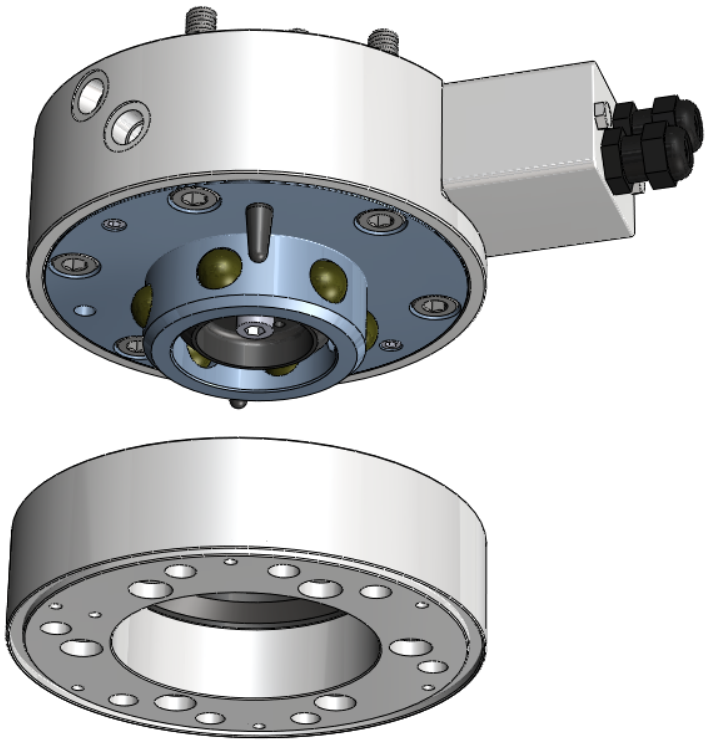
ATI INDUSTRIAL AUTOMATION
ISO 9001 Registered

QC-77

Custom Tool Changer

Installation and Operation Manual



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Engineered Products for Robotic Productivity

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Foreword

This manual contains basic information applicable to all ATI Quick-Change Robotic Tool Changers.

Please contact ATI Industrial Automation with any questions concerning your particular model.

> ⚠ **CAUTION:** This manual describes the function, application and safety considerations of this product. This manual must be read and understood before any attempt is made to install or operate the product, otherwise damage to the product or unsafe conditions may occur.

How to Reach Us

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Table of Contents

Glossary

Term	Definition
Master Plate	The half of the Tool Changer that is mounted to a robot. The Master Plate contains the locking mechanism.
Tool Plate	The half of the Tool Changer to which various tools or end-effectors are mounted.
Piston	Piston located in the Master Plate that actuates the locking mechanism.
Cam	Circular cam attached to the piston that forces the locking balls outward during the locking process.
Bearing Race	Hardened steel ring in the Tool Plate that is engaged by the locking balls during the locking process.
End-Effector	Tool used by the robot to perform a particular function.
Tool Stand	Stand that holds tools not being used by the robot. This is usually supplied by the customer and is specific to the application.
IP	**I**nterface **P**late – Interface plate between the robot flange and Master Plate.
Lock Port	Pneumatic port on the Master Plate to which air is supplied to Lock the Master Plate to the Tool Plate.
Unlock Port	Pneumatic port on the Master Plate to which air is supplied to Unlock the Master Plate from the Tool Plate.
No-Touch™	Design feature of all ATI Quick-Change products that allows coupling the Master Plate and Tool Plate without physical contact prior to locking.

1. Safety

1.1 Explanation of Warnings

The warnings included here are specific to the product(s) covered by this manual. It is expected that the user heed all warnings from the robot manufacturer and/or the manufacturers of other components used in the installation.

Danger indicates that a situation could result in potentially serious injury or damage to equipment.

Caution indicates that a situation could result in damage to the product and/or the other system components.

1.2 Precautions

DANGER: During operation, the area between the Master and tool must be kept clear.

DANGER: Power and air should always be removed prior to maintenance or repair.

CAUTION: The Quick-Change system is only to be used for intended applications and applications approved by the manufacturer.

2. Product Overview

2.1 Introduction

The Quick-Change Tool Changer consists of two primary parts: The **Master Plate** and the **Tool Plate**. The Master Plate is attached to a robot while end-effectors, such as grippers, material handlers, etc. are attached to one or more Tool Plates. The Master Plate is typically mounted to the robot with an optional interface plate. The QC-77 is a custom Tool Changer consisting of a Washdown capable Master and Tool assembly.

The QC-77 uses in-body sensors to detect the lock and unlock conditions of the Tool Changer. The customer is encouraged to monitor the status of these lock/unlock sensors to achieve the highest level of safety and reliability.

In operation, the robot can be programmed to select the desired end-effector by coupling the Master Plate to the Tool Plate. Unlike most other ATI Tool Changers, the QC-77 is a payload only application. That is, due to specific customer requirements, no utilities actually pass through the Master to the Tool-side. The Tool Changer only supports a payload on the end-effector.

A Tool Changer enhances the flexibility and reliability of a robotic cell. Robotic Tool changes are used in automated Tool change applications, as well as manual Tool change operations. Robotic Tool Changers also provide a method for quick Tool change for maintenance purposes such as food-handling Washdown procedures.

The ATI Tool Changer has been designed to provide extremely long-life with little or no maintenance.

2.2 Master Plate/Tool Plate Coupling Mechanism

The coupling of the Master Plate and the Tool Plate is achieved through a patented, high-strength, high-repeatability, stainless steel mechanism. During locking, steel balls in the Master Plate are driven outward by a circular cam attached to a pneumatically actuated piston. The cam profile has three features: A lead-in angle (conical), a flat (cylindrical) area, and a secondary angle (conical). The lead-in angle initiates the coupling process, the flat area assures the coupling will not be compromised in case of air loss (fail-safe feature), and the secondary angle provides rigid coupling during normal operation. The balls engage a bearing race (or “locking ring”) in the Tool Plate and lock the Master Plate and Tool Plate tightly together.

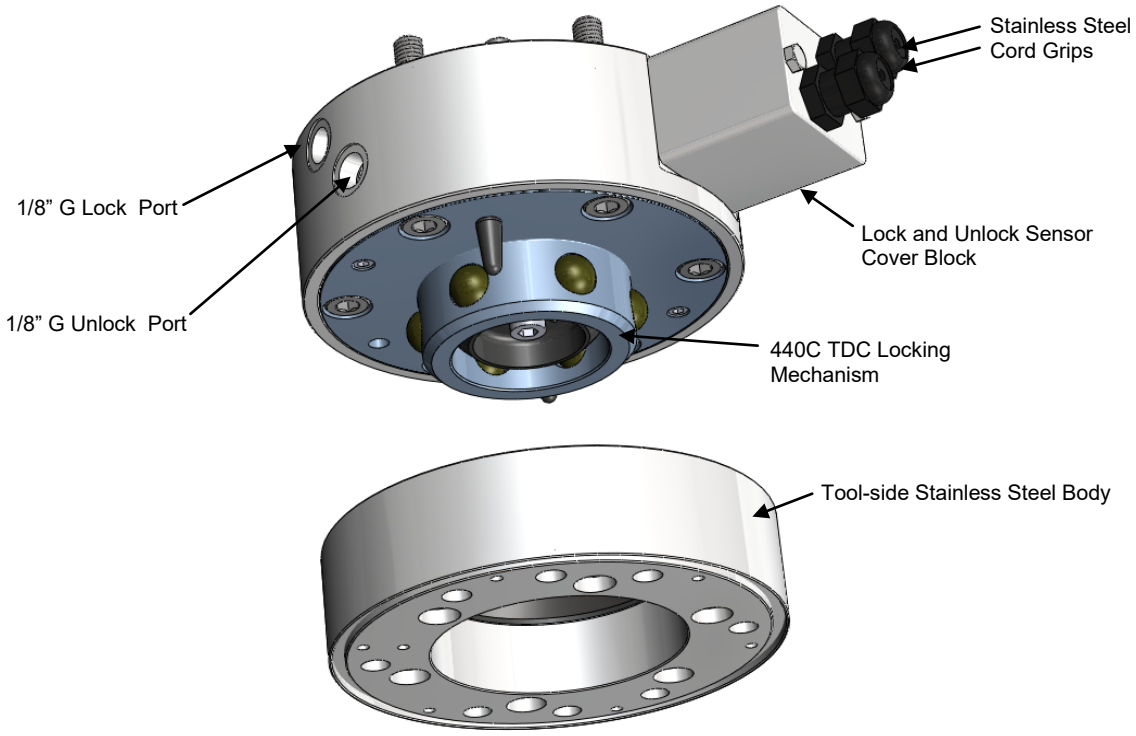


Figure 2.1—QC-77 Master and Tool

3. Installation

3.1 Installation

See customer drawings and documentation in *Section 9—Installation and Maintenance* of this manual for specific installation details and dimensions.

3.2 Lock/Unlock Pneumatic Connections and Valving

DANGER: Failure to use a 4-way valve and properly vent to atmosphere may cause the locking mechanism to operate incorrectly and may cause the Quick-Change to not lock or unlock as expected. This could result in damage to the product, attached tooling or personnel.

Air must be supplied to the "Lock" air port on the Master Plate (robot-side) to move the internal piston, which moves the cam and forces the locking balls outward. The locking balls move outward until they contact the bearing race on the mating Tool Plate. This will rigidly engage the Master Plate and Tool Plate providing high load capacity and positional accuracy. The patented cam profile prevents the Tool Plate from becoming disengaged in the event that there is a loss of air in the locked state.

To unlock the Tool Plate from the Master Plate, lock air must be vented and air supplied to the "Unlock" air port on the Master Plate.

3.2.1 Air Requirements

For proper operation of the Quick-Change system, the Master Plate must be supplied with clean, dry, non-lubricated air supplied between 60–100 psi (4.1–6.9 Bar) and filtered at 40 microns or better.

Flow requirements are negligible, typically no more than 1/3 CFM at 70 PSI when cycled continuously.

3.2.2 Valve Requirements and Connections

As with all pneumatic piston arrangements, smooth operation requires proper porting of the supplied and vented air. It is recommended that a single 4-way valve be used to actuate the locking mechanism in the Master Plate. The valve may be of either 4-Port or 5-Port configuration. It is imperative that when air is supplied to the Lock or Unlock Port on the Master Plate, that the opposite port be vented to atmosphere (i.e., when air is supplied to the Lock Port, the Unlock Port must be open to the atmosphere). Failure to vent trapped air or vacuum on the inactive port will negate the locking force of the Quick-Change mechanism.

DANGER: The Quick-Change mechanism **will not function properly** when connected to a **single** 3-way valve as this type of valve is incapable of venting trapped air pressure from within the Tool Changer.

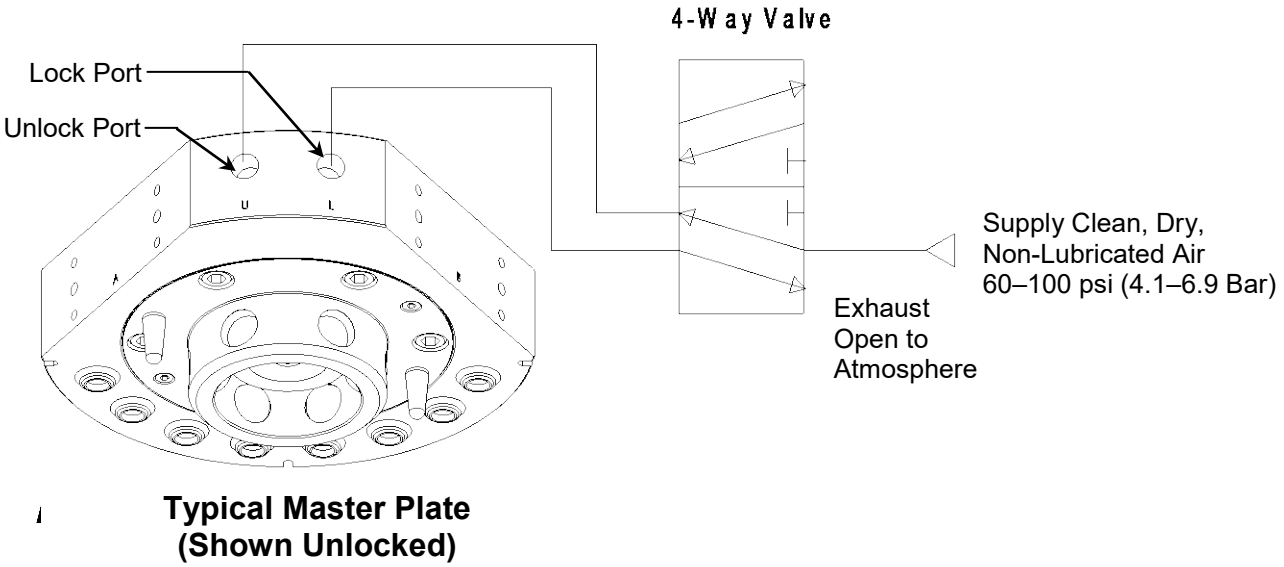


Figure 3.1—Pneumatic Connections

4. Operational Considerations

4.1 Coupling and Uncoupling

DANGER: During operation, the area between the Master Plate and tool must be kept clear.

CAUTION: Safe, reliable operation of the Tool Changer is dependent on a continuous supply of compressed air at a pressure of 60 to 100 PSI. Robot motion should be halted if the air supply pressure drops below 60 PSI for any reason.

ATTENTION: The QC-77 initially lubricated using *Jetlube FMG food grade grease*. The end user must apply additional lubricant to the locking mechanism components and alignment pins prior to start of service (See Section 4.2). Tubes of lubricant for this purpose are shipped with every Tool Changer.

4.1.1 Coupling Sequence

Prior to coupling and with air supplied to the Unlock Port, position the Master Plate above the Tool Plate. Move the Master Plate toward the Tool Plate so that the two Master Plate alignment pins enter the alignment holes on the Tool Plate. Take care to program the robot so that the Master Plate and Tool Plate are aligned axially and are parallel to each other as closely as possible. This will minimize Tool movement and subsequent wear during lock-up.

When the two faces are within the specified No-Touch™ distance, release the pressure from the Unlock port and supply air to the Lock port. The Tool Plate will

be drawn toward the Master Plate and coupled. Air must be maintained on the Lock port during operation to assure rigid coupling.

A sufficient delay must be programmed between locking valve actuation and robot motion so that the locking process is complete before moving the robot.

ATI's patented fail-safe design prevents the Tool Plate from being released in the event of air-pressure loss to the Lock port, thereby increasing safety and reliability. Positional accuracy may not be maintained during air loss, but will be regained once air pressure is re-established to the Lock port.

The QC-77 incorporates in-body sensors to detect the lock and unlock condition of the Tool Changer. The customer is encouraged to monitor these sensors to increase the reliability and safety of the application in automated situations.

4.1.2 Uncoupling Sequence

Position the Tool Plate in the Tool Stand such that there is little or no contact force between the Tool Plate and Tool Stand. Release air on the Lock port and apply air to the Unlock port. The air will cause the locking mechanism to be released and the weight of the Tool Plate and attached tooling will assist in its removal. (Note: Tool weight assists in uncoupling if the Tool is released in the vertical position only.) Move the Master Plate axially away from the Tool Plate.

A sufficient delay must be programmed between unlocking valve actuation and robot motion so that the unlocking process is complete and the Tool Plate is fully released before moving the robot.

As in the coupling sequence, the customer is encouraged to monitor the QC-77's in-body Lock/Unlock sensors to determine that the locking mechanism has fully released before robot motion. It is also recommended that a Tool-presence sensor(s) be used in the Tool Stand to verify that the Tool is present and to verify that the Tool remains in place as the robot moves away after the unlocking process.

> ⚠ **CAUTION:** The use of the Integrated Lock/Unlock sensors and Tool Stand proximity sensors are highly recommended to verify that the coupling and uncoupling process occurs as expected.

4.2 Typical Tool Stand Design

> ⚠ **CAUTION:** During coupling and lock-up the Tool Stand must allow for movement (float) in a plane parallel to the mating surfaces of the Master Plate and Tool Plates, and in a direction perpendicular to this plane, towards the Master Plate.

In most cases, the Tools are stored in a Tool Stand when not being used by the robot. During coupling and lock-up the Tool Stand must allow for movement (float) in a plane parallel with the mating surfaces of the Master Plate and Tool Plates (X and Y), and also in a direction towards the Master Plate (Z). Even slight misalignment between the Master Plate and Tool Plate can generate high forces during lock-up if the Tool Plate is not allowed to float into place during lock-up. These high forces can cause excessive wear and even jamming of the end effector and robot. The degree of float required depends on the accuracy of the robot's positioning and the repeatability of the Tool location in the Tool Stand during lock-up. See Figure 4.1 and Table 4.1 for recommended maximum allowable float (offsets) prior to coupling. The Tool Stand should be designed to minimize misalignment during

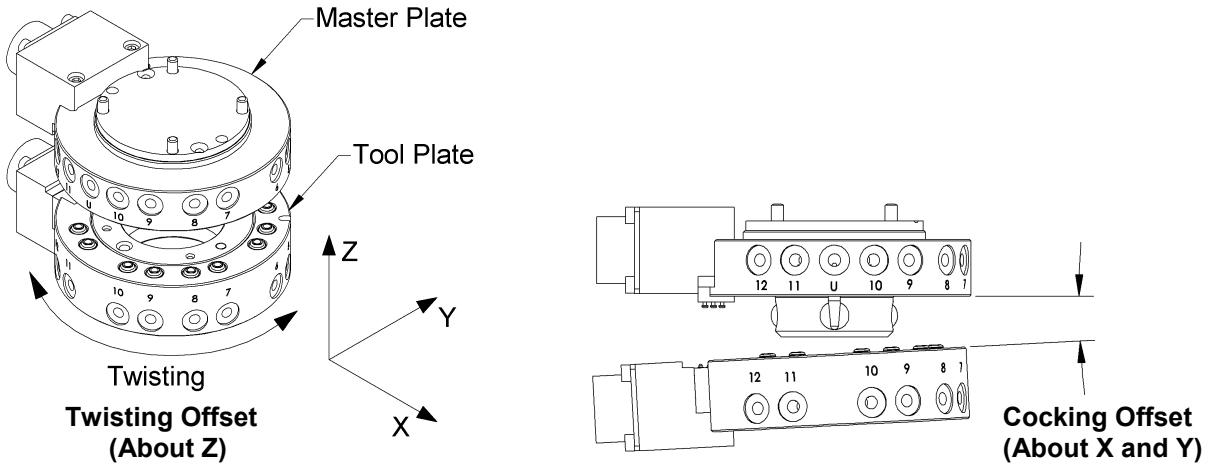
coupling and uncoupling. In some cases, greater offsets than shown in Table 4.1 can be accommodated by the Master and Tool Plates, but will increase wear.

Ideally, the Tool should be hanging vertically in the Tool Stand so that gravity acts to uncouple the Tool Plate from the Master Plate during unlocking. It is possible to design Tool Stands that hold Tools in the horizontal position, but care must be taken that the necessary compliance is provided during coupling and uncoupling. In general, "horizontal-position" Tool Stands cause more wear on the locking mechanism and locating features of the Tool and Tool Stand.

Lock-up should occur with the Master Plate in the No-Touch™ locking zone (see Table 4.1), but not touching the Tool Plate. As locking occurs, the Master Plate should draw the Tool Plate into the locked position.

> ⚠ **CAUTION:** Tool stand design is critical to proper operation of the Tool Changer. Improperly designed Tool Stands can cause misalignments that will cause jamming and/or excessive wear of Tool Changer components.

Tool Stands may also need to incorporate means for covering Tools and electrical modules to protect them in dirty environments such as grinding or welding.



X, Y and Z Offset
Figure 4.1—Offset Definitions

Model	No-Touch™ Zone Z Offset (Max)* (mm)	X and Y Offset (Max)† (mm)	Cocking Offset (Max) (degrees)	Twisting Offset (Max) (degrees)
QC-77	+2mm	±2	±0.6	±1

Table 4.1—Maximum Recommended Offsets Prior to Coupling

Notes: * Maximum values shown. Decreasing actual values will minimize wear during coupling/uncoupling.
† Actual allowable values may be higher in some cases but higher offsets will increase wear during coupling.

4.2.1 Tool Locating Features

The Tool must be positively located in the Tool Stand. A variety of methods may be used to accomplish this. Whatever method is chosen, it is important that the required compliance or "float" be built into the locating system. A common method is to use tapered dowel pins in holes. As the Tool Plate is lifted during the locking action, the taper allows the Tool to float into its locked position even with small deviations in robot position.

Other Tool locating feature methods include balls and detents, dowel pins in notched V-grooves, etc. Please consult ATI for recommendations or assistance with locating feature design for your particular tooling.

Cylindrical (not tapered) dowel pins should not be used as they provide too much surface engagement. During coupling and uncoupling, the Tool can bind on these straight (cylindrical) pins due to misalignment of the Master and Tool Plates.

Robot programming and locational repeatability are important in Tool pick-up and drop-off.

4.2.2 Tool Stand Sensors

It is suggested that the customer provide a sensor that detects the presence of a properly seated Tool in the Tool Stand. The sensor may be used prior to coupling to ensure there is a Tool properly seated in the stand. Sensors may also be used as the robot starts to move away after uncoupling. This provides a fail-safe measure in the event that a Tool should become jammed in the stand or if the Tool should fail to release properly from the robot.

Proximity sensors should be located so that the sensing face is vertical to prevent swarf or other debris from falling on the sensor and creating false readings.

5. Maintenance

ATTENTION: The cleanliness of the work environment strongly influences the trouble-free operation of the changer; the dirtier the environment, the greater the need for protection against debris. Protection of the entire EOAT, the Master, the tool, and all of the modules may be necessary. Protective measures include the following: 1) placement of Tools Stands away from debris generators, 2) covers incorporated into the Tool Stands (see Section 2.3), and 3) guards, deflectors, air curtains, and similar devices built into the EOAT and the Tool Stand.

5.1 Preventive Maintenance

The Tool Changer and optional modules are designed to provide a long life with regular maintenance.

A visual inspection and preventive maintenance schedule is provided in the table below depending upon the application.

Detailed assembly drawings are provided in *Section 10—Drawings* of this manual.

ATTENTION: The QC-77 is initially lubricated using *Jetlube FMG food grade* grease. The end user must apply additional lubricant to the locking mechanism components and alignment pins prior to start of service (See Section 4.2).

Application(s)	Tool Change Frequency	Inspection Schedule
General Usage Material Handling Docking Station	> 1 per minute	Weekly
	< 1 per minute	Monthly
Welding/Servo/ Deburring, Foundry Operations (Dirty Environments)	All	Weekly

Checklist
Balls/Alignment Pins/Holes/Bearing Race
Inspect for lubrication and wear. Jetlube FMG Food Grade Grease is suggested for locking mechanism and alignment pin lubrication. Over time, lubricants can become contaminated with process debris. Therefore, it is recommended to thoroughly clean the existing grease and replace with new as needed. See *Section 9.2—Lubrication*.
Excessive alignment pin/bushing wear may be an indication of poor robot position during pickup/drop-off. Adjust robot position as needed. Check Tool Stand for wear and alignment problems.
Wear on the balls/bearing race could be an indication of excessive loading.
Mounting Hardware/Interface Connections
Inspect for proper torque and interference or wear, abrasions, cuts of hoses, and electrical cables. Tighten and correct as required.
Rubber Bushings
Inspect for wear, abrasion, and cuts.
Exposed rubber bushings may be subject to damage during normal operation. Replace damaged o-rings and rubber bushings as needed.

5.2 Cleaning, Lubrication, Adjustment and Replacement

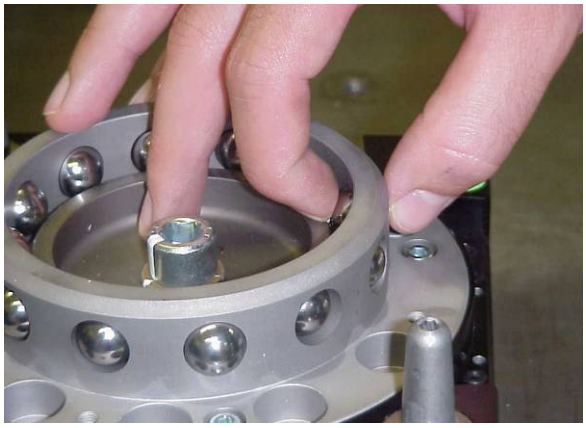
5.2.1 Cleaning and Lubrication of the Locking Mechanism and Alignment Pins (Master Plate).

1. The locking mechanism must be in the unlock state before cleaning.
2. Use a clean rag to thoroughly remove the existing lubricant and debris from the balls, the male coupling, the cam, and the alignment pins.

Cleaning balls and outer surfaces of male coupling. (QC-210 shown)

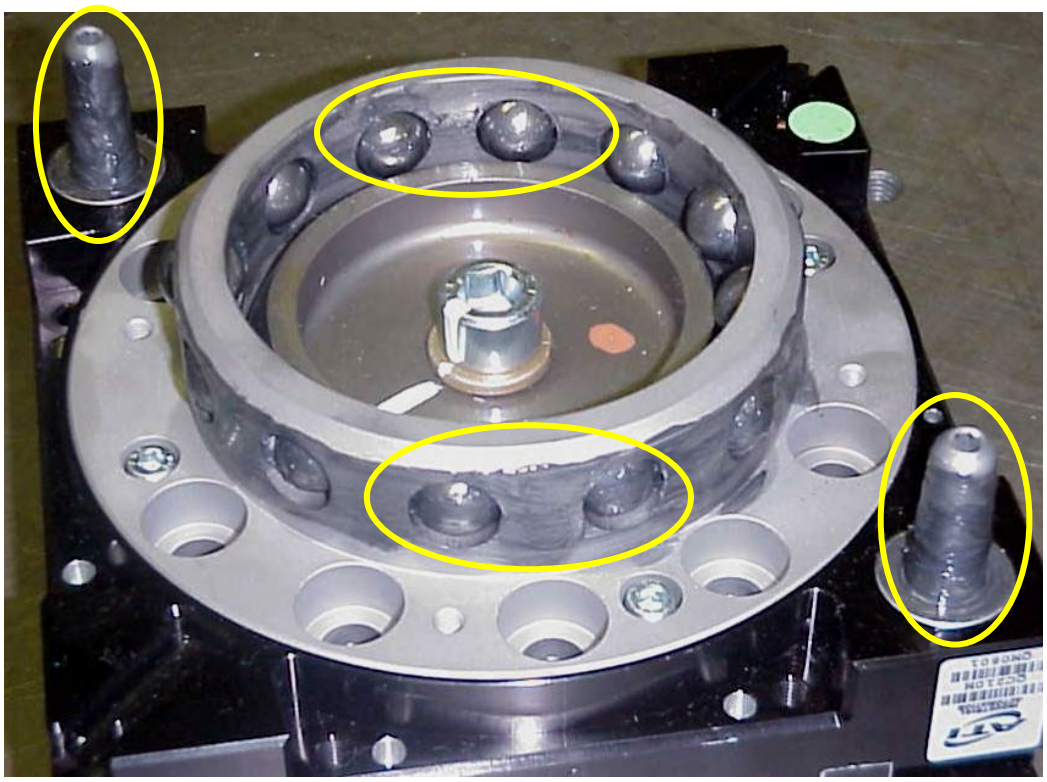
Cleaning balls, cam and inner surfaces of male coupling. (QC-210 shown)

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



(QC-210 shown)

4. Apply a liberal coating of lubricant to the balls, the male coupling (inside and out), and the alignment pins.



(QC-210 shown)

5.2.2 Cleaning the Locking Mechanism and Alignment Pin Bushings (Tool Plate).

1. Use a clean rag to thoroughly remove the any lubricant and debris from the bearing race and the bushings.
2. No re-lubrication is necessary on the Tool Plate components.

6. Troubleshooting

Symptom	Possible Cause / Correction
Check these conditions prior to any further troubleshooting.	• Ensure that the Quick-Change has proper pneumatic and electrical connections, air is supplied at a minimum of 60 psi (4.1 Bar), and that no air or vacuum can be trapped in a de-energized Lock or Unlock port (pressure must be vented to atmosphere).
Unit will not lock or unlock	• Verify that ball bearings are not moving freely. Clean and lubricate as needed (see *Section 9—Installation and Maintenance*). • Check air supply • Check that exhaust port is properly vented • Verify that the Master and Tool are within the specified No-Touch zone when attempting to lock.
Sensors not operating properly	• Verify that cables are connected 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.

7. Recommended Spare Parts

Assembly	Part Number	Description
Master Assembly	9120-077MNP-TDC-SS-SD-E	QC-77 Master Assembly
	3620-1200001-50	Cord Grip, M12 x 1.5, Stainless Steel, Cord Dia 0.08"–0.20"
	9005-20-8776	Sensor Carrier Assembly, 4mm PNP, 5m Cable, Viton, SS Fasteners
	3560-0862050-23	M4 x 50mm SS SHCS, Self Sealing, Viton Seal
	3500-1068050-21	M8 X 50 SHCS, 316 SS
Tool Plate	9120-077TNP-TDC-SS	QC-77 Tool Assembly
	3410-0001323-01	O-Ring, 116mm ID x 3mm CS, Viton, 75 Durometer

8. Specifications

Master and Tool Plates

Suggested Payload Limit	220 lbs (110 kg)	The mass attached to the Tool Changer.
Operating Temperature Range	-20–150ºF (-30–66ºC)	
Operating Pressure	60–100 psi (4.1–6.9 bar)	Locking mechanism supply pressure operating range. Supply to be clean, dry and filtered to 40 micron or better.
Coupling Force @ 80psi	2600 lbs (12,000 N)	Axial holding force.
Static Moment Capacity (x,y,z)	4,800 in-lb (540 Nm)	Maximum recommended working load for optimum performance of the Tool Changer.
Positional Repeatability	0.0006 in (0.015 mm)	Repeatability tested at rated load at one million cycles.
Max. distance between Master and Tool Plate	0.08 in (2 mm)	No-Touch Locking™ technology allows the Master and Tool Plates to lock with separation when coupling.
Mounting Surface/Customer Interface	Master Plate	Customer-specified Robot Pattern
	Tool Plate	Customer specified Tool pattern

9. Installation and Maintenance

9.1 General

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.

The following items should be visually inspected at regular intervals:

- Ball bearings
- Bearing race
- Electrical contacts
- Rubber bushings
- Alignment pins
- Tool-side O-ring Seal

Spare parts are available from ATI. Please call for recommendations.

9.2 Lubrication

9.2.1 External

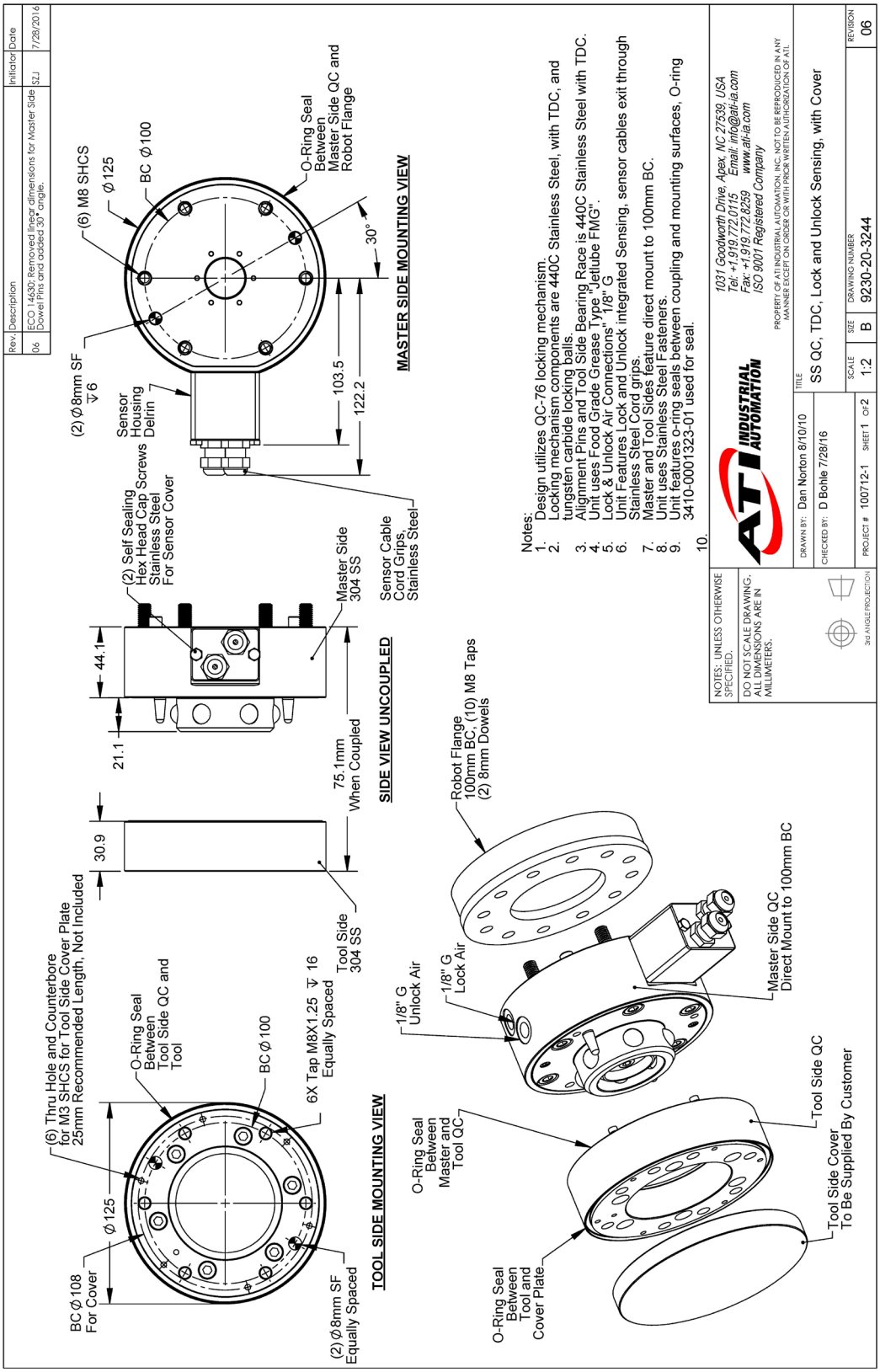
The Quick-Change is factory-lubricated. For many applications this lubrication is sufficient for the life of the product. In some high-cycle applications the Tool Changer locking mechanism wear can be reduced by applying a thin film of Jetlube FMG Food Grade Grease to the locking balls, cam, and bearing race at periodic intervals (e.g., every 50,000 cycles).

In some extremely dirty applications, the locking balls and cam can pick up grit and debris if grease is present. In these cases, it is recommended that the locking mechanism be covered, and/or moved to a less-dirty location when a Tool Plate is not locked in place. Also, the elimination of grease is a possible solution in these cases.

9.3 Alignment Pins

Alignment pins are the tapered pins located on the face of the Master Plate that guide the Master Plate and Tool Plate together during the locking process. In heavy-duty applications, alignment pins may need to be replaced due to wear. When replacing alignment pins, always use original ATI parts.

10. Drawings


Rev. | Description | Initiator | Date
06 | ECO 14630: Removed linear dimensions for Master Side Dowel Pins and added 30° angle. | SZJ | 7/28/2016
(6) M8 SHCS
Ø 125
BC Ø 100
O-Ring Seal Between Master Side QC and Robot Flange
30°
(2) Ø 8mm SF ∀ 6
Sensor Housing Delrin
103.5
122.2
MASTER SIDE MOUNTING VIEW
(2) Self Sealing Hex Head Cap Screws Stainless Steel For Sensor Cover
Master Side 304 SS
Sensor Cable Cord Grips, Stainless Steel
44.1
21.1
30.9
75.1mm When Coupled
Tool Side 304 SS
SIDE VIEW UNCOUPLED
(6) Thru Hole and Counterbore for M3 SHCS for Tool Side Cover Plate 25mm Recommended Length, Not Included
O-Ring Seal Between Tool Side QC and Tool
BC Ø 100
6X Tap M8X1.25 ∀ 16 Equally Spaced
Ø 125
BC Ø 108 For Cover
(2) Ø 8mm SF Equally Spaced
TOOL SIDE MOUNTING VIEW
Robot Flange 100mm BC, (10) M8 Taps (2) 8mm Dowels
1/8" G Unlock Air
1/8" G Lock Air
Master Side QC Direct Mount to 100mm BC
O-Ring Seal Between Master and Tool QC
Tool Side QC
O-Ring Seal Between Tool and Cover Plate
Tool Side Cover To Be Supplied By Customer
Notes:
1. Design utilizes QC-76 locking mechanism.
2. Locking mechanism components are 440C Stainless Steel, with TDC, and tungsten carbide locking balls.
3. Alignment Pins and Tool Side Bearing Race is 440C Stainless Steel with TDC.
4. Unit uses Food Grade Grease Type "Jetlube FMG".
5. Lock & Unlock Air Connections" 1/8" G
6. Unit Features Lock and Unlock integrated Sensing, sensor cables exit through Stainless Steel Cord grips.
7. Master and Tool Sides feature direct mount to 100mm BC.
8. Unit uses Stainless Steel Fasteners.
9. Unit features o-ring seals between coupling and mounting surfaces, O-ring 3410-0001323-01 used for seal.
10.
NOTES: UNLESS OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS.
3rd ANGLE PROJECTION
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Fax: +1.919.772.8259 www.ati-ia.com
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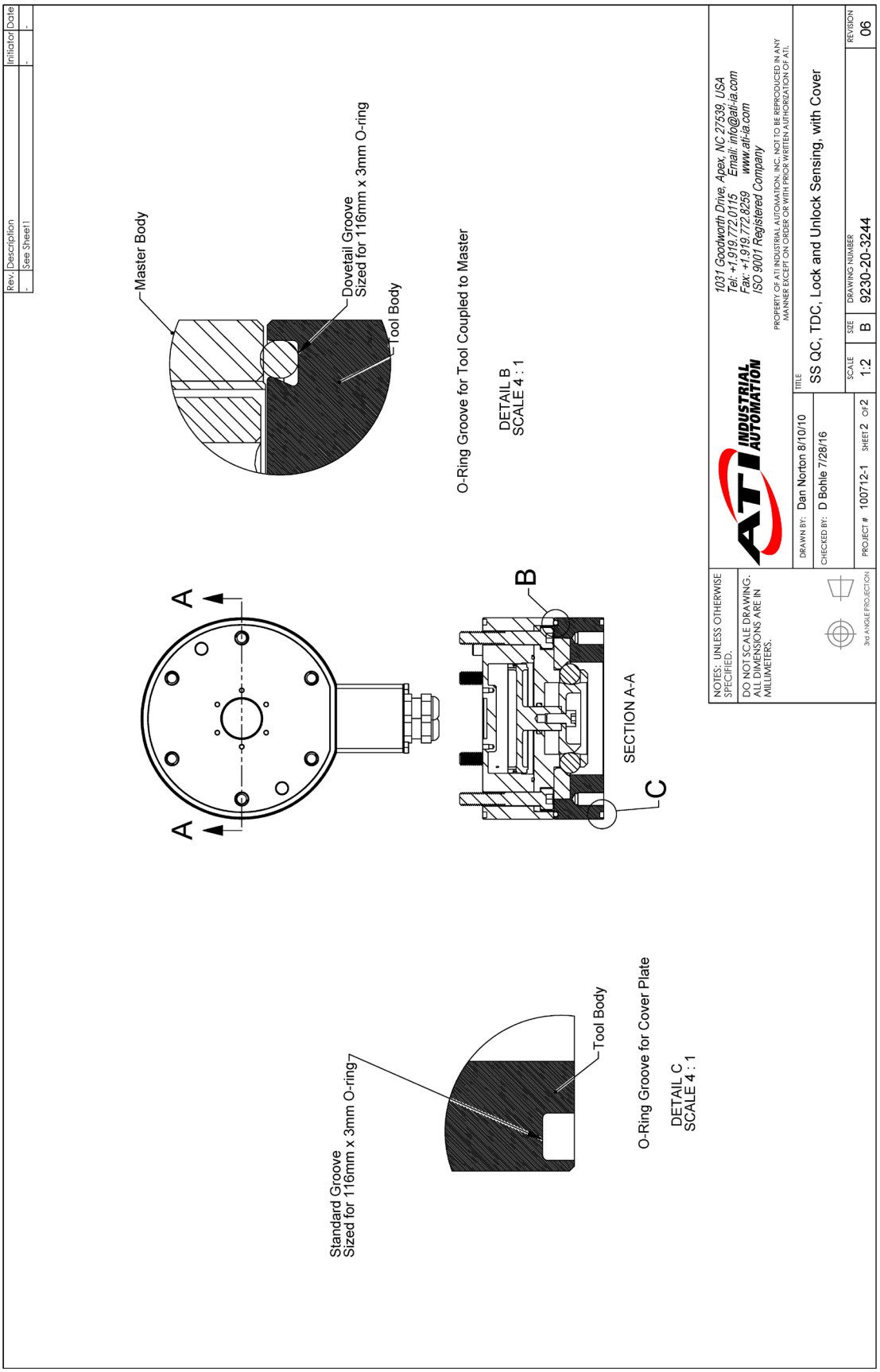
PROPERTY OF ATI INDUSTRIAL AUTOMATION, INC. NOT TO BE REPRODUCED IN ANY MANNER EXCEPT ON ORDER OR WITH PRIOR WRITTEN AUTHORIZATION OF ATI.
DRAWN BY: Dan Norton 8/10/10
CHECKED BY: D Bohle 7/28/16
PROJECT # 100712-1 SHEET 1 OF 2
TITLE
SS QC, TDC, Lock and Unlock Sensing, with Cover
SCALE 1:2
SIZE B
DRAWING NUMBER 9230-20-3244
REVISION 06


Rev.
Description
Initiator
Date
See Sheet1
Master Body
Dovetail Groove
Sized for 116mm x 3mm O-ring
Tool Body
O-Ring Groove for Tool Coupled to Master
DETAIL B
SCALE 4 : 1
A
A
B
C
SECTION A-A
Standard Groove
Sized for 116mm x 3mm O-ring
Tool Body
O-Ring Groove for Cover Plate
DETAIL C
SCALE 4 : 1
NOTES: UNLESS OTHERWISE SPECIFIED.
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3rd ANGLE PROJECTION
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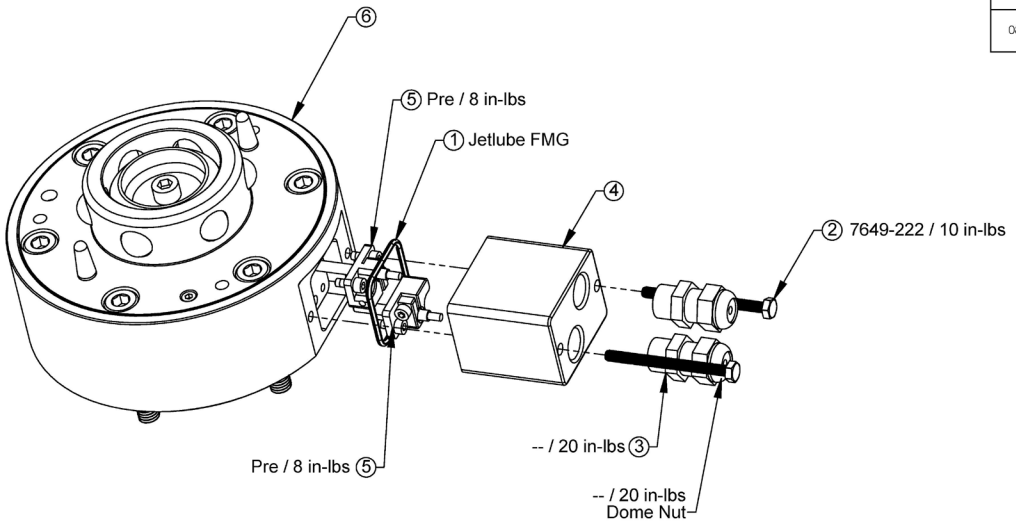
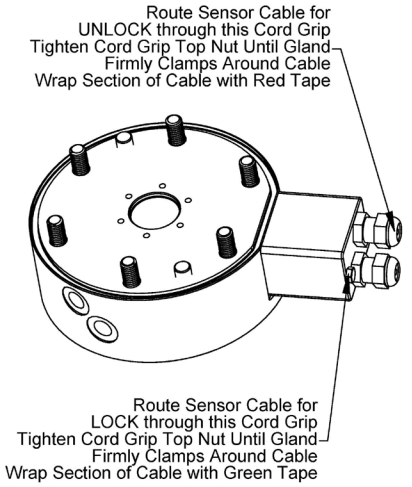
INDUSTRIAL AUTOMATION
DRAWN BY: Dan Norton 8/10/10
CHECKED BY: D Bohle 7/28/16
TITLE
SS QC, TDC, Lock and Unlock Sensing, with Cover
PROJECT # 100712-1
SHEET 2 OF 2
SCALE 1:2
SIZE B
DRAWING NUMBER 9230-20-3244
REVISION 06

Rev.	Description	Initiator	Date
04P	Updated Notes from Safe Launch	DAN	2/7/11
05	Release	DAN	9/12/2011
06	Eco 9454; Changed torque on fastener 3560-0862050-23 from 12 to 10 in-lbs.	CF	2/16/2012
07	Eco 14801; Removed Note 1. Replaced --/Tighten to contact with -- /20 in-lbs. Added callout Pre/12 in-lbs to item 5. Switch note callouts for Route Sensor Cable	DS	8/29/2016
08	Eco 17415; Replaced (2) 9005-20-1483 with (2) 9005-20-8776. Changed torque from 12 in-lbs to 8 in-lbs for item 5	DS	11/7/2018





ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	3410-0001010-01	O-Ring AS568-025
2	2	3560-0862050-23	M4-0.7 X 50 HHCS, SS, Self Sealing, Viton
3	2	3620-1200001-50	Cord Grip, M12 x 1.5, Stainless Steel, Cord Dia .08"-.20"
4	1	3700-20-6543	Sensor Cover Block
5	2	9005-20-8776	SENSOR CARRIER ASSEMBLY, 4mm PNP, 5m CABLE, VITON, SS FASTENERS
6	1	9120-077MNP-TDC-SS-E	QC-77 Master No Ports, TDC Lock Mech, SS Body, G Ported L/UL Air

Notes:

1. ***THIS UNIT UTILIZES FOOD GRADE GREASE TYPE "JETLUBE FMG"

NOTES: UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DRAWING. ALL DIMENSIONS ARE IN INCHES.

3rd ANGLE PROJECTION

ATI INDUSTRIAL AUTOMATION
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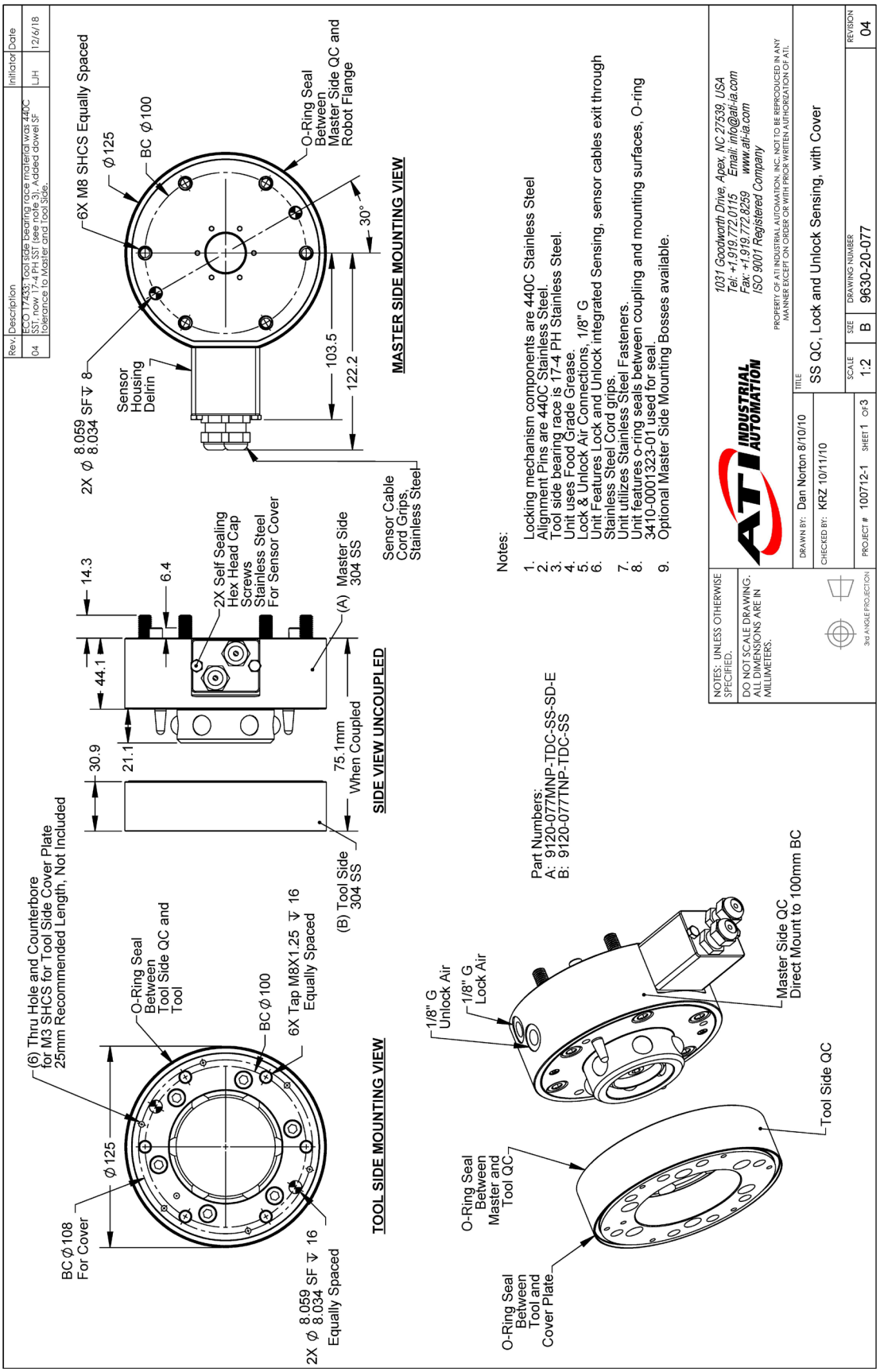
ISO 9001 Registered Company

DRAWN BY: Dan Norton, 9/8/10
CHECKED BY: KRZ, 9/16/10
PROJECT # 100712-1 SHEET 1 OF 1

TITLE: QC-77 Master No Ports, TDC Lock Mech, SS Body, G Ported L/UL Air

SCALE	SIZE	DRAWING NUMBER	REVISION
1:1.5	B	9120-077MNP-TDC-SS-SD-E	08


Rev.
Description
Initiator
Date
04
ECO 17433: Tool side bearing race material was 440C SST, now 17-4 PH SST [see note 3]. Added dowel SF tolerance to Master and Tool Side.
LJH
12/6/18
6X M8 SHCS Equally Spaced
Ø 125
BC Ø 100
O-Ring Seal Between Master Side QC and Robot Flange
2X Ø 8.059 8.034 SF ↧ 8
Sensor Housing Delrin
30°
103.5
122.2
MASTER SIDE MOUNTING VIEW
14.3
6.4
44.1
30.9
21.1
2X Self Sealing Hex Head Cap Screws Stainless Steel For Sensor Cover
(A) Master Side 304 SS
Sensor Cable Cord Grips, Stainless Steel
75.1mm When Coupled
(B) Tool Side 304 SS
SIDE VIEW UNCOUPLED
(6) Thru Hole and Counterbore for M3 SHCS for Tool Side Cover Plate 25mm Recommended Length, Not Included
O-Ring Seal Between Tool Side QC and Tool
BC Ø 100
6X Tap M8X1.25 ↧ 16 Equally Spaced
BC Ø 108 For Cover
Ø 125
2X Ø 8.059 8.034 SF ↧ 16 Equally Spaced
TOOL SIDE MOUNTING VIEW
Notes:
1. Locking mechanism components are 440C Stainless Steel
2. Alignment Pins are 440C Stainless Steel.
3. Tool side bearing race is 17-4 PH Stainless Steel.
4. Unit uses Food Grade Grease.
5. Lock & Unlock Air Connections, 1/8" G
6. Unit Features Lock and Unlock integrated Sensing, sensor cables exit through Stainless Steel Cord grips.
7. Unit utilizes Stainless Steel Fasteners.
8. Unit features o-ring seals between coupling and mounting surfaces, O-ring 3410-0001323-01 used for seal.
9. Optional Master Side Mounting Bosses available.
Part Numbers:
A: 9120-077MNP-TDC-SS-SD-E
B: 9120-077TNP-TDC-SS
1/8" G Unlock Air
1/8" G Lock Air
Master Side QC Direct Mount to 100mm BC
O-Ring Seal Between Master and Tool QC
O-Ring Seal Between Tool and Cover Plate
Tool Side QC
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INDUSTRIAL AUTOMATION
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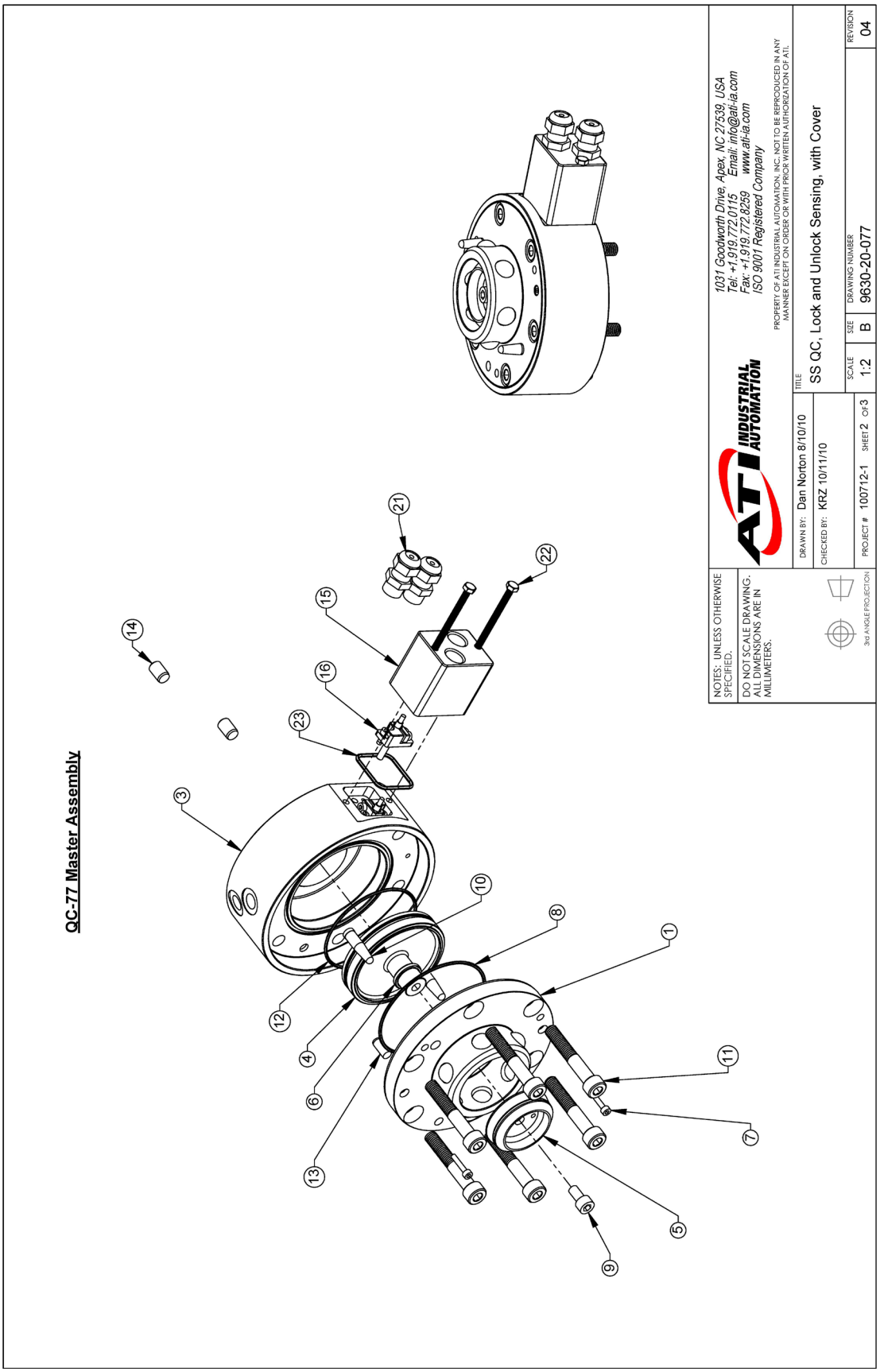
DRAWN BY: Dan Norton 8/10/10
CHECKED BY: KRZ 10/11/10
TITLE
SS QC, Lock and Unlock Sensing, with Cover
3rd ANGLE PROJECTION
PROJECT # 100712-1 SHEET 1 OF 3
SCALE 1:2
SIZE B
DRAWING NUMBER 9630-20-077
REVISION 04


QC-77 Master Assembly
1031 Goodworth Drive, Apex, NC 27539, USA
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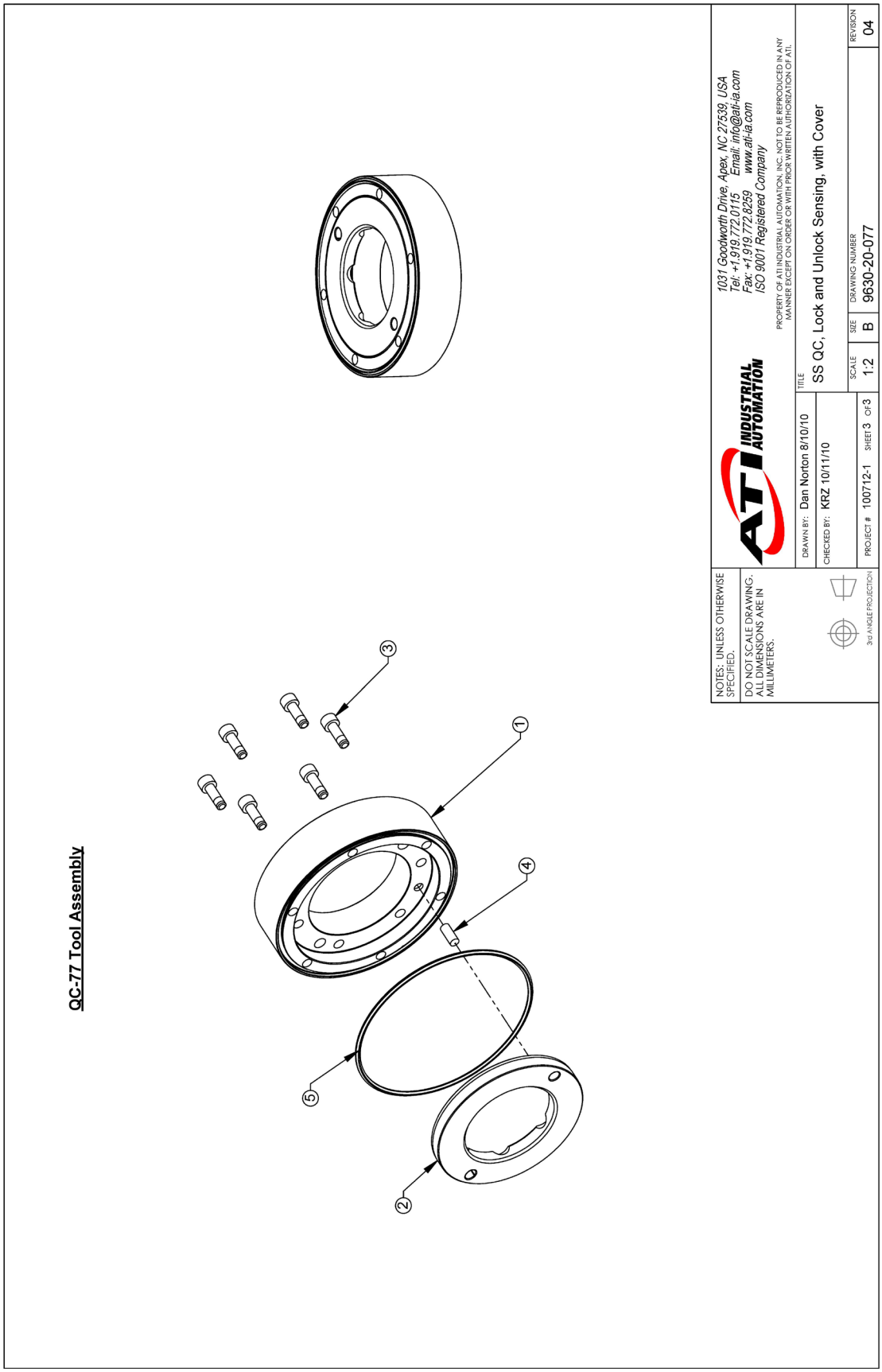
DRAWN BY: Dan Norton 8/10/10
CHECKED BY: KRZ 10/11/10
TITLE
SS QC, Lock and Unlock Sensing, with Cover
SCALE 1:2
SIZE B
DRAWING NUMBER 9630-20-077
REVISION 04
PROJECT # 100712-1 SHEET 2 OF 3
3rd ANGLE PROJECTION


QC-77 Tool Assembly
1
2
3
4
5
NOTES: UNLESS OTHERWISE SPECIFIED.
DO NOT SCALE DRAWING. ALL DIMENSIONS ARE IN MILLIMETERS.
3rd ANGLE PROJECTION
DRAWN BY: Dan Norton 8/10/10
CHECKED BY: KRZ 10/11/10
PROJECT # 100712-1 SHEET 3 OF 3
TITLE
SS QC, Lock and Unlock Sensing, with Cover
SCALE 1:2
SIZE B
DRAWING NUMBER 9630-20-077
REVISION 04
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ATI will in no event be liable for incidental, consequential or special damages of any kind, even if ATI has been advised of the possibility of such damages. ATI's aggregate liability will in no event exceed the amount paid by purchaser for the item which is the subject of claim or dispute. ATI will have no liability of any kind for failure of any equipment or other items not supplied by ATI.

No action against ATI, regardless of form, arising out of or in any way connected with products or services supplied hereunder may be brought more than one (1) year after the cause of action accrued.

No representation or agreement varying or extending the warranty and limitation of remedy provisions contained herein is authorized by ATI, and may not be relied upon as having been authorized by ATI, unless in writing and signed by an executive officer of ATI.

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Without ATI's prior written permission, Purchaser will not use such information for any other purpose or provide or otherwise make such information available to any third party. Purchaser agrees to take all reasonable precautions to prevent any unauthorized use or disclosure of such information.

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