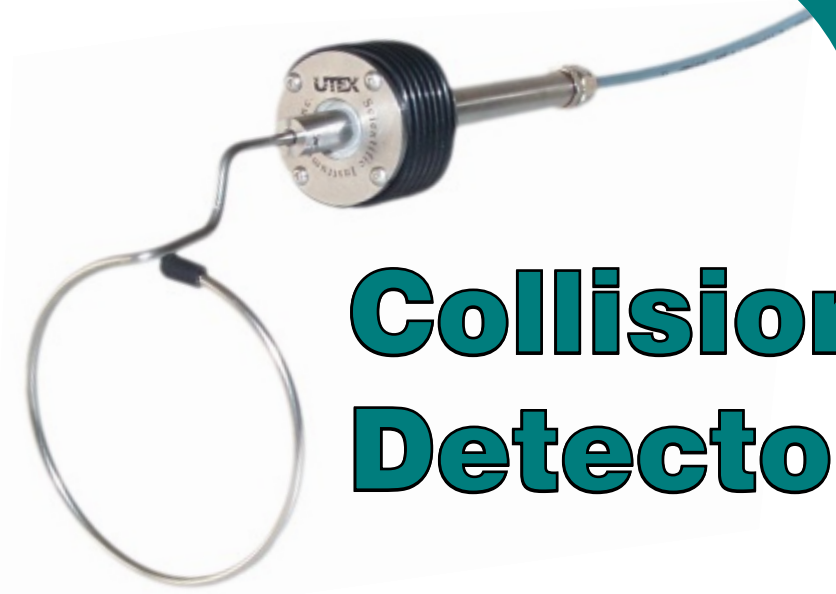

Collision Detector

Installation & Technical Reference Manual

UTEX Scientific Instruments Inc.

Automated NDT systems made simple

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Table of Contents

What is a Collision Detector?

The Collision Detector is a touch sensor designed to prevent damage to a scanning system or inspection components due to accidental collisions.

The Collision Detector detects when the scanner gets too close to the surface of a part using an omni-directional, low-force sensor. It sends a signal to the emergency stop circuit of a motor controller using a normally-open or normally-closed contact. The trip threshold is adjustable and the sensor head can withstand a load of up to 100 pounds. An operator can be alerted by an LED and audible alarm when the unit is tripped.

What kinds of applications can a Collison Detector be used for?

The Collision Detector should be used with any robotic or automated machinery where collisions could cause damage to either the machinery or the part. Any scanner can benefit from having Collision Detectors installed to protect tank walls, bottoms, transducers, and inspection parts. The Collision Detector can also be used as a bottom sensor.

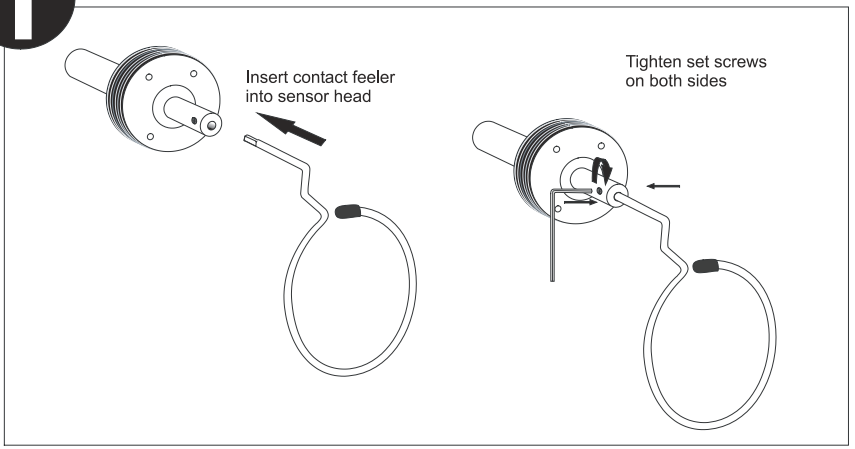
What is included in this Kit

Sensor Head + 10 Ft cable	1
Contact Feeler, Loop	1
Contact Feeler, Straight	1
Interface Unit	1
Mounting Block, Delrin	1
Black Elastomers, short	2
Black Elastomers, long	2
Hex Key	1
Rubber feet	4
4 position terminal block, Male	1
3 position terminal block, Male	1
3 position terminal block, Female	1

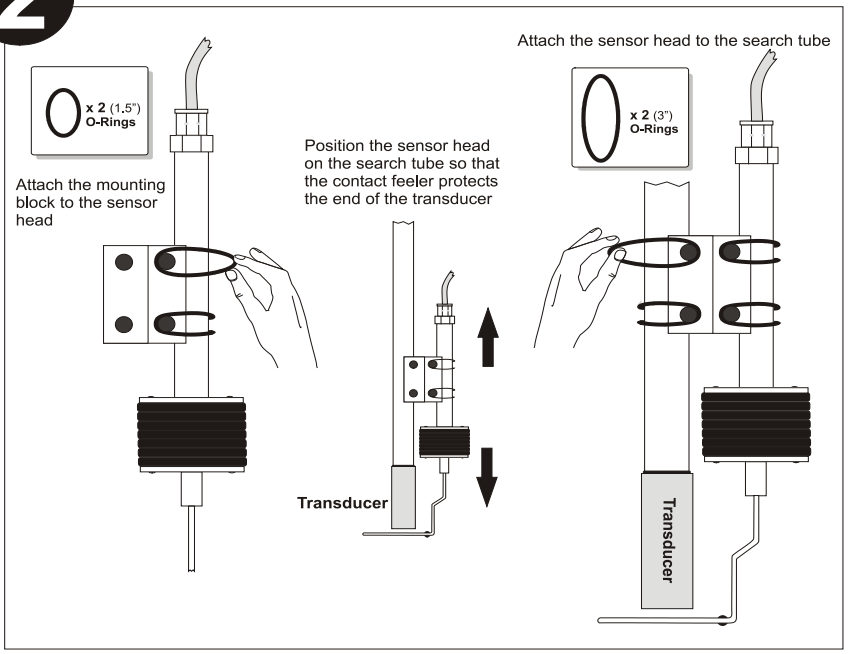
Assembly and Installation

There are only four steps required to prepare the Collision Detector for operation.

1 Attach a contact feeler to the sensor head



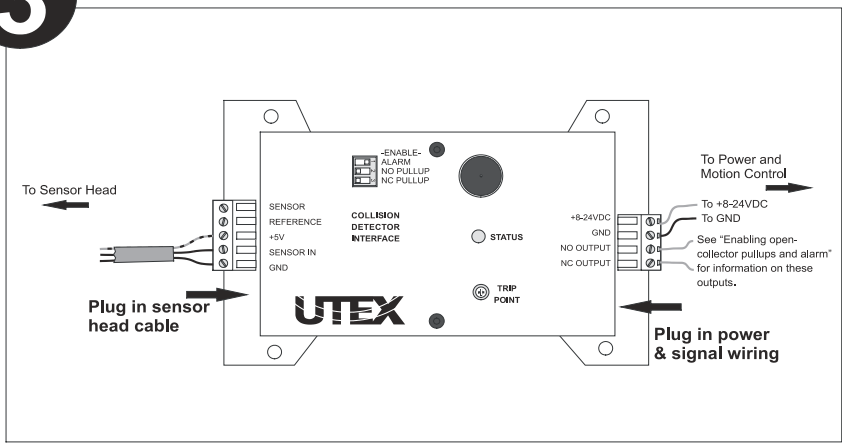
2 Attach the sensor head to the search tube or scanner arm



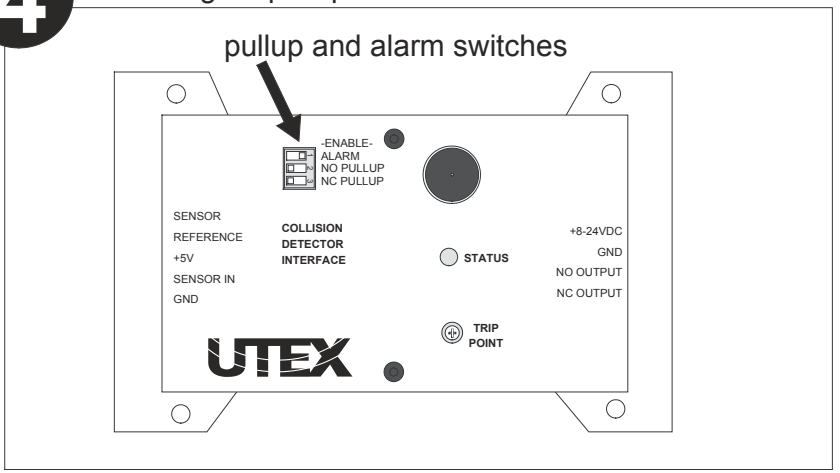
Attach the sensor head... continued:

The means by which to mount the sensor head to a scanner will vary from scanner to scanner. A mounting block is supplied that may be appropriate for attaching the sensor head to the search tube of your scanner.

3 Connect the cables to interface unit



4 Configure pullups and the alarm



Configuring open-collector pullups and alarm

The Interface unit provides two open-collector outputs and an audible alarm.

- The Normally Open output sinks current to GND when the sensor trips (deflected)
- The Normally Closed output sinks current to GND when the sensor is not tripped (at rest)
- Each output can sink 300 mA when active
- Pullup resistors may be switched in to pull each output up to +5V when inactive (TTL operation)
- The alarm (when enabled) provides an audible tone when the sensor is tripped

To enable the pullup resistor for a particular output, slide the enable switch for the NO PULLUP or NC PULLUP to the right position. To disable a pullup, slide the switch to the left position.

WARNING: If a pull-up is enabled on an output, the open-circuit voltage on the input of the external equipment must not exceed +5 volts.

For a schematic of how the NO and NC outputs operate see **Appendix C**.

Mounting the Interface Unit

The Interface unit should be mounted in a cabinet away from your tank. The Interface Unit is not waterproof, and should be kept dry and protected.

- The Interface Unit can be panel-mounted with four #6 or M4 screws (not included)
- Four rubber feet (included) can be used for non-permanent installations.

When mounting the unit remember to leave room on each end to plug in the sensor and signal cables.

Adjustment

With the sensor head plugged into the interface unit, and DC power on, the threshold may be adjusted.

To aid in the adjustment of the trip point, the interface unit has an audio alarm that can sound when the trip point is reached. The alarm provides a convenient way of making the trip point adjustment without watching the LED, as well as providing an audible alert of a collision.

Status of Sensor	Action	Comment
At Rest	Turn trip Point CW until Status LED goes red, then turn CCW until it turns green	
Deflected	Status LED should turn red	Adjust Trip Point for desired amount of deflection

If the LED fails to change color, see the troubleshooting information in **Appendix B**

Technical Reference

General Specifications

Interface Unit dimensions	(Approx) 3.5”W x 5.2”L x 1.0”H for accurate dimensions see **diagram 2**	
Sensor Head dimensions	See **diagram 1**	
Electrical Power supply requirement	8 to 24 VDC 50 mA (typ)	
Outputs Maximum current: Maximum voltage	 300 mA 30 V (output in off state)	
Forces and displacements Breakover moment Breakover force†	(typical) 0.16 Nm 125 g / 1.23 N	(typical) 22.7 ozf-in 4.4 ozf
Maximum angular displacement	10°	
Maximum axial displacement	3.6 mm	0.14 in
Cable:	3-conductor, 10 feet	

† Breakover force is measured at the ring of the Contact Feeler
(UTEX part number AY11-004-005/001)

Diagram 1: Sensor Head Dimensions

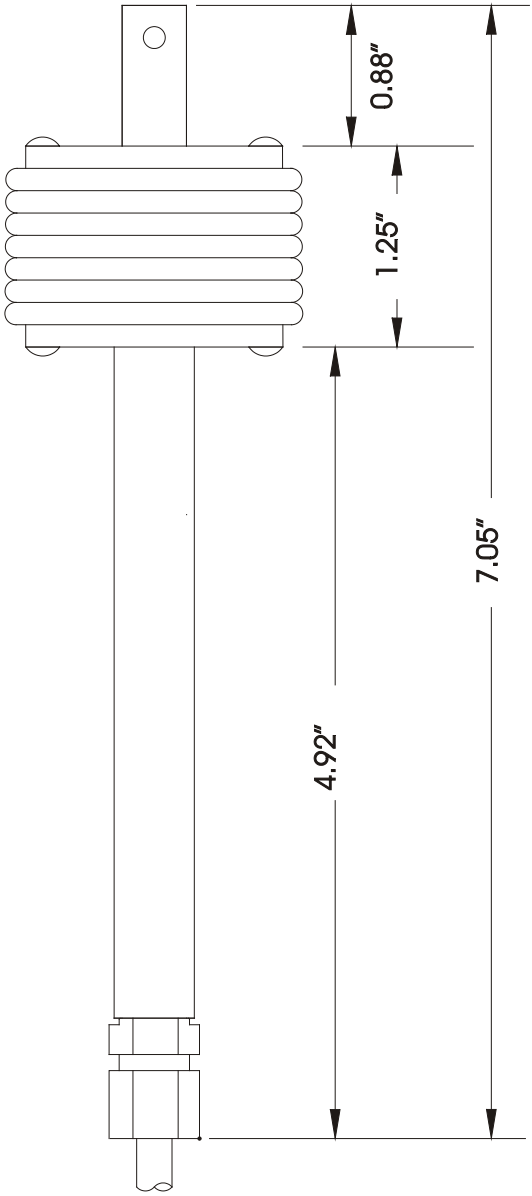
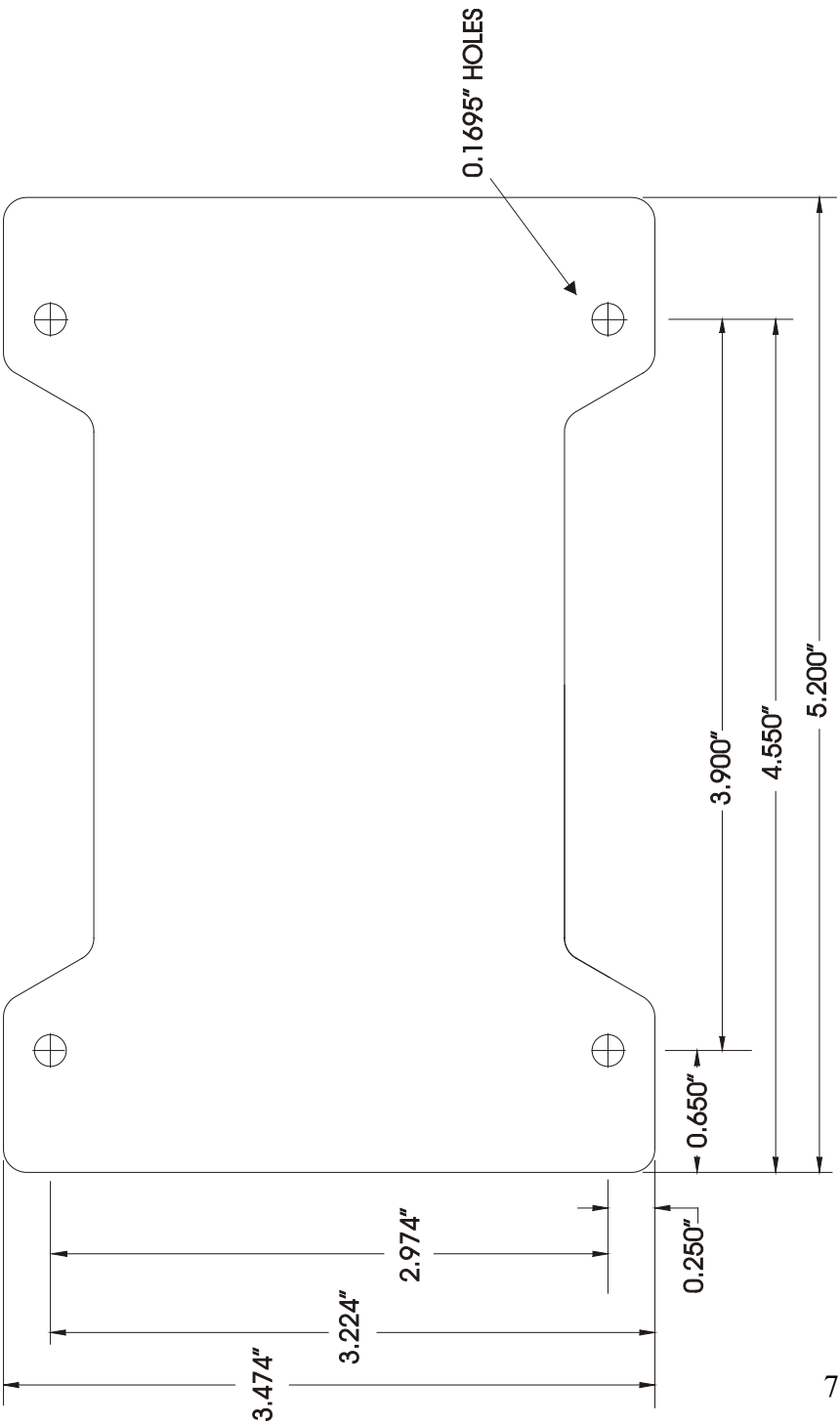


Diagram 2: Interface Unit Dimensions

This diagram is printed at 1:1 and can be removed and used as a template. Remember to leave room for cable attachments.



Appendix A

Connectors, Adjustments, and Switches

Interface to Sensor head connector (5-position terminal block)

Position	Name	Function
1	SENSOR	Sensor input voltage (for test purposes)
2	REFERENCE	Threshold reference voltage output (for test purposes)
3	+5V	+5 VDC supply to sensor head
4	SENSOR IN	Input signal from sensor head
5	GND	Ground return for sensor head

Output and power connector (4-position terminal block)

Position	Name	Function
1	NC OUPUT	Open-collector output: low when sensor not deflected
2	NO OUTPUT	Open-collector output: low when sensor deflected
3	GND	Common return for power supply and outputs
4	+8-24VDC	+8 to +24 VDC supply input

Adjustment potentiometers

Position	Function	Location
R19	High limit of threshold	Not accessible with cover on
R20	Threshold adjust (trip point)	Accessible though opening in cover
R22	Low limit of threshold	Not accessible with cover on

Switches

Switch #	Name	Function
1	Enable alarm	Enables audio alarm when sensor head is deflected
2	Enable NO pullup	Connects 330Ω pullup (to internal +5V) to NO output
3	Enable NC pullup	Connects 330Ω pullup (to internal +5V) to NC output

Sensor head cable connector

The 3-conductor cable of the sensor head is terminated on a 5-position terminal block plug. In this 3-conductor cable, there is one conductor with yellow/green stripes, and two black wires numbered “1” and “2” at periodic intervals.

Position	Wire number	Function
1	N/A	Not used
2	N/A	Not used
3	2	+5 VDC supply to sensor
4	1	Voltage output from sensor
5	Yellow/Green	GND

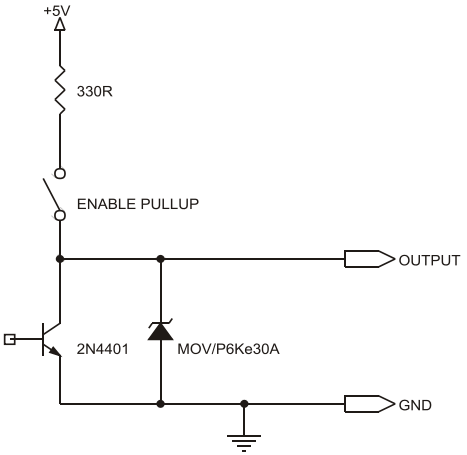
Appendix B

Troubleshooting

Problem	Probable Cause	Solution
LED stays red over entire adjustment range.	Threshold range is too low.	1. Set trip point adjustment to midpoint of rotation. 2. Remove cover. 3. Turn R19 clockwise until LED changes to green. 4. Replace cover.
LED stays green over entire adjustment range.	Threshold range is too high.	1 Set trip point adjustment to midpoint of rotation. 2 Remove cover. 3 Turn R22 counterclockwise until LED changes to red. 4 Replace cover.
Trip point changes when sensor is attached to scanner.	Steel, iron, or other ferromagnetic metal located near the back of the sensor head may interfere with the magnetic field	Try: - Increase separation between metal and sensor - Adjust trip point - Adjust threshold range

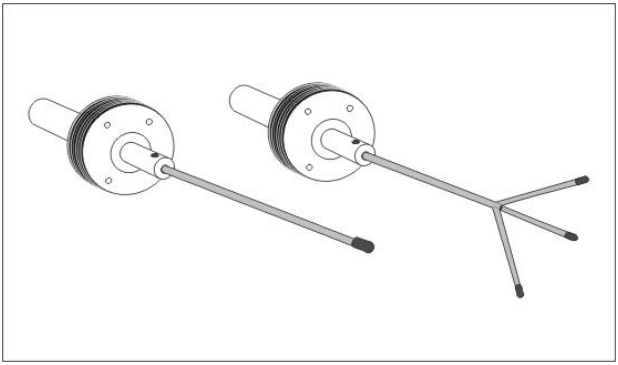
Appendix C

Output Schematic (NO or NC output)



Appendix D

Custom Contact Feelers



Examples of Custom Contact Feelers

Custom Contact Feelers can be built using 1/8” stainless rod.

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