



## Robotic Collision Sensor

U.S. Patent Nos. 6069415 and 6690208

**SR-48, 61, 81, 101, 131, 176, and 221**

## Installation Instructions for Coolant Protection Boot



Document #: 9610-60-1008

*Engineered Products for Robotic Productivity*

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## Glossary

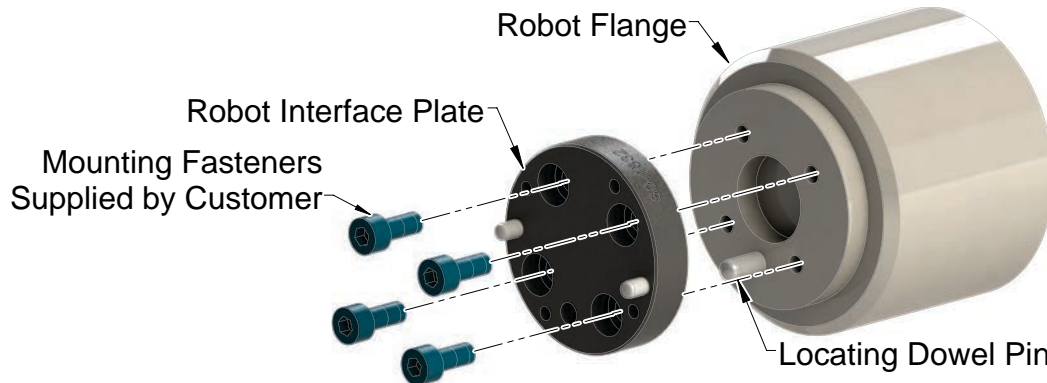
| Term            | Definitions                                                                                                                                                |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Body            | Cylindrical aluminum housing and air pressure chamber. An interface plate to the user's robot is usually attached here.                                    |
| Collision       | The accidental impact between the end of arm tooling and some obstruction in its path.                                                                     |
| Cover Plate     | Disk-shaped aluminum cover for Collision Sensor body.                                                                                                      |
| Crash           | The result of a disturbance that displaces the Collision Sensor components from their standard, working position.                                          |
| Interface Plate | Optional component used to adapt the Collision Sensor body or stem to the user's robot or tooling.                                                         |
| Piston          | The component which, together with the Body, creates a pressure chamber. Varying the pressure in this chamber varies the load required to move the piston. |
| Stem            | Round tapered post containing tapped holes and a dowel pin hole. An interface plate to the user's tooling is usually attached here.                        |

## 1. Installation of Coolant Protection Boot

Prior to installing the Coolant Protection Boot, the Collision Sensor must be installed to the robot flange. The tooling interface plate must be attached to the Collision Sensor and pneumatic pressure or spring pressure must be supplied to the Collision Sensor.

1. Attach the robot interface plate to the robot flange, it is recommended to use thread- locking compound on all mounting fasteners.

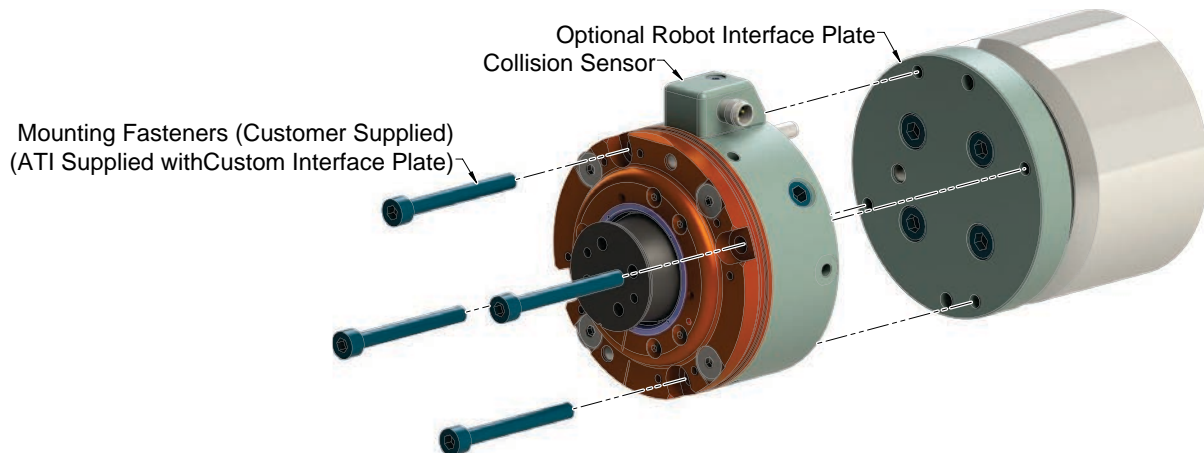
**Figure 1.1—Install Robot Interface Plate**



**NOTICE:** A robot interface plate is required. The robot interface plate can be purchased from ATI or manufactured by the customer using ATI approved drawings. The use of a robot interface plate supplied by ATI is strongly recommended.

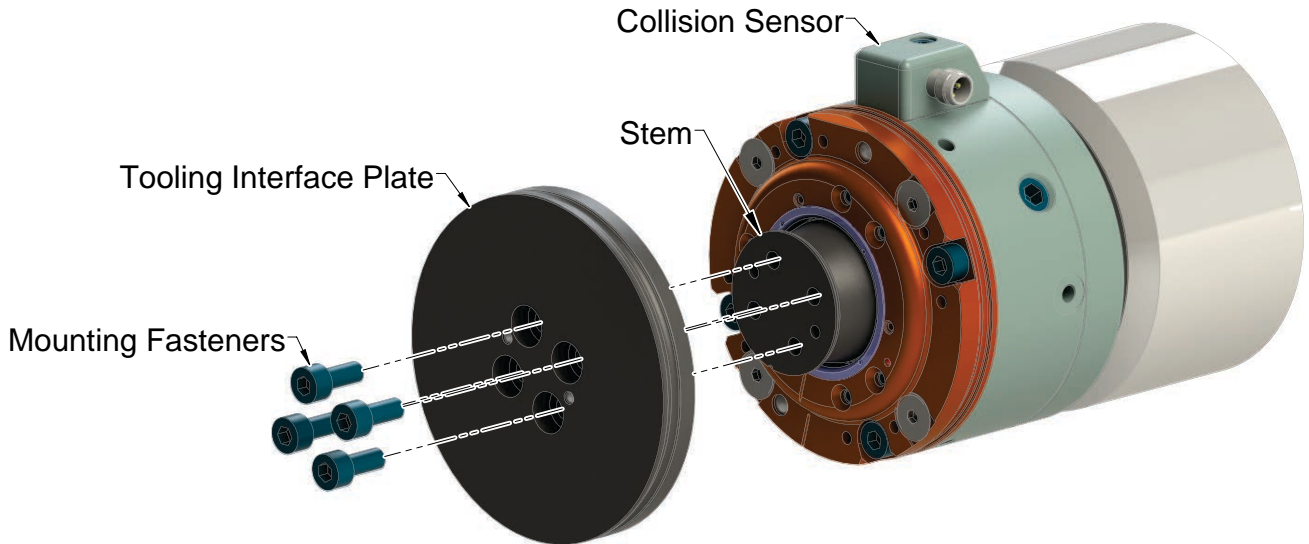
2. Attach the Collision Sensor to the robot interface plate using the fasteners supplied with ATI interface plate. Refer to the Installation and Operation manual for Collision Sensor being installed for specific mounting fastener torque and thread-locking compound requirements.

**Figure 1.2—Install the Collision Sensor to the Robot Interface Plate**



3. Attach the tooling interface plate to the Collision Sensor using the fasteners supplied. Refer to the Installation and Operation manual for Collision Sensor being installed for specific mounting fastener torque and thread-locking compound requirements.

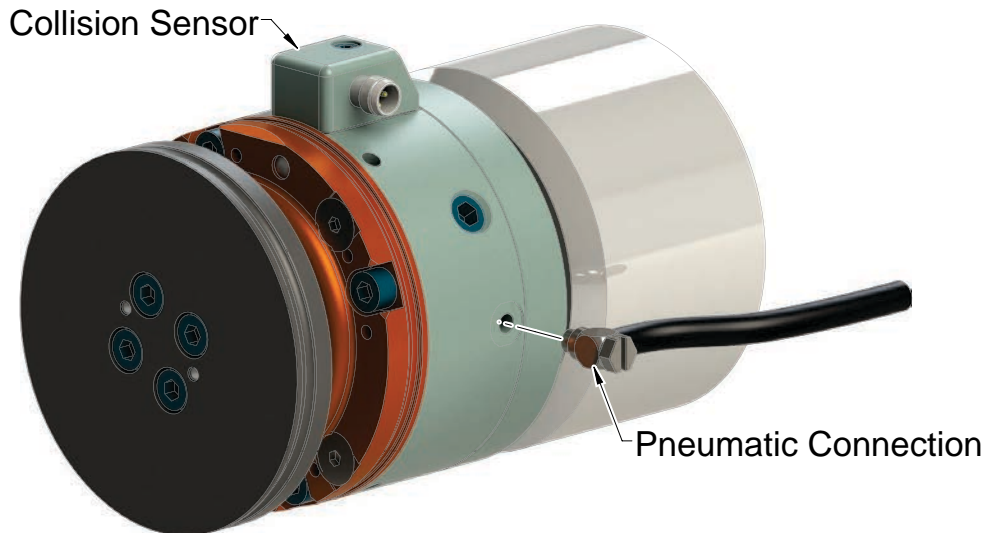
**Figure 1.3—Install the Tooling Interface Plate to the Collision Sensor Stem**



4. Connect the pneumatic air hose to the Collision Sensor and apply 10-20 psi (0.69-1.38 bar) to raise the stem. Note: This step is not required for Collision Sensors that are spring loaded. Refer to the Installation and Operation manual for Collision Sensor being installed for specific pneumatic requirements.

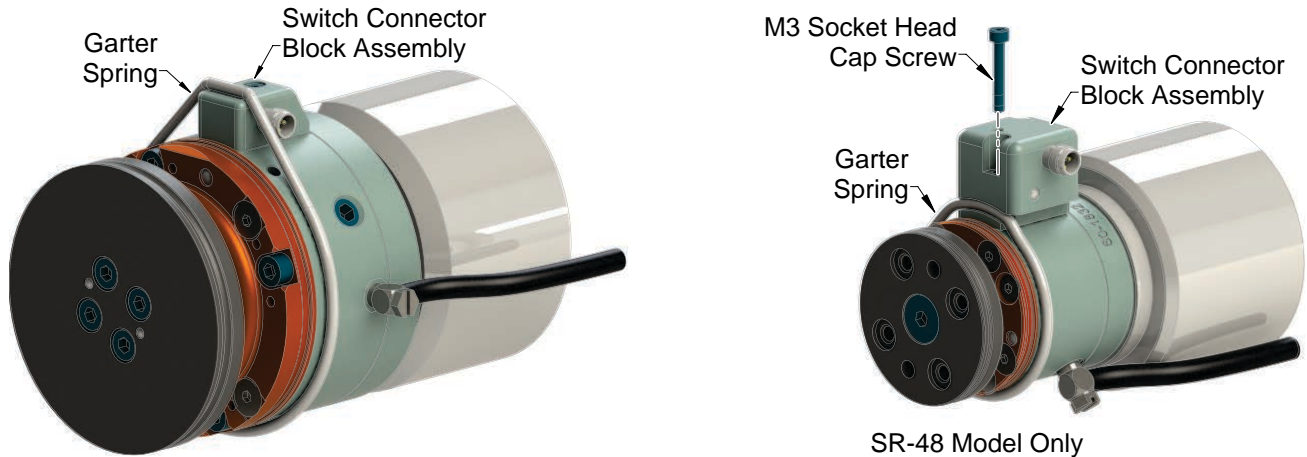
**NOTICE:** SR-48, SR-61, SR-81, and SR-101 models are equipped with a #10-32 or M5 x 0.8 air port connection. SR-131, SR-176, and SR-221 models are equipped with a 1/8" NPT air port connection

**Figure 1.4—Install the Collision Sensor to the Robot Interface Plate**



5. For SR-48 model remove M3 socket head cap screw shown in [Figure 1.5](#).
6. Temporarily stretch one of the garter springs over the Collision Sensor body and over switch connector block assembly as shown in [Figure 1.5](#). For the SR-48 model stretch garter spring over Collision Sensor body and into groove in switch connector block assembly.

**Figure 1.5—Stretch the Garter Spring over the Collision Sensor**



7. Slide the coolant protection boot over the Tooling interface plate and onto the Collision Sensor cover. Make sure the grooves in the boot are seated into the grooves in the Tooling interface plate and Collision Sensor cover.

**Figure 1.6—Install the Coolant Protection Boot**



8. Stretch the first garter spring off the switch connector block assembly and into the groove in the boot and Collision Sensor cover to secure the boot.
9. Stretch the second garter spring over the end of the coolant protection boot and into the first groove in the boot and tooling interface plate.
10. For SR-48, install the M3 socket head cap screw. Tighten to 12 in-lbs.(1.36 Nm)

## 2. Design/Procurement of Interface Plates

This sealing system utilizes a bellows style boot attached to the cover and stem side interface plate and a molded wire channel gasket. In order to insure proper sealing the following items are necessary:

1. The unit must have been purchased from the factory with the coolant protection boot. (This is necessary since the cover must contain the groove for the garter spring and be sealed to the body.)
2. Purchase custom collision sensor interface plates from ATI. Provide the robot and tooling interface patterns to ATI and we will design and manufacture custom interface plates for your application.

or

Purchase blank collision sensor interface plates and modify them as follows:

### Tooling to Collision Sensor Stem Interface Plate

- a) The tooling mounting holes in the collision sensor stem to tooling interface plate must be surrounded with o-rings installed in properly sized counterbores.

### Robot to Collision Sensor Body Interface Plate

- a) The robot mounting holes and dowel hole(s) in the collision sensor body to robot interface plate must be oriented so that they do not cross the molded wire channel gasket.

Refer to *Section 3—Drawings for Replacement Parts & Interface Plates* for interface plate part numbers and examples of properly modified interface plates.



### 3. Drawings for Replacement Parts & Interface Plates

#### 3.1 SR-48

| ITEM NO. | QTY. | PART NUMBER      | DESCRIPTION                                         | Rev. | Description                | Instructor | Date     |
|----------|------|------------------|-----------------------------------------------------|------|----------------------------|------------|----------|
| 1        | 1    | 3700-60-1829     | C5 Boot, SR-048                                     | 01   | ECO-11161; Initial Drawing | DAW        | 7/5/2013 |
| 2        | 2    | 3610-0351800-20  | Garler Spring, SR-048 Boot                          |      |                            |            |          |
| 3        | 1    | 3500-1265016-15A | M6 x 16mm SFHCS; Blue Dyed Magni-565 w/Microspheres |      |                            |            |          |
| 4        | 1    | NSS              | Blank IPS Stem for Tooling                          |      |                            |            |          |
| 5        | 1    | 3410-0001080-01  | 6mm x 1mm O-Ring Buna-N                             |      |                            |            |          |
| 6        | 4    | 3540-0102006-11  | 2mm x 6mm Dowel Alloy Steel                         |      |                            |            |          |
| 7        | 4    | 3500-1262040-15A | M4 x 40mm SFHCS; Blue Dyed Magni-565 w/Microspheres |      |                            |            |          |
| 8        | 2    | 3540-0104012-11  | 4mm x 12mm Dowel Alloy Steel                        |      |                            |            |          |
| 9        | 1    | NSS              | Blank IPB Body to Robot                             |      |                            |            |          |

9160-FLEXBOOT-048

9160-048-IPB-1830 Blank IPS Stem to Tooling

9160-048-IPB-1831 Blank IPB Body to Robot  
 9160-048-IPB-1832 IPB SR-48 Body to BC31.5, (4)M5, Boss 20, Dowel 5

SR-048 Collision Sensor

Customer to Machine Pattern of Tapped Holes for Attachment to Tooling (See sheet 2 for More Details)

Robot Flange

Interface Plate to Robot  
(Varies with Robot - Customer Supplied)

Interface Plate to Robot  
Mounting Screws  
(Varies with Robot - Customer Supplied)

Interface Plate to Robot  
Positioning Dowel(s)  
(Varies with Robot - Customer Supplied)

NSS - Not sold separately.

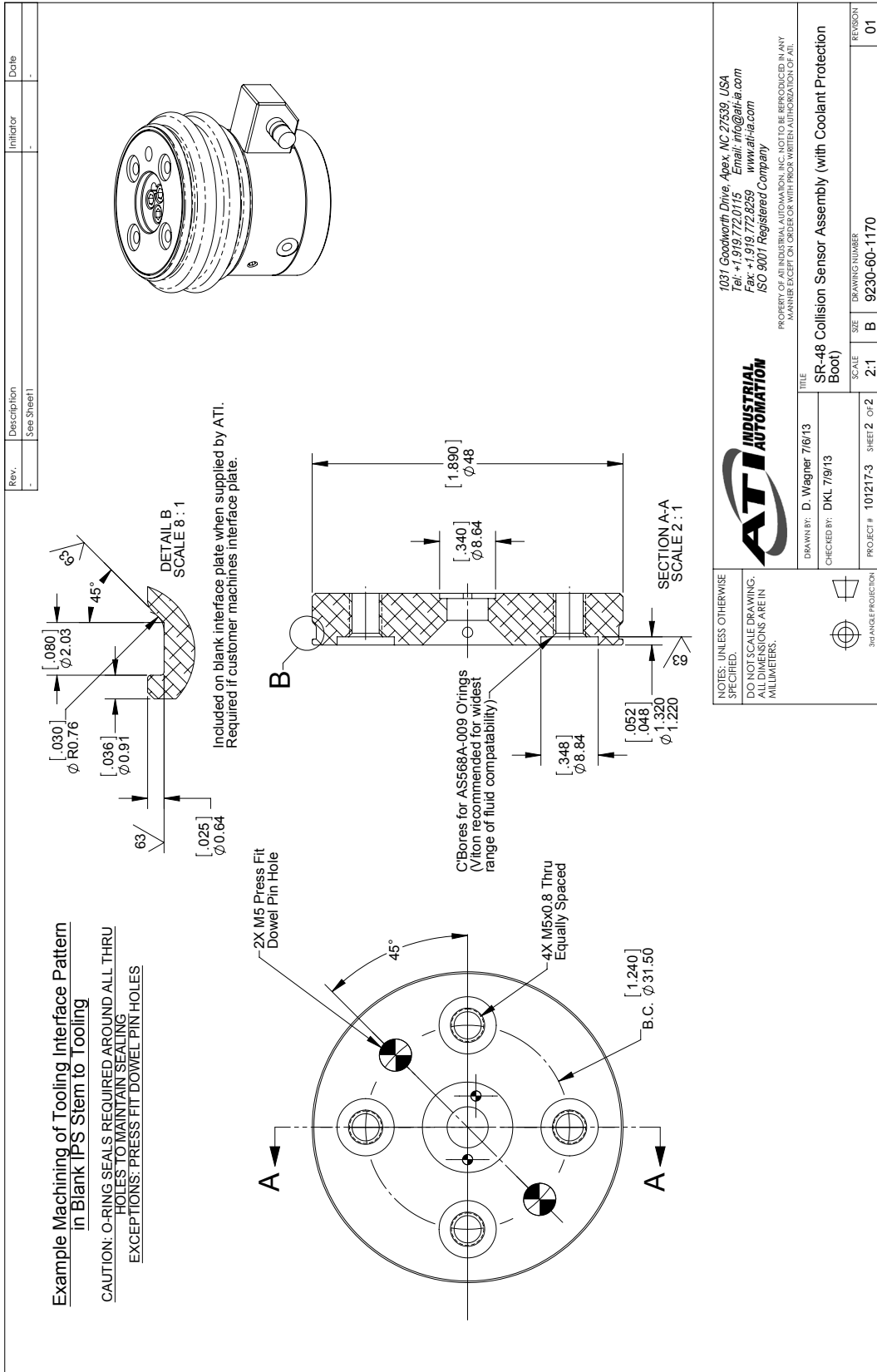
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|                            |                                                                       |              |                              |              |
|----------------------------|-----------------------------------------------------------------------|--------------|------------------------------|--------------|
| DRAWN BY: D. Wagner 7/6/13 | TITLE: SR-48 Collision Sensor Assembly (with Coolant Protection Boot) | SCALE: 3:4   | DRAWING NUMBER: 9230-60-1170 | REVISION: 01 |
| CHECKED BY: DKL 7/9/13     | PROJECT #: 101217-3                                                   | SHEET 1 OF 2 |                              |              |



3.2 SR-61

|            |                                |                  |                   |
|------------|--------------------------------|------------------|-------------------|
| Rev.<br>01 | Description<br>Initial Version | Initiator<br>DAW | Date<br>5/16/2007 |
|------------|--------------------------------|------------------|-------------------|

| ITEM NO. | Default/<br>QTY. | PART NUMBER     | DESCRIPTION                     |
|----------|------------------|-----------------|---------------------------------|
| 1        | 1                | 3700-60-1554    | Flex Boot, SR-061               |
| 2        | 2                | 3610-0368800-20 | Garter Spring, SR-061 Boot      |
| 3        | 3                | 3500-1062012-15 | M4-0.7 x 12mm SHCS, Blue        |
| 4        | 1                | NSS             | Blank IPS Stem to Tooling       |
| 5        | 1                | 3540-0103010-11 | 3mm x 10mm Dowel Alloy Steel    |
| 6        | 4                | 3500-1062040-11 | M4-0.7 x 40mm SHCS, Black Oxide |
| 7        | 2                | 3540-0104014-11 | 4mm x 14mm Dowel Alloy Steel    |
| 8        | 1                | NSS             | Blank IPB Body to Robot         |

9160-FLEXBOOT-061

9160-061-IPS-1557 Blank IPS Stem to Tooling

9160-061-IPB-1479 Blank IPB Robot to Body  
 9160-061-IPB-1481 IPB for SR-061 Body to BC40, (4)M6, Boss 25, D6  
 9160-061-IPB-1495 IPB for SR-061 Body to BC31.5, (4)M5, Boss 20, D5

NSS - Not sold separately.

SR-061 Collision Sensor

Robot Flange

Interface Plate to Robot Positioning Dowel(s)  
(Varies with Robot - Customer Supplied)

Interface Plate to Robot Mounting Screws  
(Varies with Robot - Customer Supplied)

Customer to Machine Pattern of Tapped Holes for Attachment to Tooling (See Sheet 2 for More Details)

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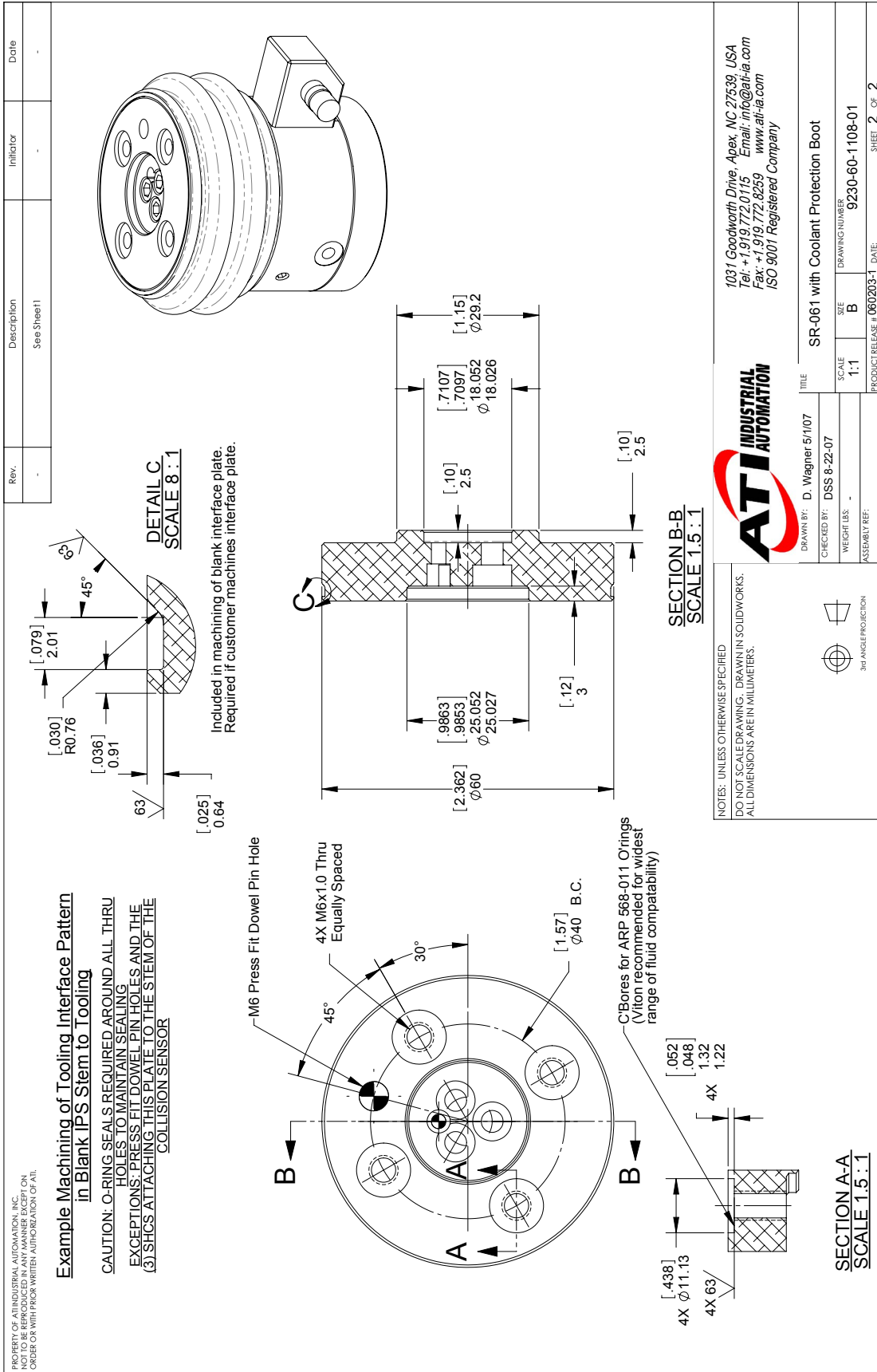
3/4 ANGLE PROJECTION

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|                            |                                            |              |                                    |
|----------------------------|--------------------------------------------|--------------|------------------------------------|
| DRAWN BY: D. Wagner 5/1/07 | TITLE: SR-061 with Coolant Protection Boot | SCALE: 1:2   | DRAWING NUMBER: 9230-60-1108-01    |
| CHECKED BY: DSS 8-22-07    | WEIGHT LBS: -                              | SCALE: B     | PRODUCT RELEASE # 060203-1 DATE: - |
| ASSEMBLY REF: -            |                                            | SHEET 1 OF 2 |                                    |



3.3 SR-81

| Item No. | Quan. | Part Number     | Description                           |
|----------|-------|-----------------|---------------------------------------|
| 1        | 1     | 3700-60-1548    | Flexible Boot, SR-081                 |
| 2        | 2     | 3610-0494000-20 | Garter Spring, SR-081                 |
| 3        | 1     | 3700-60-1590    | Molded Wire Channel Gasket, SR-081    |
| 4        | 4     | 3500-1064012-15 | M5 x 12 SHCS - Grade 12.9 Metric Blue |
| 5        | 1     | NSS             | Blank IPS Stem to Tooling             |
| 6        | 2     | 3540-0103016-11 | M3 x 16 Alloy Steel Dowel Pin         |
| 7        | 4     | 3500-1064045-15 | M5 x 45 SHCS - Grade 12.9 Metric Blue |
| 8        | 2     | 3540-0105020-11 | M5 x 20 Alloy Steel Dowel Pin         |
| 9        | 1     | NSS             | Blank IPB Body to Robot               |

9160-FLEXBOOT-081

9160-081-IPS-1551 Blank IPS Stem to Tooling

9160-081-IPB-1122 Blank IPB Body to Robot

9160-081-IPB-1602 IPB for SR-81 Body to BC40, (4)M6, Boss 25, D6

9160-081-IPB-1604 IPB for SR-81 Body to BC50, (4)M6, Boss 31.5, D6

NSS - Not sold separately.

SR-081 Collision Sensor

Robot Flange

Interface Plate to Robot Positioning Dowel(s)  
(Varies with Robot - Customer Supplied)

Interface Plate to Robot Mounting Screws  
(Varies with Robot - Customer Supplied)

Customer to Machine Pattern of Tapped Holes for Attachment to Tooling (See Sheet 2 for More Details)

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TITLE: SR-081 with Coolant Protection Boot

DRAWN BY: D. Wagner 8/18/06

CHECKED BY: DSS 3-30-07

SCALE: 7:16

WEIGHT LBS: --

ASSEMBLY REF: --

DRAWING NUMBER: 9230-60-1099-05

PRODUCT RELEASE # 060203-1 DATE: SHEET 1 OF 2

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3.4 SR-101

| Rev. | Description                                                                                                  | Initiator | Date    |
|------|--------------------------------------------------------------------------------------------------------------|-----------|---------|
| 02   | Revised Item 3, description of 9160-101-IPB-1669; added dimensions to Detail B; revised drawing description. | DAW       | 8/21/07 |

| Item No. | Quan. | Part Number     | Description                                 |
|----------|-------|-----------------|---------------------------------------------|
| 1        | 1     | 3700-60-1558    | Flexible Boot, SR-101                       |
| 2        | 2     | 3610-5329200-20 | Garter Spring, SR-101                       |
| 3        | 1     | 3700-60-1607    | Molded Wire Channel Gasket, SR-081 & SR-101 |
| 4        | 4     | 3500-1064012-15 | M5 x 12 SHCS - Grade 12.9 Metric Blue       |
| 5        | 1     | NSS             | Blank IPS Stem to Tooling                   |
| 6        | 2     | 3540-0703016-11 | M3 x 16 Alloy Steel Dowel Pin               |
| 7        | 4     | 3500-1064050-15 | M5 x 50 SHCS - Grade 12.9 Metric Blue       |
| 8        | 2     | 3540-0705020-11 | M5 x 20 Alloy Steel Dowel Pin               |
| 9        | 1     | NSS             | Blank IPB Body to Robot                     |

9160-FLEXBOOT-101

9160-101-IPS-1561 Blank IPS Stem to Tooling

9160-101-IPB-1131 Blank IPB Body to Robot  
 9160-101-IPB-1669 IPB for SR-101 Body to BC40, (4)M6, Boss 25, D6

Robot Flange

SR-101 Collision Sensor

Interface Plate to Robot Positioning Dowel(s)  
(Varies with Robot - Customer Supplied)

Interface Plate to Robot Mounting Screws  
(Varies with Robot - Customer Supplied)

Customer to Machine Pattern of Tapped Holes for Attachment to Tooling (See Sheet 2 for More Details)

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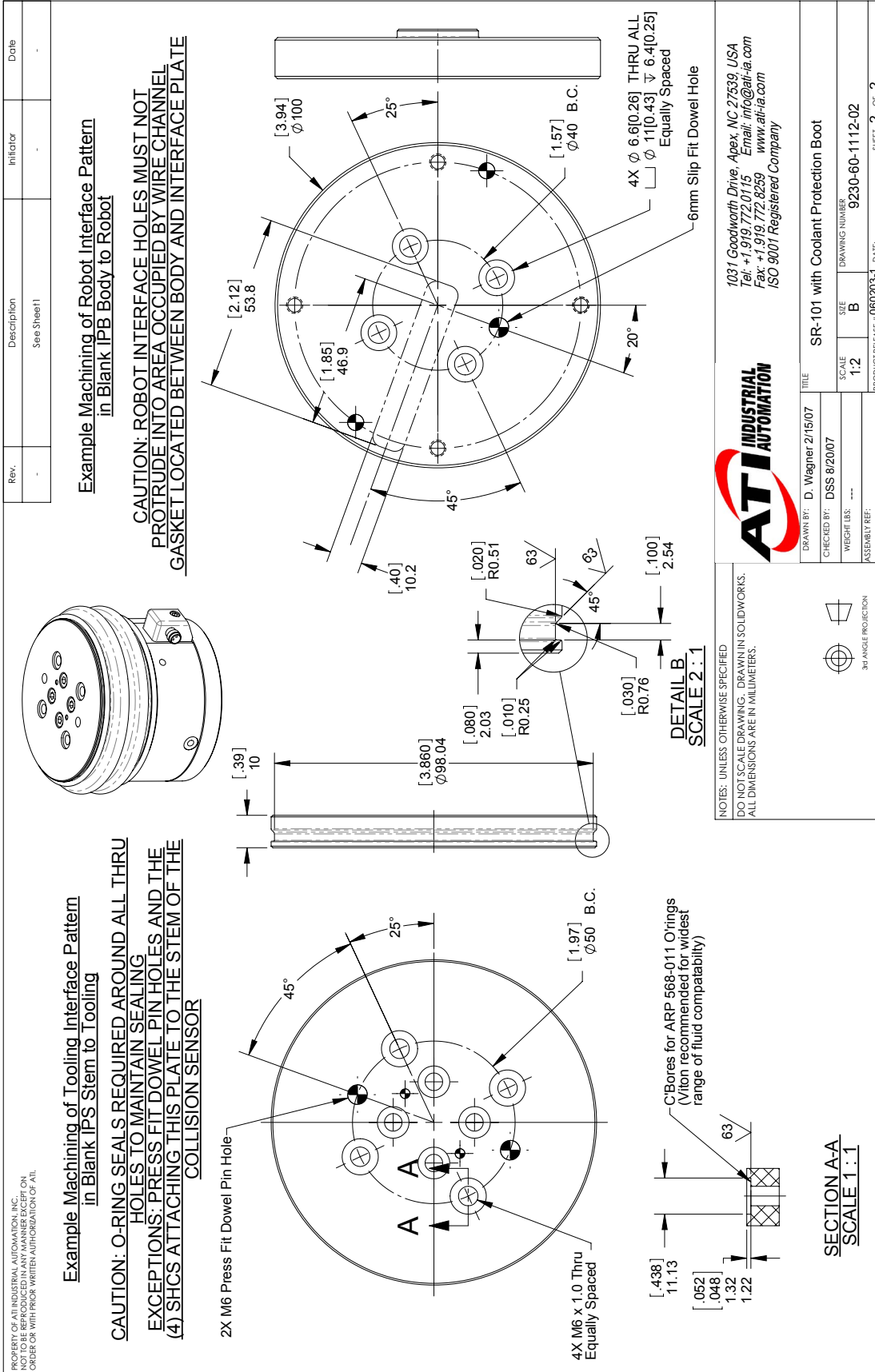
  

| DRAWN BY: D. Wagner 2/15/07 | TITLE: SR-101 with Coolant Protection Boot     |
|-----------------------------|------------------------------------------------|
| CHECKED BY: DSS 8/20/07     | SCALE: 1:2                                     |
| WEIGHT LBS: ---             | SIZE: B                                        |
| ASSEMBLY REF: ---           | DRAWING NUMBER: 9230-60-1112-02                |
|                             | PRODUCT RELEASE #: 060203-1 DATE: SHEET 1 OF 2 |

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3/4 ANGLE PROJECTION





3.5 SR-131

| Rev. | Description                                 | Initiator | Date      |
|------|---------------------------------------------|-----------|-----------|
| 01   | Initial Issue                               | PS        | 6/24/2007 |
| 02   | Revised to show new high strength cover/cam | DAW       | 9/12/2007 |

| Item No. | Quan. | Part Number     | Description                           |
|----------|-------|-----------------|---------------------------------------|
| 1        | 1     | 3700-60-1563    | Flexible Boot, SR-131                 |
| 2        | 2     | 3610-5538100-20 | Garter Spring, SR-131                 |
| 3        | 1     | 3700-60-1663    | Molded Wire Channel Gasket, SR-131    |
| 4        | 4     | 3500-1066020-15 | M6 x 20 SHCS - Grade 12.9 Metric Blue |
| 5        | 1     | NSS             | Blank IPS Stem to Tooling             |
| 6        | 2     | 3540-0105020-11 | M5 x 20 Alloy Steel Dowel Pin         |
| 7        | 4     | 3500-1066060-12 | M6 x 60 SHCS - Black Oxide            |
| 8        | 2     | 3540-0106024-11 | M6 x 24 Alloy Steel Dowel Pin         |
| 9        | 1     | NSS             | Blank IPB Body to Robot               |

9160-FLEXBOOT-131

9160-131-IPS-1566 Blank IPS Stem to Tooling

9160-131-IPB-1310 Blank IPB Body to Robot  
 9160-131-IPB-1415 IPB for SR131 Body to BC90, (4)M8, Boss 50, Dowel 6

Customer to Machine Pattern of Tapped Holes for Attachment to Tooling (See Sheet 2 for More Details)

NSS - Not sold separately.

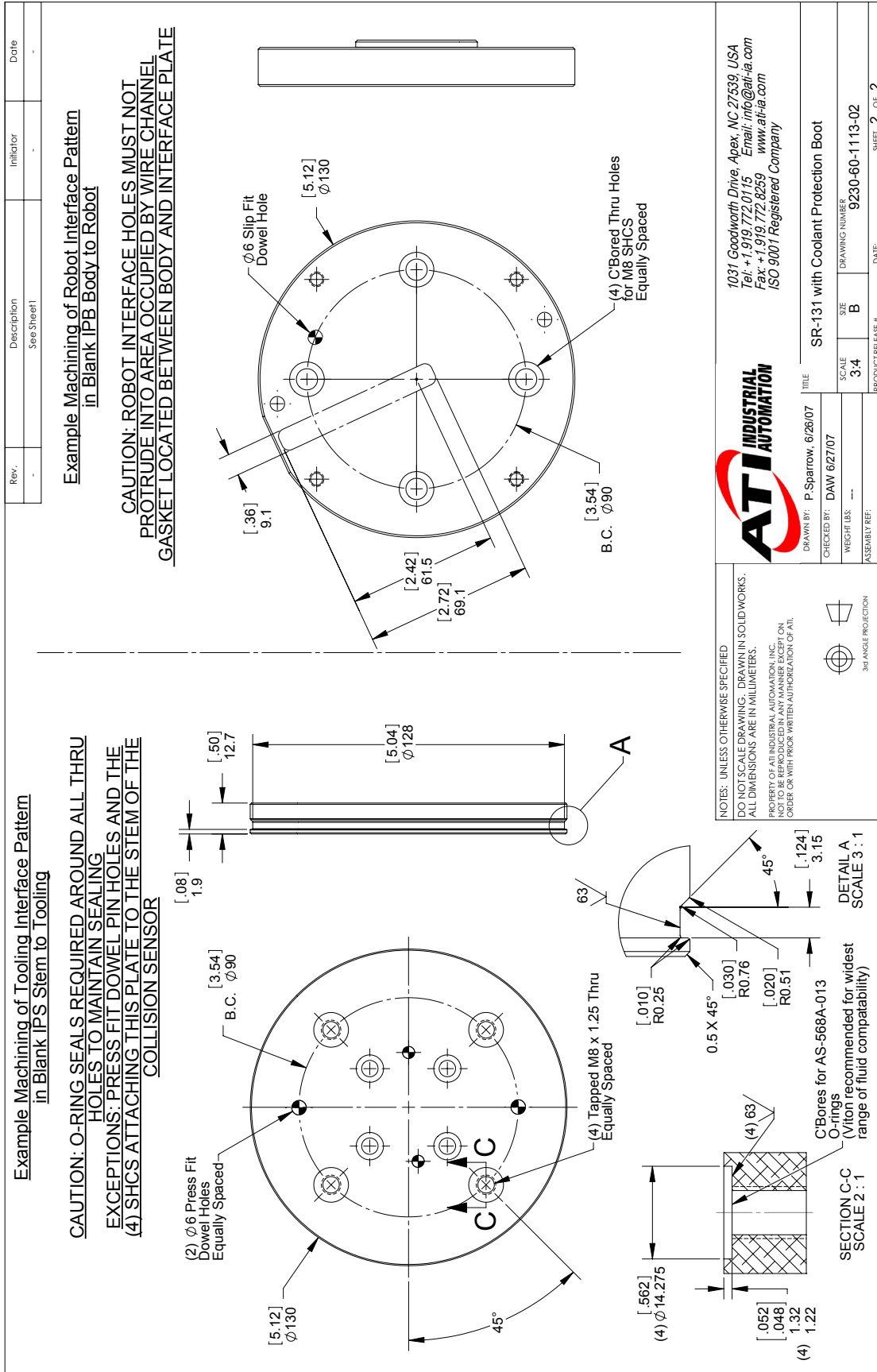
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|                               |                                            |
|-------------------------------|--------------------------------------------|
| DRAWN BY: P. Sparrow, 6/26/07 | TITLE: SR-131 with Coolant Protection Boot |
| CHECKED BY: DAW 6/27/07       | DRAWING NUMBER: 9230-60-1113-02            |
| WEIGHT LBS: ---               | SCALE: 1:4                                 |
| ASSEMBLY REF: ---             | SIZE: B                                    |
| DATE: ---                     | PRODUCT RELEASE #                          |
|                               | SHEET 1 OF 2                               |



3.6 SR-176

| Rev. | Description                   | Initiator | Date       |
|------|-------------------------------|-----------|------------|
| 01   | Initial Version               | DAW       | 11/12/2007 |
| 02   | Eco 14804; Corrected Detail A | LJH       | 8/24/2016  |

| Item No. | Quan. | Part Number     | Description                         |
|----------|-------|-----------------|-------------------------------------|
| 1        | 1     | 3700-60-1581    | Flexible Boot, SR-176               |
| 2        | 2     | 3610-5551400-20 | Garter Spring, SR-176               |
| 3        | 1     | 3700-60-1664    | Molded Wire Channel Gasket, SR-176  |
| 4        | 6     | 3500-1068020-15 | M8 x 20 SHCS Grade 12.9 Metric Blue |
| 5        | 1     | NSS             | Blank IPS Stem to Tooling           |
| 6        | 2     | 3540-0106024-11 | M6 x 24 Alloy Steel Dowel Pin       |
| 7        | 4     | 3500-1068080-15 | M8 x 80 SHCS Grade 12.9 Metric Blue |
| 8        | 2     | 3540-0106024-11 | M6 x 24 Alloy Steel Dowel Pin       |
| 9        | 1     | NSS             | Blank IPB Body to Robot             |

9160-FLEXBOOT-176

9160-176-IPS-1584 Blank IPS Stem to Tooling

9160-176-IPB-1289 Blank IPB Body to Robot

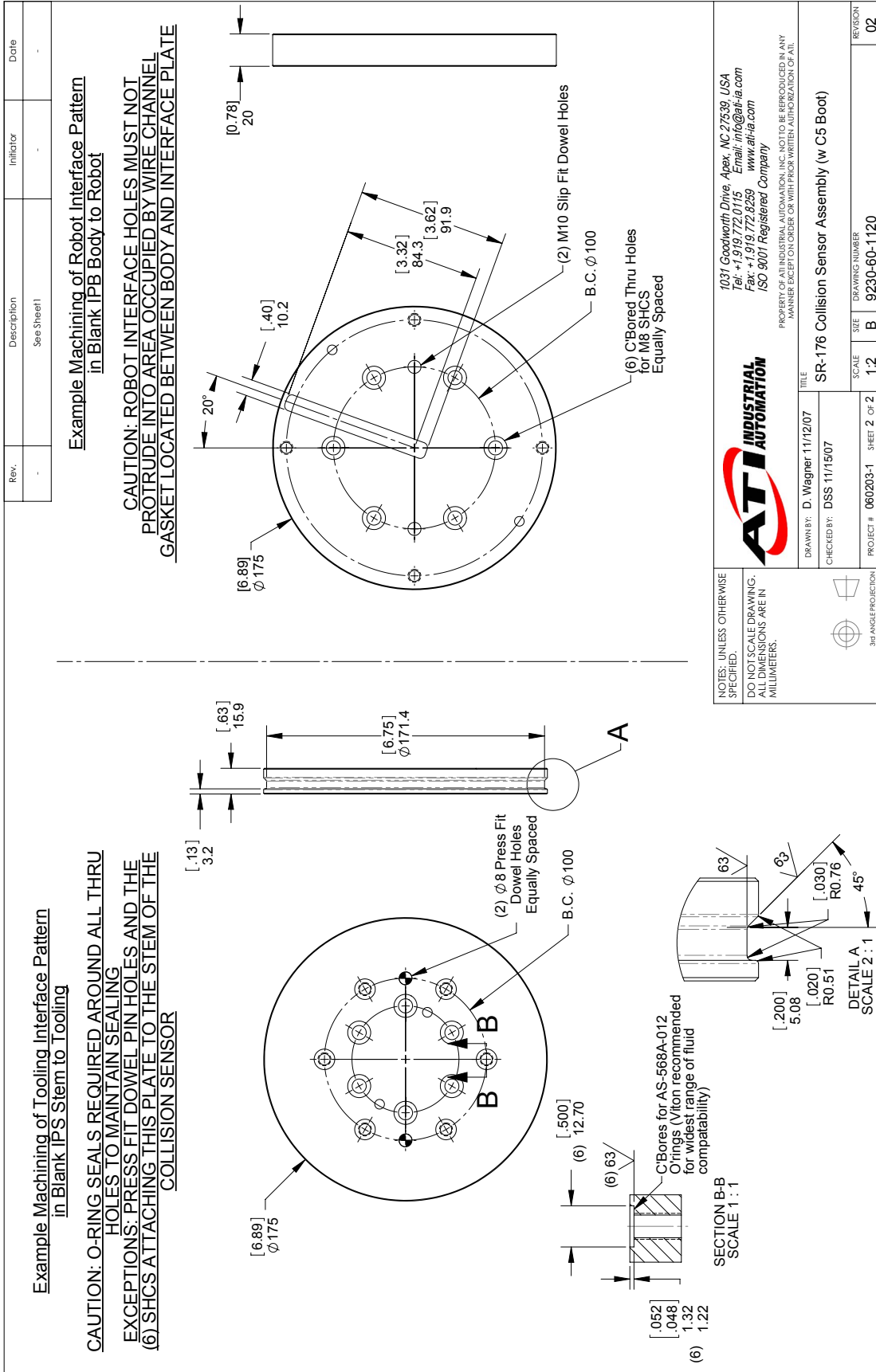
NSS - Not sold seperately.

Customer to Machine Pattern of Tapped Holes for Attachment to Tooling (See Sheet 2 for More Details)

|                                                                                                    |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <p>DRAWN BY: D. Wagner 11/12/07<br/>                 CHECKED BY: DSS 11/15/07</p>                  |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p>TITLE: SR-176 Collision Sensor Assembly (w C5 Boot)</p>                                         |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| SCALE: 1:4                                                                                         | SIZE: B                    | DRAWING NUMBER: 9230-60-1120                                                                                                                                                                                                                                                                                                                                                                                                                     |
| PROJECT #: 060203-1                                                                                | SHEET 1 OF 2               | REVISION: 02                                                                                                                                                                                                                                                                                                                                                                                                                                     |



3.7 SR-221

| Rev. | Description                              | Initiator | Date       |
|------|------------------------------------------|-----------|------------|
| 02   | Revised no. of screws from 4 to 6.       | DAW       | 11/15/2007 |
| 03   | ECO-5966; Revised detail A, corner radii | DAW       | 11/20/2007 |

| Item No. | Quan. | Part Number      | Description                           |
|----------|-------|------------------|---------------------------------------|
| 1        | 1     | 3700-60-1585     | Flexible Boot, SR-221                 |
| 2        | 2     | 3610-5865400-20  | Garter Spring, SR-221                 |
| 3        | 1     | 3700-60-1665     | Molded Wire Channel Gasket, SR-221    |
| 4        | 4     | 3500-1070030-15A | M10 x 30 SHCS Grade 12.9 Metric Blue  |
| 5        | 1     | NSS              | Blank IPS Stem to Tooling             |
| 6        | 2     | 3540-0110032-11  | M10 x 32 Alloy Steel Dowel Pin        |
| 7        | 4     | 3500-1070100-15  | M10 x 100 SHCS Grade 12.9 Metric Blue |
| 8        | 2     | 3540-0110040-11  | M10 x 40 Alloy Steel Dowel Pin        |
| 9        | 1     | NSS              | Blank IPB Body to Robot               |

NSS - Note sold separately.

9160-FLEXBOOT-221

9160-221-IPS-1588 Blank IPS Stem to Tooling

9160-221-IPB-1358 Blank IPB Body to Robot  
 9160-221-IPB-1417 IPB for SR-221 Body to BC125,  
 (6)M10, Boss63, Dowel 10

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**ATI INDUSTRIAL AUTOMATION**

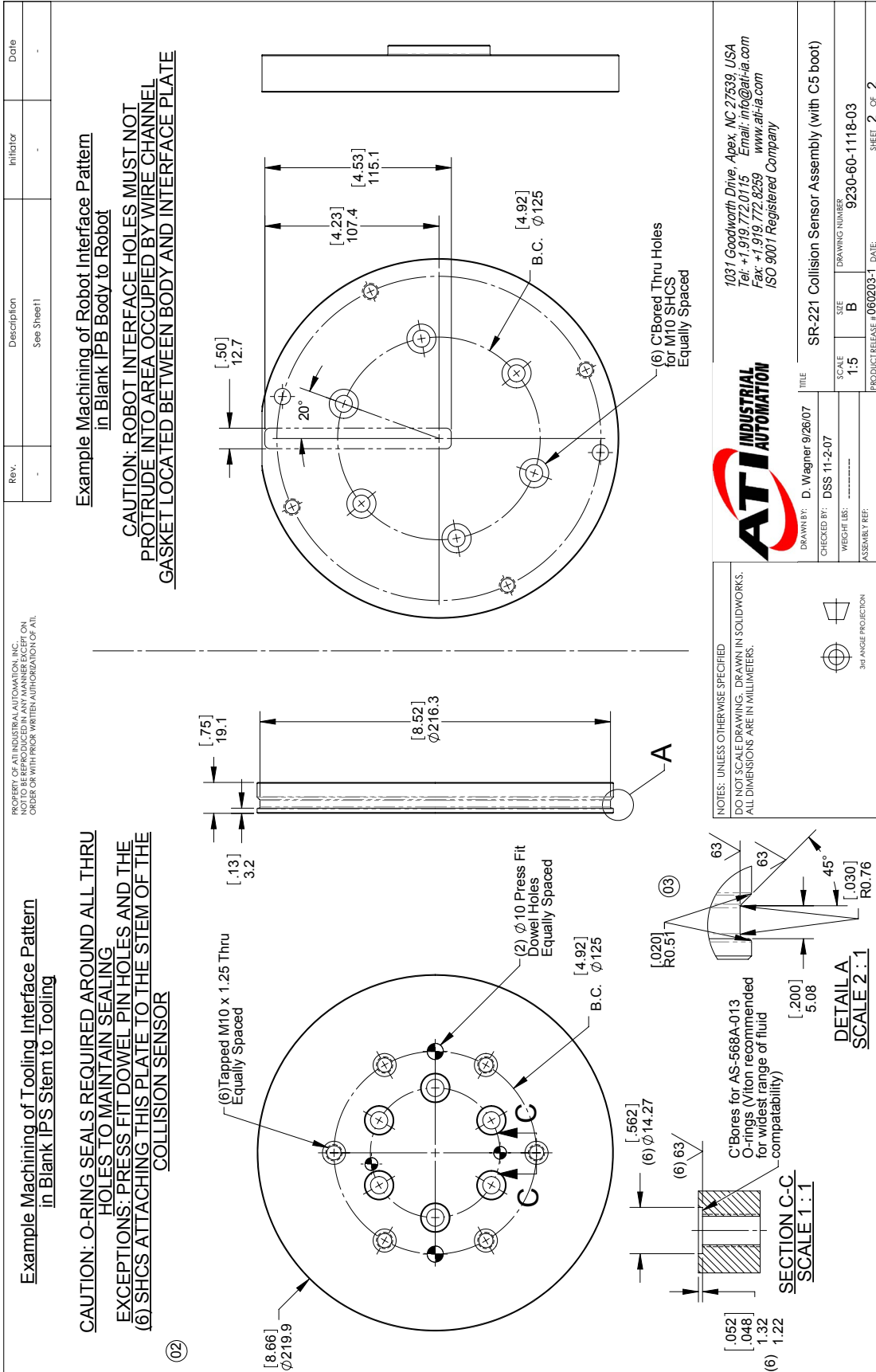
Drawn By: D. Wagner 9/26/07  
 Checked By: DSS 11-2-07  
 Weight Lib: \*\*\*\*\*  
 Assembly Ref: \*\*\*\*\*

TITLE: SR-221 Collision Sensor Assembly (with C5 boot)  
 SCALE: 1:5  
 DRAWING NUMBER: 9230-60-1118-03  
 PRODUCT RELEASE # 060203-1 DATE: SHEET 1 OF 2

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

3RD ANGLE PROJECTION



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