Table of Contents

C. Control and Signal Modules
VB12-M, VB13-M, and VB12-T—Discrete Control Module Supporting Integrated Valve

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 MS-style Amphenol connector on the control/signal Master module. Lock, Unlock, and Ready-to-Lock proximity sensor inputs (PNP sourcing-type) 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. Reference drawings in Section 8 for pin out information and location of the I/O signals.

Refer to the specific Tool Changer manual for details on the operation of the Tool Changer and recommended procedure for coupling.

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 1.3—Master-side TSI with Safety Switch* for detailed information regarding the safety features of the discrete control modules.

1.1 Master Module

The Master module is equipped with a 36-Pin, MS-3122 style connector for interfacing with the Tool Changer's Lock, Unlock, and Ready-to-Lock sensors and for supplying signals and power to the end-of-arm tooling (**Note: the Ready-to-Lock sensors in the Master are wired in series**). The Master is designed to **support only PNP sensors**. 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.

The safety switch is connected to the Master module via a 5-Pin, M12 connector mounted to the side of the Master module. Refer to *Section 1.3—Master-side TSI with Safety Switch* for detailed information regarding the safety features of the discrete control modules.

An electrical interface is provided on the Master module for support of a **double-solenoid** integrated valve (DC Voltage, sourcing-type: **single-solenoid valve is not supported**). 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 Thru*). Electrical interface drawings and connector details provided are in *Section 8—Drawings.*

1.2 Tool Module

The VB12 Tool module is equipped with a 36-Socket, MS-3122 style connector and provides the interface for supplying signals and power 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.

Figure 1.1—VB12-M and VB12-T Discrete Control Modules

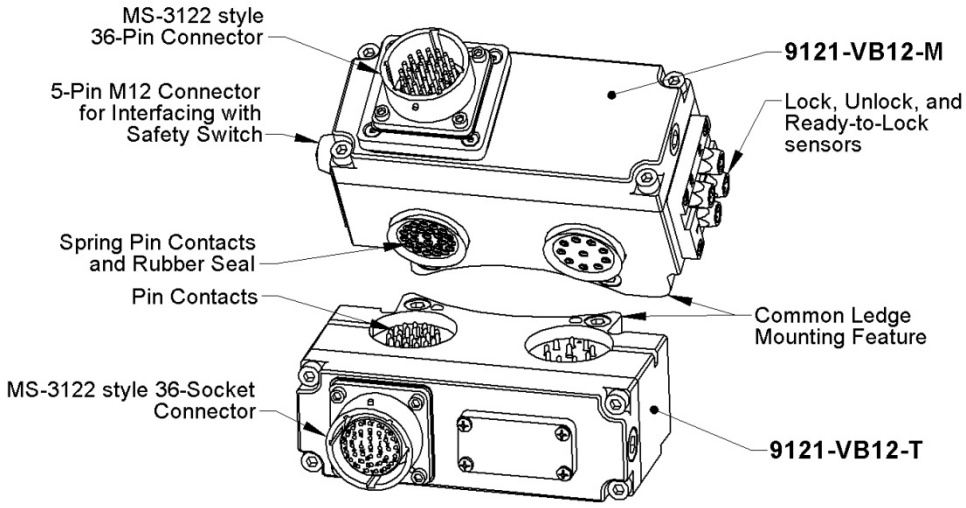
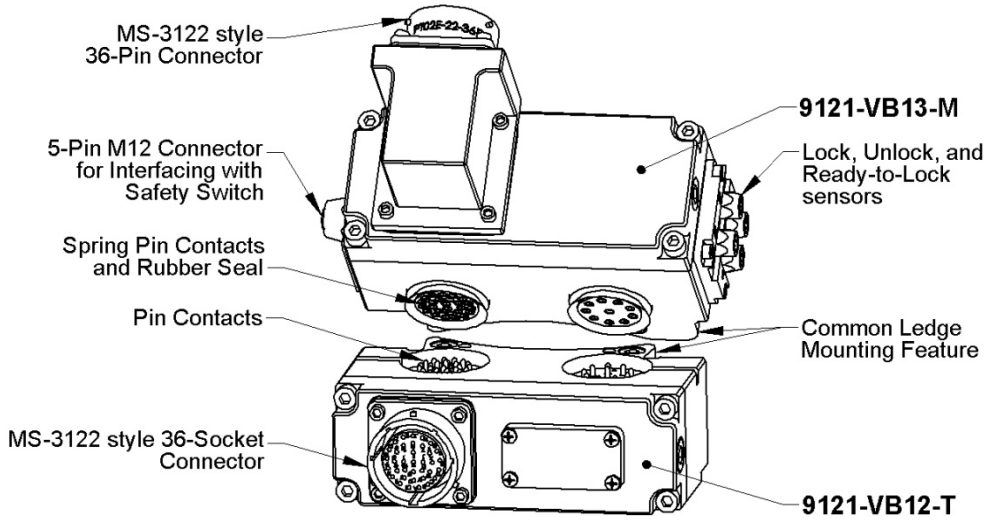


Figure 1.2—VB13-M and VB12-T Discrete Control Modules

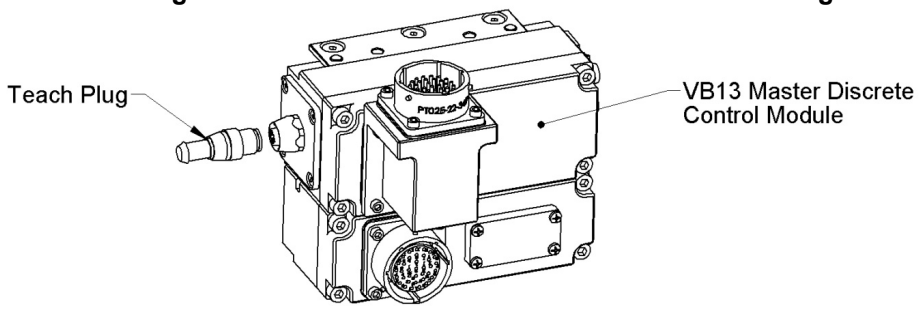


1.3 Master-side TSI with Safety Switch

To prevent an unintended Tool release, the electrical power to the unlatch valve circuit is routed through a safety switch that is mounted to the Master. With the transponder, actuator, or trip dog mounted on the Tool Stand, the safety switch will insure that a Tool can only be released at the Tool Stand. *Sections 1.3.1 through 1.3.4* provide a detailed description of the safety circuit.

The safety switch is connected to the Master module via a 5-pin M12 connector that is mounted to the side of the module. A teach plug, can be connected to the 5-pin M12 TSI connector to override the TSI circuit during setup and integration. Refer to *Section 6—Recommended Spare Parts and Accessories*.

Figure 1.3—Discrete Control Modules with Teach Plug



The VB12-M, VB13-M, and VB12-T support three types of safety switches:

Klaschka Widen Sensor 13.28-06 and Klaschka Sident 13.14.68 Transponder - (RFID-type)

Sipha Sensor S22 and Sipha Actuator S20 - (Magnetic-type)

Euchner Safety Switch NZ1HS-3131- (Mechanical-type)

Note: With the RFID-type sensor, always use the safety switch in conjunction with a proximity sensor. Due to its fairly wide sensing range, the safety switch is not intended to replace a Tool Stand sensor or switch to signal the robot that the Tool is positioned in the Tool Stand and can be released.

Figure 1.4—Master-side TSI with RFID-type or Magnetic-type Safety Switch

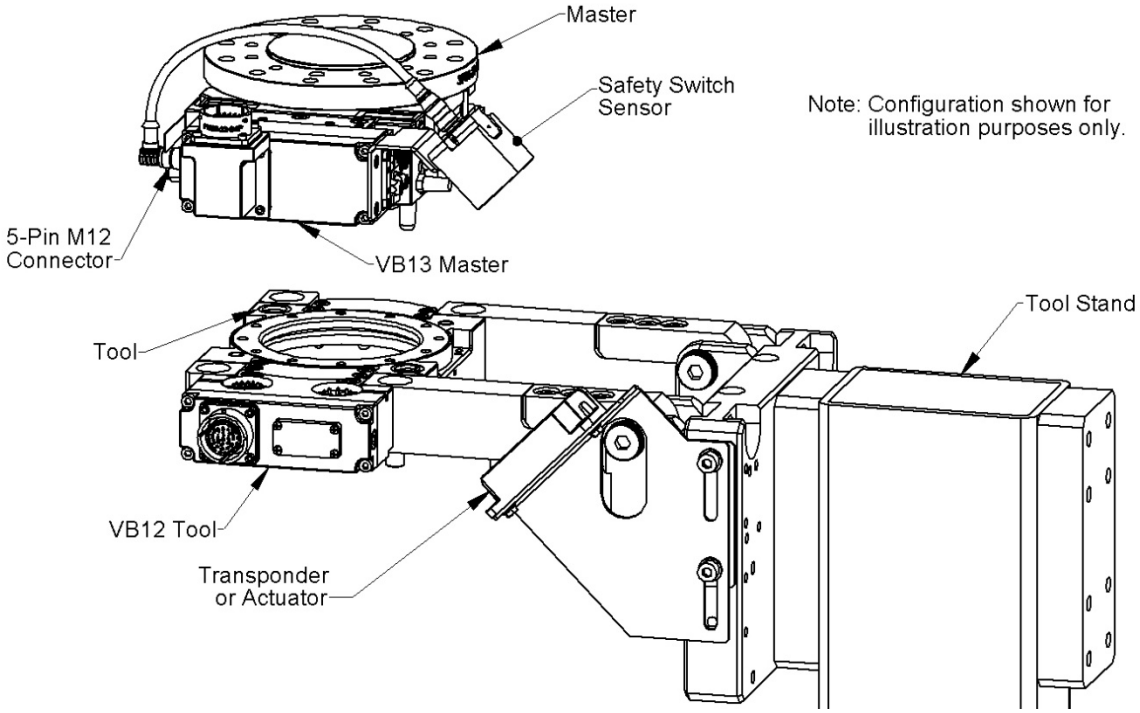
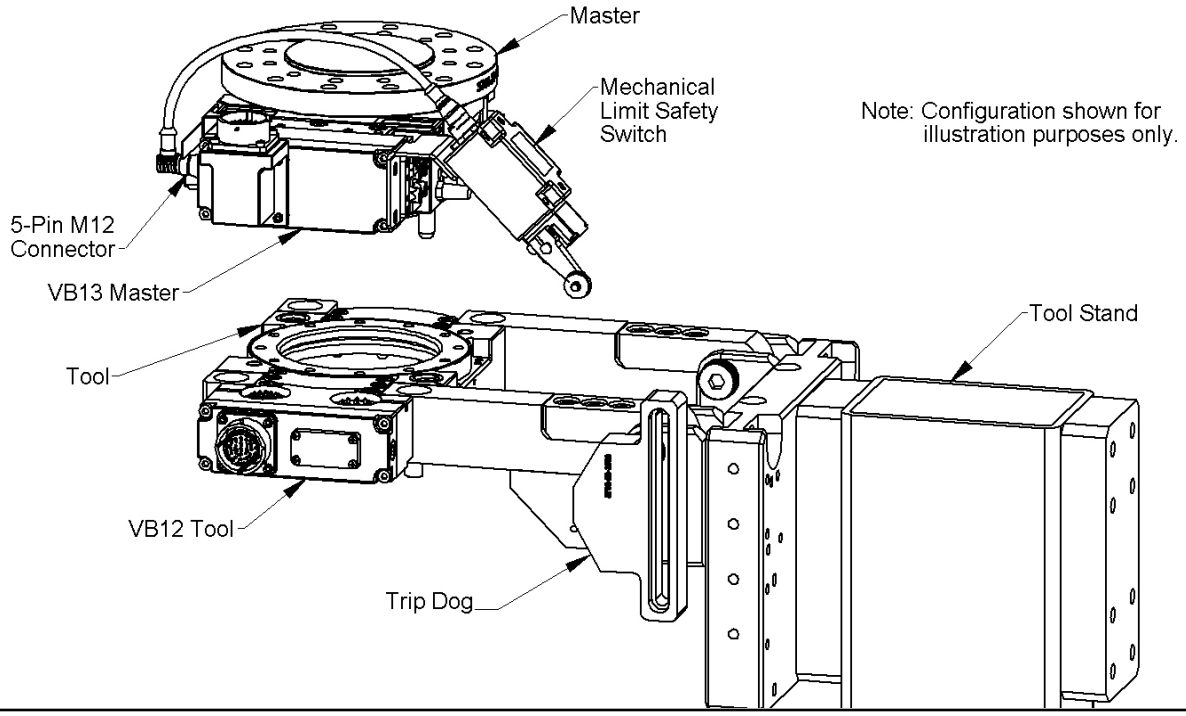


Figure 1.5— Master-side TSI with Mechanical-type Safety Switch



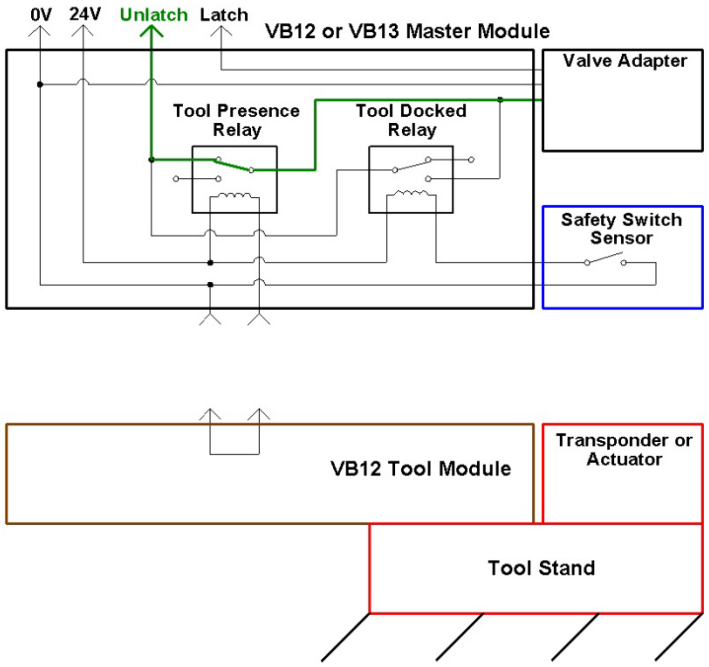
CAUTION: This Tool Changer is equipped with Tool Stand Interlock (TSI). Special procedures are required to uncouple the Tool Changer.

The following sections provide a detailed sequential description of the discrete control modules safety circuitry.

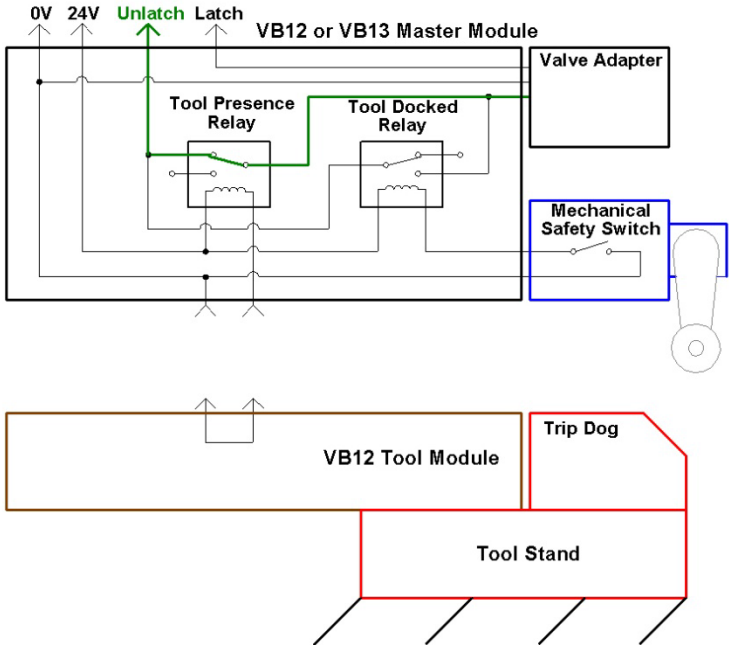
1.3.1 Master Free of Stand, Tool in the Stand

The Master is away from the Tool Stand and the Tool is in the Stand. In order to allow the Tool Changer to uncouple when the Tool is not present, a Tool Presence relay circuit is utilized. This relay circuit is located in the Master module and is triggered by electrical contact between the Master and Tool. When there is no electrical contact, indicating no Tool Presence, then the relay circuit is closed, allowing Unlatch power to be supplied to the solenoid valve.

Figure 1.6—Master Free of Stand, Tool in the Stand
Safety Circuit with RFID-type or Magnetic-type



Safety Circuit with Mechanical-type

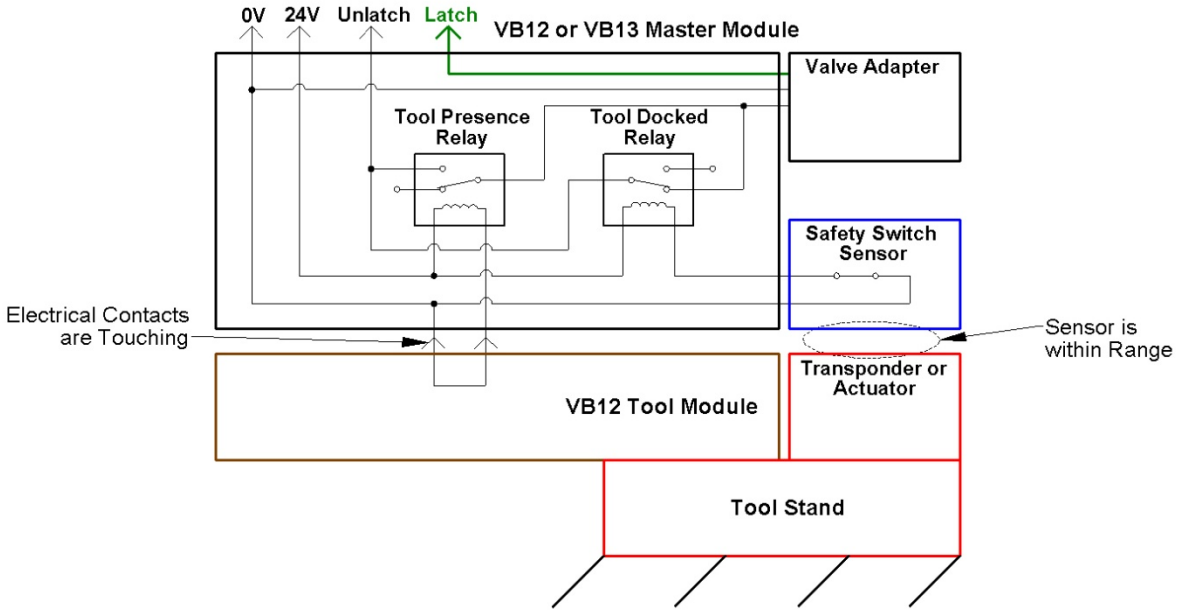


1.3.2 Master and Tool Ready to Couple

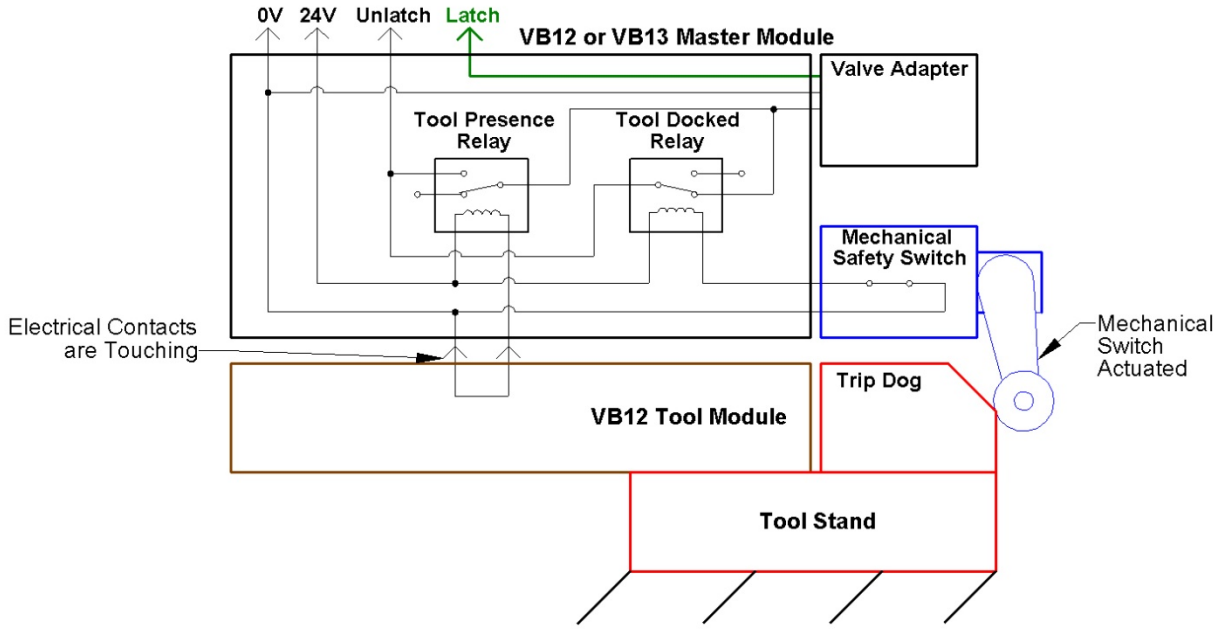
The Master and Tool are within coupling distance and the electrical contacts are touching, indicating Tool presence. Latch power is provided to the valve and the Tool Changer couples.

Figure 1.7—Master and Tool Ready to Couple

Safety Circuit with RFID-type or Magnetic-type



Safety Circuit with Mechanical-type

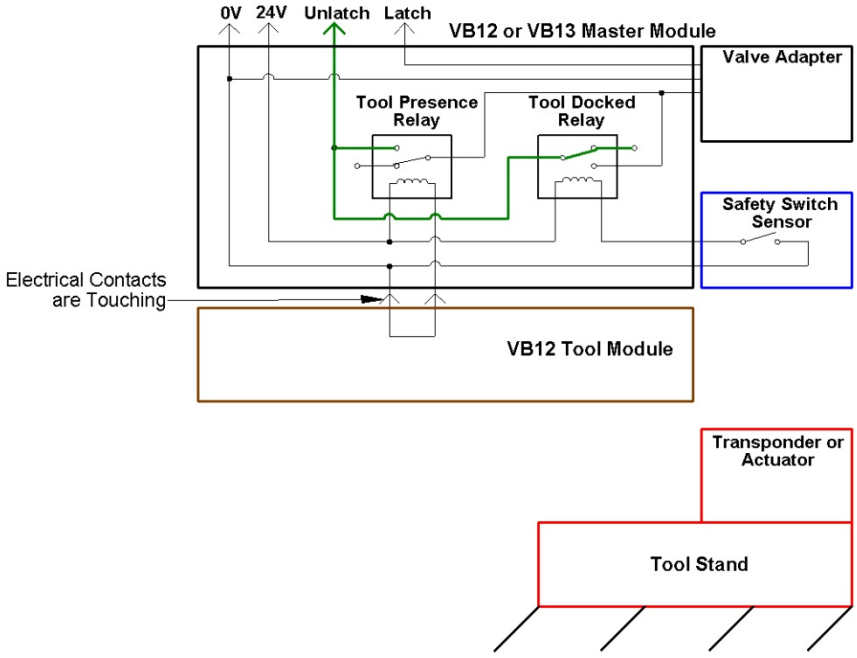


1.3.3 Master and Tool are Coupled and Away from Stand

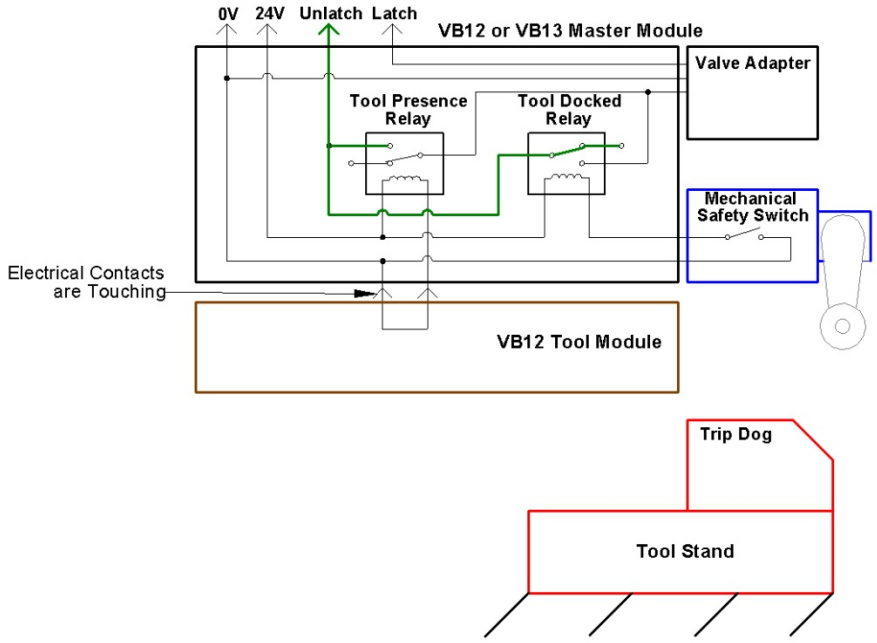
The Master and Tool are coupled and away from the Stand. The electrical contacts are touching, therefore the Tool Presence relay is open and valve Unlatch power is diverted through the Tool Docked relay. The Tool Docked relay will provide Unlatch power to the valve ONLY when the safety switch is closed. Since the Tool is not in the stand and the transponder/actuator is not within range of the switch or the mechanical switch is not actuated, an unintended Tool release is not possible.

Figure 1.8—Master and Tool are Coupled and Away from Stand

Safety Circuit with RFID-type or Magnetic-type



Safety Circuit with Mechanical-type

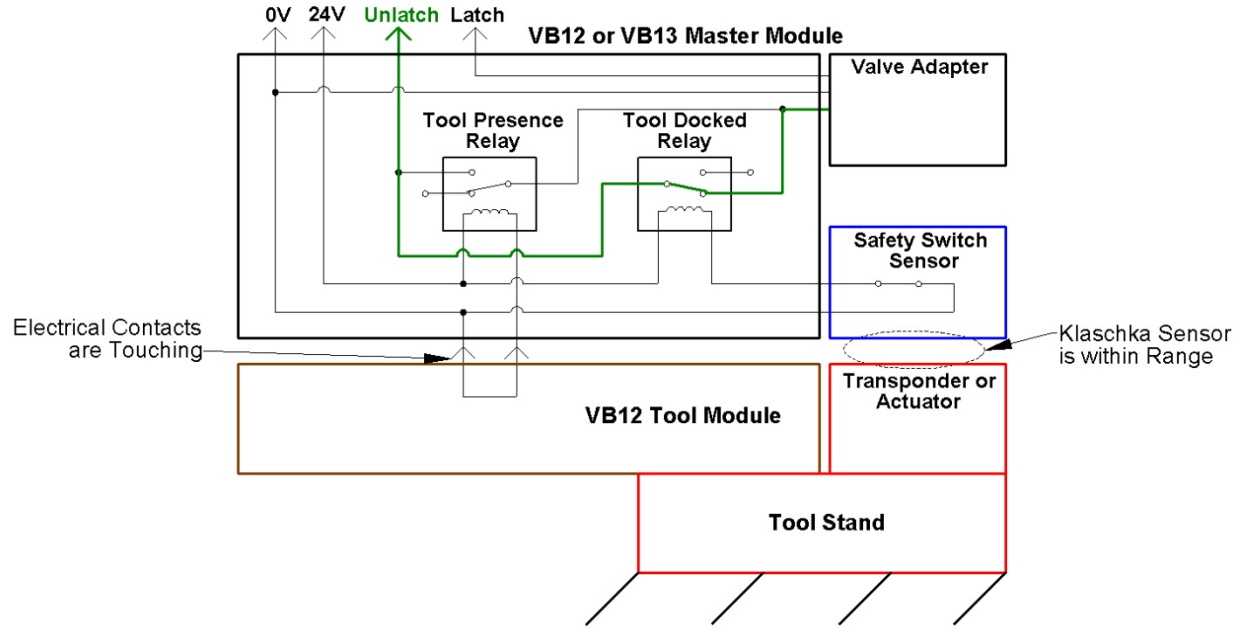


1.3.4 Master and Tool are Ready to Uncouple

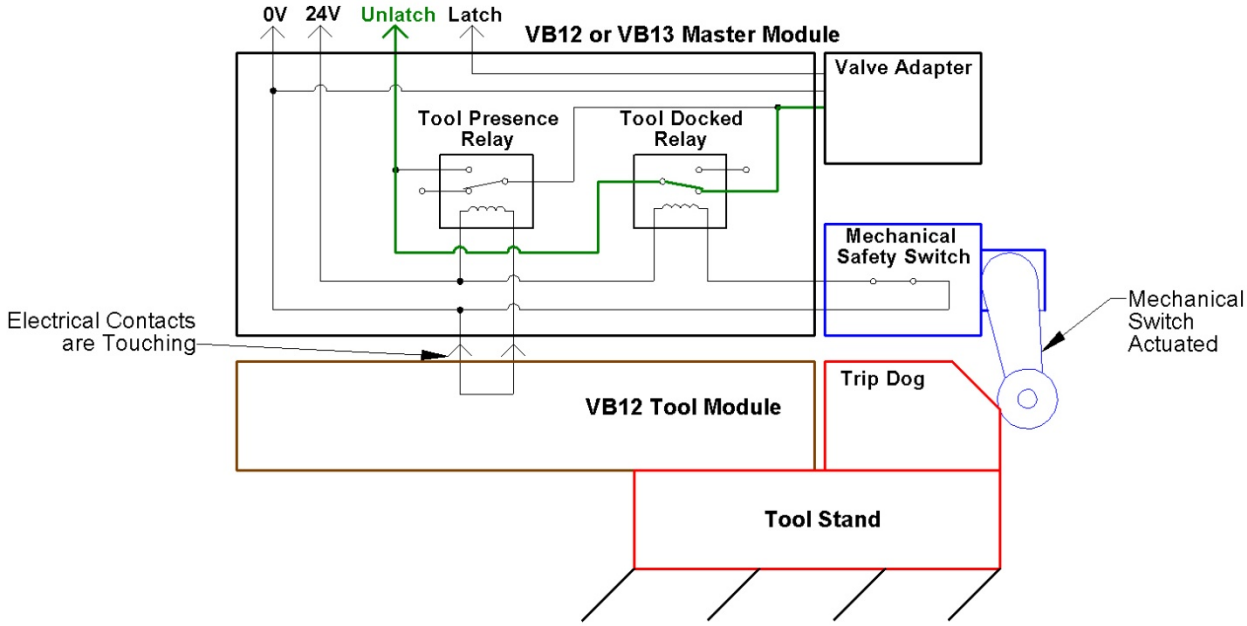
The robot moves into the Tool Stand with the Tool Changer coupled. The electrical contacts are touching, therefore the Tool Presence relay is open and valve Unlatch power is diverted through the Tool Docked relay. Since the Tool is in the Stand, the transponder/actuator is within range of the switch or the mechanical switch is actuated, which causes the Tool Docked relay to close. Unlatch power to the valve is now available to release the Tool.

Figure 1.9—Master and Tool are Ready to Uncouple

Safety Circuit with RFID-type or Magnetic-type



Safety Circuit with Mechanical-type



2. Installation

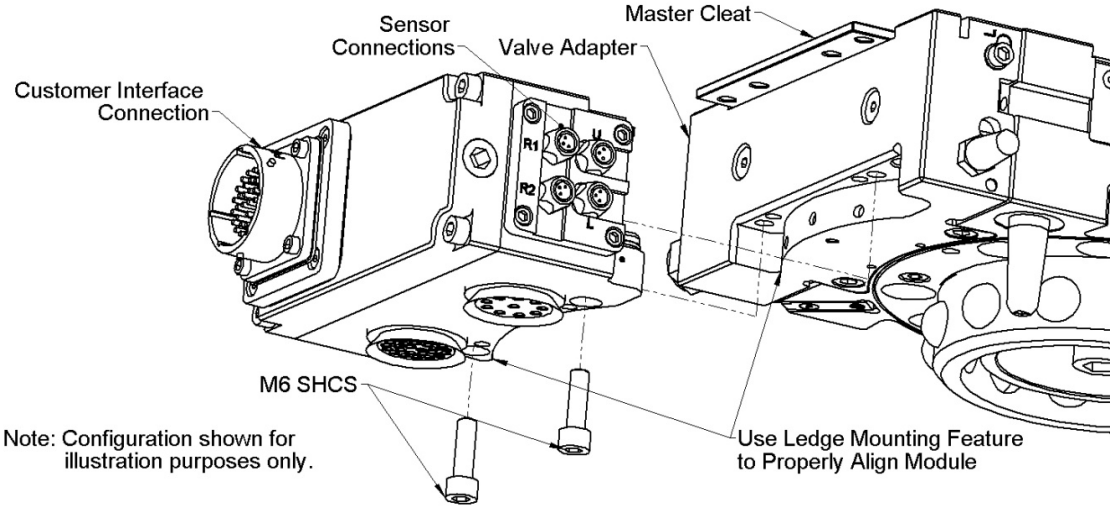
The control/signal modules are typically installed by ATI prior to shipment. The steps below outline the field installation or removal as required.

> **WARNING:** Do not perform maintenance or repair on Tool Changer or modules unless the tool is safely supported or docked in the tool stand and all energized circuits (e.g. electrical, air, water, etc.) have been turned off. Injury or equipment damage can occur with tool not docked and energized circuits on. Dock the tool safely in the tool stand and turn off all energized circuits before performing maintenance or repair on Tool Changer or modules.

2.1 Installing

1. It may be necessary to clean the mounting surface on the Tool Changer prior to installing the module in order to remove any debris that may be present.
2. Using the ledge feature as a guide place the module into the appropriate location on the Tool Changer body. Align the module with the Tool Changer using the dowels in the bottom of the ledge feature. Refer to *Figure 2.1*.
3. If fasteners do not have pre-applied adhesive, apply Loctite 242® to the supplied M6 SHCS fasteners. Install the two (2) M6 socket head screws securing the module to the Tool Changer and tighten to 40–70 in-lbs.
4. Customer interface, switch, sensor, and valve cables can be connected to the module after attaching the module to the Tool Changer body. Ensure that the connectors are cleaned prior to being secured as appropriate.

Figure 2.1—Module Installation



2.2 Removal

1. Prior to removing the module use a marker pen to scribe a line or indication between the Tool Changer and module body as a reminder where the module is to be re-installed.
2. Depending upon the service or repair being done, customer connections up to the module may or may not need to be disconnected. Also, proximity sensor and valve cables may or may not need to be disconnected.
3. Remove the socket head cap screws and lift the module from the Tool Changer.

> **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.

2.3 Utility Schematic

> **WARNING:** All pneumatic fittings and tubing must be capable of withstanding the repetitive motions of the application without failing. The routing of electrical and pneumatic lines must minimize the possibility of over stressing, pullout, or kinking the lines. Failure to do so can cause some critical electrical and/or pneumatic lines not to function properly and may result in injury to personnel or damage to equipment.

Refer to *Section 8—Drawings* of this manual for customer interface and wiring details for the VB12-M, VB13-M, and VB12-T modules.

3. 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 VB12-M, VB13-M, and VB12-T control/signal modules. This procedure is intended for "automatic" modes used during normal application processes.

3.1 Recommended Sequence of Operation

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 **RTL** input is false.
   b. The ATI Tool and any downstream device is offline.

2. Unlock the Master. (This must be done prior to the Master entering the Tool to prevent the ball bearings from impinging on the Tool bearing race.)
   a. The **Latch** output command is made false and the **Unlatch** output command is made true.
   b. The **Unlocked** input goes true and remains true, indicating that the Tool Changer locking mechanism is fully retracted and the **Unlatch** operation is complete.

3. Robot and Master move into the Tool and are parallel and within 0.15” to 0.06” of the Tool (i.e., the module contact pins are touching, but the **RTL** sensors have not yet sensed the targets on the Tool).
   a. Power and I/O connections with downstream devices are established.

4. Robot and Master move within 0.06” of the Tool.
   a. The **RTL** input is true, indicating that it is okay to couple the Tool.

5. Couple the Tool Changer.
   a. The **Unlatch** output is made false and the **Latch** output is made true.
   b. 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.

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

7. Normal operation.
   a. The following inputs are true:
      i. **Locked**
      ii. **RTL**
   b. The following inputs are false:
      i. **Unlocked**
   c. The following outputs are true:
      i. **Latch**
   d. The following outputs are false:
      i. **Unlatch**

8. Robot moves into the Tool Stand with the Tool Changer coupled.

9. 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. The **Latch** output is made false and the **Unlatch** output is made true.
   b. 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.

10. Robot and Master move away from the Tool and are parallel and between 0.15” to 0.06” of the Tool.
    a. The **RTL** input is false.

11. Robot and Master move away from the Tool and are parallel and > 0.15” from the Tool.
    a. Power and I/O connections with downstream devices are no longer available.

12. Robot and Master in free space.
    a. The following inputs are true:
       i. **Unlocked**
    b. The following inputs are false:
       i. **Locked**
       ii. **RTL**

4. Maintenance

The VB12–M, VB13-M, and VB12-T discrete control/signal modules are designed to provide a long life with little maintenance required. Once installed the operation of the control modules is 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.

> **WARNING:** Do not perform maintenance or repair on Tool Changer or modules unless the tool is safely supported or docked in the tool stand and all energized circuits (e.g. electrical, air, water, etc.) have been turned off. Injury or equipment damage can occur with tool not docked and energized circuits on. Dock the tool safely in the tool stand and turn off all energized circuits 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.

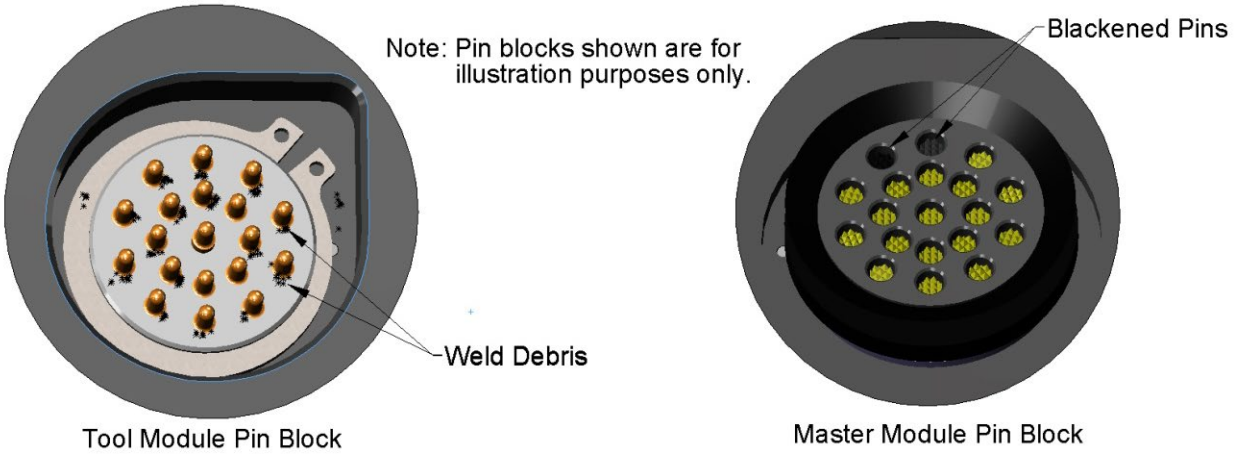
Under normal conditions, no special maintenance is necessary, however it is recommended that periodic inspections be performed to assure long-lasting performance and to assure that unexpected damage has not occurred. Perform the following visual inspection monthly:

- Inspect mounting fasteners to verify they are tight and if loose, then tighten to the proper torque.
- 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 4.2—Seal Replacement.*

4.1 Pin Block Inspection and cleaning

1. Inspect the Master and Tool pin blocks for any debris or darkened pins.

Figure 4.1—Inspect Master and Tool Pin Blocks

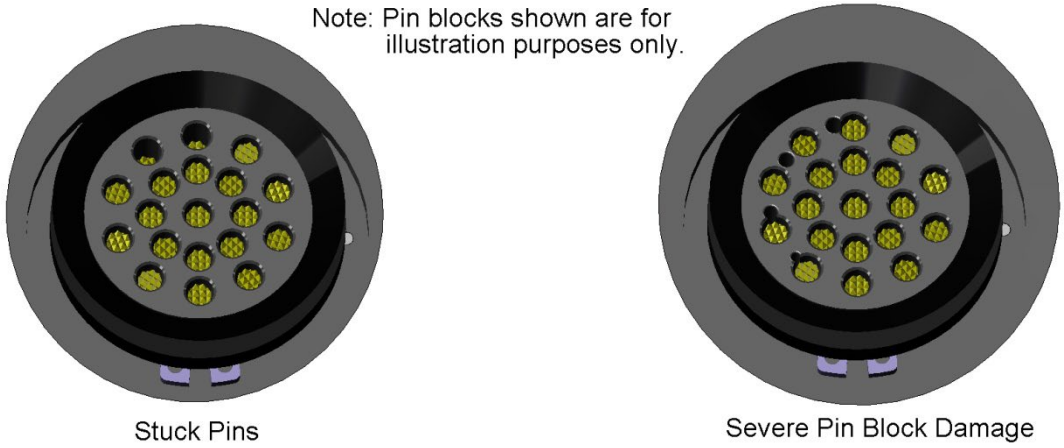


2. If debris or darkened pins exist, remove debris using a vacuum, and clean using a nylon brush (ATI part number 3690-0000064-60).

> **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. Clean contact surfaces with a vacuum or non-abrasive media such as a nylon brush (ATI part number 3690-0000064-60).

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

Figure 4.2—Stuck Pin and Pin Block Damage



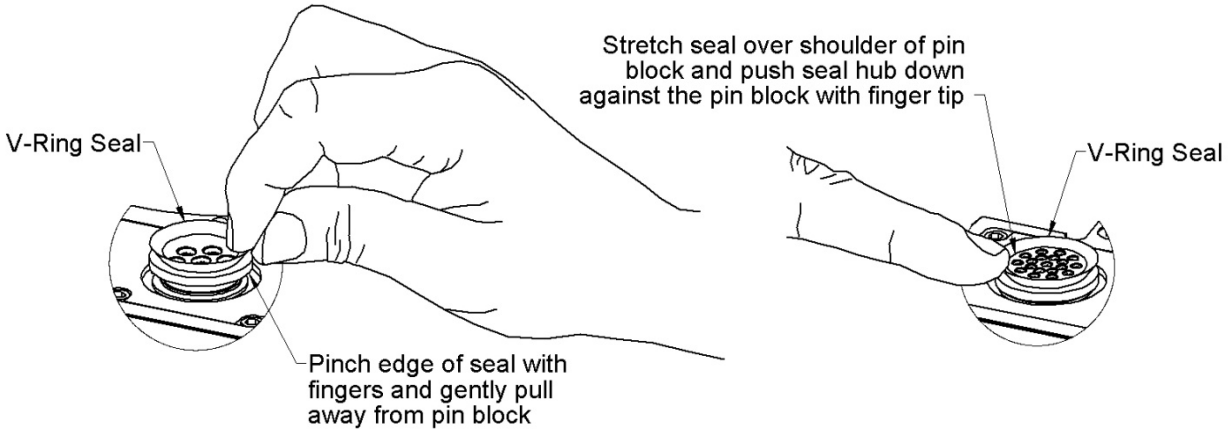
4. If stuck pins or severe pin block damage exists, contact ATI for possible pin replacement procedures or module replacement.

4.2 Seal Replacement

Replace the V-Ring seal:

1. To remove the existing seal, pinch edge of seal with fingers and gently pull the seal away from the pin block on the Master.
2. Pull the seal off the pin block.
3. To install a new seal, stretch the new seal over the shoulder of the pin block.
4. Push the seal's hub down against the pin block using finger tip.

Figure 4.3—V-Ring seal Replacement



5. 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 air supply source and proper exhaust. Verify that discrete signals are mapped correctly and operating properly. Verify that the Master and Tool are within the specified No-Touch zone when attempting to lock. If equipped with RFID or magnetic type Safety Switch, verify that the Safety Switch and Transponder are within sensing range and operating correctly. If equipped with mechanical type Safety Switch, verify that the switch contacts trip dog and actuates the Safety Switch.
Sensors not operating properly	Verify that cables are connected correctly. Verify that the sensors are set correctly. Ensure that the Tool Plate is securely held to the Master Plate, that nothing is trapped between their surfaces, and that there is no air trapped in the Unlock (U) air port.
Loss of Discrete Communication	Check/Replace signal cabling up- and down-stream of Tool Changer modules. Inspect module contact pins for debris/wear/damage.

6. Recommended Spare Parts and Accessories

Description	Part Number
VB12 Master Module Assembly	9121-VB12-M
VB13 Master Module Assembly	9121-VB13-M
VB12 Tool Module Assembly	9121-VB12-T
Optional Accessories	
Safety Switch Sensor (Klaschka WIDENT 13.28-06)	8605-132806
Safety Switch Transponder (Klaschka SIDENT 13.14-68)	8605-131468
Transponder Bracket Assembly	9121-TSL-KT-5841
Sipha S22/S20 Sensor and Actuator	8600-440N-S32023-01
Sipha S22 Sensor	8600-440N-S32023
Sipha S20 Actuator	8600-440N-S32020
Euchner Safety Switch NZ1HS-3131-M	8510-9909999-01
Teach Plug	1700-0535501-01
TSI Cable(s)	9120-C-4EM-4EF-010 (1 Meter) 9120-C-4EM-4EF-020 (2 Meter) 9120-C-4EM-4EF-040 (4 Meter)
Brush, Blue Nylon All Purpose (Contact Pin Cleaning)	3690-0000064-60

See *Section 8—Drawings* of this manual for spare parts directly associated with the VB12-M, VB13-M, and VB12-T modules.

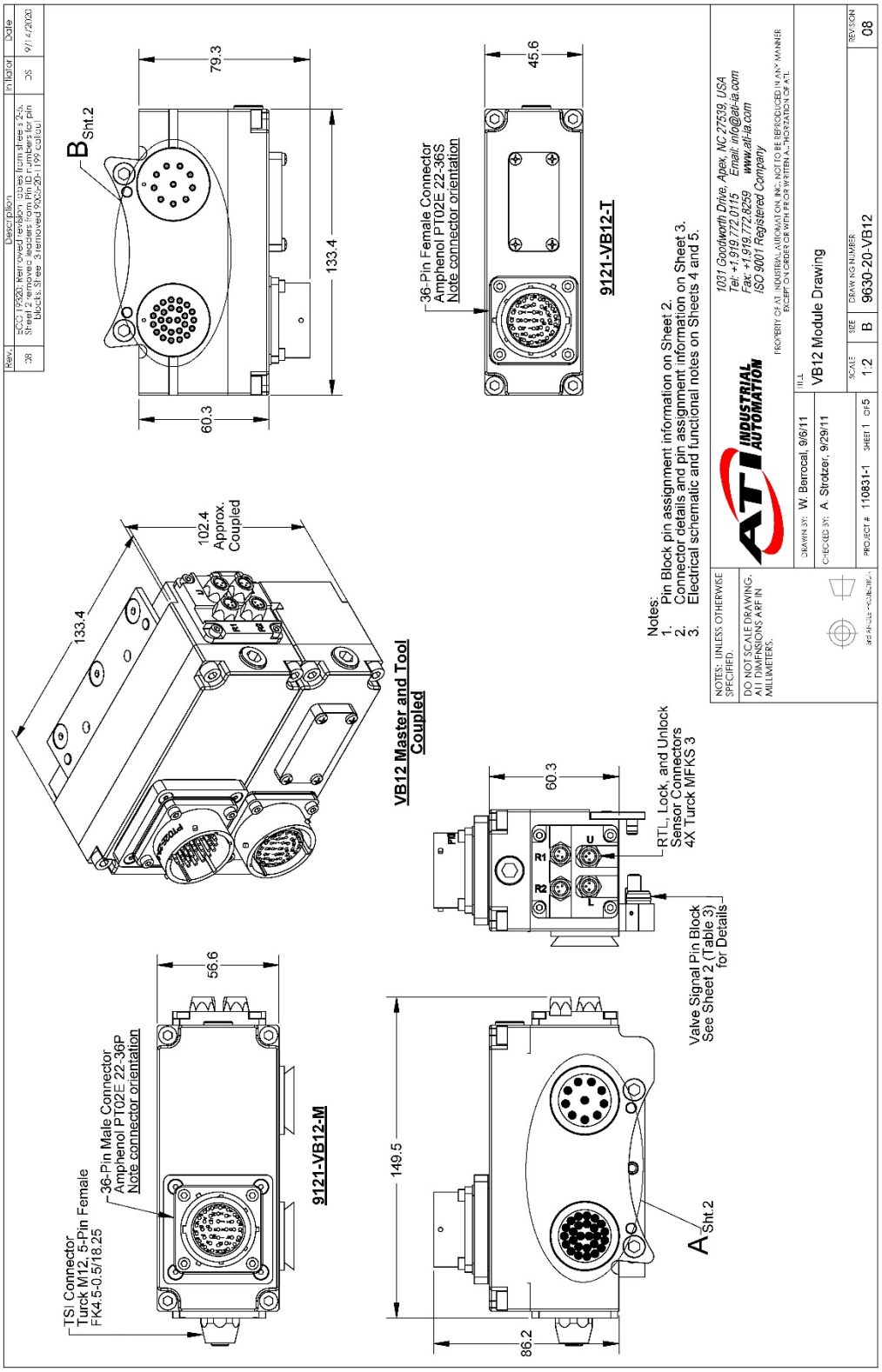
7. Specifications

9121-VB12-M **9121-VB13-M**	Discrete Signal Module with 36-pin MS connector, 19-pin and 10-pin pin blocks, supports PNP Lock and Unlock sensors and RTL sensors in series, supports an integrated double solenoid valve and TSI on the Master.
Interface Connections	Tool Changer I/O: Amphenol PT02E 22-36P, 36-pin (male contacts), male threaded connector. Integrated Tool Changer I/O: • 4X M8, 3-pin female connectors supporting Tool Changer Locked, Unlocked, and Ready-to-Lock proximity sensors in series, PNP sensor type. • 3-pin Internal Pin Block to transmit Latch and Unlatch signals to the double solenoid valve. • M12, 5-Pin Female TSI Connector
Electrical Rating	Power Pass-Through: • Input Power: 5A, 30VDC maximum
	Signal Pass-Through: 5A, 250V maximum Straight through wiring, no special twisting or shielding *Note: A total of 29 signal/power pass-through connections are available.*
	Tool Changer Control: • Lock, Unlock, and Ready-to-Lock sensors: 10-30 VDC operational voltage (Sensors are PNP, sourcing-type) *Note: Input Power provides power to the L, U, and RTL sensors.*
	Valve Control Power: • Latch and Unlatch Valve control: 24 VDC ±20% (19-29 VDC) operational voltage.
Weight	VB12 Master: 1.70 lbs (0.77 kg) VB13 Master: 1.72 lbs (0.78 kg)

9121-VB12-T	Discrete Signal Module with 36-pin MS Connector, 19-pin and 10-pin pin blocks, supports TSI on the Master.
Interface Connections	Tool Changer I/O: Amphenol PT02E 22-36S, 36-pin (female contacts), male threaded connector.
Electrical Rating	Power Pass-Through: • Input Power: 5A, 30VDC maximum
	Signal Pass-Through: 5A, 250V maximum Straight through wiring, no special twisting or shielding *Note: A total of 29 signal/power pass-through connections are available.*
Weight	1.30 lbs (0.59 kg)

8. Drawings

8.1 VB12 Master and Tool



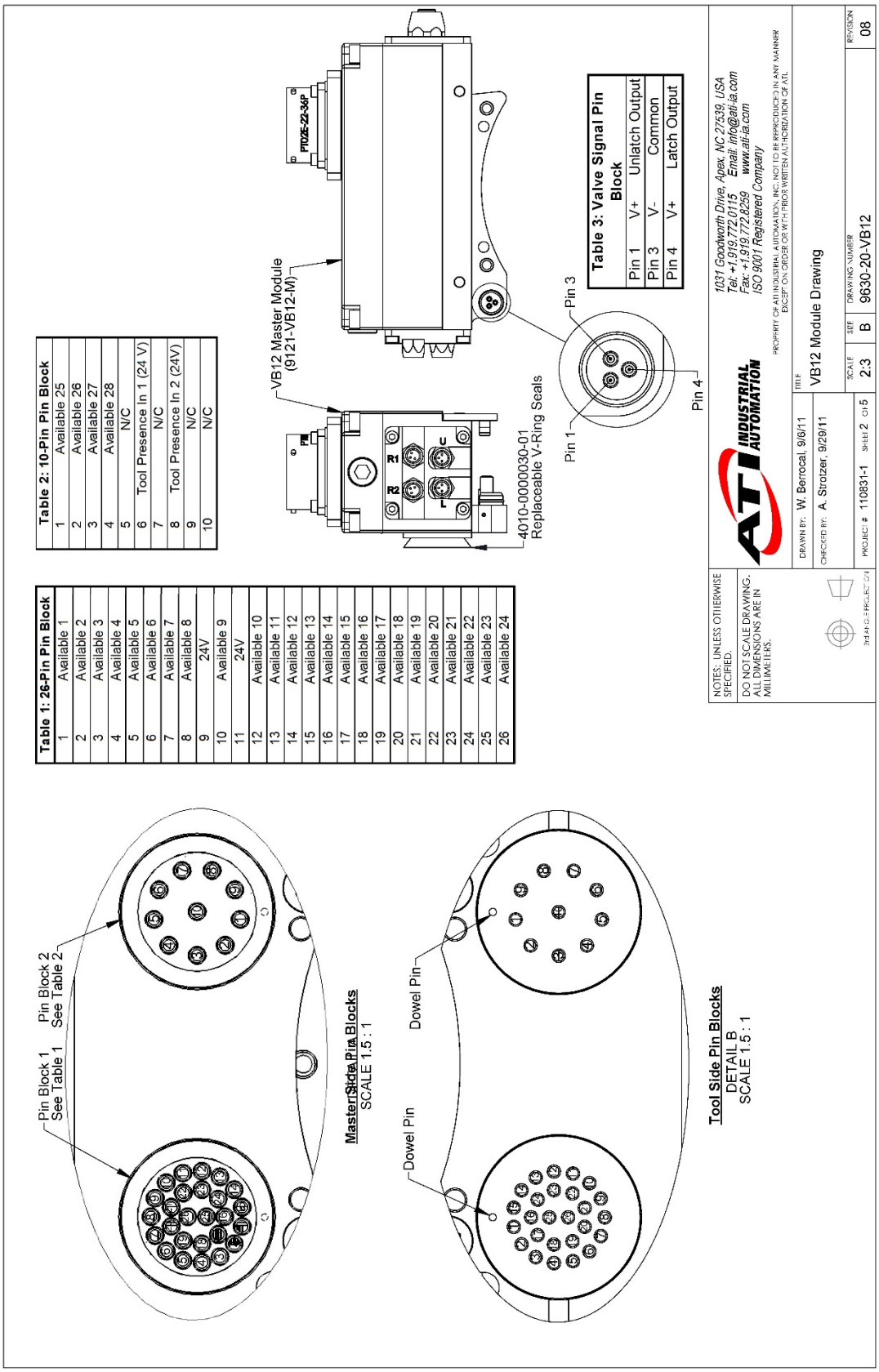


Table 1: 26-Pin Pin Block
1 Available 1
2 Available 2
3 Available 3
4 Available 4
5 Available 5
6 Available 6
7 Available 7
8 Available 8
9 24V
10 Available 9
11 24V
12 Available 10
13 Available 11
14 Available 12
15 Available 13
16 Available 14
17 Available 15
18 Available 16
19 Available 17
20 Available 18
21 Available 19
22 Available 20
23 Available 21
24 Available 22
25 Available 23
26 Available 24
Table 2: 10-Pin Pin Block
1 Available 25
2 Available 26
3 Available 27
4 Available 28
5 N/C
6 Tool Presence In 1 (24 V)
7 N/C
8 Tool Presence In 2 (24V)
9 N/C
10 N/C
VB12 Master Module (9121-VB12-M)
PTO2E-22-36P
4010-0000030-01 Replaceable V-Ring Seals
Pin 1
Pin 3
Pin 4
Table 3: Valve Signal Pin Block
Pin 1 V+ Unlatch Output
Pin 3 V- Common
Pin 4 V+ Latch Output
Pin Block 1 See Table 1
Pin Block 2 See Table 2
Dowel Pin
Master Side Pin Blocks
SCALE 1.5 : 1
Tool Side Pin Blocks
DETAIL B
SCALE 1.5 : 1
NOTES: UNLESS OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS.
DRAWN BY: W. Berrocal, 9/6/11
CHECKED BY: A. Strotzer, 9/29/11
TITLE
VB12 Module Drawing
SCALE 2:3
SIZE B
DRAWING NUMBER 9630-20-VB12
REVISION 08
PROJECT # 110831-1
SHEET 2 OF 5
1031 Goodworth Drive, Apex, NC 27539, USA
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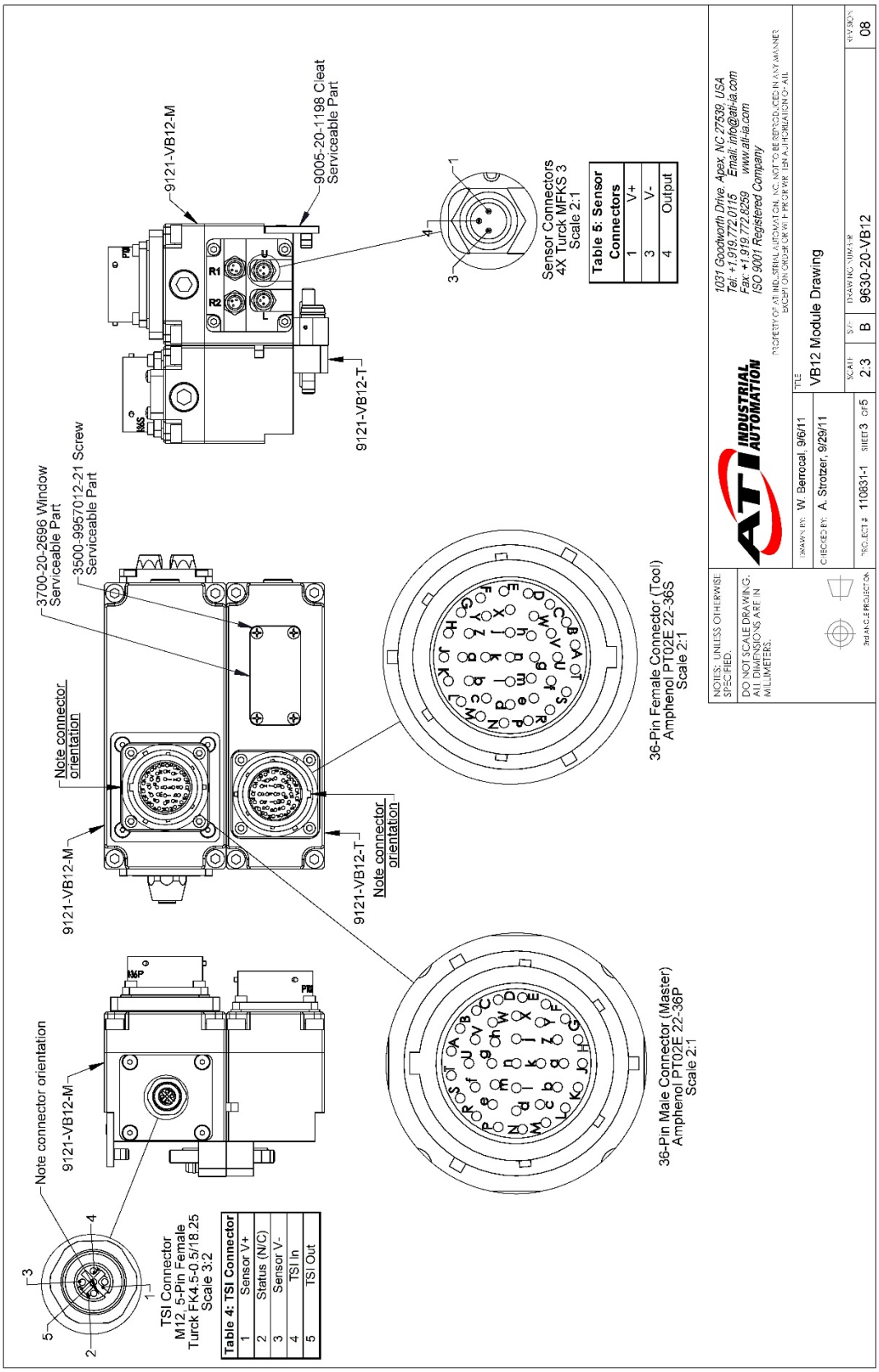
9121-VB12-M
9005-20-1198 Cleat
Serviceable Part
9121-VB12-T
Sensor Connectors
4X Turck MFKS 3
Scale 2:1
Table 5: Sensor Connectors
1 V+
3 V-
4 Output
3700-20-2696 Window
Serviceable Part
3500-9957012-21 Screw
Serviceable Part
Note connector orientation
9121-VB12-M
9121-VB12-T
Note connector orientation
36-Pin Female Connector (Tool)
Amphenol PT02E 22-36S
Scale 2:1
36-Pin Male Connector (Master)
Amphenol PT02E 22-36P
Scale 2:1
Note connector orientation
9121-VB12-M
TSI Connector
M12_5-Pin Female
Turck FK4.5-0.5/18.25
Scale 3:2
Table 4: TSI Connector
1 Sensor V+
2 Status (N/C)
3 Sensor V-
4 TSI In
5 TSI Out
NOTES: UNLESS OTHERWISE SPECIFIED.
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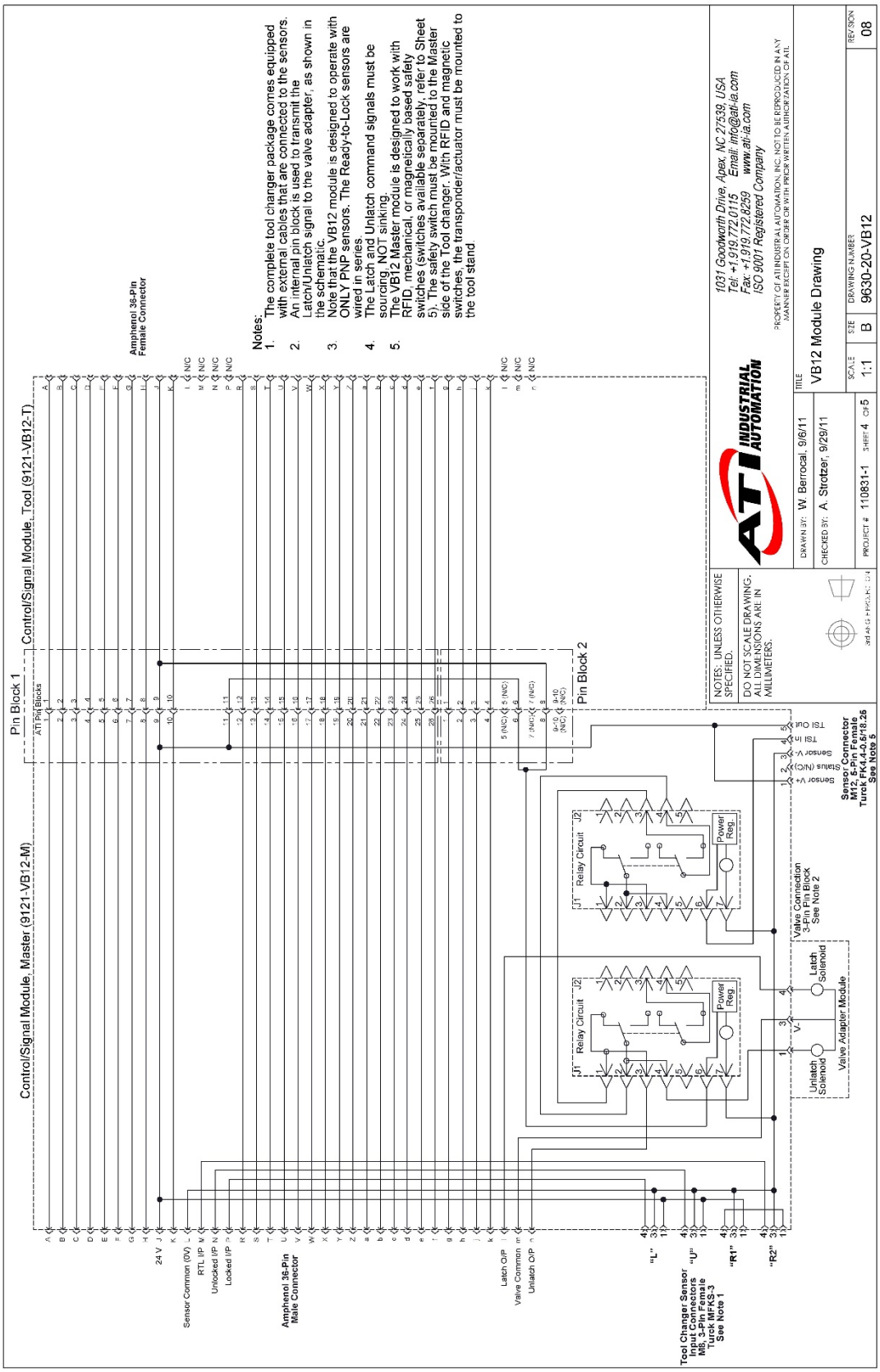
INDUSTRIAL AUTOMATION
DRAWN BY: W. Berrocal, 9/6/11
CHECKED BY: A. Stroizer, 9/29/11
TITLE
VB12 Module Drawing
SCALE: 2:3
SIZE: B
DRAWING NUMBER
9630-20-VB12
REV
08
PROJECT # 110831-1
SHEET 3 OF 5
3rd ANGLE PROJECTION


Control/Signal Module, Master (9121-VB12-M)
Control/Signal Module, Tool (9121-VB12-T)
Pin Block 1
Pin Block 2
Amphenol 36-Pin Female Connector
Amphenol 36-Pin Male Connector
Notes:
1. The complete tool changer package comes equipped with external cables that are connected to the sensors.
2. An internal pin block is used to transmit the Latch/Unlatch signal to the valve adapter, as shown in the schematic.
3. Note that the VB12 module is designed to operate with ONLY PNP sensors. The Ready-to-Lock sensors are wired in series.
4. The Latch and Unlatch command signals must be sourcing, NOT sinking.
5. The VB12 Master module is designed to work with RFID, mechanical, or magneticaly based safety switches (switches available separately, refer to Sheet 5). The safety switch must be mounted to the Master side of the Tool changer. With RFID and magnetic switches, the transponder/actuator must be mounted to the tool stand.
Relay Circuit
Power Reg.
Latch Solenoid
Unlatch Solenoid
Valve Adapter Module
Valve Connection 3-Pin Pin Block See Note 2
Sensor Connector M12, 5-Pin Female Turck PK4.4-0.6/18.26 See Note 5
Tool Changer Sensor Input Connectors M8, 3-Pin Female Turck PKG3-3 See Note 1
"L"
"U"
"R1"
"R2"
24 V
Sensor Common (0V)
RTL I/P
Unlocked I/P
Locked I/P
Latch O/P
Valve Common
Unlatch O/P
Sensor V+
Status (N/C)
Sensor V-
TSI In
TSI Out
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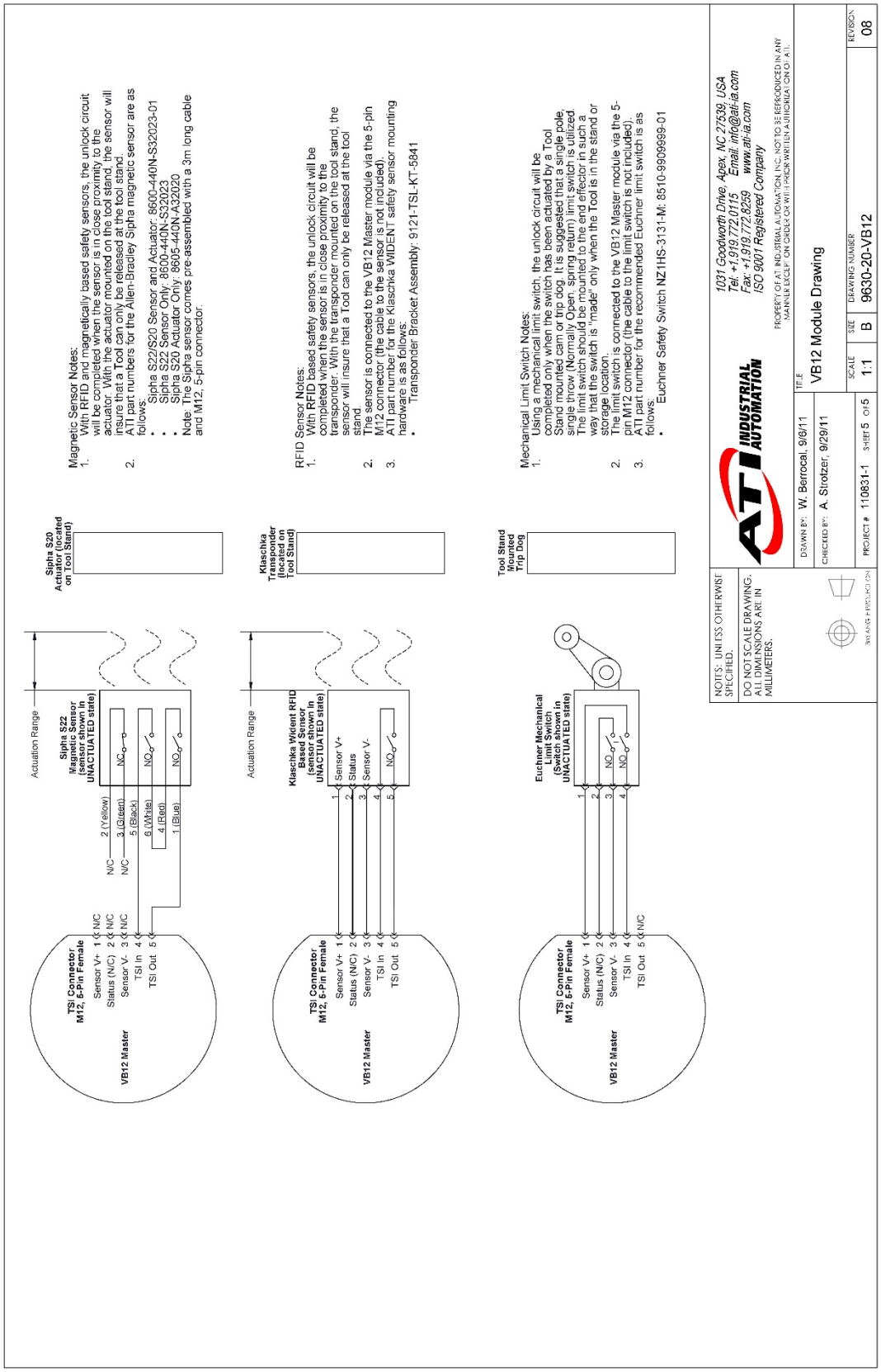
NOTES: UNLESS OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS.
DRAWN BY: W. Berrocal, 9/6/11
CHECKED BY: A. Stratzer, 9/29/11
PROJECT # 110831-1
SHEET 4 OF 5
TITLE
VB12 Module Drawing
SCALE 1:1
SIZE B
DRAWING NUMBER
9630-20-VB12
REVISION 08


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.
RFID Sensor Notes:
1. With RFID based safety sensors, the unlock circuit will be completed when the sensor is in close proximity to the transponder. With the transponder mounted on the tool stand, the sensor will insure that a Tool can only be released at the tool stand.
2. The sensor is connected to the VB12 Master module via the 5-pin M12 connector (the cable to the sensor is not included).
3. ATI part number for the Klaschka WIDENT safety sensor mounting hardware is as follows:
• Transponder Bracket Assembly: 9121-TSL-KT-5841
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: 8510-9999999-01
Sipha S20 Actuator (located on Tool Stand)
Klaschka Transponder (located on Tool Stand)
Tool Stand Mounted Trip Dog
Actuation Range
Sipha S22 Magnetic Sensor (Sensor shown in UNACTUATED state)
TSI Connector M12, 6-Pin Female
VB12 Master
Sensor V+ 1
Status (N/C) 2
Sensor V- 3
TSI In 4
TSI Out 5
N/C
2 (Yellow)
3 (Green)
5 (Black)
6 (White)
4 (Red)
1 (Blue)
NO
Klaschka Widient RFID Based Sensor (Sensor shown in UNACTUATED state)
Euchner Mechanical Limit Switch (Switch shown in UNACTUATED state)
NOTES: UNLESS OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS.
DRAWN BY: W. Berrocal, 9/9/11
CHECKED BY: A. Strotzer, 9/29/11
PROJECT # 110831-1
SHEET 5 OF 5
TITLE
VB12 Module Drawing
SCALE 1:1
SIZE B
DRAWING NUMBER 9630-20-VB12
REVISION 08
1031 Goodworth Drive, Apex, NC 27539, USA
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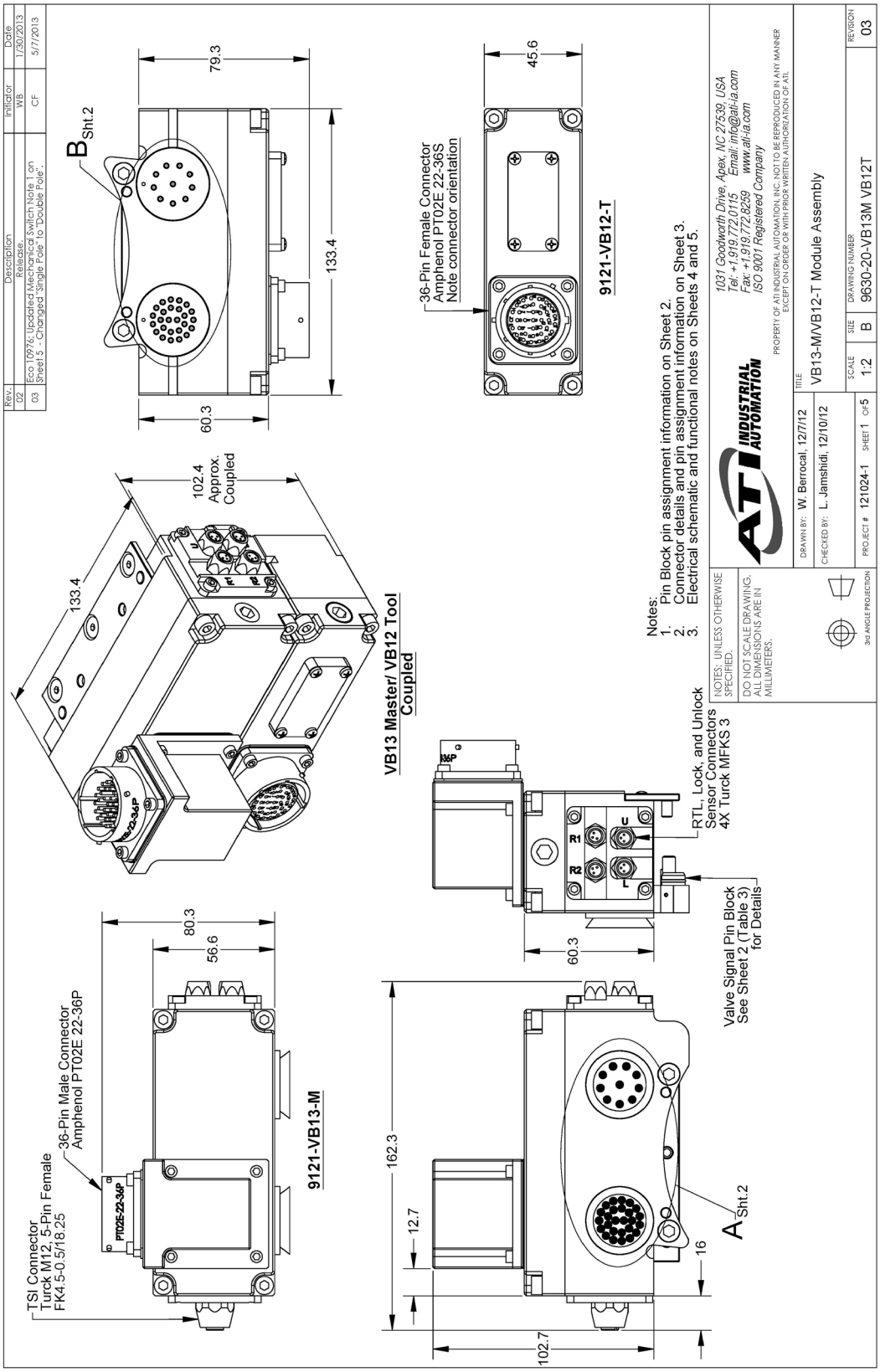
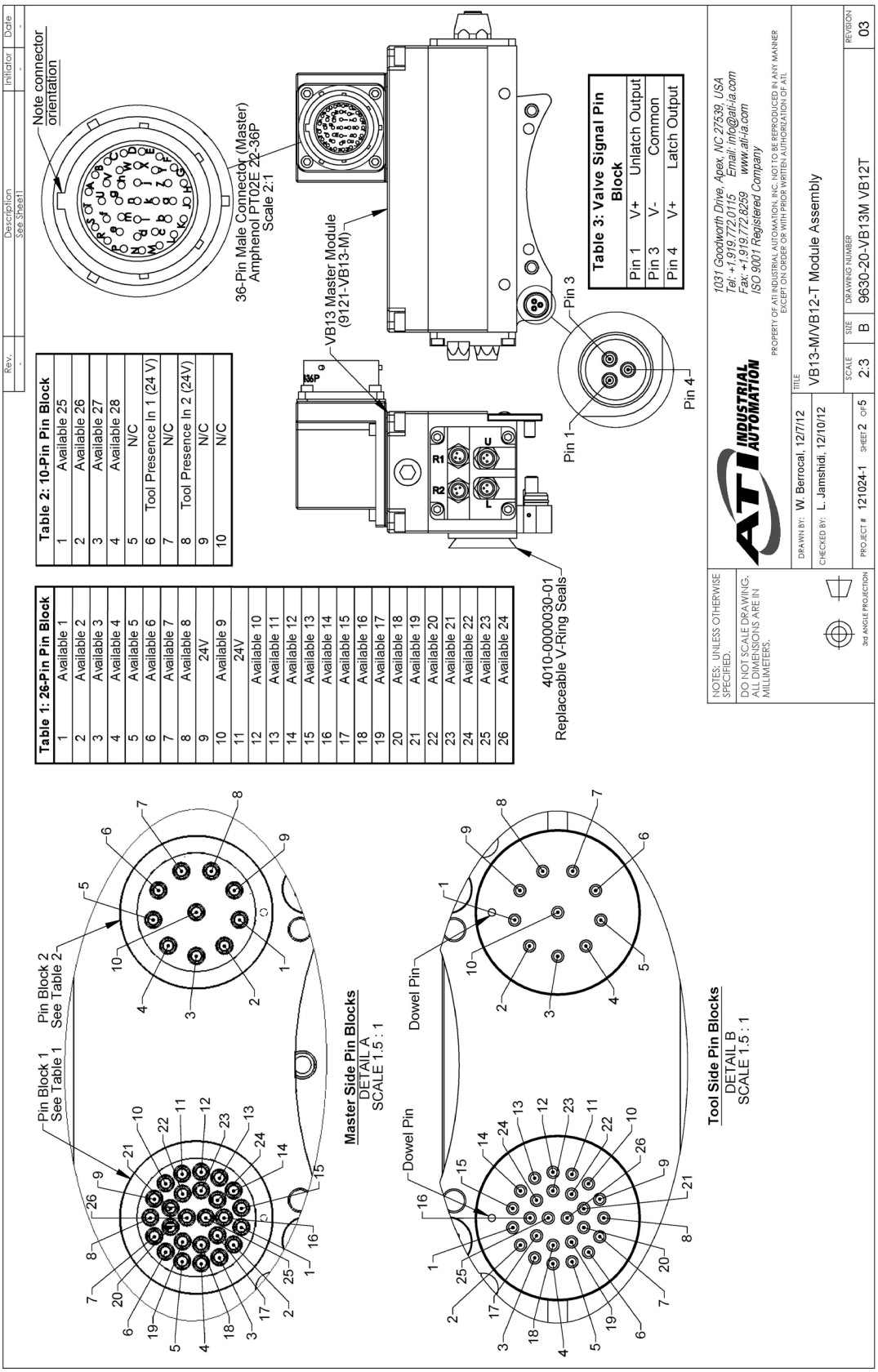
8.2 VB13 Master and VB12 Tool




Rev.
Description
Initiator
Date
See Sheet1
Note connector orientation
36-Pin Male Connector (Master)
Amphenol PT02E 22-36P
Scale 2:1
VB13 Master Module
(9121-VB13-M)
Pin 3
Pin 4
Pin 1
Table 3: Valve Signal Pin Block
Pin 1 V+ Unlatch Output
Pin 3 V- Common
Pin 4 V+ Latch Output
Table 2: 10-Pin Pin Block
1 Available 25
2 Available 26
3 Available 27
4 Available 28
5 N/C
6 Tool Presence In 1 (24 V)
7 N/C
8 Tool Presence In 2 (24V)
9 N/C
10 N/C
Table 1: 26-Pin Pin Block
1 Available 1
2 Available 2
3 Available 3
4 Available 4
5 Available 5
6 Available 6
7 Available 7
8 Available 8
9 24V
10 Available 9
11 24V
12 Available 10
13 Available 11
14 Available 12
15 Available 13
16 Available 14
17 Available 15
18 Available 16
19 Available 17
20 Available 18
21 Available 19
22 Available 20
23 Available 21
24 Available 22
25 Available 23
26 Available 24
4010-0000030-01
Replaceable V-Ring Seals
Pin Block 1
See Table 1
Pin Block 2
See Table 2
Master Side Pin Blocks
DETAIL A
SCALE 1.5 : 1
Dowel Pin
Tool Side Pin Blocks
DETAIL B
SCALE 1.5 : 1
NOTES: UNLESS OTHERWISE SPECIFIED.
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3rd ANGLE PROJECTION
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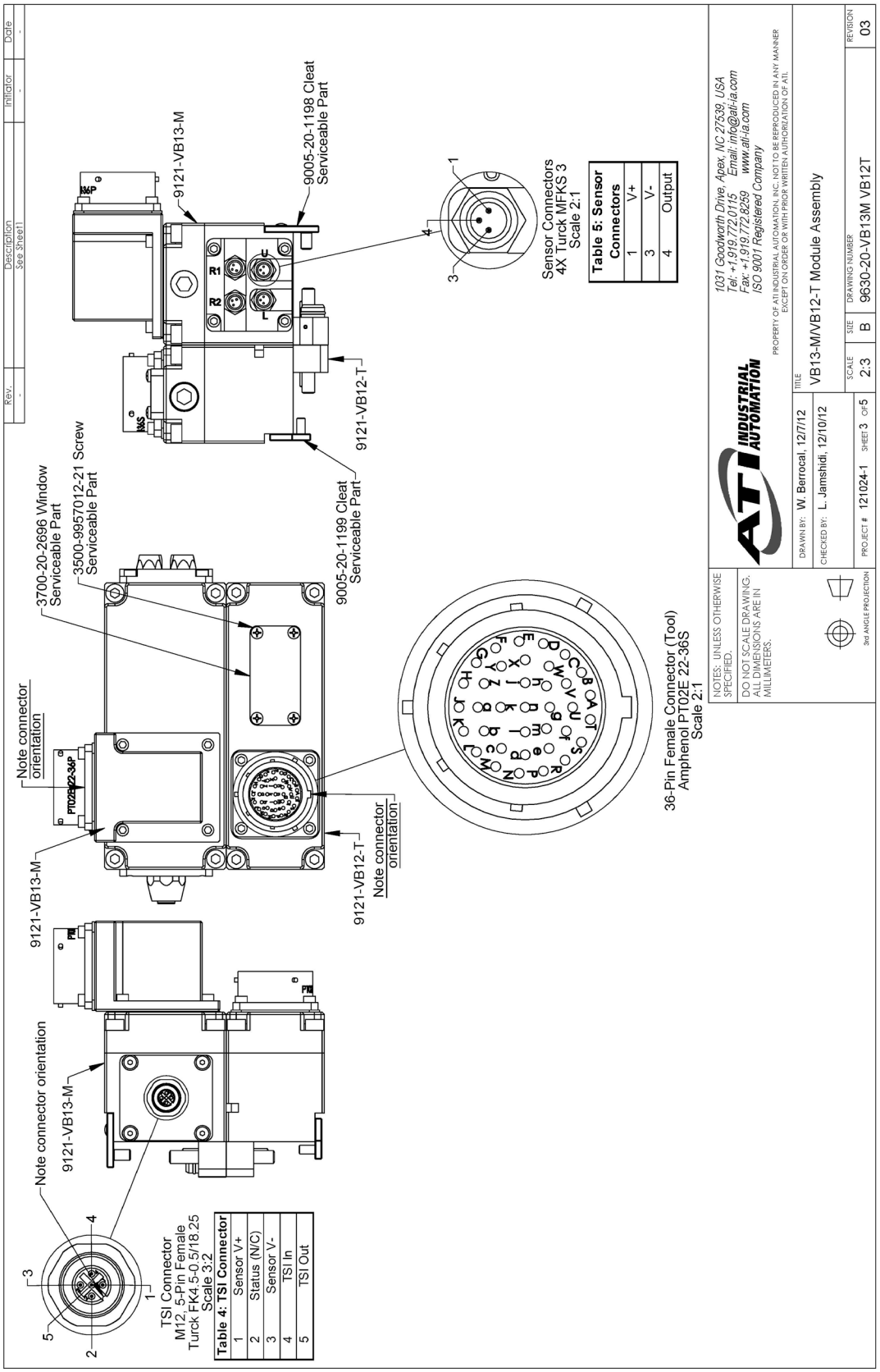
DRAWN BY: W. Berrocal, 12/7/12
CHECKED BY: L. Jamshidi, 12/10/12
PROJECT # 121024-1 SHEET 2 OF 5
TITLE
VB13-M/VB12-T Module Assembly
SCALE 2:3
SIZE B
DRAWING NUMBER 9630-20-VB13M VB12T
REVISION 03


Rev.
Description
Initiator
Date
See Sheet1
9121-VB13-M
9005-20-1198 Cleat
Serviceable Part
9121-VB12-T
3700-20-2696 Window
Serviceable Part
3500-9957012-21 Screw
Serviceable Part
9005-20-1199 Cleat
Serviceable Part
Note connector orientation
Sensor Connectors
4X Turck MFKS 3
Scale 2:1
Table 5: Sensor Connectors
1 V+
3 V-
4 Output
36-Pin Female Connector (Tool)
Amphenol PT02E 22-36S
Scale 2:1
TSI Connector
M12, 5-Pin Female
Turck FK4.5-0.5/18.25
Scale 3:2
Table 4: TSI Connector
1 Sensor V+
2 Status (N/C)
3 Sensor V-
4 TSI In
5 TSI Out
NOTES: UNLESS OTHERWISE SPECIFIED.
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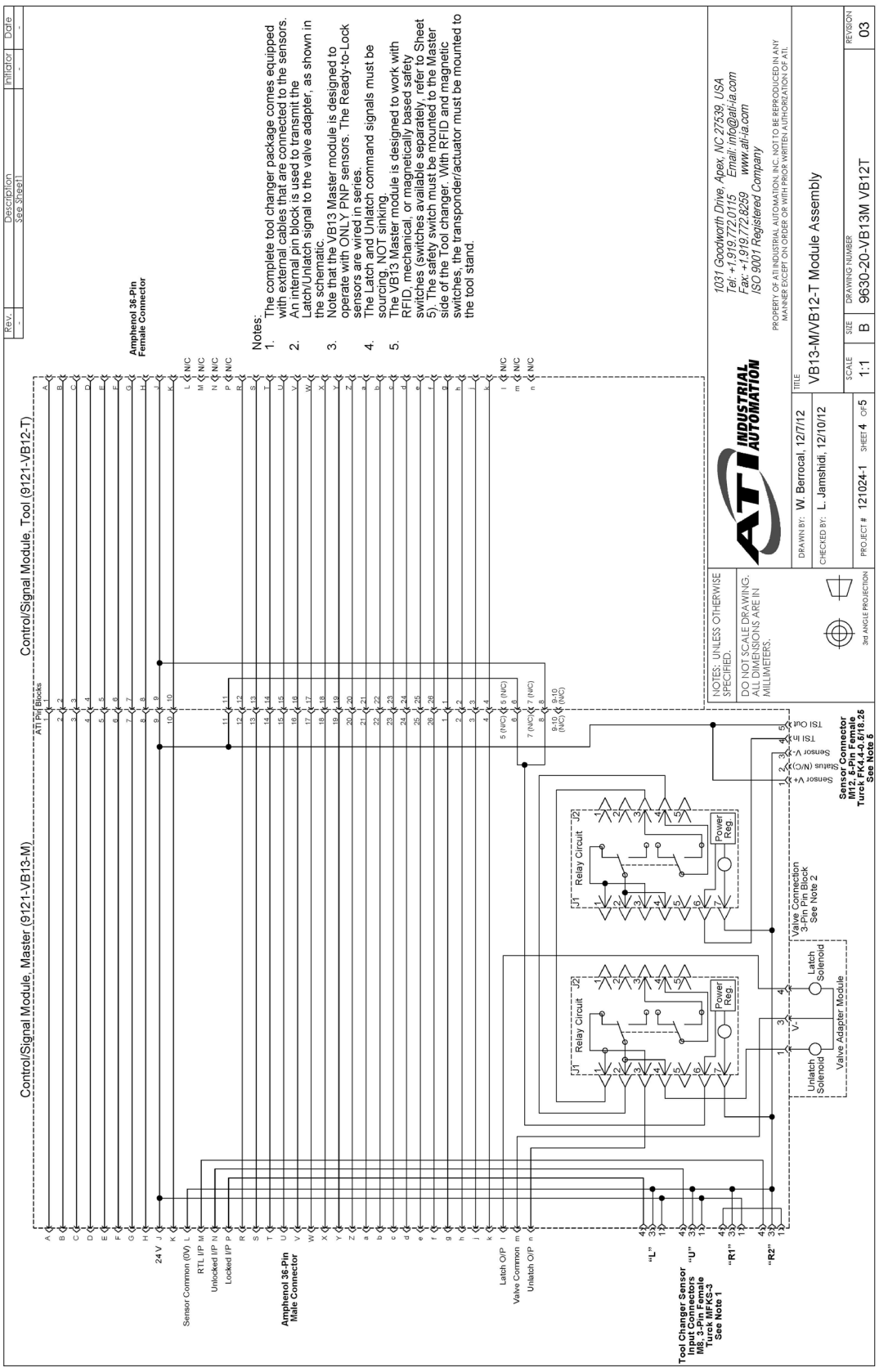
DRAWN BY: W. Berrocal, 12/7/12
CHECKED BY: L. Jamshidi, 12/10/12
PROJECT # 121024-1
SHEET 3 OF 5
TITLE
VB13-M/VB12-T Module Assembly
SCALE 2:3
SIZE B
DRAWING NUMBER
9630-20-VB13M VB12T
REVISION 03
3rd ANGLE PROJECTION


Control/Signal Module, Master (9121-VB13-M)
Control/Signal Module, Tool (9121-VB12-T)
ATI Pin Blocks
Amphenol 36-Pin Female Connector
Amphenol 36-Pin Male Connector
Notes:
1. The complete tool changer package comes equipped with external cables that are connected to the sensors.
2. An internal pin block is used to transmit the Latch/Unlatch signal to the valve adapter, as shown in the schematic.
3. Note that the VB13 Master module is designed to operate with ONLY PNP sensors. The Ready-to-Lock sensors are wired in series.
4. The Latch and Unlatch command signals must be sourcing, NOT sinking.
5. The VB13 Master module is designed to work with RFID, mechanical, or magnetically based safety switches (switches available separately, refer to Sheet 5). The safety switch must be mounted to the Master side of the Tool changer. With RFID and magnetic switches, the transponder/actuator must be mounted to the tool stand.
24 V
Sensor Common (0V)
RTL I/P
Unlocked I/P
Locked I/P
Latch O/P
Valve Common
Unlatch O/P
"L"
"U"
"R1"
"R2"
Tool Changer Sensor Input Connectors M8, 3-Pin Female Turck MFKS-3 See Note 1
Unlatch Solenoid
Latch Solenoid
Valve Adapter Module
Valve Connection 3-Pin Pin Block See Note 2
J1 Relay Circuit
J2
Power Reg
Sensor Connector M12, 8-Pin Female Turck FK44.4-0.6/18.25 See Note 6
Status (N/O)
Sensor V-
Sensor V+
TSI In
TSI Out
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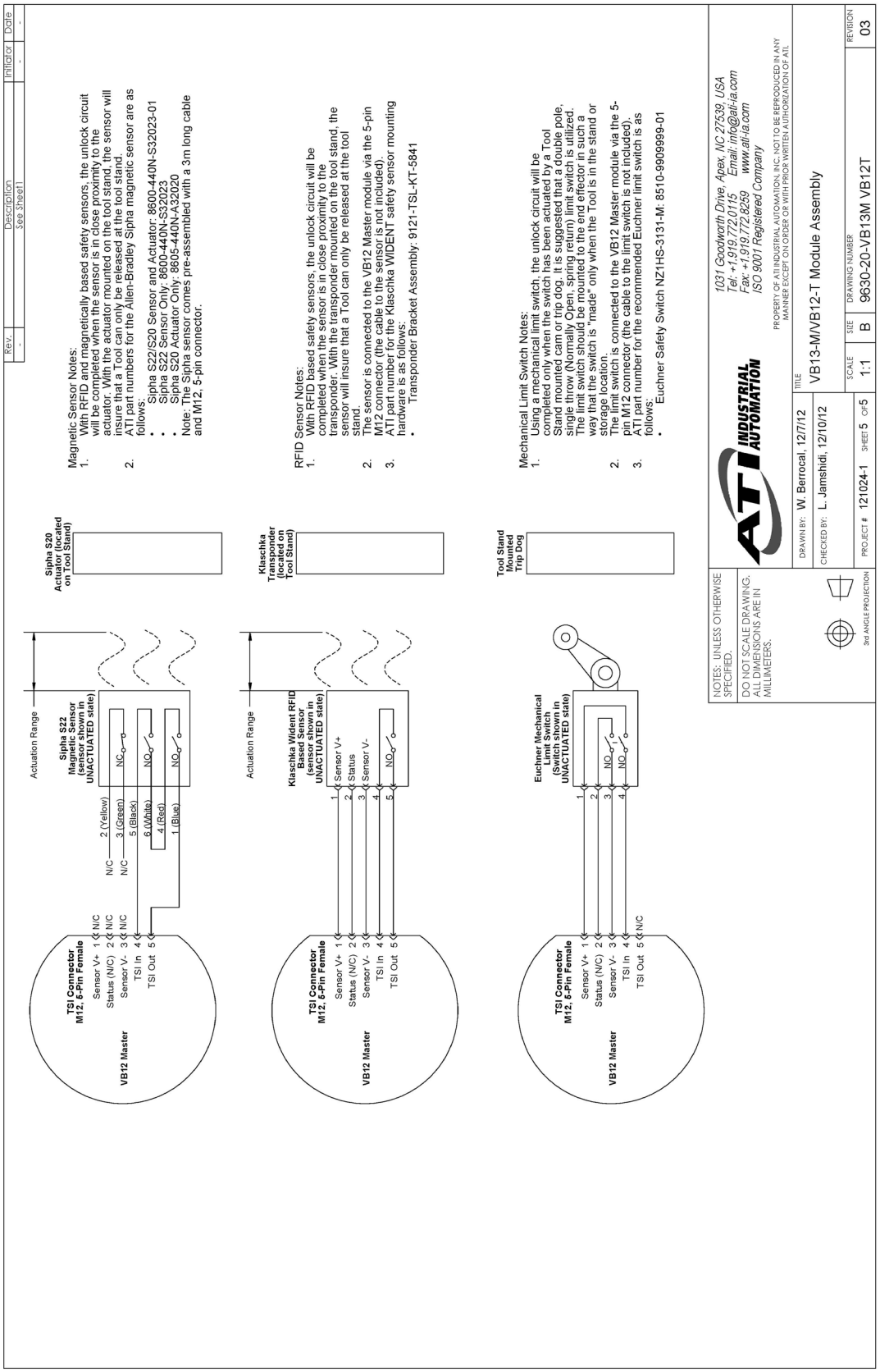
3rd ANGLE PROJECTION
DRAWN BY: W. Berrocal, 12/7/12
CHECKED BY: L. Jamshidi, 12/10/12
PROJECT # 121024-1 SHEET 4 OF 5
TITLE
VB13-M/VB12-T Module Assembly
SCALE 1:1
SIZE B
DRAWING NUMBER 9630-20-VB13M VB12T
REVISION 03
Rev. Description Initiator Date
- See Sheet1 - -


Rev.
Description
Initiator
Date
See Sheet1
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.
RFID Sensor Notes:
1. With RFID based safety sensors, the unlock circuit will be completed when the sensor is in close proximity to the transponder. With the transponder mounted on the tool stand, the sensor will insure that a Tool can only be released at the tool stand.
2. The sensor is connected to the VB12 Master module via the 5-pin M12 connector (the cable to the sensor is not included).
3. ATI part number for the Klaschka WIDENT safety sensor mounting hardware is as follows:
• Transponder Bracket Assembly: 9121-TSL-KT-5841
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 double 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
Sipha S20 Actuator (located on Tool Stand)
Klaschka Transponder (located on Tool Stand)
Tool Stand Mounted Trip Dog
Actuation Range
Sipha S22 Magnetic Sensor (sensor shown in UNACTUATED state)
Klaschka Wident RFID Based Sensor (sensor shown in UNACTUATED state)
Euchner Mechanical Limit Switch (Switch shown in UNACTUATED state)
TSI Connector M12, 5-Pin Female
VB12 Master
Sensor V+ 1
Status (N/C) 2
Sensor V- 3
TSI In 4
TSI Out 5
N/C
2 (Yellow)
3 (Green)
5 (Black)
6 (White)
4 (Red)
1 (Blue)
NC
NO
Sensor V+
Status
Sensor V-
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3rd ANGLE PROJECTION
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CHECKED BY: L. Jamshidi, 12/10/12
PROJECT # 121024-1
SHEET 5 OF 5
TITLE
VB13-M/VB12-T Module Assembly
SCALE 1:1
SIZE B
DRAWING NUMBER 9630-20-VB13M VB12T
REVISION 03