

Ultimatic™ and High-Angle Ultimatic™ Pneumatic Collision Sensors

Product Description

The Ultimatic™ is a mechanical Collision Sensor (U.S. Patent #6,214,057) that utilizes pneumatics for dynamic variability.

Benefits

RAD's Ultimatic™ and High-Angle Ultimatic™ Collision Sensors **minimize** the potential for **costly damage** to the robot or tooling in the event of a crash and **maximize uptime** by automatically returning to within 0.0005" (0.013mm) of its starting position once it has been separated from the source of the crash.

The Ultimatic™ Collision Sensors are RAD's patented mechanical collision sensors that:

- **Stop** the robot* within 2 to 10ms of a collision to minimize costly damage to the robot and/or tooling. RAD's collision sensors provide protection even if the robot itself is not moving.
- **Absorb** the crash energy without releasing the air pressure in the unit. Keeping the air in the unit prevents tooling 'sag' and eliminates the effects of compressed air being released into the environment.
- **Automatically reset** to within $\pm 0.0005''$ (0.013mm) in x, y, and z dimensions and to within ± 0.017 degrees rotationally to maximize uptime and eliminate the need for human intervention.
- **Offer** 8 degrees (standard Ultimatic™) or 13 degrees (High-Angle Ultimatic™) of angular compliance
- Allow pneumatic adjustment so the user can easily change the amount of resistance the unit must encounter before signaling a collision.

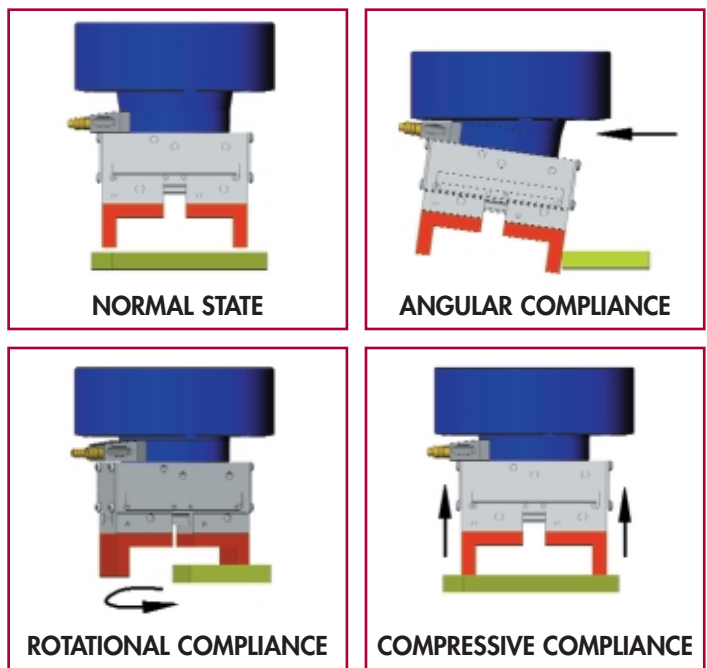
- Have a compliance adjustment feature that lets the user determine the amount of deflection allowed before a signal is sent to your robot's E-stop or controller.

*can also be used on linear actuators, pick & place machines, and other automated equipment

Operating Principle

RAD's Ultimatic™ and High-Angle Ultimatic™ Collision Sensors work by establishing the minimal points of contact required to restrain all degrees of freedom (movement) in normal operation. When a collision occurs, external forces upset this balance thereby allowing angular, rotational, or compressive compliance. This motion opens a normally closed switch and sends a signal to your robot's E-stop or controller.

Note: The Ultimatic™ Collision Sensors can be used as compliance (alignment) devices rather than collision sensors by simply mounting the unit without wiring it to the robot.

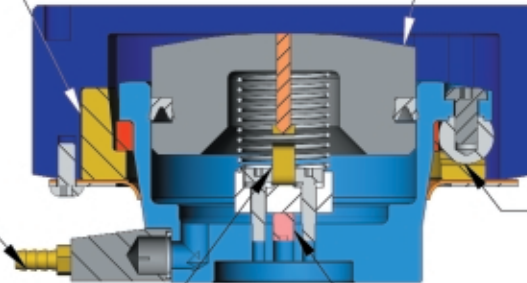


Insert is the mechanism for **Automatic Reset** and rotational motion.

Piston provides resistance and **Crash Energy Absorption**. No air escapes during a collision.

Unit is **Dynamically Variable** between 10 and 90 psi

Three balls locate the unit and provide for **Precise Repeatability**.



Mechanical NC switch

Adjustment screw to change the amount of movement in the unit before the switch is opened (**Pre-Trip Compliance**).

Features

Note: The Features of the Ultimatic™ and High-Angle Ultimatic™ are the same unless otherwise stated.

Automatic Reset

RAD's Ultimatic™ Collision Sensor automatically returns to its starting position once it has been separated from the source of the collision. The mechanical piston within the collision sensor absorbs the crash energy without releasing the air pressure. Since the air pressure is not released there is no need for someone to manually reset the unit.

Precise Repeatability

Following a collision, the Ultimatic™ Collision Sensor consistently returns to within $\pm 0.0005'' / 0.013\text{mm}$ (x, y & z) and $\pm 0.017^\circ$ (rotationally) of its original position.

Compliance

RAD's Ultimatic™ Collision Sensors provide angular (x), rotational (y), and compressive (z) compliance to minimize potential damage to the robot or tooling should a collision occur. The High-Angle Ultimatic™ provides an additional 5° of

angular compliance over the standard Ultimatic™. See product specification sheets for more detail.

Dynamically Variable

The force, moment, and torque resistance of the Ultimatic™ Collision Sensor is pneumatically controlled using a regulator and the robot's logic and valve system. By using a programmable air regulator, the collision sensor can be easily adjusted to respond to as many interim load levels as the user chooses to install.

Adjustable Pre-Trip Compliance (Switch Sensitivity)

RAD's Ultimatic™ Collision Sensor has a compliance adjustment feature that allows the user to determine the amount of deflection allowed before a signal is sent to stop the robot. The switch sensitivity is factory set at $0.025'' (0.64\text{mm})$ axial compliance and can be adjusted up to $0.100'' (2.5\text{mm})$.

Quick Response Time

The Ultimatic™ will detect a collision within 2 to 10ms and send a signal to the robot's E-stop or controller. The speed of impact, air pressure, and compliance adjustment will affect the response time.

Crash Energy Absorption

RAD's Ultimatic™ Collision Sensor uses a mechanical piston that absorbs the crash energy without releasing air from the unit. The use of a mechanical piston prevents tooling sag caused by loss of air pressure and also prevents compressed air from being released into the environment.

UL Approved

RAD's Ultimatic™ Collision Sensor is an Underwriters Laboratory certified component under 'robotic and robotic equipment' standard UL 1740.

Durable

The Ultimatic™ Collision Sensor was designed with durability in mind. The body is constructed of anodized aluminum and internal contact surfaces are made of hardened tool steel.

Easy to Connect

Ultimatic™ Collision Sensors have quick disconnect electrical connections with the exception of RAD's smallest unit, the U-4618, which is only available in hard wire due to its size.

Versatile

The Ultimatic™ Collision Sensor can be mounted in any orientation. RAD recommends the small diameter be mounted to the robot to minimize wear on the cables.

Maintenance Free

The Ultimatic™ Collision Sensor is pre-adjusted at the factory and requires no maintenance.

Field Repairable

Should a repair be necessary, most components of the Ultimatic™ Collision Sensor can be replaced or repaired in the field, minimizing downtime.

Options

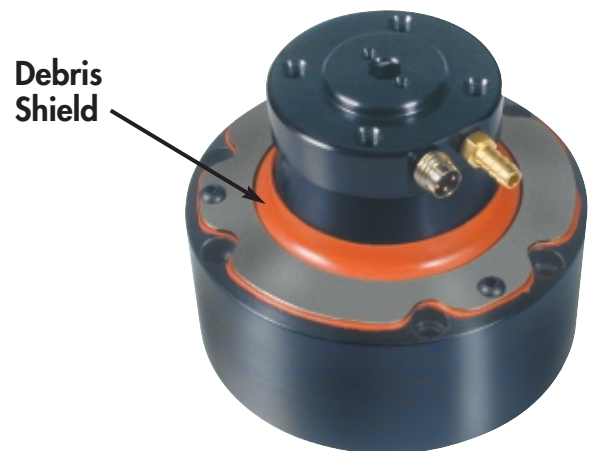
Note: The Options of the Ultimatic™ and High-Angle Ultimatic™ are the same unless otherwise stated.

Adapter Plates

Plates used to mount the Ultimatic™ Collision Sensor to the robot or end-effector are available to help you easily install your new collision sensor.

Debris Shields

Debris shields, used in harsh environments such as welding, grinding, painting, or machining applications, are available to protect the collision sensor from potential contaminants.



Viton Seals

Viton seals are available when the collision sensor is to be used in a harsh environment. Viton seals are designed for high temperature environments (up to 400° F/204° C) and are resistant to many hostile fluids.

High-Flex Cables

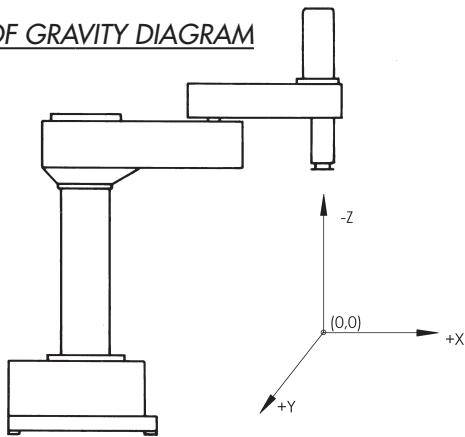
High-flex cables are available for applications involving constant twisting and flexing motions.

Sizing

RAD would be pleased to assist you in sizing your application to determine the most effective Ultimatic™ Collision Sensor to meet your needs. Once you have the following information, please call us at 937.667.5705 or e-mail us at info@rad-ra.com:

- Total payload (include weight of tooling, adapter plates, and part)
- Center of gravity in each direction – x, y, and z – in inches or millimeters
- Acceleration of robot (inches/second² or millimeter/second²)
- Environmental factors that apply (high heat, dirty or contaminated environment, etc.)
- Additional insertion forces
- Available air pressure

CENTER OF GRAVITY DIAGRAM



NOTE: Dimensions are taken from robot flange face (ref 0,0)

Warranty

RAD warrants our Ultimatic™ Collision Sensors against manufacturing defects for a full 12 months from product shipment. If you ever have a concern with your Ultimatic™, please call us at 937.667.5705 or e-mail us at info@rad-ra.com with the model number, serial number, date purchased, and description of the issue you are experiencing for quick, efficient problem resolution.

Placing An Order

New Customers

If you wish to place an order for a RAD Ultimatic™ Collision Sensor (or other end-effector product), please contact us at 937.667.5705 or e-mail us at info@rad-ra.com to have a customer service representative contact you ASAP. If you choose to e-mail RAD, please include your name, title, company, city, state, and telephone number.

Current Customers

As an established RAD customer you may:

- 1) Phone in your order by calling us at 937.667.5705 (EST)
- 2) E-mail your order to info@rad-ra.com
- 3) Fax your order to 937.667.7602

Please be sure to include all the information below so that we may quickly process and ship your order:

- Your Name
- Your Title
- Company Name
- Street Address
- City, State, Zip
- Telephone Number
- Your E-mail Address
- Ship To Address (or confirm that you wish to have the product shipped to the address already provided)
- Quantity and Part Number for each product you wish to order (please be sure to include the RAD part number if different from your product number to ensure efficient order placement)
- Purchase Order Number

If you have any questions, please call us at 937.667.5705 – we are here to assist you!