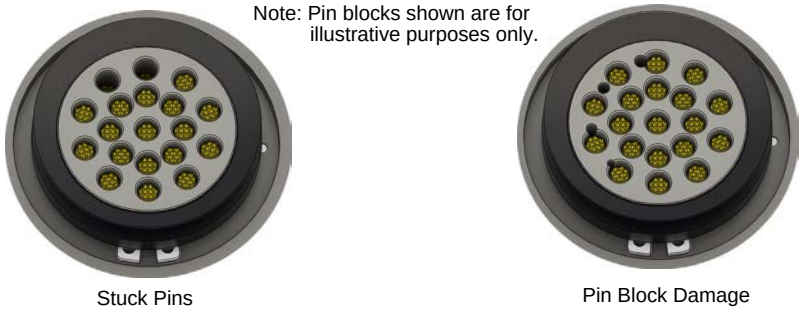
NOTICE: Do not use an abrasive media and/or cleaners or solvents to clean the contact pins. Using abrasive media and/or cleaners or solvents will cause damage to the contact surface or cause pins to stick. Clean contact surfaces with a vacuum or non-abrasive media such as a nylon brush (ATI Part Number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

Figure 4.2—Clean Pin Blocks with a Nylon Brush



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

Figure 4.3—Stuck Pin and Pin Block Damage



7. If pins become stuck or if there is damage to the pin block, contact ATI for either a possible pin replacement procedure or module replacement.
8. Safely resume normal operation.

5. Troubleshooting and Service Procedures

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

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 or Utility Coupler.

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 specific 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 Procedures

Troubleshooting information is provided in the following table.

Table 5.1—VB19 Troubleshooting Procedures

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 Maintenance section of the Tool Changer manual for instructions.
	Air supply not to specifications.	Check air supply. Refer to the Installation section of the Tool Changer manual for specifications.
	Check that exhaust port is properly vented.	Check that exhaust port is properly vented. *Refer to Pneumatic Connection section of the Base Tool Changer Manual* for valve requirements.
	Incorrect valve operation.	Check valve for proper operation. *Refer to Pneumatic Connection section of the Base Tool Changer Manual* for valve requirements.
	Signals are mapped incorrectly.	Verify that signals are mapped and are communicating properly. Refer to *Section 8—Drawings* for electrical schematic.
	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 Installation – Tool Stand Design Section of the Tool Change manual for specifications.*

Table 5.1—VB19 Troubleshooting Procedures		
Symptom	**Possible Cause**	**Correction**
Sensors not operating properly	Sensor cables damage or incorrectly connected.	Verify that cables are connected correctly and not damaged, replace if damaged. Refer to the Troubleshooting Section of the Tool Change manual.
	Sensors are set correctly.	Verify that the sensors are set correctly. *Refer to the Troubleshooting Section of the Tool Changer manual.*
	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.
	Air trapped in the Unlock (U) air port.	Ensure that there is no air trapped in the Unlock (U) air port. *Refer to Air and Valve adapter section for pneumatic specification and requirements.*
Loss of Communication	Damaged signal cabling	Check/Replace signal cabling up- and down-stream of Tool Changer modules.
	Worn or damaged contact pins	Inspect module contact pins for debris/wear/ damage.
	Product up- and downstream of Tool Changer failed or damaged	Check product up- and downstream of Tool Changer for failure. This failure can “appear” to be caused by the Tool Changer or affect Tool Changer performance.

5.1.1 Solenoid Valve Manual Override Procedure

The manual override procedure should be used when the Tool Changer is locked without the Tool plate attached. The control module safety circuit does not allow the Tool Changer to be unlatched without the Tool plate attached and the tool in the tool stand.

WARNING: Do not use the solenoid valve manual override if the tool is locked to the Master. Using the manual override will release the Tool and may cause bodily injury or damage to equipment. If the Tool is attached to the Master, it must be secured in the tool stand or in a location where the tool weight is supported before using the manual override.

CAUTION: The manual override is not intended for normal operations. Manual override is to be used in situations where no alternative is available to unlock the Master. Do not execute the Latch command unless the Master and the Tool are ready to be coupled.

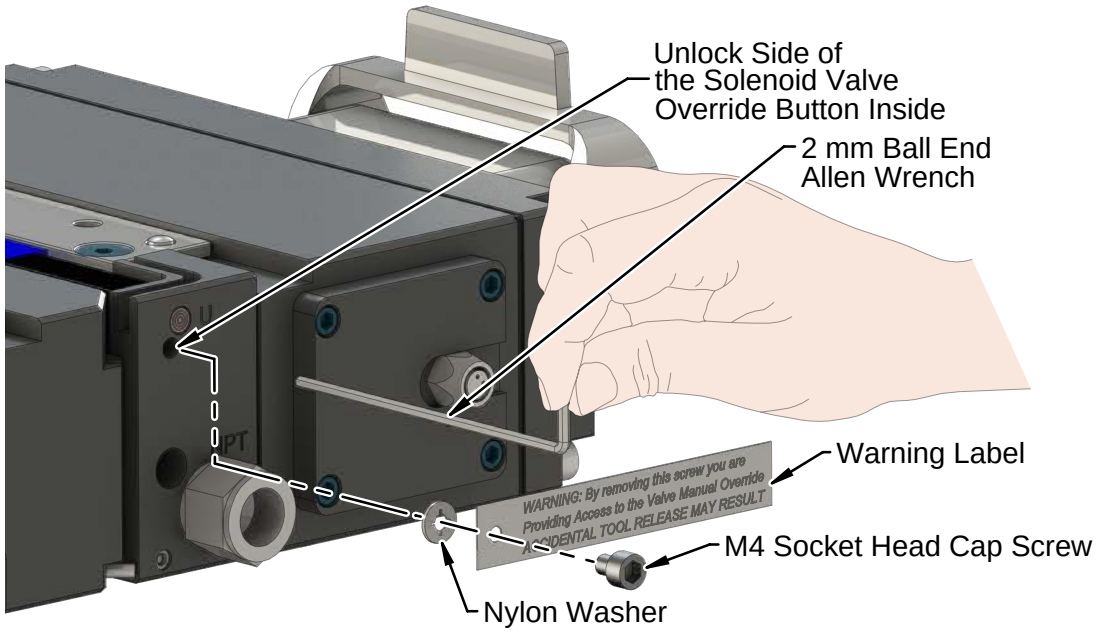
Tools required: *3 mm Allen® wrench (hex key), 2 mm ball end Allen wrench (hex key)*

1. Using a 3 mm hex key, remove the M4 socket head cap screws, warning label, and nylon washer from the Unlock side of the solenoid valve. The Unlock side is marked with a “U”.

CAUTION: Applying excess force can damage the solenoid or cause the override button to stick in one position. Actuation of valve override buttons requires about 1 mm of travel and minimal of force. Use a non-sharp object, similar to ball nose 2 mm hex key, to gently depress the override button; an air release should be heard when the solenoid is activated.

2. Insert a 2 mm ball end hex key in the unlock valve screw hole and gently depress the valve override button. An air release should be heard when the solenoid is actuated. Make sure the locking mechanism is fully retracted.
3. Using a 3 mm hex key, replace the M4 socket head cap screws, warning label, and nylon washer and tighten the screw.

Figure 5.1—Manual Override



5.2 Service Procedures

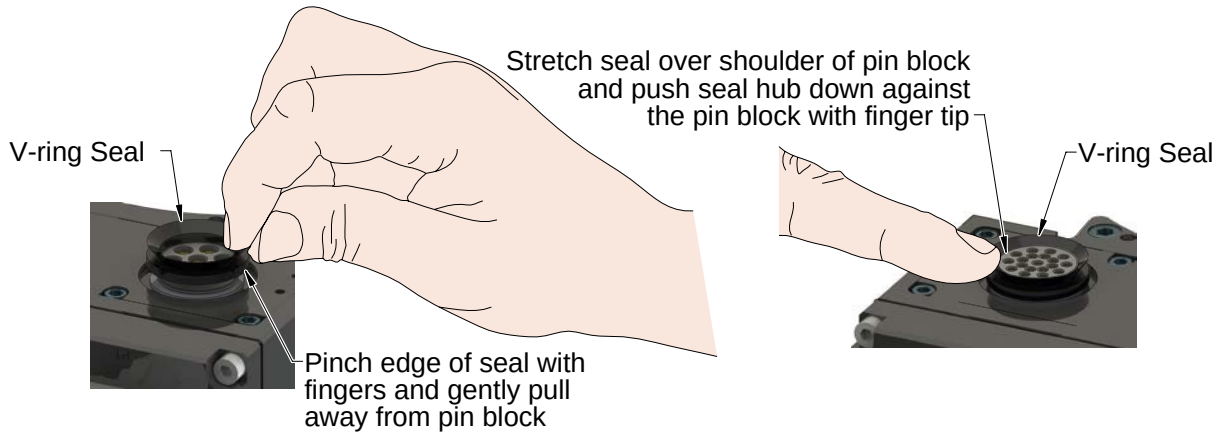
Component replacement and adjustment procedures are provided in the following section.

5.2.1 Seal Replacement

The seal protects the electrical connection between the Master and Tool module. Replace the seal if it becomes worn or damaged.

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: electrical, pneumatic, and hydraulic circuits).
4. To remove the existing seal, pinch the edge of the seal and pull the seal away from the pin block on the Master module.
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.
7. Safely resume normal operation.

Figure 5.2—V-ring Seal Replacement



6. Serviceable Parts

6.1 Master Module Serviceable Parts

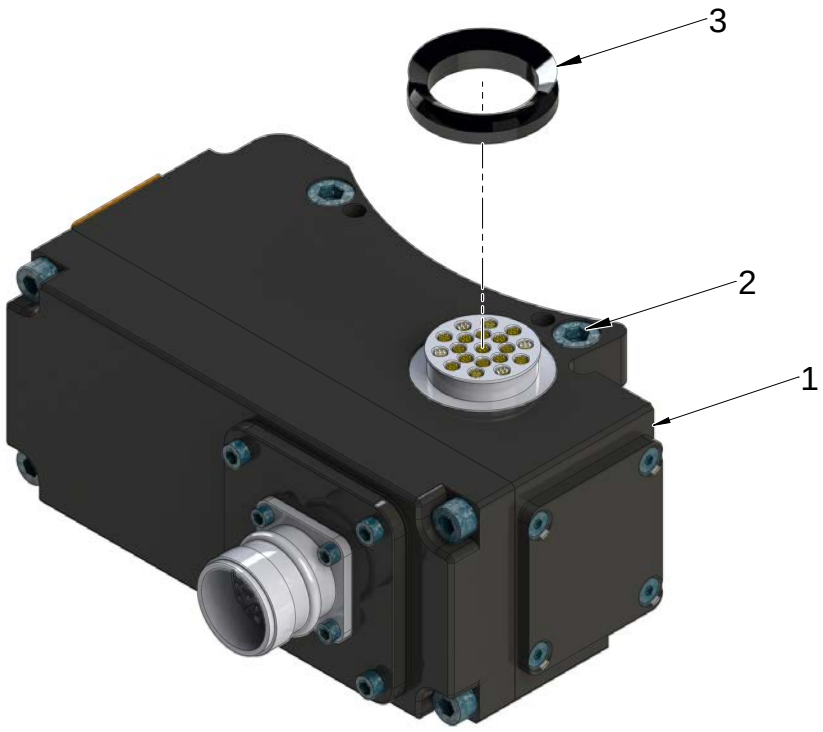


Table 6.1—VB19 Master Module Serviceable Parts			
Item No.	**Qty.**	**Part Number**	**Description**
1	1	9121-VB19-M	VB19 Master Module Assembly
2	*2*	3500-1066020-15A	M6X20 socket head cap screw, 12.9, ISO4762/ DIN912, ES-ATI-007, YL M-spheres/IFI 525
3	1	4010-0000030-01	V-Ring Seal

6.2 Tool Module Serviceable Parts

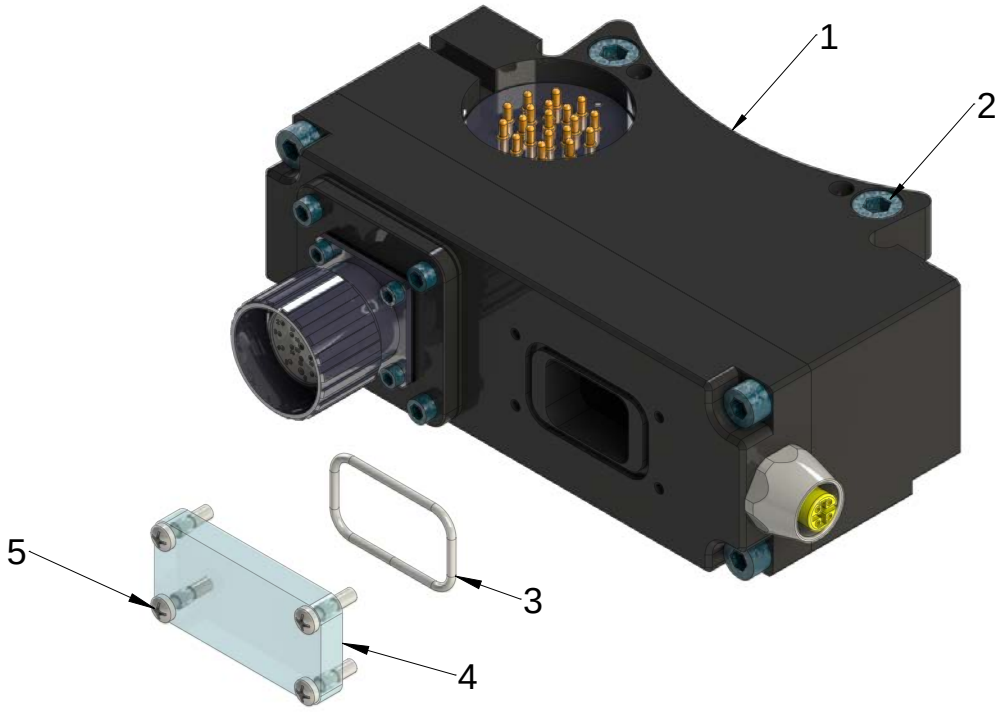


Table 6.2—VB19 Master Module Serviceable Parts			
Item No.	**Qty.**	**Part Number**	**Description**
1	1	9121-VB19-T	VB19 Tool Module Assembly
2	*2*	3500-1066016-15A	M6x16 socket head cap screw, 12.9, ISO4762/ DIN912, ES-ATI-007, YL M-spheres/IFI 525
3	1	3410-0001092-01	O-ring
4	1	3700-20-2696	Window
5	4	3500-9957012-21	Pan Head M3 Captive Screw

6.3 Accessories

Table 6.3—Accessories			
Item No.	**Qty.**	**Part Number**	**Description**
1	1	3690-0000064-60	Brush, Blue Nylon All Purpose (Contact Pin Cleaning)

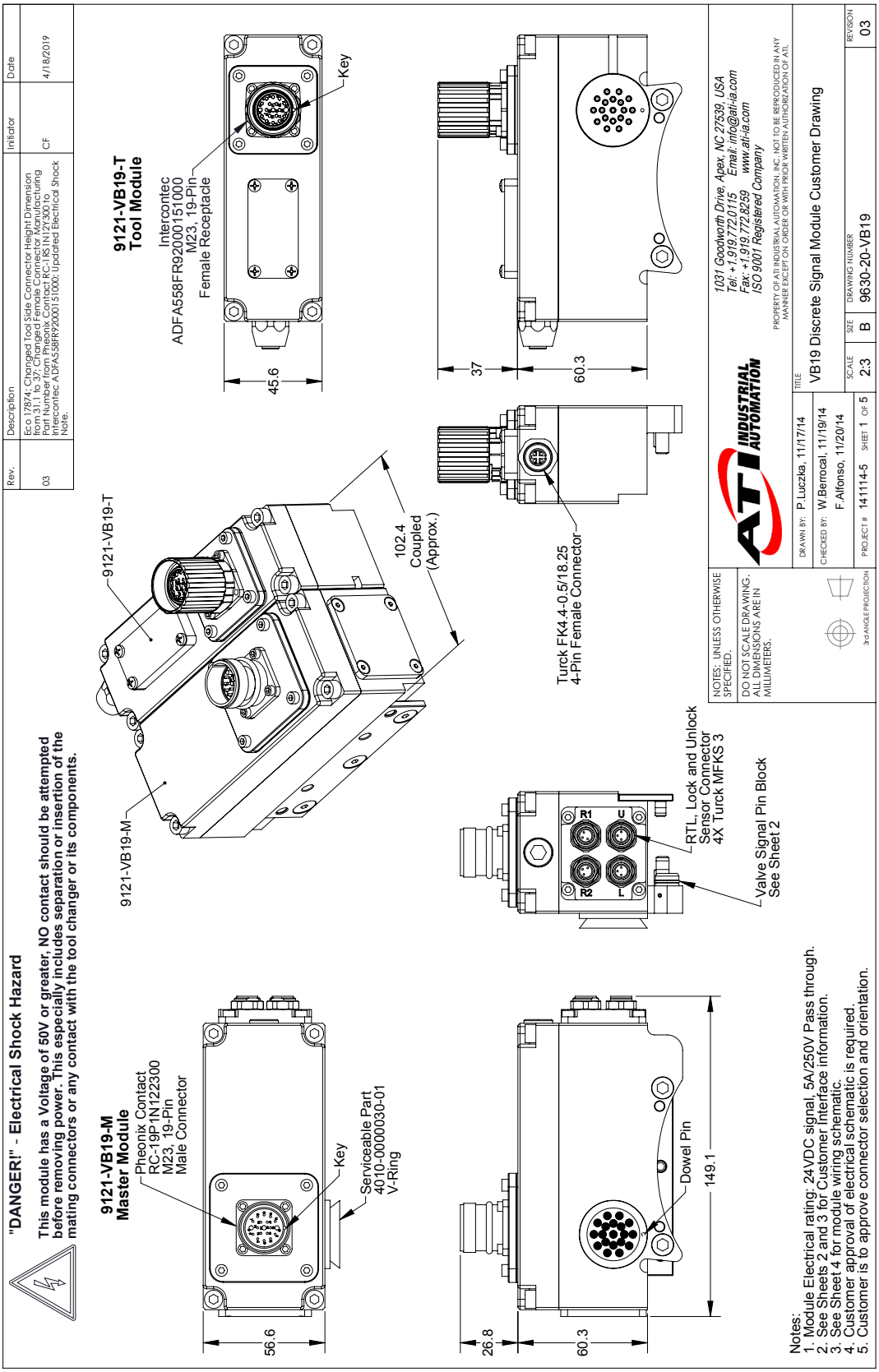
7. Specifications

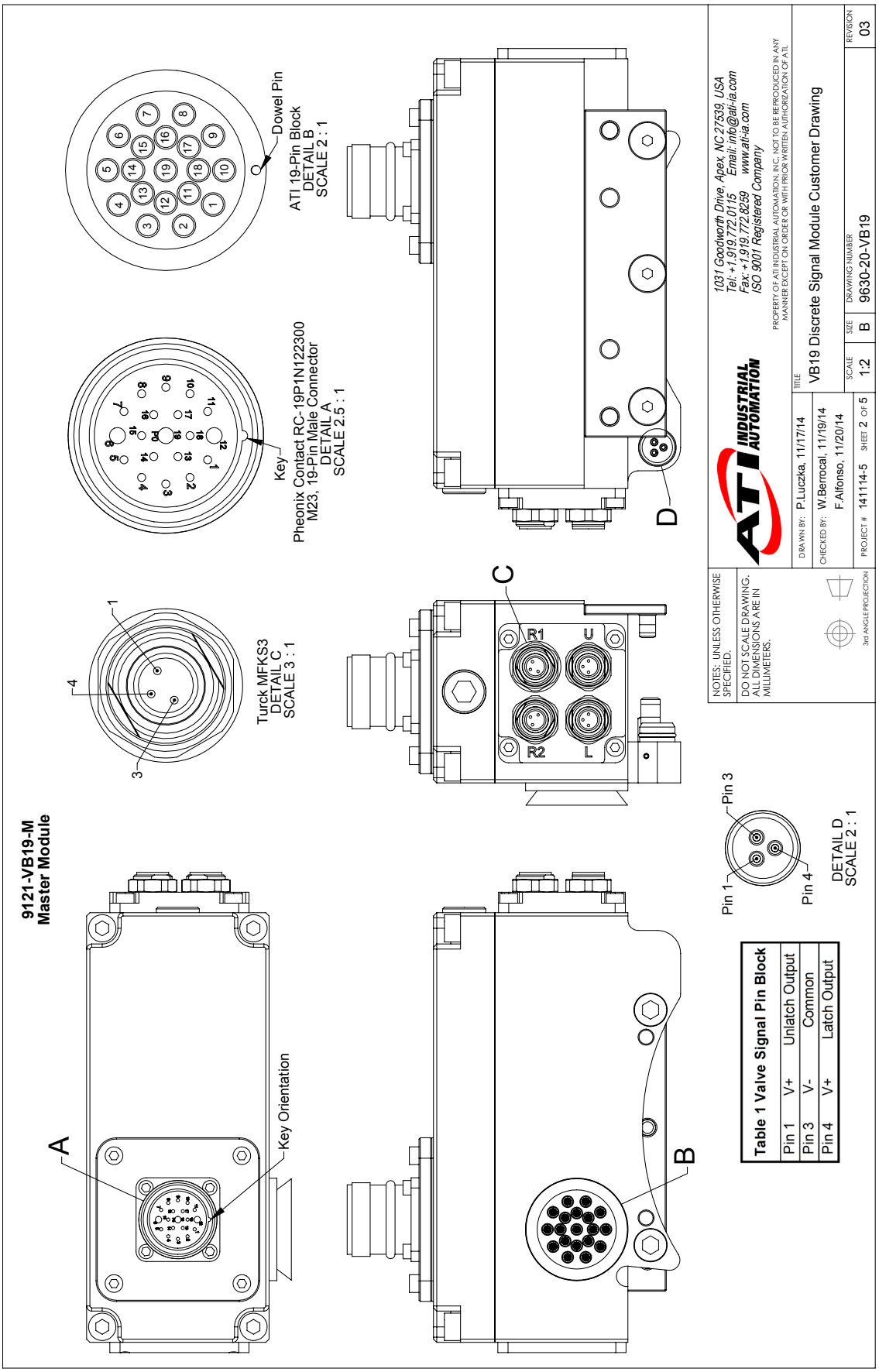
Table 7.1—VB19 Master Module Specifications	
9121-VB19-M	Discrete Signal Master Module w/19-pin M23, 19-pin block, Supports TSI on Tool
Interface Connections	Customer Interface: 19-Pin M23 Male Connector. Integrated Tool Changer I/O: (4X) M8 3-Pin female connector supporting Tool Changer Locked, Unlocked, and Ready-to-Lock Proximity sensor in series.
Electrical Rating	Signal Pass-Through: 5A maximum current rating, 250V Max.
	Tool Changer Control: Lock, Unlock, and Ready-to-Lock Sensors: 10-30 VDC operational voltage.
Weight	1.71 lbs. (0.76 kg)

Table 7.2—VB19 Tool Module Specifications	
9121-VB19-T	Discrete Signal Tool Module w/19-pin M23, 19-pin block, Supports TSI on Tool
Interface Connections	Customer Interface: 19-pin M23 Female Connector. TSI Interface: 4-Pin M12 Female Connector
Electrical Rating	Signal Pass-Through: 5A maximum current rating, 250V Max.
Weight	1.27 lbs. (0.58 kg)

8. Drawings

8.1 VB19M VB19T




9121-VB19-M
Master Module
A
Key Orientation
B
C
R1
R2
D
Dowel Pin
ATI 19-Pin Block
DETAIL B
SCALE 2 : 1
Key
Pheonix Contact RC-19P1N122300
M23, 19-Pin Male Connector
DETAIL A
SCALE 2.5 : 1
Turck MFKS3
DETAIL C
SCALE 3 : 1
Pin 1
Pin 3
Pin 4
DETAIL D
SCALE 2 : 1
Table 1 Valve Signal Pin Block
Pin 1 V+ Unlatch Output
Pin 3 V- Common
Pin 4 V+ Latch Output
NOTES: UNLESS OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS.
3rd ANGLE PROJECTION
1031 Goodworth Drive, Apex, NC 27539, USA
Tel: +1.919.772.0115 Email: info@ati-ia.com
Fax: +1.919.772.8259 www.ati-ia.com
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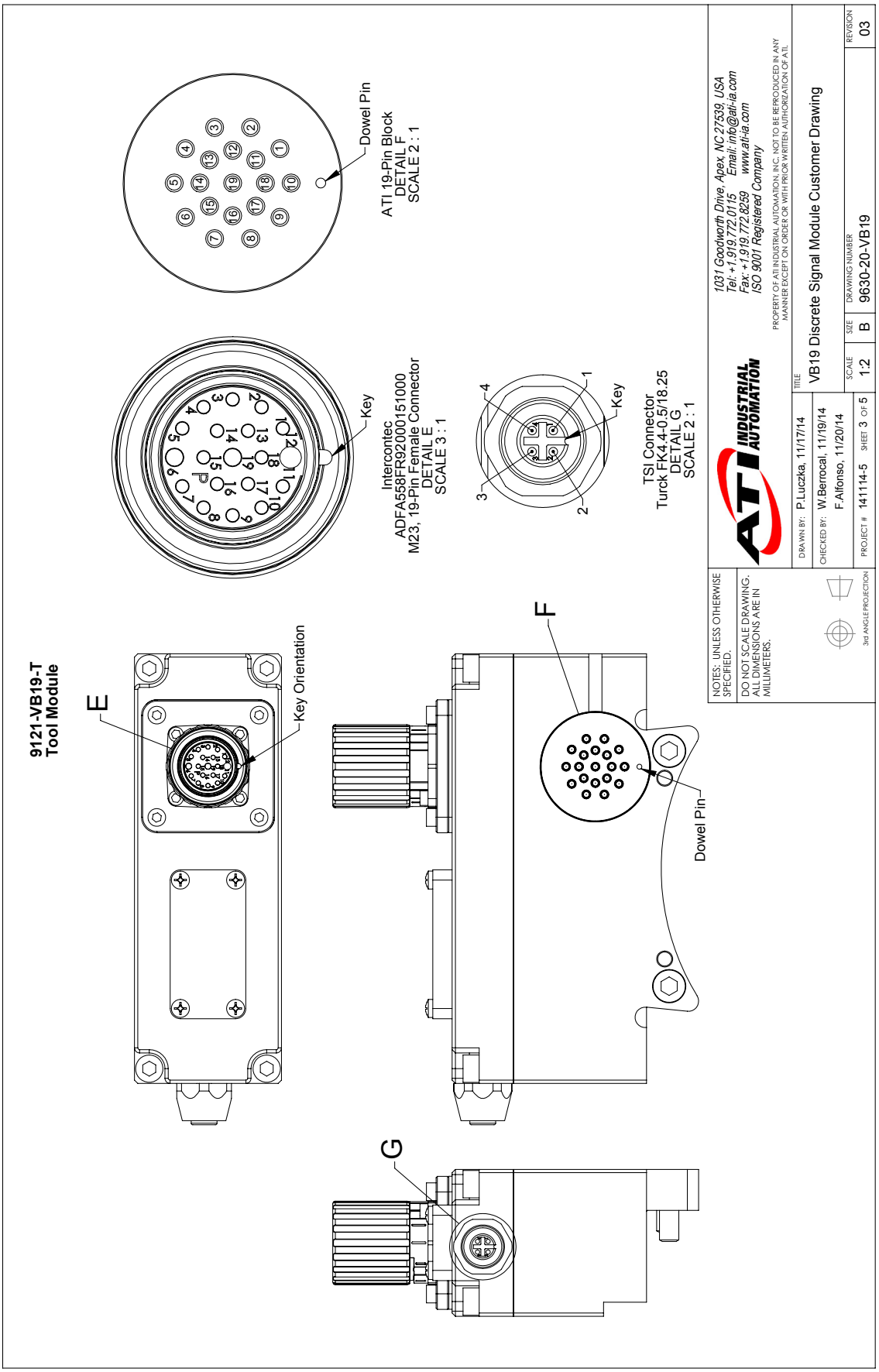
PROPERTY OF ATI INDUSTRIAL AUTOMATION, INC. NOT TO BE REPRODUCED IN ANY MANNER EXCEPT ON ORDER OR WITH PRIOR WRITTEN AUTHORIZATION OF ATI.
INDUSTRIAL AUTOMATION
DRAWN BY: P.Luczka, 11/17/14
CHECKED BY: W.Berrocal, 11/19/14
F.Alfonso, 11/20/14
PROJECT # 141114-5
SHEET 2 OF 5
TITLE
VB19 Discrete Signal Module Customer Drawing
SCALE 1:2
SIZE B
DRAWING NUMBER 9630-20-VB19
REVISION 03


9121-VB19-T
Tool Module
E
Key Orientation
F
Dowel Pin
G
ATI 19-Pin Block
DETAIL F
SCALE 2 : 1
Dowel Pin
Intercontec
ADFA558FR92000151000
M23, 19-Pin Female Connector
DETAIL E
SCALE 3 : 1
Key
TSI Connector
Turck FK4.4-0.5/18.25
DETAIL G
SCALE 2 : 1
Key
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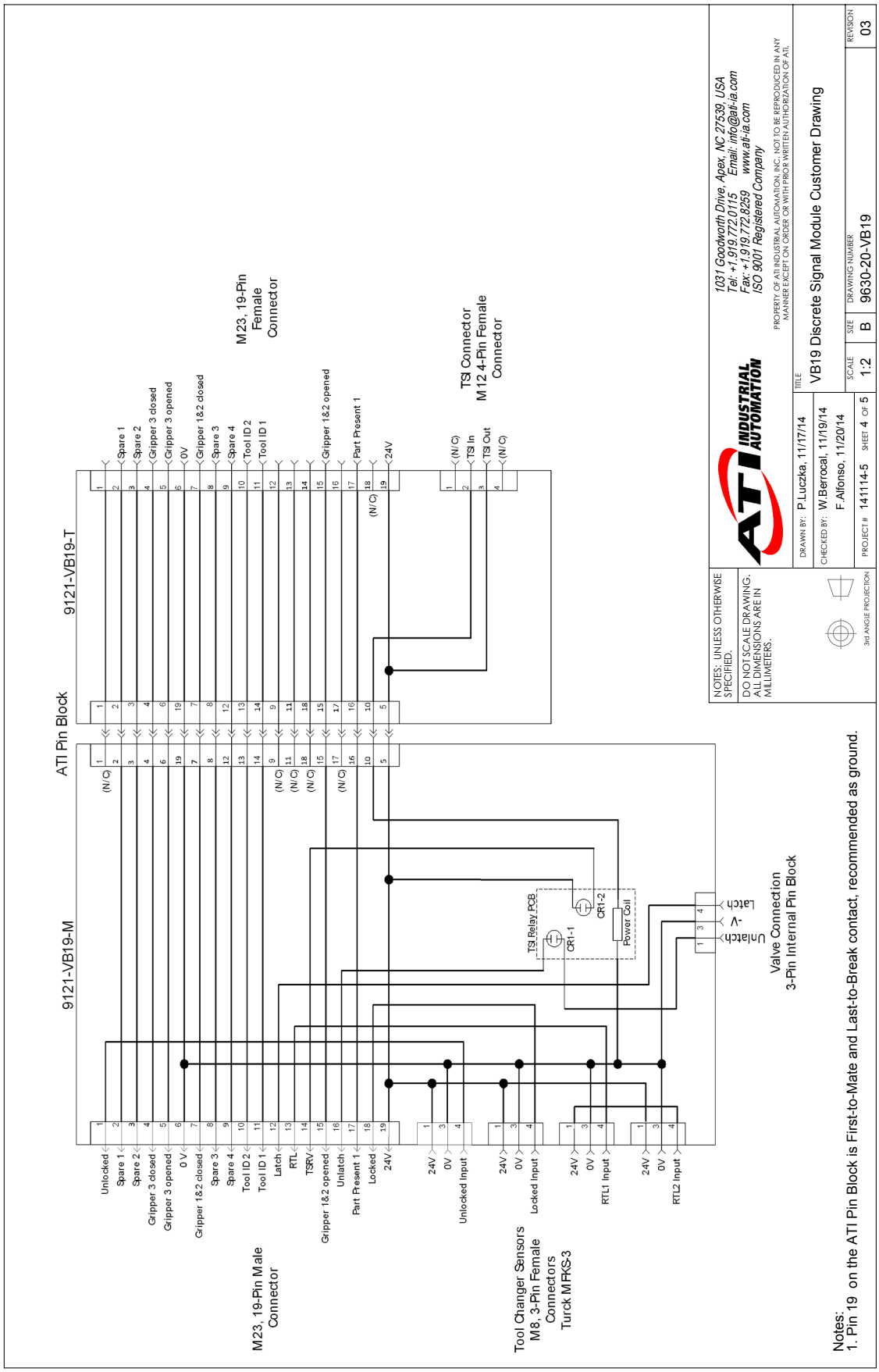
PROJECT # 141114-5 SHEET 3 OF 5
TITLE
VB19 Discrete Signal Module Customer Drawing
SCALE 1:2
SIZE B
DRAWING NUMBER 9630-20-VB19
REVISION 03


ATI Pin Block
9121-VB19-M
9121-VB19-T
M23, 19-Pin Male Connector
M23, 19-Pin Female Connector
TSI Connector M12 4-Pin Female Connector
Tool Changer Sensors M8, 3-Pin Female Connectors Turck MRKS3
Valve Connection 3-Pin Internal Pin Block
TSI Relay PCB
CR1-1
CR1-2
Power Coil
Unlatch
-V
Latch
Unlocked
Spare 1
Spare 2
Gripper 3 closed
Gripper 3 opened
0 V
Gripper 1&2 closed
Spare 3
Spare 4
Tool ID 2
Tool ID 1
Latch
RTL
TSRV
Gripper 1&2 opened
Unlatch
Part Present 1
Locked
24V
0V
Unlocked Input
Locked Input
RTL1 Input
RTL2 Input
(N/C)
TSI In
TSI Out
Notes:
1. Pin 19 on the ATI Pin Block is First-to-Mate and Last-to-Break contact, recommended as ground.
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F.Alfonso, 11/20/14
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SHEET 4 OF 5
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VB19 Discrete Signal Module Customer Drawing
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DRAWING NUMBER 9630-20-VB19
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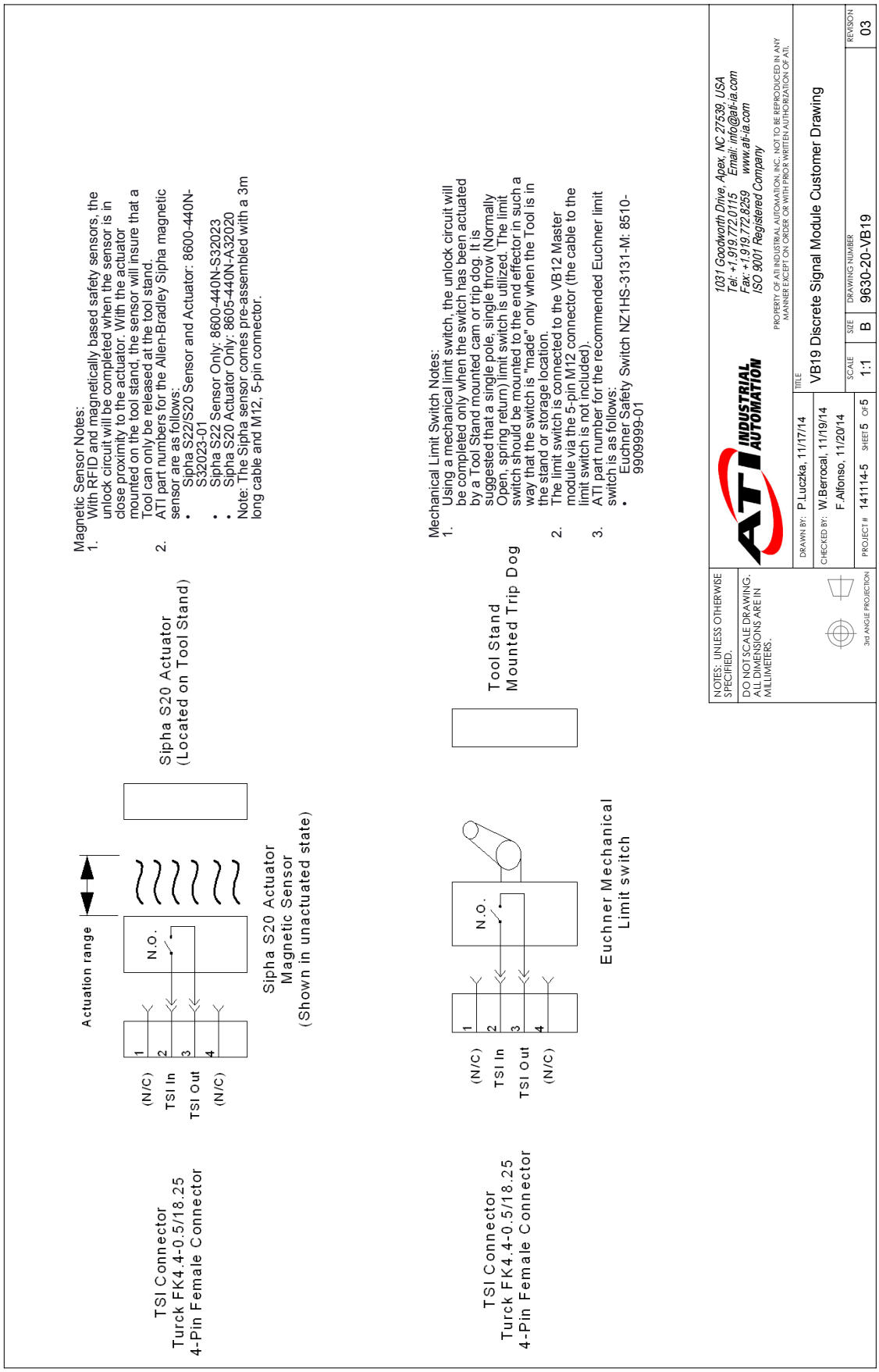
Magnetic Sensor Notes:
1. With RFID and magnetically based safety sensors, the unlock circuit will be completed when the sensor is in close proximity to the actuator. With the actuator mounted on the tool stand, the sensor will insure that a Tool can only be released at the tool stand.
2. ATI part numbers for the Allen-Bradley Sipha magnetic sensor are as follows:
• Sipha S22/S20 Sensor and Actuator: 8600-440N-S32023-01
• Sipha S22 Sensor Only: 8600-440N-S32023
• Sipha S20 Actuator Only: 8605-440N-A32020
Note: The Sipha sensor comes pre-assembled with a 3m long cable and M12, 5-pin connector.
Actuation range
N.O.
Sipha S20 Actuator
(Located on Tool Stand)
Sipha S20 Actuator
Magnetic Sensor
(Shown in unactuated state)
TSI Connector
Turck FK4.4-0.5/18.25
4-Pin Female Connector
(N/C)
TSI In
TSI Out
(N/C)
1
2
3
4
Mechanical Limit Switch Notes:
1. Using a mechanical limit switch, the unlock circuit will be completed only when the switch has been actuated by a Tool Stand mounted cam or trip dog. It is suggested that a single pole, single throw (Normally Open, spring return) limit switch is utilized. The limit switch should be mounted to the end effector in such a way that the switch is "made" only when the Tool is in the stand or storage location.
2. The limit switch is connected to the VB12 Master module via the 5-pin M12 connector (the cable to the limit switch is not included).
3. ATI part number for the recommended Euchner limit switch is as follows:
• Euchner Safety Switch NZ1HS-3131-M: 8510-9909999-01
Tool Stand
Mounted Trip Dog
N.O.
Euchner Mechanical
Limit switch
TSI Connector
Turck FK4.4-0.5/18.25
4-Pin Female Connector
(N/C)
TSI In
TSI Out
(N/C)
1
2
3
4
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3rd ANGLE PROJECTION
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SCALE 1:1
SIZE B
DRAWING NUMBER 9630-20-VB19
REVISION 03