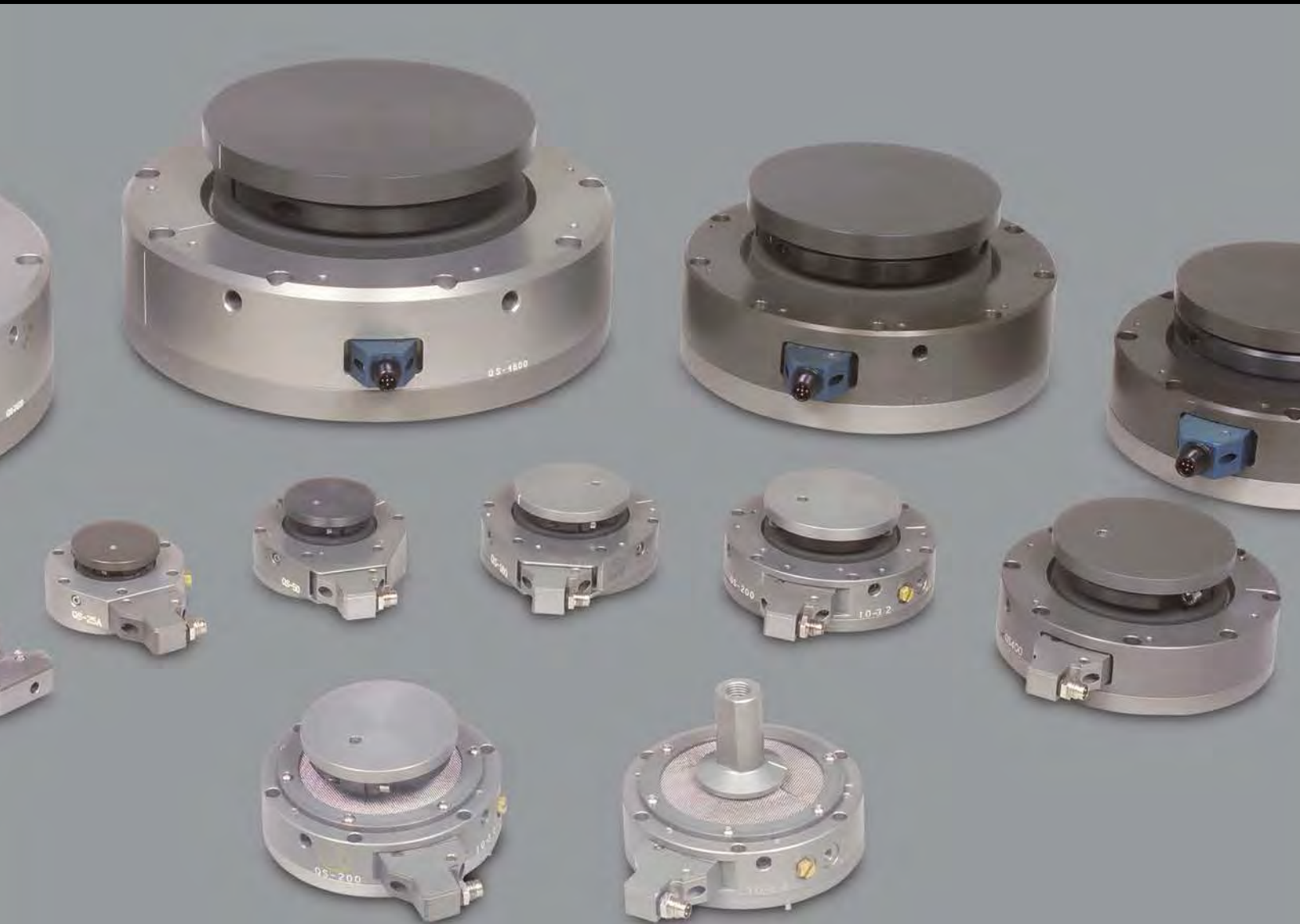




# QuickSTOP™ Collision Protection



*Superior engineering  
for superior performance*

# QuickSTOP™ Effectively Protects Your End-of-arm Tooling

It's a common misconception that a robot's servo protection circuitry also protects the tooling. Servos are strong and the robot's protection circuitry is tuned to them. By the time the servo protection fires, your fragile and expensive tooling is likely ruined. QuickSTOP™ collision sensors have infinitely programmable trip points — allowing you to exactly match your application and protect your tooling.

## Unique Air Chamber Design

Regulated air supply provides positive pressure to hold QuickSTOP™ rigid and secure during normal operation. Pressure is dynamically-variable — giving you an infinite number of programmable trip points.

## Metal-to-Metal Seal

Non-compressive seal ensures reliable, leak-free operation and permanent repeatability

## Foam Collar

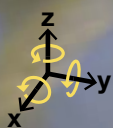
Prevents dust and debris from entering the QuickSTOP™ air chamber when metal-to-metal seal is opened during impact

## Robot Adaptor Plate

Supplied blank, ready for customer drilling to meet specifications for mounting QuickSTOP™ to any automated equipment

## Pre-Drilled Pneumatic Connections

Two threaded holes accommodate English or metric pneumatic fittings. Plug supplied for unused port.



## Ox, Oy, Oz Axes Protection

6 degrees of Axis Protection

Senses angular, rotational AND compressive forces

## Durable Electrical Cable

A flexible and durable signal cable is supplied with each QuickSTOP™

## Pressure Switch

Senses pressure loss in the QuickSTOP™ air chamber providing a signal for system shutdown immediately upon impact.

## Becomes Compliant on Impact

to remove the force from your tool and robot wrist

# QuickSTOP™ — a unique design makes the ultimate solution for collision protection

## PROTECT YOUR VALUABLE ROBOT OR AUTOMATED MACHINE PARTS FROM DAMAGE while

preserving precious production uptime with the superbly engineered QuickSTOP™ line of robotic collision sensors. Offering an infinite number of variable trip points, permanent repeatability and superior strength—QuickSTOP™ can sense excessive rotational, angular, and compressive forces and immediately trigger system shutdown, therefore avoiding damage to your expensive tooling.

- **Effectively protects tooling**—infinitely adjustable to provide tuned protection that the robot's servo protection cannot match.
- **Unique air chamber design**—holds tooling and payload rigid and secure during normal operation.
- **Dynamically variable trip points**—program the collision sensor to match your application.
- **Permanent repeatability**—non-compressive, metal-to-metal seal ensures reliable and leak-free operation.
- **Senses angular, rotational, and compressive forces**—our unique design offers protection in the 0x, 0y and 0z axes.
- **Quick reaction time**—air chamber design means instant shut-down signal. No reaction time is lost waiting for a deflection to occur.
- **Monitors performance readiness**—the ready-to-perform signal from the pressure switch lets you know the QuickSTOP™ is properly reset and pressurized.
- **QuickSTOP™ becomes compliant**—its non-resistive compliancy on impact removes the force from your tool and robot wrist.
- **Low mass and profile**—the compact size of QuickSTOP™ makes it easy to fit into any workcell.

The QuickSTOP™ line covers all sizes and applications from handling test tubes to aircraft body panels

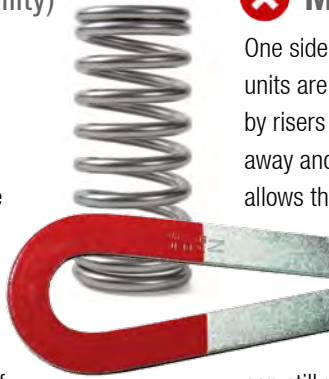


# Superior performance by design — QuickSTOP™ vs. the competition

**A COLLISION SENSOR** must protect valuable robot or automated machine parts from damage while preserving precious production uptime. A sensor should mimic the dynamic activities of the automated robot or machinery, in order to give collision protection throughout the full range of the application sequence. The competing designs on the market are spring units, magnetic units, air bladder units, and QuickSTOP's air chamber design—which gives performance advantages the others can't match.

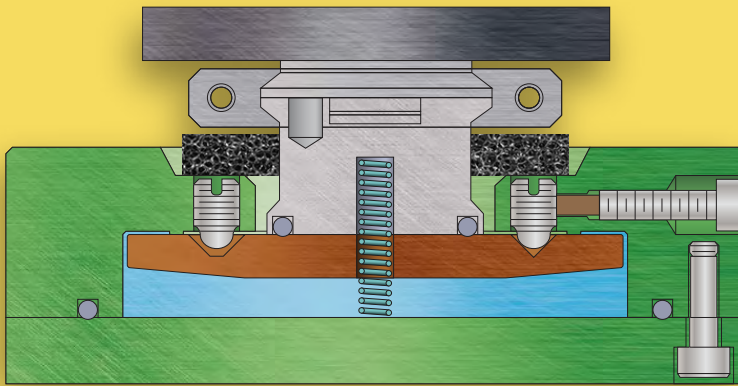
## ✗ Spring Units (limited adjustability)

When a spring unit has a collision the springs are compressed until an electrical contact is activated which fires off the signal to stop the robot. The problem with springs is that they become stiffer as they are compressed. Unlike the instant release and compliancy provided by QuickSTOP™, a spring unit actually increases the load on the tool for a brief period prior to triggering. This is often enough time and pressure to damage your costly tooling. Also, spring units are not as inherently stiff as QuickSTOP™ and if subjected to vibration can “chatter” and cause loss of precision.

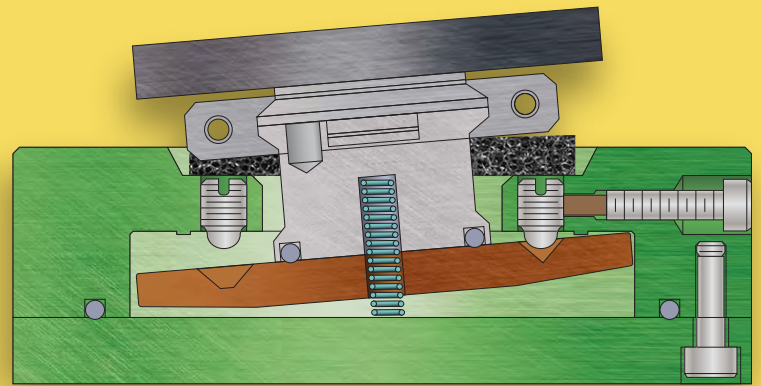


## ✗ Magnetic Units (not adjustable)

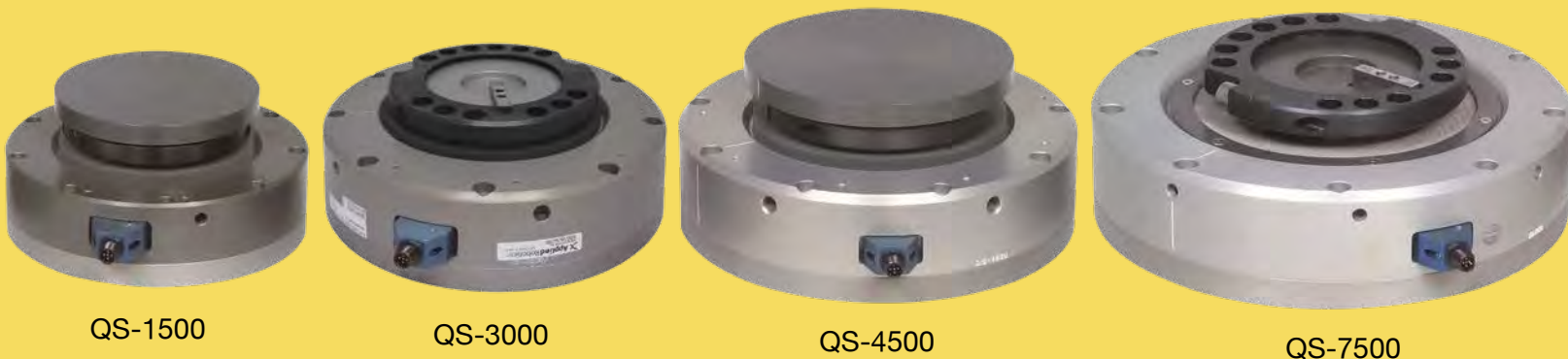
One side of a magnetic unit is a metal plate and the other is a magnet. These units are generally found on cutting tables where the metal being cut is supported by risers above a water bath. In the event of a collision, the magnet will break away and dangle, along with the torch head, on a retaining wire. This usually allows the torch head to come in contact with the work piece. In order to reset, the operator must either risk crawling onto a wet, slippery table to reset the tool in place—or have the gantry system drag the tool across the product back to the operator...resulting in scrapped work. Rigidity is also a concern as a light hit that does not separate the magnet can still redirect the tool and ruin the work. The Applied Robotics QuickSTOP™ remains rigid until it trips. Once tripped, the QuickSTOP™ becomes compliant but does not separate, so it can be retrieved in the air by the gantry system without dragging across or touching the work piece.



**QuickSTOP™—Normal Operation:** Positive pressure in the air chamber holds tooling and payload rigid and secure. Pressure is dynamically-variable — giving an infinite number of programmable trip points. Non-compressive metal-to-metal seal gives reliable operation and permanent repeatability.



**QuickSTOP™—On Impact:** The pressure switch senses loss of pressure in the air chamber and sends an INSTANT shutdown signal. No reaction time is wasted waiting for a deflection to occur. QuickSTOP™ becomes compliant and removes the force from your tool and robot wrist.



QS-1500

QS-3000

QS-4500

QS-7500

**✖ Bladder Units** (adjustable)

These units operate similar to QuickSTOP™ in that the stiffness is set by air pressure and is adjustable. Where QuickSTOP™ uses an air chamber with a metal to metal seal, they use a non-airtight chamber with an air bladder inside. When a collision occurs, the bladder needs to compress until the contacts connect and then the unit triggers. This is inherently slower than QuickSTOP™, which triggers as soon as the air chamber seal breaks. Bladder units claim an advantage as they are able to automatically reset the unit by closing the air escape valve on the bladder and re-inflating it, thus putting everything back into its proper place. It sounds good on paper, but air bladder units make it too easy for an operator to reset from a distance and begin work again—*without checking the tooling*. The quick and precise QuickSTOP™ hand-reset promotes tooling inspection after a collision—preventing a damaged tool from producing noncompliant parts for the remainder of the shift, causing the expense of scrapped production and lost time.



 **QuickSTOP™ Air Chamber Units** (adjustable)

Our unique design gives performance the competition can't match. The QuickSTOP™ programmability, instant reaction, and non-resistive compliancy effectively protects your end-of-arm tooling in the event of a collision. The rigidity and high repeatability of QuickSTOP™ give precision at the tool head and the non-compressive, metal-to-metal seal ensures reliable and leak-free operation.

A close-up photograph of a circular metal-to-metal seal, likely part of a robotic end effector. The seal features a central circular opening surrounded by a thick, metallic ring. Several small, dark, circular features, possibly screws or mounting points, are visible around the perimeter of the ring. The lighting highlights the metallic texture and the precision of the manufacturing.

## A Complete Product Line

QuickSTOP™ collision sensors are available in 11 sizes and 12 models, including a specific model for arc welding applications, making it the most complete line in the industry. Optional flash protector and replacement cables are available.

## Product Specifications

|                                                                            |                     | QS-7                                                                                                                                                   | QS-25              | QS-50              | QS-100             | QS-200                                        | QS-AW                     | 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+)                                                      | mm<br>in            | 1.38<br>0.054                                                                                                                                          | 3.40<br>0.134      | 4.30<br>0.169      | 4.50<br>0.177      | 5.20<br>0.205                                 | 5.20<br>0.205             | 6.60<br>0.265                 | 9.30<br>0.366                           | 10.80<br>0.425      | 14.30<br>0.563       | 10.68<br>0.420         | 12.68<br>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 Torque trip point:<br>continuously variable                             | N-m<br>in-lb        | .28-1.5<br>2.5-13.5                                                                                                                                    | 1.0-6.4<br>9-56    | 2.2-14.0<br>19-124 | 5.3-30.4<br>47-270 | 7.5-45.2<br>66-400                            | 7.5-45.2<br>66-400        | 11.8-84.6<br>104-749          | 53-255<br>427-2250                      | 82-291<br>784-3284  | 153-478<br>1353-4232 | 345-1185<br>3315-10490 | 1007-2098<br>8919-18568   |
| Mx & My Moment trip point:<br>continuously variable                        | N-m<br>in-lb        | .31-1.5<br>2.7-13.2                                                                                                                                    | 1.0-6.4<br>9-56    | 2.6-11.8<br>23-104 | 4.1-20.3<br>36-180 | 5.9-32.4<br>52-287                            | 5.9-32.4<br>52-287        | 11.3-63.9<br>100-566          | 36-158<br>292-1400                      | 87-371<br>727-2573  | 105-414<br>924-3664  | 220-614<br>1950-5433   | 472-1049<br>4181-9289     |
| Repeatability:<br>at tool mounting surfaces<br>X and Y                     | mm<br>in            | ± 0.013<br>± 0.0005                                                                                                                                    |                    | ± 0.025<br>± 0.001 |                    |                                               |                           |                               |                                         | ± 0.038<br>± 0.0015 |                      |                        |                           |
| Repeatability:<br>at tool mounting surface Z                               | mm<br>in            | ± 0.013<br>± 0.0005                                                                                                                                    |                    |                    |                    |                                               |                           |                               |                                         |                     |                      |                        |                           |
| Repeatability:<br>rotational                                               | rad. (10-3)<br>deg. | ± 0.489<br>± 0.028                                                                                                                                     | ± 0.419<br>± 0.024 |                    |                    |                                               |                           |                               | ± 0.500<br>± 0.029                      |                     |                      |                        |                           |
| Mass                                                                       | kg<br>lb            | .11<br>.24                                                                                                                                             | .26<br>.56         | .29<br>.65         | .45<br>.99         | .68<br>1.5                                    | .68<br>1.5                | 1.3<br>2.9                    | 3.72<br>8.2                             | 5.5<br>12           | 12.2<br>27           | 12.8<br>28             | 16.8<br>37                |
| Center of Mass<br>(from robot adaptor interface<br>plate)                  | mm<br>in            | 11<br>.43                                                                                                                                              | 18.6<br>.73        | 20.3<br>.80        | 21.6<br>.85        | 25.7<br>1.01                                  | 25.7<br>1.01              | 32.6<br>1.29                  | 46.8<br>1.84                            | 54.6<br>2.15        | 66.0<br>2.60         | 66.0<br>2.60           | 73<br>2.875               |
| Average response time<br>(varies with air pressure and<br>speed of impact) | ms                  | 4-7                                                                                                                                                    | 2-6                | 2-6                | 4-7                | 4-7                                           | 4-7                       | 4-8                           | 4-8                                     | 4-18                | 4-18                 | 4-18                   | 4-18                      |
| Operating temperature                                                      |                     | Min. 0° C (32° F), Max. 70° C (158° F)                                                                                                                 |                    |                    |                    |                                               |                           |                               | Min. 0° C (32° F), Max. 100° C (212° F) |                     |                      |                        |                           |
| Switch Description<br>UL Recognized Rating                                 |                     | High reliability aircraft snap acting type. UL/CSA rated at 3 amps, 120 VAC. Average mechanical life — 7 million cycles.<br>42.4 VDC Max / 3 amps Max. |                    |                    |                    |                                               |                           |                               |                                         |                     |                      |                        |                           |
| Dust protection                                                            |                     | Standard foam collar supplied                                                                                                                          |                    |                    |                    |                                               | Screen collar<br>supplied | Standard foam collar supplied |                                         |                     |                      |                        | Screen collar<br>supplied |
| Welding Flash Protection                                                   |                     |                                                                                                                                                        |                    |                    |                    | Optional high-temperature skirt kit available |                           |                               |                                         |                     |                      |                        |                           |

## QuickSTOP™ for Special Situations

**IF YOUR WORKCELL** involves coolants, mists or welding, we offer specific QuickSTOP™ models to accommodate those situations.

**Coolant Resistant Option** — If you work with cutting fluids, waterjet cutting, and shot peening or blasting operations, the coolant resistant QuickSTOP™ offers the additional environmental protection you need. It includes a protective boot, a coolant resistant switch assembly and a coolant resistant signal connector.

**QS-AW** — Specifically designed for arc welding, laser cutting or plasma cutting applications, it features a heat resistant cable, metal screen for cavity protection, insulator plate and an inverted design to avoid build-up of debris.

**Heavy Payloads** — Every QuickSTOP™ operates on an adjustable air pressure system, which lets you adjust the breakaway threshold to overcome unyielding stiffness. And with our exclusive pre-load system, resetting heavy equipment and tools is easy. The larger QuickSTOP™ units, QS800–QS7500 incorporate a rotation limiting system which upon tripping doesn't allow the QuickSTOP™ to rotate more than 25 degrees — eliminating additional damage or injury. The QuickSTOP™ becomes compliant but does not allow the tooling to freely spin — eliminating damage or injury.

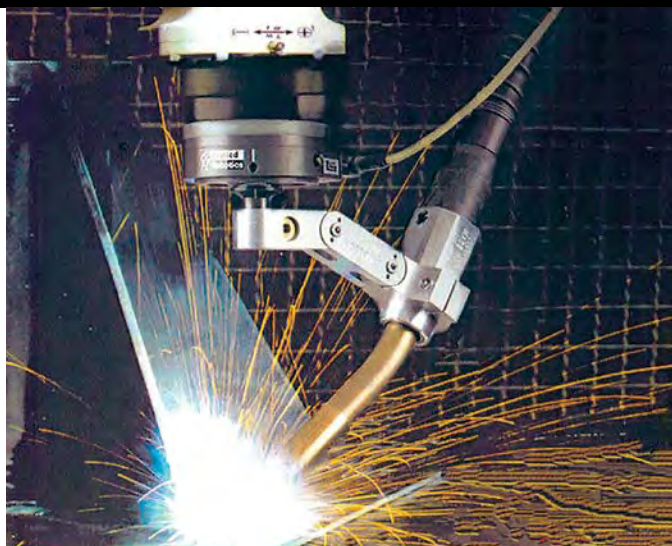
**Robot-Specific** — Product Adaptor Kits are available to connect your QuickSTOP™ to your equipment. They include adaptor plates, clamp rings and all mounting hardware.

## How to Choose a QuickSTOP™ Model

The QuickSTOP™ moment resistance is designed to change by varying the input pressure. In order to get the most protection from your QuickSTOP™, it is important to choose the most appropriate model for your application's moment/torque requirements. Please call your sales representative at (518) 384-1000 for further information.

**LEARN MORE**

Contact our customer service department at  
**(518) 384-1000** or **info@appliedrobotics.com**



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