



# ***QuickSTOP***<sup>TM</sup>

## **Collision Sensors**

USER'S GUIDE 95010 Rev 01

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## Revision

| Revision | Date              | Author | Description                                                                                                                   |
|----------|-------------------|--------|-------------------------------------------------------------------------------------------------------------------------------|
| 00       | November 22, 2006 | JE     | Initial Release                                                                                                               |
| 01       | June 11, 2012     | DLW    | Combine mechanical and solid state switch user's guides into one user's guide; incorporate CE certification testing comments. |

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## 1 PRECAUTIONS



### **DANGER**

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



### **WARNING**

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



### **CAUTION**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

### **NOTICE**

Indicates a situation which, if not avoided, could result in equipment damage and voiding the manufacturer's equipment warranty.

**IGNORING INFORMATION ABOUT POTENTIAL HAZARDS CAN LEAD TO SERIOUS HARM TO PERSONNEL AND/OR DAMAGE TO THE EQUIPMENT, AND MAY RESULT IN THE NULLIFICATION OF THE MANUFACTURER'S EQUIPMENT WARRANTY.**

**HEED ALL PRECAUTION NOTICES**

## 2 QUICKSTOP OPERATING PRINCIPLE

A pneumatically sealed, Pressurized Chamber is used to provide collision protection for robot and tooling. When a collision occurs, the seal instantly opens resulting in an immediate loss of pneumatic pressure in the chamber. The *QuickSTOP* unit acts as a valve that releases the pressurized air. The pressure loss is sensed by a pressure switch that can be wired into your robot emergency stop circuit or other stop circuit. (Both mechanical and solid state switches are available.)

By varying the pneumatic pressure in the chamber, the overload threshold can be easily adjusted to suit your particular requirements. By using a variable pressure programmable regulator, your robot controller can dynamically change the pressure. All *QuickSTOP* Units provide collision compliance in all axes including unwanted deflection directly into the faceplate of the robot. The **only** motion that will not break the seal is a purely tensile axial force with absolutely no other loading on the *QuickSTOP* Unit.

All *QuickSTOP* models include rotary compliance—rotation about the "Z" axis. The larger size units are supplied with a Rotation Limiting Stop installed. This stop may be removed if additional rotational compliance is desired.

### 3 INSTALLATION

PLEASE REVIEW THESE INSTRUCTIONS THOROUGHLY BEFORE INSTALLING YOUR *QuickSTOP* Unit.



## WARNING

KEEP OUT OF THE ROBOT WORK ENVELOPE WHEN DRIVE POWER IS ON

#### 3.1 Mount to robot

## NOTICE

THE TOOLING SURFACE THAT MATES WITH THE BOTTOM OF THE QUICKSTOP SHOULD BE MACHINED FLAT WITHIN .001" (.025MM). BOLTING AN UNEVEN SURFACE TO THE BOTTOM OF THE *QUICKSTOP* MAY DISTORT THE HOUSING AND CAUSE AN AUDIBLE LEAK.

**NOTE:** Applied Robotics recommends mounting model QS-7 inverted.

If your *QuickSTOP* Robot-Side Adaptor Plate has been pre-drilled:

1. **Mount** it with the appropriate hardware.

If not:

2. **Machine** the Adaptor Interface Plate to match your robot faceplate mounting requirements.
3. **Mount** the Adaptor Interface Plate to your robot.
4. **Attach** the *QuickSTOP* unit to the adapter interface plate by using the socket head cap screws provided. All screws must be installed and evenly tightened per table below.

| UNIT  | MEASUREMENTS |     | UNIT   | MEASUREMENTS |      |
|-------|--------------|-----|--------|--------------|------|
|       | in-lb        | Nm  |        | in-lb        | Nm   |
| QS7   | 4            | 0.5 | QS400  | 30           | 3.4  |
| QS25A | 4            | 0.5 | QS800  | 133          | 15.0 |
| QS50  | 4            | 0.5 | QS1500 | 133          | 15.0 |
| QS100 | 12           | 1.4 | QS3000 | 265          | 29.9 |
| QSAW  | 16           | 1.8 | QS4500 | 265          | 29.9 |
| QS200 | 16           | 1.8 | QS7500 | 265          | 29.9 |

5. Temporarily **pressurize** the *QuickSTOP* unit to hold the central flanged stem portion rigid. (**NOTE:** Pressurizing the larger units may not be necessary because of the strength and rigidity of the internal spring.)
  - a. **Apply** pneumatic pressure at 3-6 bars (40 - 87 PSIG) to one of the two input pneumatic ports located on the unit.
  - b. **Plug** the unused port with the supplied brass plug.
  - c. With pneumatic pressure applied, **align** the white colored "alignment mark" on the outside of the unit body with the "alignment mark" located on the flange shaft. This will seal the unit. Pressurize the chamber and hold the stem flange rigid in the sealed position.
6. **Mount** the *QuickSTOP* Unit to the Adaptor Interface Plate by:
  - a. **Fitting** the *QuickSTOP* Unit flange to the Adaptor Interface Plate
  - b. **Placing** the two-piece clamp ring around the plate and flange.
  - c. Evenly **tighten** the clamp ring screws according to your model number.
7. **Attach** your tooling to the bottom surface of the *QuickSTOP* Unit by using any of the counter bored through-holes provided for socket head cap screws.

## NOTICE

**DO NOT DRILL AND TAP THE TOP PLATE OF THE QUICKSTOP UNIT. ANY HOLES WHICH BREAK THROUGH TO THE PNEUMATIC CHAMBER WILL CAUSE LOSS OF PRESSURE AND DAMAGE TO INTERNAL COMPONENTS.**

8. **Plumb** a clean, dry permanent pneumatic supply line to one of the two ports on the body of the *QuickSTOP* Unit. Plug the unused port with the brass or steel plug included. The pneumatic supply for the *QuickSTOP* should not be interrupted when the robot, robot cell power, or pneumatic supply is turned off. Using an uninterruptable pneumatic supply will ensure that the *QuickSTOP* Unit will not "nuisance release" when the robot or cell is shut down.

| UNIT   | PORT(S)                  |
|--------|--------------------------|
| QS-7   | M3 tapped port           |
| QS-25A | M5 or 10-32 tapped ports |
| QS-50  |                          |
| QS-100 |                          |
| QS-200 |                          |
| QS-400 |                          |

| UNIT    | PORT(S)                   |
|---------|---------------------------|
| QS-800  | ¼ NPT or ¼ BSPT ports     |
| QS-1500 |                           |
| QS3000  | 3/8 NPT or 3/8 BSPT ports |
| QS4500  |                           |
| QS7500  |                           |

A variable pressure source is recommended to allow flexibility of the break-away threshold point. To adjust the pneumatic pressure you can use:

A single air regulator

**OR**

A solenoid valve and two regulators. This creates a simple two-pressure supply. For reference, see drawing 93501-C1083A in the Drawings section.

**OR**

An electro/pneumatic relay converter valve. This unit accepts a digital 6-bit electrical signal to vary pressure output.

9. For solid state pressure switches:

Wire the *QuickSTOP* switch in series with the Robot Emergency Stop Circuit or other "stop" circuit. The *QuickSTOP* contains a solid state pressure switch that is closed when the pneumatic chamber is pressurized, but opens when pneumatic pressure in the unit is lost. Refer to Section 9, Informational Drawings, (*drawing 0807-A64A*) for wiring instructions.

10. For mechanical pressure switches:

- a. Wire the *QuickSTOP* electrical lead in series with the Robot Emergency Stop Circuit or other "stop" circuit. *QuickSTOP* contains a pressure switch that is held closed when the pneumatic chamber is pressurized, but opens when pneumatic pressure in the unit is lost. The lead is wired to the normally open (NO) contacts of the internal switch. These contacts are pin numbers 1 (brown) and 4 (black) on T3S, T3M, and T4L type connectors and pin numbers 1 and 2 on the "D" subminiature connector (-MP version units).
- a. On *QuickSTOP* units size QS-800 and larger, a T4 switch is used. These switches can either be wired NO (normally open) or NC (normally closed) as shown on drawing 0007-C75A in drawing section of this manual. Remember these states are as described before the *QuickSTOP* unit is pressurized. When the unit is pressurized, the states will reverse.

NOTE: Older QS-800 and larger units used a T3L switch. To convert to the standard T4L switch, use retrofit kit 0101-C33A, Kit, Cable & Switch T4L.

**See the Outline Drawings in the Informational Drawings Section for more mounting details.** If existing holes cannot be used, an Adaptor Interface Plate should be fabricated. It should contain your *QuickSTOP* mounting hole pattern and your tooling mounting hole pattern.

## 3.2 Mounting of torch (QS-AW models only)

### 3.2.1 Flat Plate *QuickSTOP* (QS-AWFP):

1. **Machine** the Torch Holder Mounting Plate to match your torch bracket requirements.
2. **Mount** the Torch Holder Mounting Plate to the torch bracket using appropriate hardware.
3. **Fit** the *QuickSTOP* Unit flange to the Torch Holder Mounting Plate.
4. **Place** the two-piece clamp ring around the plate and flange.
5. Evenly **tighten** the clamp ring screws to 1.8 Nm (16 in-lbs).
6. **Plumb** a permanent pneumatic supply line to one of the two ports on the body of the *QuickSTOP* Unit.
7. **Plug** the unused port with the supplied brass or steel plug.
8. **Plumb** the pneumatic lines to the *QuickSTOP* so that debris and moisture are filtered in the system. A **coalescing** filter is preferred. The pneumatic supply for the *QuickSTOP* should not be interrupted when the robot, robot cell power, or pneumatic supply is turned off. Using an uninterruptable pneumatic supply will ensure that the *QuickSTOP* Unit will not "nuisance release" when the robot or cell is shut down.

A variable pressure source is recommended to allow flexibility of the break-away threshold point. To adjust the pneumatic pressure you can use:

A single air regulator.

**OR**

A solenoid valve and two regulators. This creates a simple two-pressure supply. For reference, see drawing 93501-C1083A in the drawings section.

**OR**

An electro/pneumatic relay converter valve. This unit accepts a digital 6-bit electrical signal to vary pressure output.

Wire the *QuickSTOP* pressure switch in accordance with instructions in Section 3.1.

### 3.2.2 Stem Mount *QuickSTOP* (QS-AWSD):

1. **Mount** the torch bracket to the *QuickSTOP* stem with appropriate hardware.
2. **Proceed** to Section 3.2.1, Steps 3-8.

## 4 INITIAL TESTS FOR PROPER SWITCH OPERATION

**NOTE:** The solid state switch is rated at 10-28 VDC max, 200 mA max. The mechanical switch is rated at 120 VAC @ 3 amps or 42.4 VDC max, 3 amps max.



### WARNING

KEEP OUT OF THE ROBOT WORK ENVELOPE WHEN DRIVE POWER IS ON

1. **Turn off** the pneumatic supply to the *QuickSTOP* unit. The *QuickSTOP* pneumatic chamber should not be pressurized. In this state, the internal pressure switch will be open, and the "Stop" circuit that the *QuickSTOP* is wired to should be interrupted. Verify that the *QuickSTOP* interrupts the "Stop" circuit. All other system "Stop" switches or devices must be "closed."
2. **Apply** pneumatic pressure to the unit at approximately 1 bar (14 PSIG). (Use a higher pressure if the initial moment applied by your tooling is too great to allow sealing.) Manually align the white "alignment marks" to cause the unit to seal. This will allow the pneumatic chamber to pressurize, and the *QuickSTOP* will become rigid. At this time the pressure switch will be closed. Verify that all other "Stop" devices are closed.
3. **Apply** system power. While heeding the **WARNING** above, trip the Unit by applying a moment or torque to the Unit or to your tooling. When the *QuickSTOP* releases, your "Stop" circuit should immediately be interrupted.
4. **Manually reset** the Unit. When the Unit becomes rigid and no escaping air can be heard, the "Stop" circuit will be closed once again.

## 5 GUIDE TO OPERATIONS

Operate the *QuickSTOP* at a pressure level as low as possible without having the normal movements of the robot trip the *QuickSTOP*.

NOTE: The optimum pressure for operation depends on multiple factors. These factors can change as the robot moves through its programmed sequence. It is not possible to recommend specific pressure settings. Factors that must be considered include:

- Robot acceleration values
- Mass of tooling
- Distance of the tool center of gravity from the *QuickSTOP* interface point
- Offset from the *QuickSTOP* axial centerline
- Direction of the applied forces

A variable pressure source is preferred to allow for adjustment of the trip threshold to match the changing "normal" force conditions which occur as the robot moves. If only one set pressure is utilized, the pressure will have to be set to resist the maximum "normal" force encountered during programmed robot movement. This pressure may be so high that the force required to trip the *QuickSTOP* in a "collision" situation may cause damage to your tooling. Since the type of robot and the durability (strength) of the tooling determines how much of an abnormal force can be tolerated before damage occurs, it is difficult to predict the conditions for which a single pressure source would be satisfactory.

## 6 IN CASE OF DIFFICULTY

If you require assistance, contact our Applications Engineers in our Technical Support Departments at:

|        |               |                         |
|--------|---------------|-------------------------|
| USA    | Main Office : | <b>+ 1 518 384-1000</b> |
| Europe | ARE:          | <b>+ 39 0322 96593</b>  |

In normal use, QuickSTOP's internal parts will not need replacement or adjustment. If internal parts are damaged due to an extreme collision occurrence, we recommend that you return the unit to Applied Robotics for inspection, repair, and adjustment, since special tools and fixtures are required to ensure correct set-up.

## 7 MAINTENANCE

No user maintenance is required.

## 8 ENGINEERING DATA

|                                                                         |                             | QS-7                                                                                                        | QS-25A   | QS-50    | QS-100   | QS-AWFP/SD                             | QS-200                                                                                                                                               | QS-400                       | QS-800   | QS-1500  | QS-3000   | QS-4500    | QS-7500    |
|-------------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------|----------|----------|----------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------|----------|-----------|------------|------------|
| Compliance angle                                                        |                             | ± 5°                                                                                                        | ± 5°     | ± 5°     | ± 5°     | ± 5°                                   | ± 5°                                                                                                                                                 | ± 5°                         | ± 5°     | ± 5°     | ± 5°      | ± 4°       | ± 4°       |
| Axial Compliance (Z+)                                                   |                             | 1.38                                                                                                        | 3.40     | 4.30     | 4.50     | 5.20                                   | 5.20                                                                                                                                                 | 6.60                         | 9.30     | 10.80    | 14.30     | 10.68      | 12.68      |
|                                                                         |                             | 0.054                                                                                                       | 0.134    | 0.169    | 0.177    | 0.205                                  | 0.205                                                                                                                                                | 0.265                        | 0.366    | 0.425    | 0.563     | 0.420      | 0.499      |
| Rotary Compliance                                                       |                             | no limit                                                                                                    | no limit | no limit | no limit | no limit                               | no limit                                                                                                                                             | no limit                     | ± 25°    | ± 25°    | ± 25°     | ± 25°      | ± 25°      |
| Operating Pressure                                                      |                             | 1.0 – 6.0 bar (14.5 – 87 psig)                                                                              |          |          |          |                                        |                                                                                                                                                      | 1.4 – 6.0 bar (20 – 87 psig) |          |          |           |            |            |
| Mz Moment trip point<br>(continuously variable via air pressure):       | Nm                          | 28-1.5                                                                                                      | 1.0-6.4  | 2.2-14.0 | 5.3-30.4 | 7.5-45.2                               | 7.5-45.2                                                                                                                                             | 11.8-84.6                    | 53-255   | 87-371   | 153-478   | 345-1185   | 1007-2098  |
|                                                                         | in-lb                       | 2.5-13.5                                                                                                    | 9-56     | 19-124   | 47-270   | 66-400                                 | 66-400                                                                                                                                               | 104-749                      | 427-2250 | 784-3284 | 1353-4232 | 3315-10490 | 8919-18568 |
| Mx & My Moment trip point<br>(continuously variable via air pressure):  | Nm                          | 31-1.5                                                                                                      | 1.0-6.4  | 2.6-11.8 | 4.1-20.3 | 5.90-32.4                              | 5.9-32.4                                                                                                                                             | 11.3-63.9                    | 36-158   | 82-291   | 105-414   | 220-614    | 472-1049   |
|                                                                         | in-lb                       | 2.7-13.2                                                                                                    | 9-56     | 23-104   | 36-180   | 52-287                                 | 52-287                                                                                                                                               | 100-566                      | 292-1400 | 727-2573 | 924-3664  | 1950-5433  | 4181-9289  |
| Z-axis Compression force<br>(continuously variable via air pressure):   | kg                          | 5-30                                                                                                        | 15-92    | 25-150   | 40-238   | 53-320                                 | 53-320                                                                                                                                               | 91-523                       | 210-960  | 312-1448 | 724-2745  | 931-2952   | 1771-4629  |
|                                                                         | lb                          |                                                                                                             |          |          |          |                                        |                                                                                                                                                      |                              |          |          |           |            |            |
| Repeatability:<br>at tool mounting surfaces X<br>and Y                  | mm                          | ± 0.013                                                                                                     | ± 0.0005 |          |          | ± 0.025                                | ± 0.001                                                                                                                                              |                              |          |          |           | ± 0.038    |            |
|                                                                         | in                          |                                                                                                             |          |          |          |                                        |                                                                                                                                                      |                              |          |          |           | ± 0.0015   |            |
| Repeatability:<br>at tool mounting surface Z                            | mm                          |                                                                                                             |          |          |          | ± 0.013                                |                                                                                                                                                      |                              |          |          |           |            |            |
|                                                                         | in                          |                                                                                                             |          |          |          |                                        |                                                                                                                                                      |                              |          |          |           |            |            |
| Repeatability:<br>rotational                                            | rad,<br>(10 <sup>-3</sup> ) | ± 0.489                                                                                                     | ± 0.419  | ± 0.419  | ± 0.419  | ± 0.68                                 | ± 0.419                                                                                                                                              | ± 0.419                      | ± 0.500  |          |           |            |            |
|                                                                         | deg.                        | ± 0.028                                                                                                     | ± 0.024  | ± 0.024  | ± 0.024  | ± 0.039                                | ± 0.024                                                                                                                                              | ± 0.024                      | ± 0.029  |          |           |            |            |
| Mass                                                                    | kg                          | .11                                                                                                         | .26      | .29      | .45      | 0.86/0.75                              | .68                                                                                                                                                  | 1.3                          | 3.72     | 5.5      | 12.2      | 12.8       | 16.8       |
|                                                                         | lb                          | .24                                                                                                         | .56      | .65      | .99      | 1.89/1.67                              | 1.5                                                                                                                                                  | 2.9                          | 8.2      | 12       | 27        | 28         | 37         |
| Center of Mass<br>(from robot adaptor<br>interface plate)               | mm                          | 11                                                                                                          | 18.6     | 20.3     | 21.6     | 25.7                                   | 25.7                                                                                                                                                 | 32.6                         | 46.8     | 54.6     | 66.0      | 66.0       | 73         |
|                                                                         | in                          | .43                                                                                                         | .73      | .80      | .85      | 1.01                                   | 1.01                                                                                                                                                 | 1.29                         | 1.84     | 2.15     | 2.60      | 2.60       | 2.875      |
| Average response time                                                   | ms                          | < 15                                                                                                        | < 15     | < 15     | < 15     | < 15                                   | < 15                                                                                                                                                 | < 15                         | < 18     | < 18     | < 18      | < 18       | < 18       |
| Operating temperature (QS only; QS<br>with SS switch limited to 70° C.) |                             | Min. 0° C (32° F) Max. 70° C (158° F)                                                                       |          |          |          | Min. 0° C (32° F) Max. 100° C (212° F) |                                                                                                                                                      |                              |          |          |           |            |            |
| Switch Description                                                      |                             | Mechanical: High reliability aircraft snap-acting type                                                      |          |          |          |                                        | Solid State                                                                                                                                          |                              |          |          |           |            |            |
| Switch Rating                                                           |                             | UL/CSA rated at 3 amps, 120 VAC.<br>Average mechanical life – 7 million cycles, 42.4 VDC max, 3 amps<br>max |          |          |          |                                        | Voltage: 10-28VDC Current: 15mA consumption (200 mA max.) Protection: IP64<br>Temperature: -25° – +70° C (-25° – +90° C storage) Humidity: 35 to 95% |                              |          |          |           |            |            |
| Switch Cable 5m weld flash protected                                    |                             | No                                                                                                          | No       | No       | No       | Yes                                    | No                                                                                                                                                   | No                           | No       | No       | No        | No         | No         |
| Dust protection                                                         |                             | Standard foam collar supplied                                                                               |          |          |          | Metal Screen                           | Standard foam collar supplied                                                                                                                        |                              |          |          |           |            |            |
|                                                                         |                             |                                                                                                             |          |          |          |                                        |                                                                                                                                                      |                              |          |          |           |            |            |
| Welding Flash Protection                                                |                             | Metal Screen                                                                                                |          |          |          |                                        | Optional high-temperature skirt kit available                                                                                                        |                              |          |          |           |            |            |

## 9 INFORMATIONAL DRAWINGS

- ◆ The drawings in this section can assist with installation, use, and identification of replacement part numbers for *QuickSTOP*. These drawings are typical and may not be the latest revision. Contact ARI Technical Support for assistance.
- ◆ Outline/Replacement Part drawings for each of the *QuickSTOP* Models are included.
- ◆ A wiring diagram for *QuickSTOP* Switch Assembly is provided.
- ◆ When ordering replacement parts, locate the Outline/Replacement Parts Drawing for your *QuickSTOP* model. Use that drawing to identify the Applied Robotics Part Number (not the item number) for the part(s) you need.
- ◆ Each *QuickSTOP* Part has a unique Applied Robotics part number associated with it. Where practical, the part number is permanently marked on the part to aid in its identification.
- ◆ The following drawings are included in this User's Guide:

| DRAWING NUMBER | DESCRIPTION                                                                                  |
|----------------|----------------------------------------------------------------------------------------------|
| 99500-C1013A   | Electrical Schematic – QuickSTOP Wiring Diagram for T3M Switches QS-7                        |
| 95500-C1027A   | Electrical Schematic – QuickSTOP Wiring Diagram for T3S Switches QS-25A thru QS-400          |
| 0007-C75A      | Electrical Schematic – QuickSTOP Wiring Diagram for T4L Switches QS-800 thru QS-7500         |
| 91502-C1027A   | Electrical Schematic – QuickSTOP Wiring Diagram for Modular Plug Switches QS-25A thru QS-400 |
| 0807-A64A      | Instruction Manual <i>QuickSTOP</i> Solid-State Pressure Switch                              |
| 93501-C1083A   | QuickSTOP Air Pressure Control System                                                        |
|                |                                                                                              |
| 99500-C1030A   | Plate, Adaptor, QS 7                                                                         |
| 99503-C1036A   | Plate, Adaptor, QS-7IBP                                                                      |
| 92503-B1043A   | Plate, Adaptor, QS 25A                                                                       |
| 90511-B1023A   | Plate, Adaptor, QS 50                                                                        |
| 90510-C1002A   | Plate, Adaptor, QS 100                                                                       |
| 90510-B1029A   | Plate, Adaptor, QS 200                                                                       |
| 90511-B1033A   | Plate, Adaptor, QS 400                                                                       |
| 90510-C1059A   | Plate, Adaptor, QS 800 LR                                                                    |
| 90510-C1083A   | Plate, Adaptor, QS 1500 LR                                                                   |
| 90502-D1085A   | Plate, Adaptor, QS 3000/4500/7500                                                            |
|                |                                                                                              |
| 99503-C1008A   | Outline/Replacement Parts Drawing, QS-7INP-T3M                                               |
| 94501-D1037A   | Outline/Replacement Parts Drawing, QS-25ANP-T3                                               |
| 94501-D1038A   | Outline/Replacement Parts Drawing, QS-50NP-T3                                                |
| 94501-D1068A   | Outline/Replacement Parts Drawing, QS-100NP-T3                                               |
| 94501-D1069A   | Outline/Replacement Parts Drawing, QS-200NP-T3                                               |
| 94501-D1070A   | Outline/Replacement Parts Drawing, QS-400NP-T3                                               |
| 91501-D1095A   | Outline/Replacement Parts Drawing, QS-800LRNP-T4                                             |
| 91501-D1096A   | Outline/Replacement Parts Drawing, QS-1500LRNP-T4                                            |
| 90503-D1016A   | Outline/Replacement Parts Drawing, QS 3000 LRNP-T4                                           |
| 95500-D1048A   | Outline/Replacement Parts Drawing, QS-4500LRNP-T4                                            |

| DRAWING NUMBER | DESCRIPTION                                         |
|----------------|-----------------------------------------------------|
| 97502-D1039A   | Outline/Replacement Parts Drawing, QS-7500LRNP-T4   |
| 92503-D1082A   | Outline/Replacement Parts Drawing, QS-25ANP-MP      |
| 91501-D1091A   | Outline/Replacement Parts Drawing, QS-50NP-MP       |
| 91501-D1092A   | Outline/Replacement Parts Drawing, QS-100NP-MP      |
| 91501-D1093A   | Outline/Replacement Parts Drawing, QS-200NP-MP      |
| 91501-D1094A   | Outline/Replacement Parts Drawing, QS-400NP-MP      |
|                |                                                     |
| 1202-C21A      | Outline/Replacement Parts Drawing, QS-7INP-S/S      |
| 0810-D53A      | Outline/Replacement Parts Drawing, QS-25ANP-S/S     |
| 0810-D54A      | Outline/Replacement Parts Drawing, QS-50NP-S/S      |
| 0810-D55A      | Outline/Replacement Parts Drawing, QS-100NP-S/S     |
| 0810-D56A      | Outline/Replacement Parts Drawing, QS-200NP-S/S     |
| 0810-D57A      | Outline/Replacement Parts Drawing, QS-400NP-S/S     |
| 0810-D58A      | Outline/Replacement Parts Drawing, QS-800LRNP-S/S   |
| 0810-D59A      | Outline/Replacement Parts Drawing, QS-1500LRNP-S/S  |
| 0810-D60A      | Outline/Replacement Parts Drawing, QS 3000 LRNP-S/S |
| 0810-D61A      | Outline/Replacement Parts Drawing, QS-4500LRNP-S/S  |
| 0810-D62A      | Outline/Replacement Parts Drawing, QS-7500LRNP-S/S  |
|                |                                                     |
| 92500-D1006A   | QuickSTOP Collision Sensor Model QS-AWSDNP          |
| 94502-D1047A   | QuickSTOP Collision Sensor Model QS-AWFPNP          |
| 0810-D63A      | QuickSTOP Collision Sensor Model QS-AWSDNP-S/S      |
| 0810-D64A      | QuickSTOP Collision Sensor Model QS-AWFPNP-S/S      |
| 95601-C1057A   | Torch Mounting information for QS-AWFP              |
| 95601-C1079A   | Torch Mounting information for QS-AWSD              |

REV

DESCRIPTION

DR

CHK

DATE

ECRISR NO.

01

CHANGED TITLE FROM 05-10 TO 05-7, ADDED VIEW C

JV

TM

04/07/99

JFID-3NCT9B

02

ITEM #8 0604-P99N WAS 90502-P1035

PS

TD

06/21/06

ASMH-6NHTFC

03

ITEM #6 WAS 93505-P1013

PS

GV

06/06/09

WZEH-7SGLN6

REVISIONS

11

NOTE 2

4

2

10

5

3

9

8

7

1

DETAIL B

8:1

11

NOTE 1

6

14

4

13

2

VIEW C

PIN ORIENTATION

4

SECTION A-A

1

5

12

2

10 B

4

WIRING DIAGRAM

4

BLACK

3

BLUE

2

CUT OFF BLUE WIRE

1

NO CONNECTION

1

BROWN

4

ARI #0610-P26N

3

ARI #89505-P1003

2

ARI #89505-P1003

1

ARI #89505-P1003

NOTES:

1. APPLY LOCITITE 271 ARI #86005-P1304.

2. APPLY LOCITITE 290 ARI #93501-P1084.

14

2

48007

SCR, SOC HD CAP M2.5 X 6

13

2

48153

SCR, FLAT HD SOC CAP

12

2

48003

SCR, SOC HD CAP M2 X 8

11

1

90501-P1091

SCR, SOC SET

10

1

90509-P1011

SPRING

9

1

90502-P1032

RING, SNAP

8

1

0604-P99N

O-RING, .312 ID X .035

7

1

96504-P1026

O-RING, .239 ID X .04

6

1

0610-P26N

TURCK VFS3-0.2

5

1

89505-P1003

SWITCH, QUICKSTOP

4

1

91504-B1065

SCREEN

3

1

90502-B1029

PLUNGER

2

1

90500-C1015

PLATE, SWITCH COVER

1

1

99500-D1014

HOUSING, SWITCH

PRINT DATE

6/10/2009

ITEM

QTY

ARI PART NO.

DESCRIPTION

DR

CHK

ENG

MFG

QC

SCALE: 1X

DO NOT SCALE DRAWING

DATE AND TOLERANCE

ANSI Y14.5M-1992

THIRD ANGLE PROJECTION

METRIC

TOLERANCES UNLESS OTHERWISE SPECIFIED

DECIMAL (MILLIMETERS)

X .XX = +.12

ANGLES = ± 1/2

SURFACE FINISH = 1/8

MAT'L

SURFACE TREATMENT

3D

ISO 9001

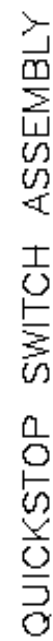
REGISTERED

APPROX. MODEL WEIGHT 0.1 lbm

WIRING DIAGRAM

Applied Robotics

Solutions in reach



|                                                                                     |  |                                       |  |          |            |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| THIRD ANGLE PROJECTION                                                              |  | METRIC                                |  | ITEM QTY | ARI        | PART NO. | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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o8o7-A64A REV oo

## Instruction Manual

### QuickSTOP Solid-State Pressure Switch

Thank you very much for using Applied Robotics Inc. products. Please read this Instruction Manual carefully and thoroughly for the correct and optimum use of this product. Kindly keep this manual in a convenient place for quick reference.

#### WARNING!

Never use this product as a sensing device for personnel protection.

#### Specifications

|                     |                                     |
|---------------------|-------------------------------------|
| Supply voltage      | 10 - 28 Vdc                         |
| Current consumption | 15 mA                               |
| Output              | 200 mA maximum                      |
| Protection          | IP64 (IEC)                          |
| Ambient temperature | -25 to +70°C, Storage: -25 to +90°C |
| Ambient humidity    | 35 to 95% Relative Humidity         |

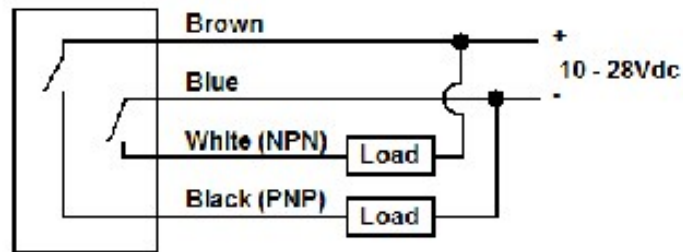
#### Cautions

- Make sure that the power supply is off while wiring.
- Be aware that wrong wiring will damage the switch.
- Verify that the supply voltage is within the rating.
- Switch does not incorporate a short-circuit protection at the output.
- Make sure that switch sensor input is clean and free of debris.
- Do not open switch – no user serviceable parts inside.

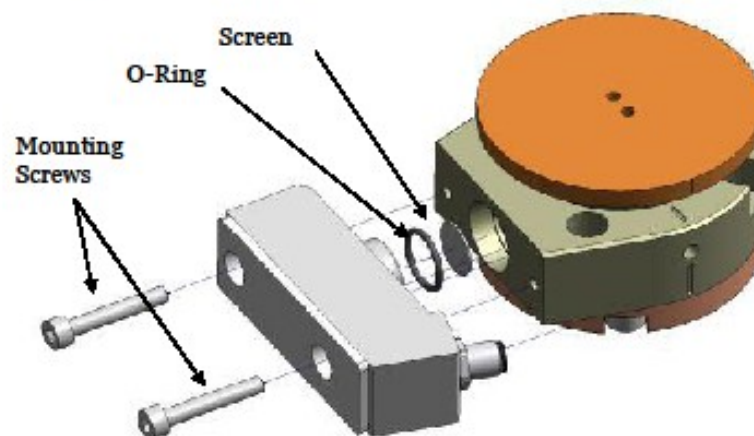
o8o7-A64A REV oo

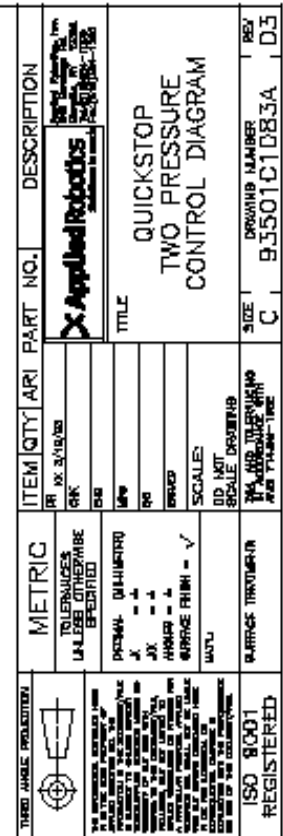
## Instruction Manual QuickSTOP Solid-State Pressure Switch

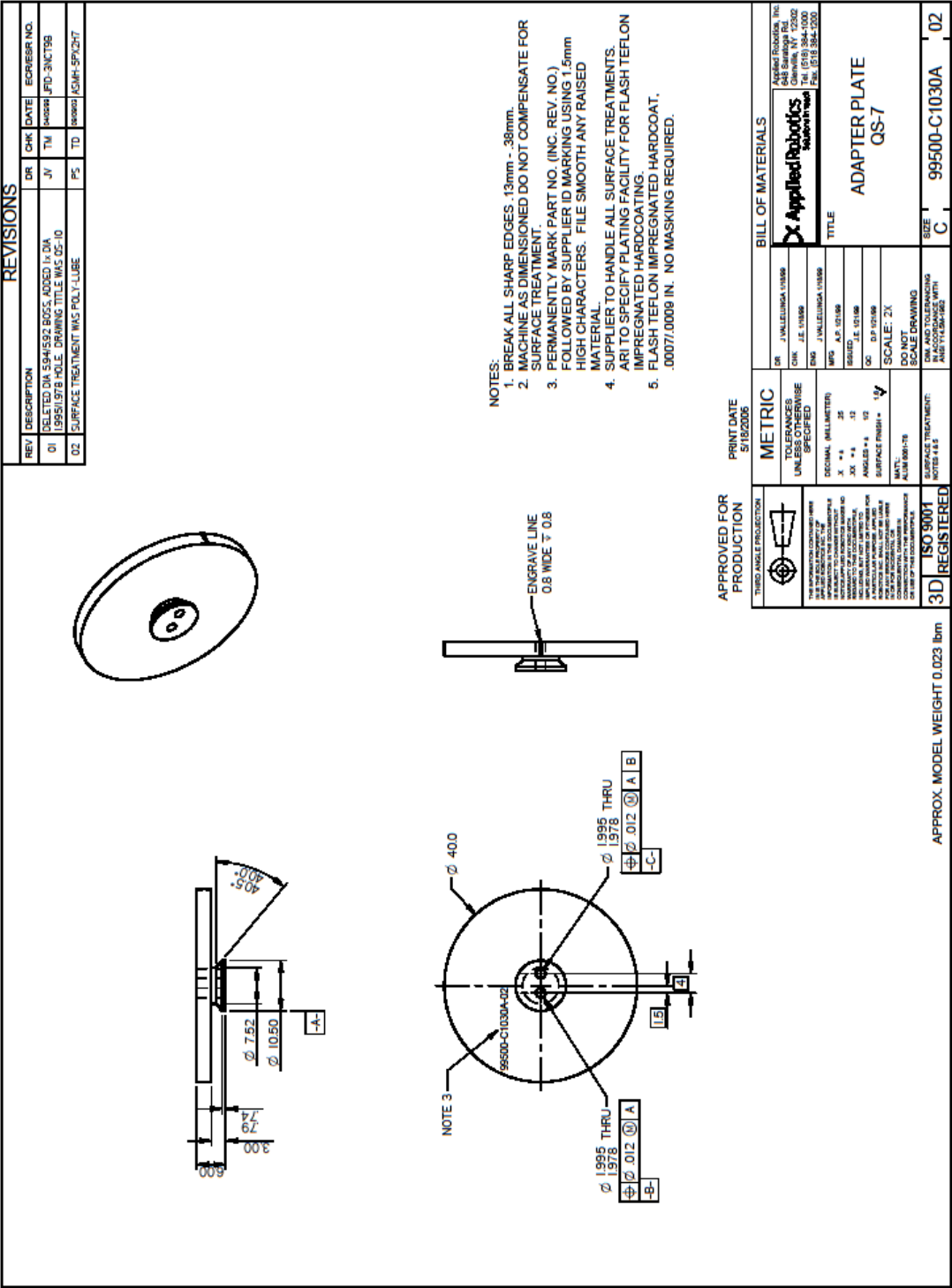
### Circuit Diagram



### Mounting

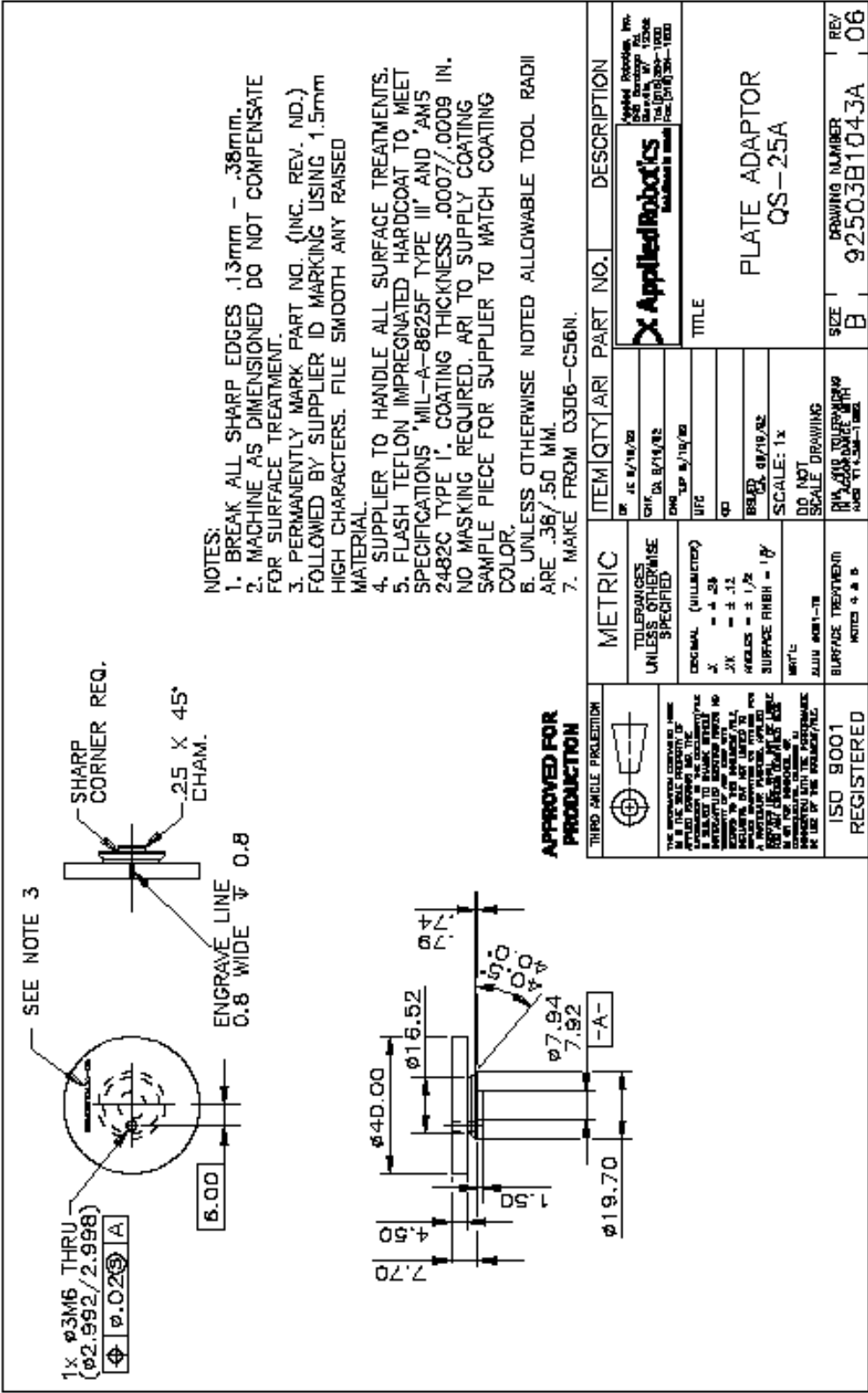








**Applied Robotics™**  
Solutions in reach

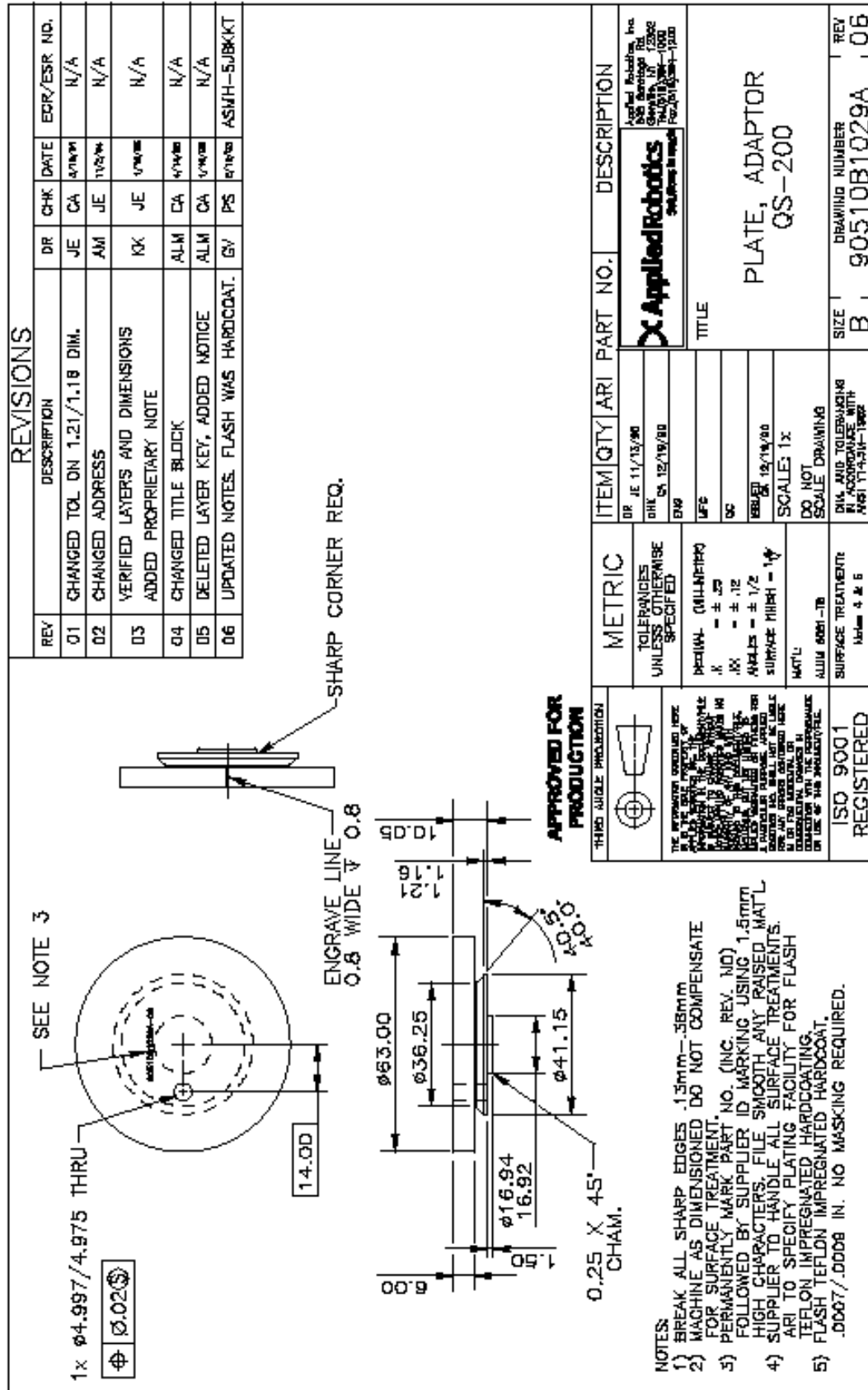


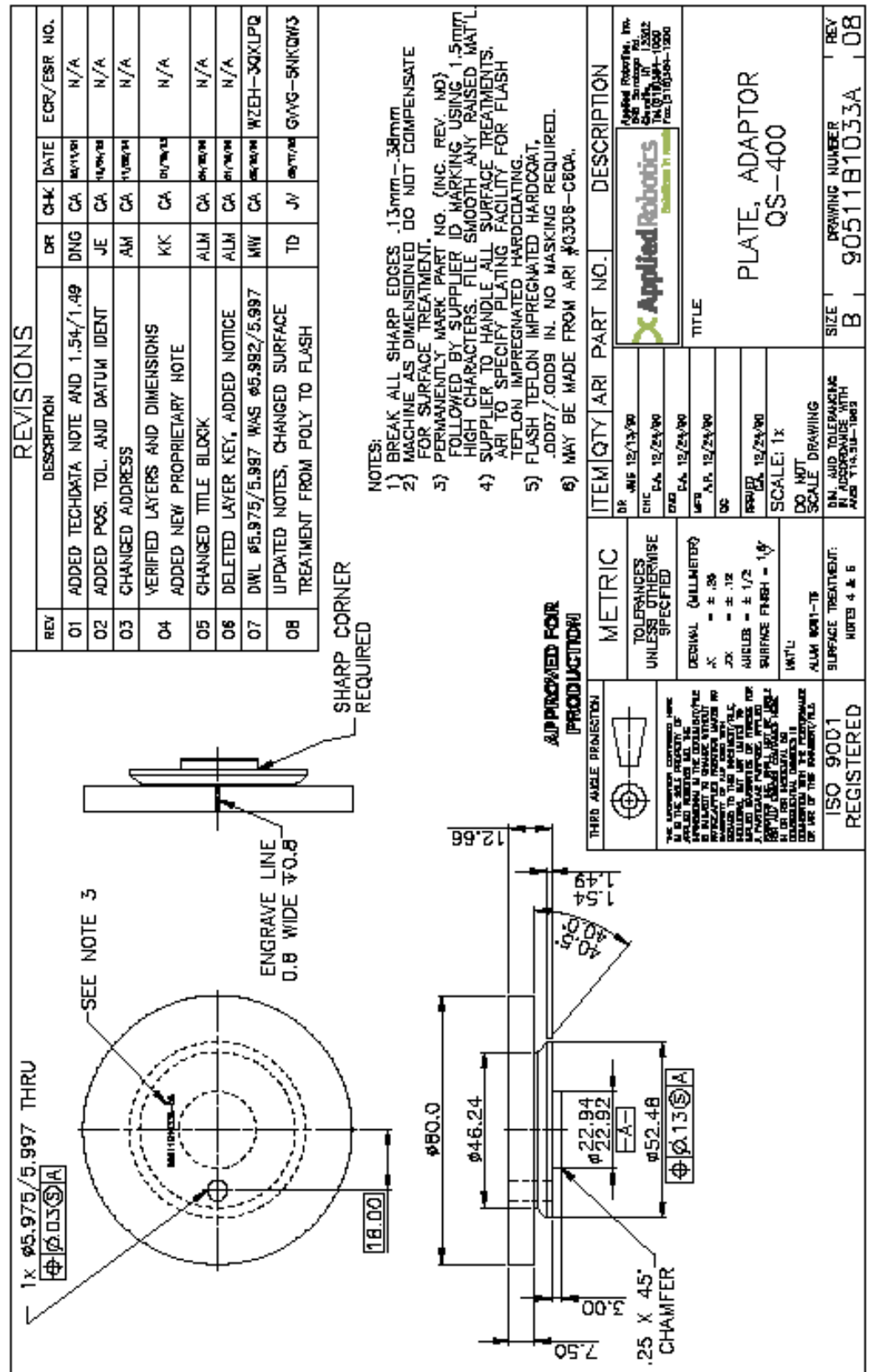


**Applied Robotics™**  
Solutions in reach



**Applied Robotics™**  
Solutions in reach







71.28  
 5.28  
 4.0  
 .5 X 45° CHAM  
 SHARP CORNER REQ.  
 40.0°  
 0.8 W  
 13.00  
 22.18  
 5.18/3.11

SECTION A-A

15.44  
 130.0  
 83.51  
 33.84  
 33.84  
 FULL R  
 SEE NOTE 3

ENGRA 0.8 W

THIRD ANGLE PROJECTION  
 LALL  
 ISO 9001 REGISTERED

NOTES:

- (1) BREAK ALL SHARP EDGES .13MM-.38MM
- (2) MACHINE AS DIMENSIONED DO NOT COMPENSATE FOR SURFACE TREATMENT.
- (3) PERMANENTLY MARK PART NO. (INC. REV. NO.) FOLLOWED BY SUPPLIER FILE NUMBER AND RAISED MAT'L HIGH CHARACTERS, FILE NUMBER AND RAISED MAT'L SUPPLIER TO HANDLE ALL SURFACE TREATMENTS.
- (4) ARI TO SPECIFY PLATING FLUASH FOR FLUASH TEFION IMPREGATED HARDCOATING.
- (5) FLUASH TEFION IMPREGATED HARDCOAT.
- (6) .0007/.0008 IN. NO MASKING REQUIRED.
- (7) MAKE FROM 0210-0844

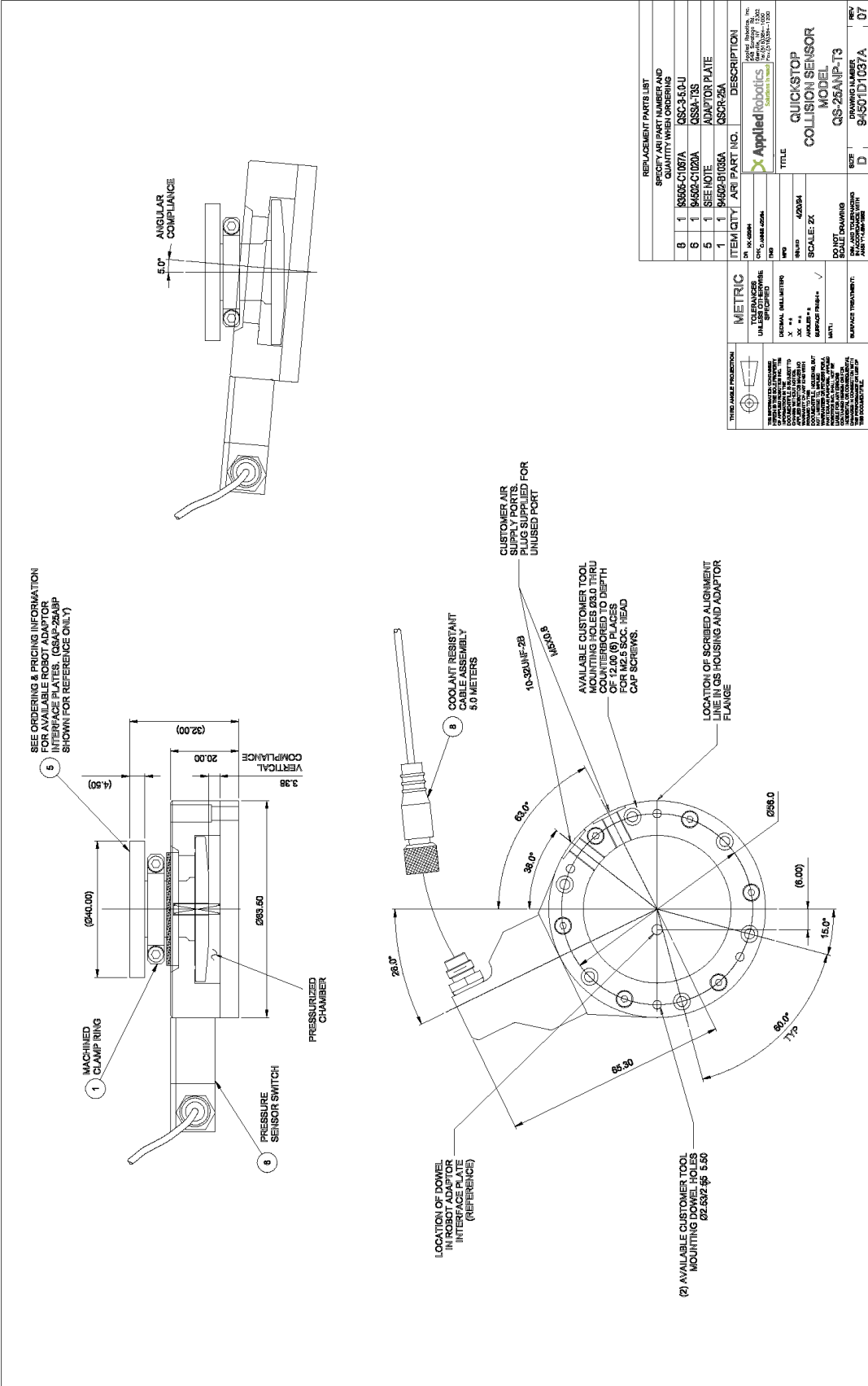
**APPROVED FOR  
PRODUCTION**

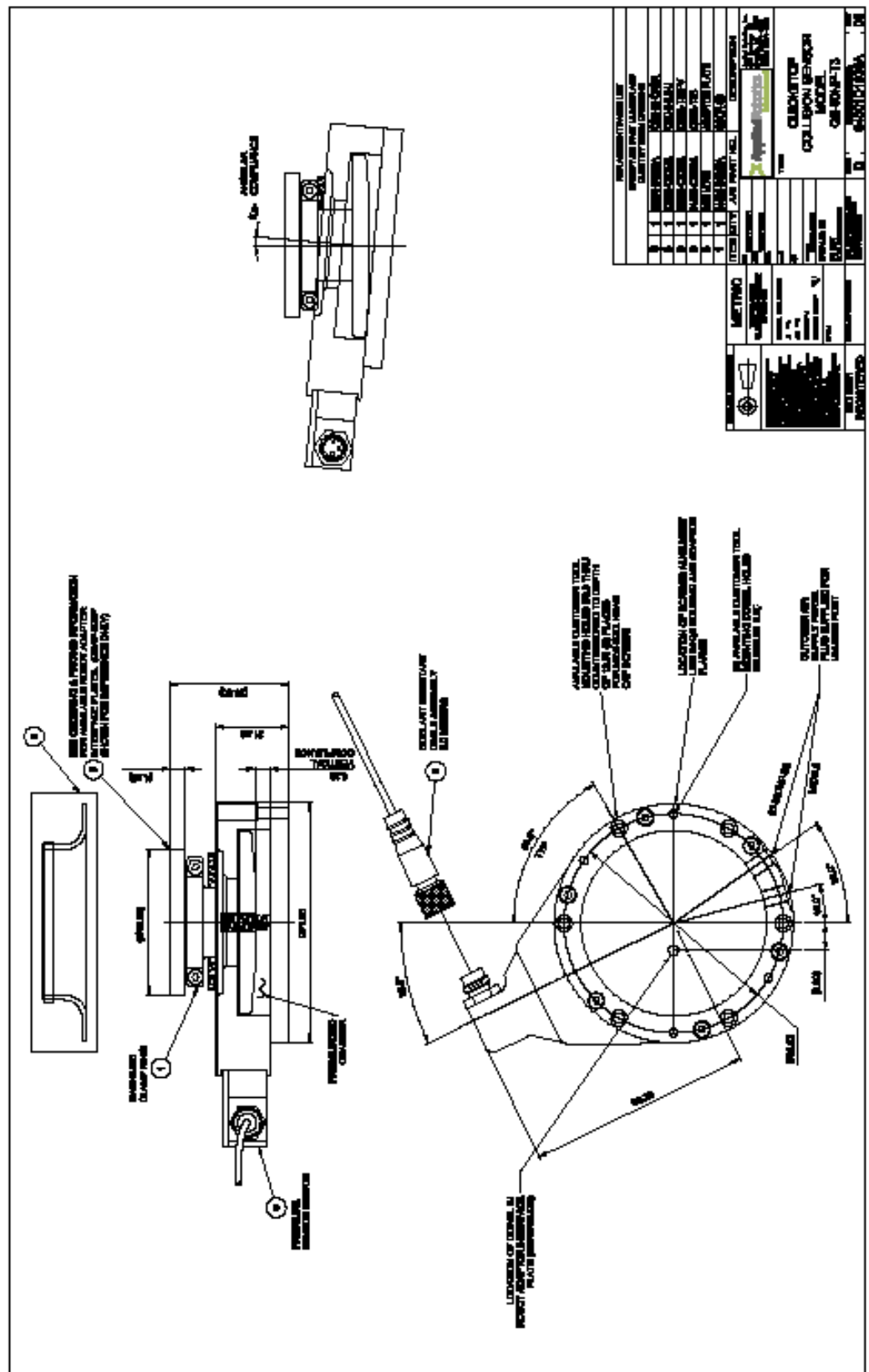
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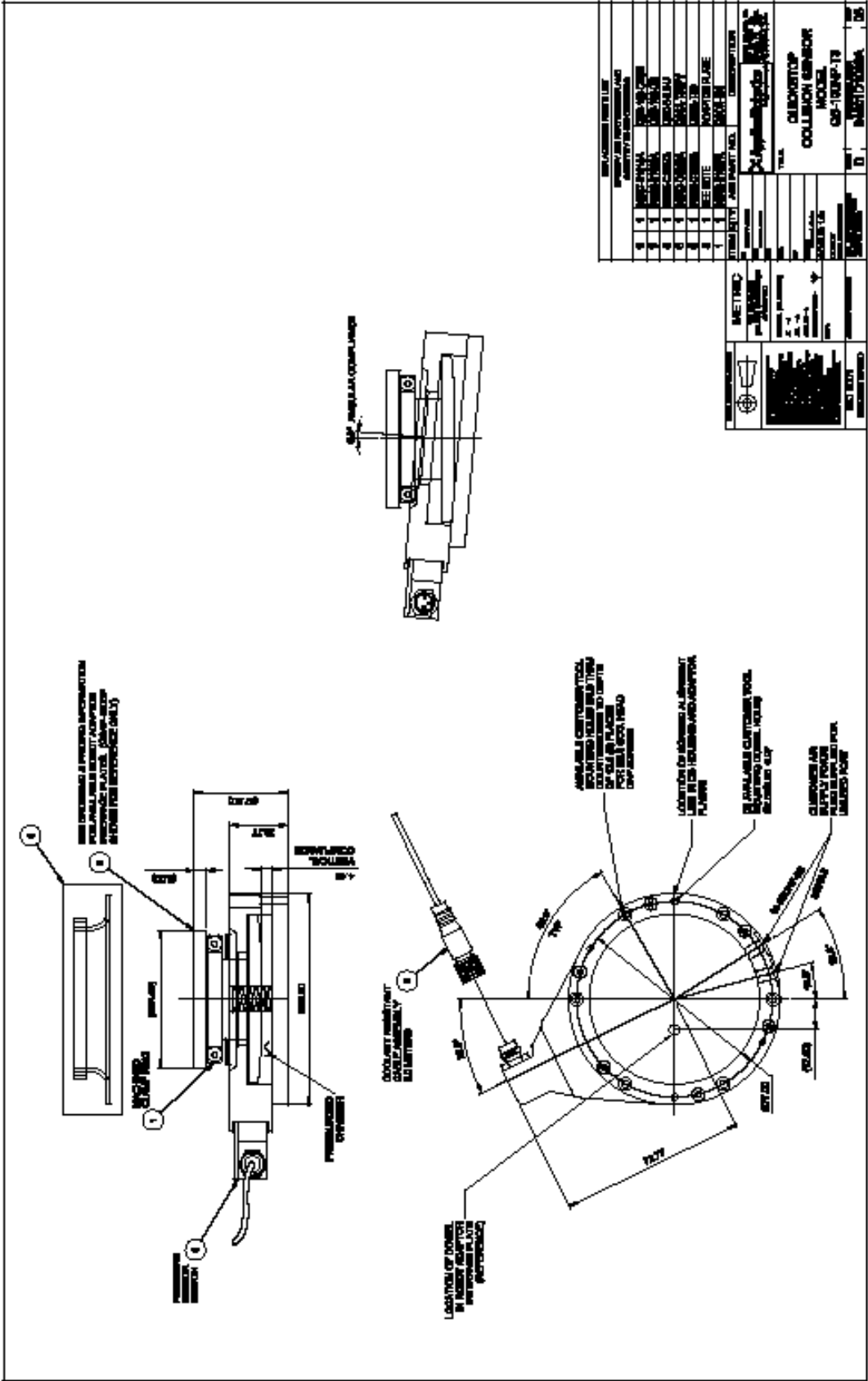




**Applied Robotics™**  
Solutions in reach



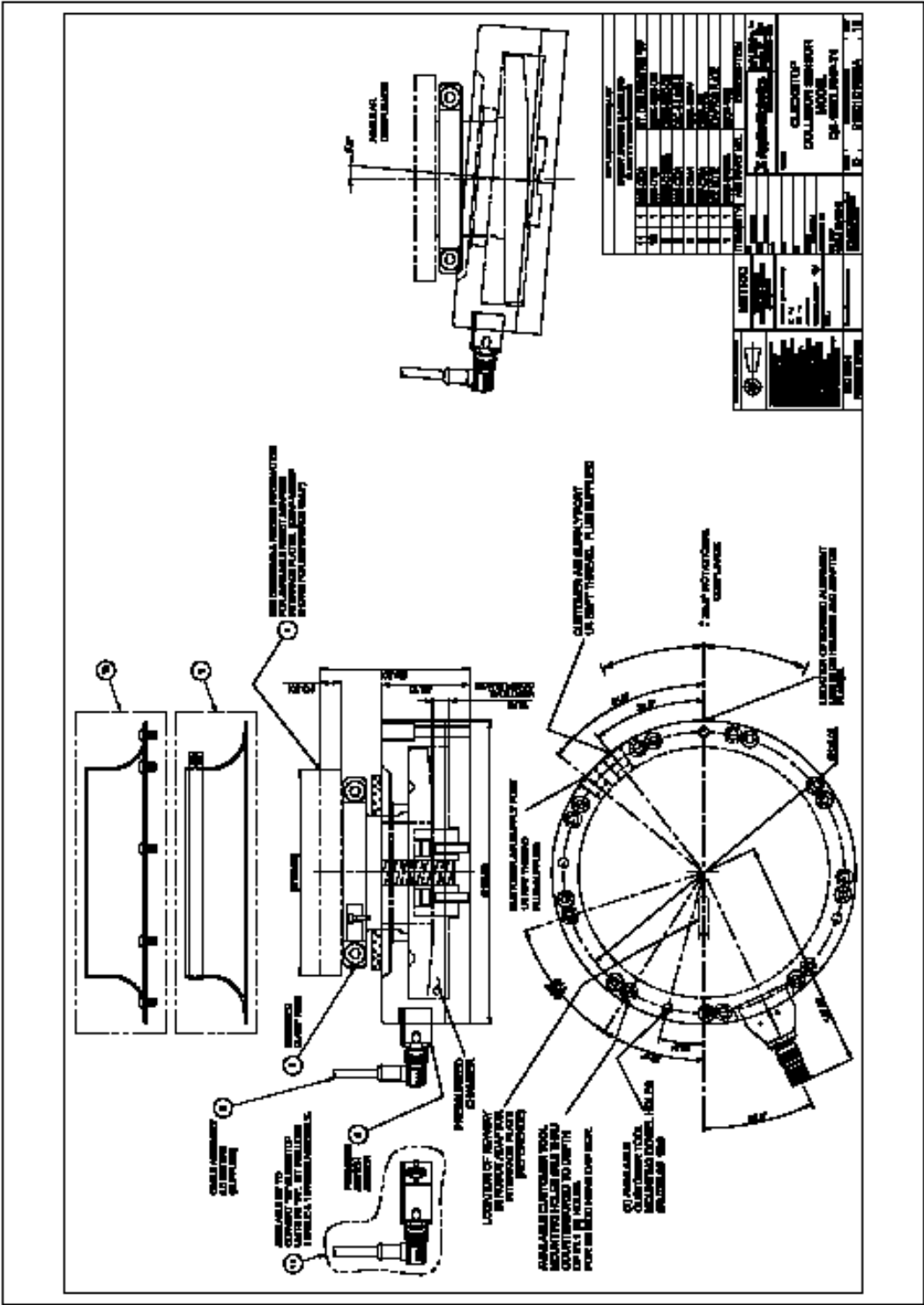


















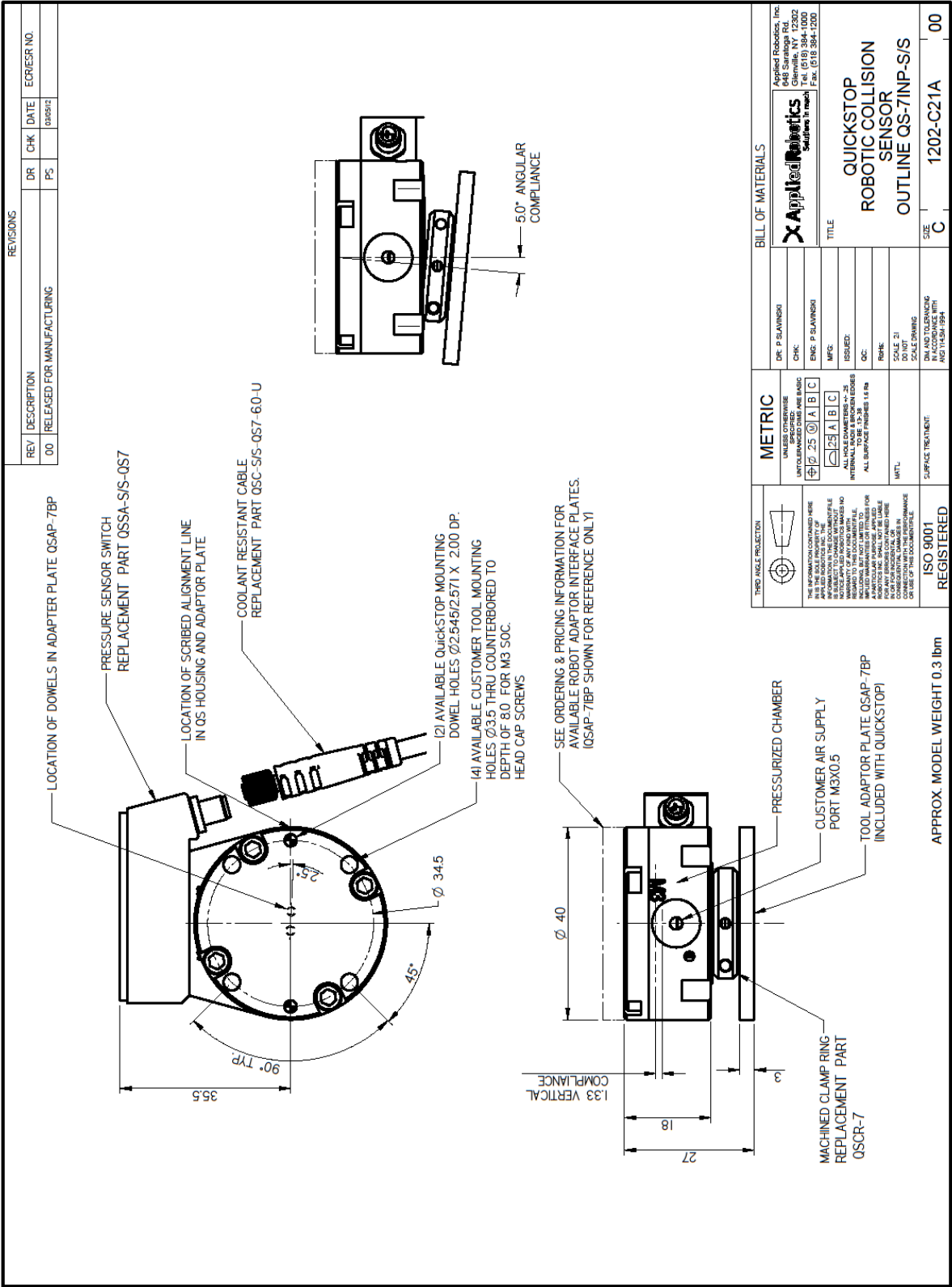


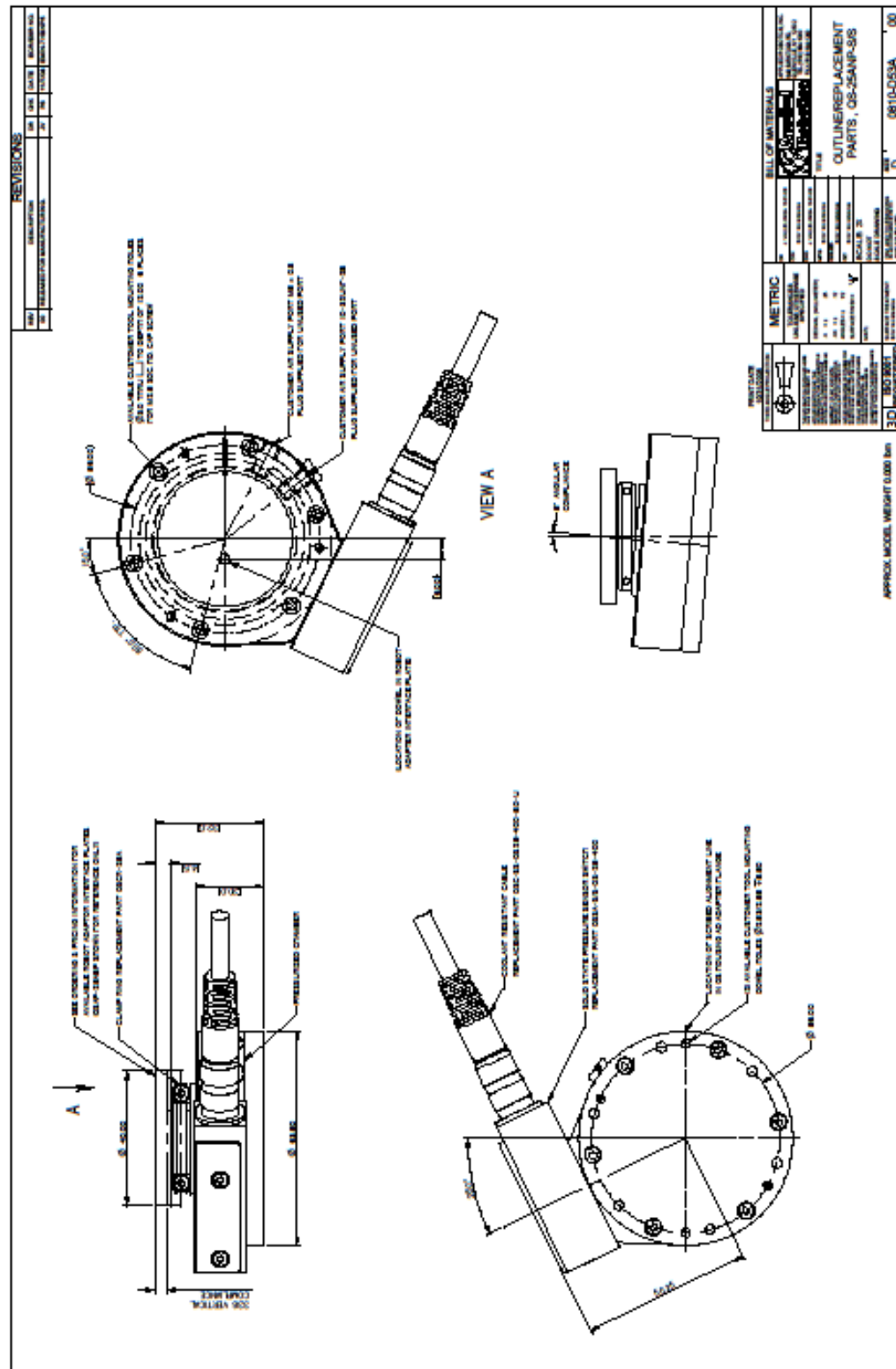




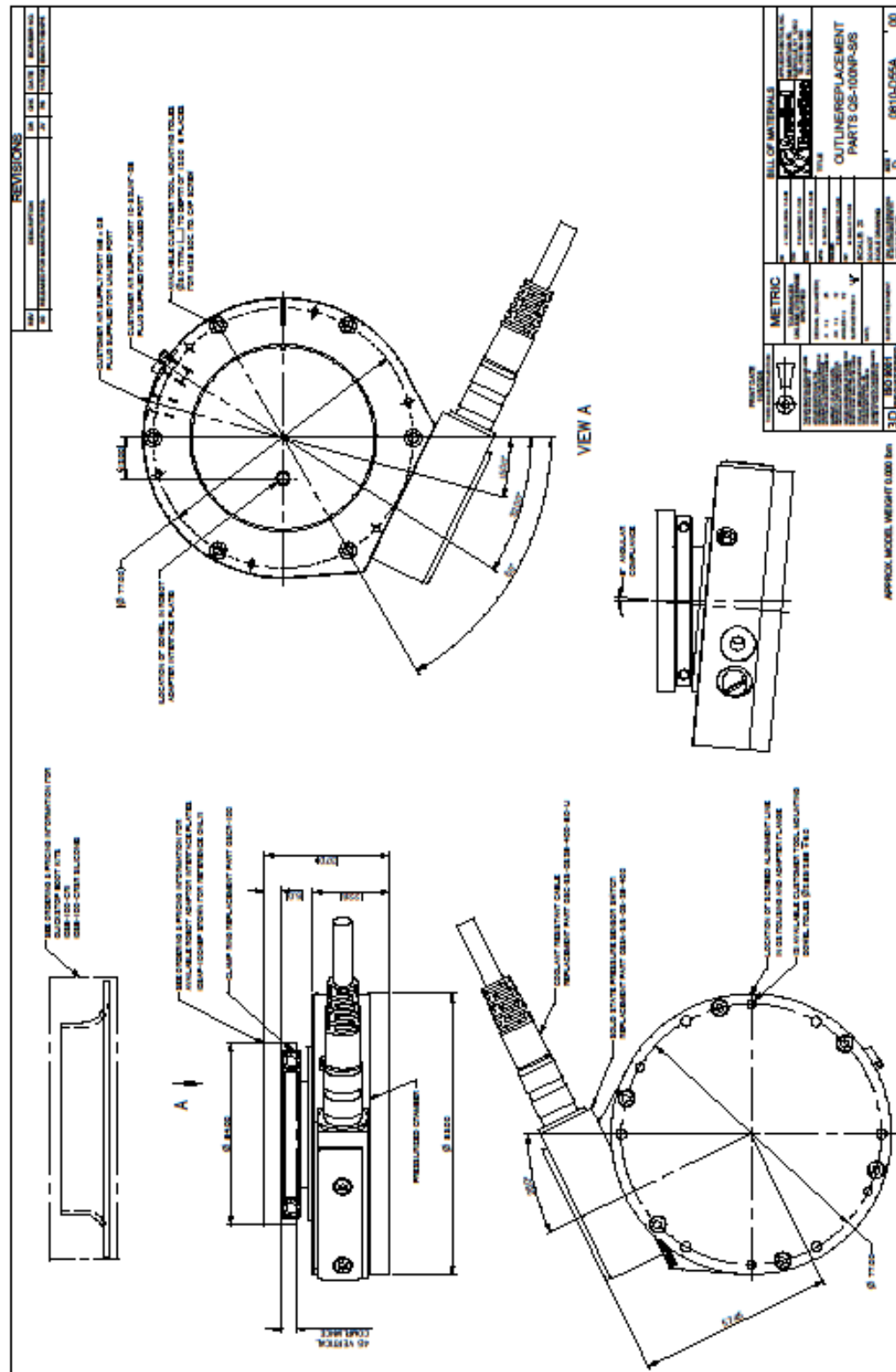




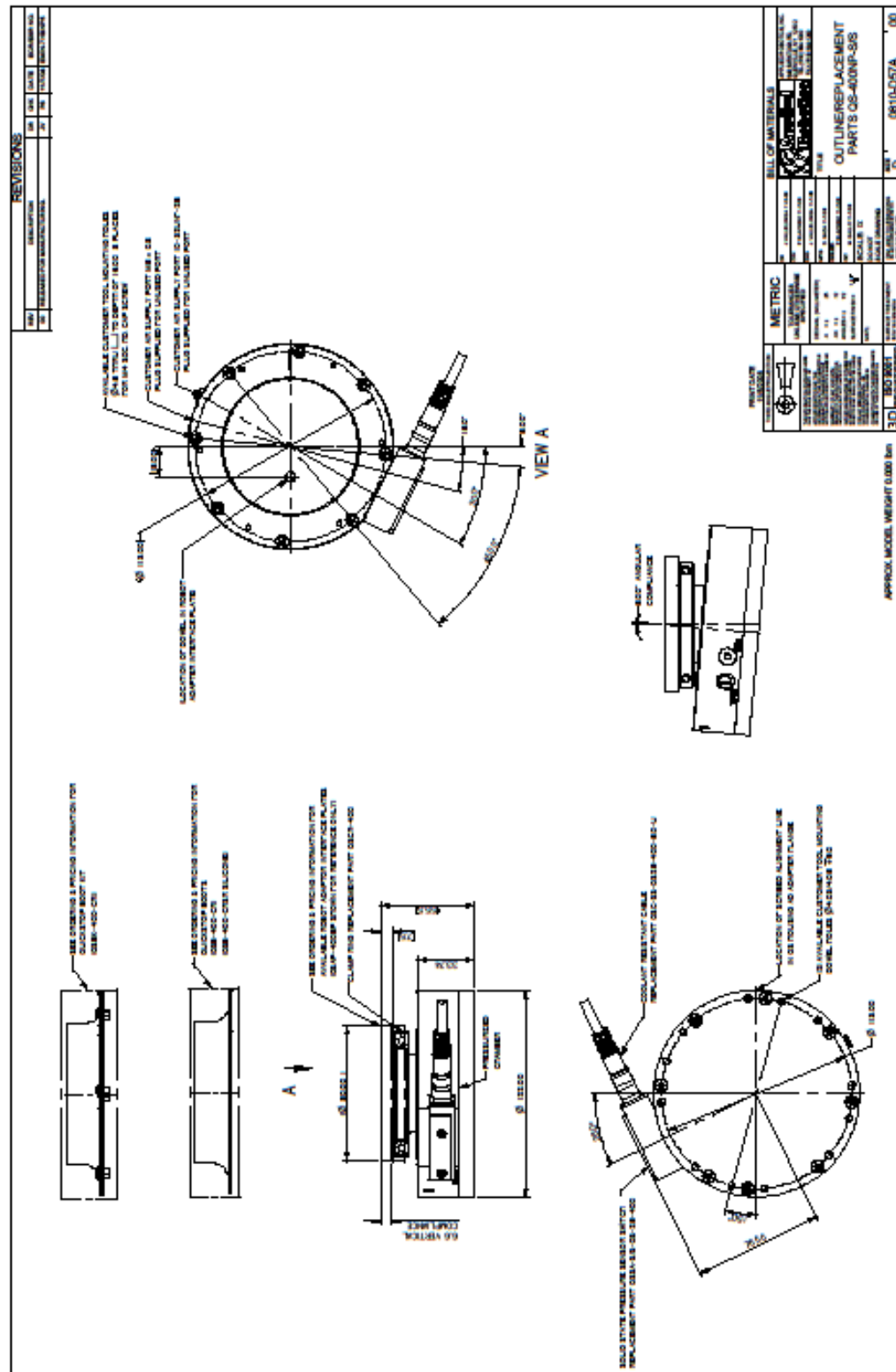




















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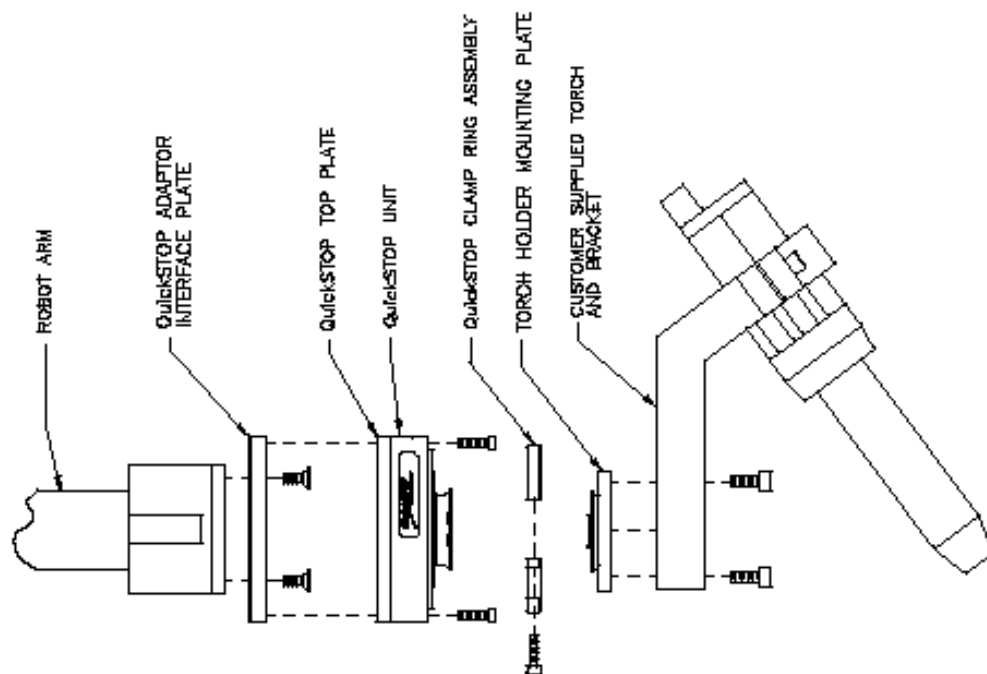


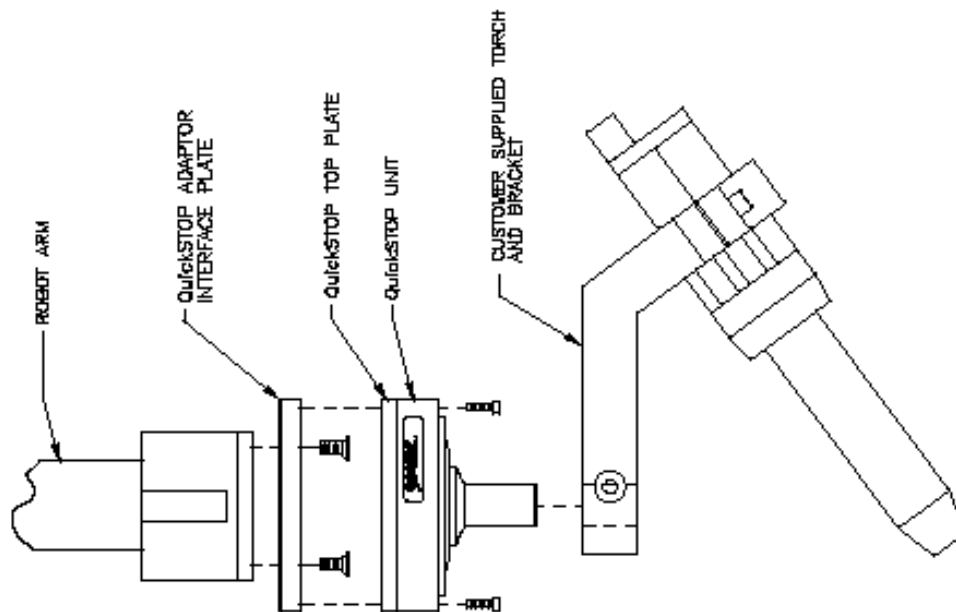






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