

# DAMAGE CONTROL

## Exline Protective Devices Keep Minor Damage From Becoming A Major Problem

**Standing 24-hour guard at compressor stations, off-shore platforms, and plants across the country.**

Exline Protective Devices signal trouble or initiate shutdown before excessive wear, excessive temperature, or out-of-spec motion turn into catastrophic damage.

Positive action and proven reliability make these simple, economical devices ideal for use on large engines, pumps and compressors, oil field treatment units, and production machinery. They're designed for easy installation on any equipment that operates attended or unattended and is subject to severe damage from major component failure.

**No calibration, no maintenance, no deterioration.**

Exline Protective Devices require no periodic recalibration or maintenance. They're made of stainless steel or other durable materials to withstand years of service in punishing environments. Your own technicians can install them, or we can provide installation assistance, if you prefer. Once activated, they can easily be replaced and quickly refitted at our facility for reuse.

**Hundreds of applications.**

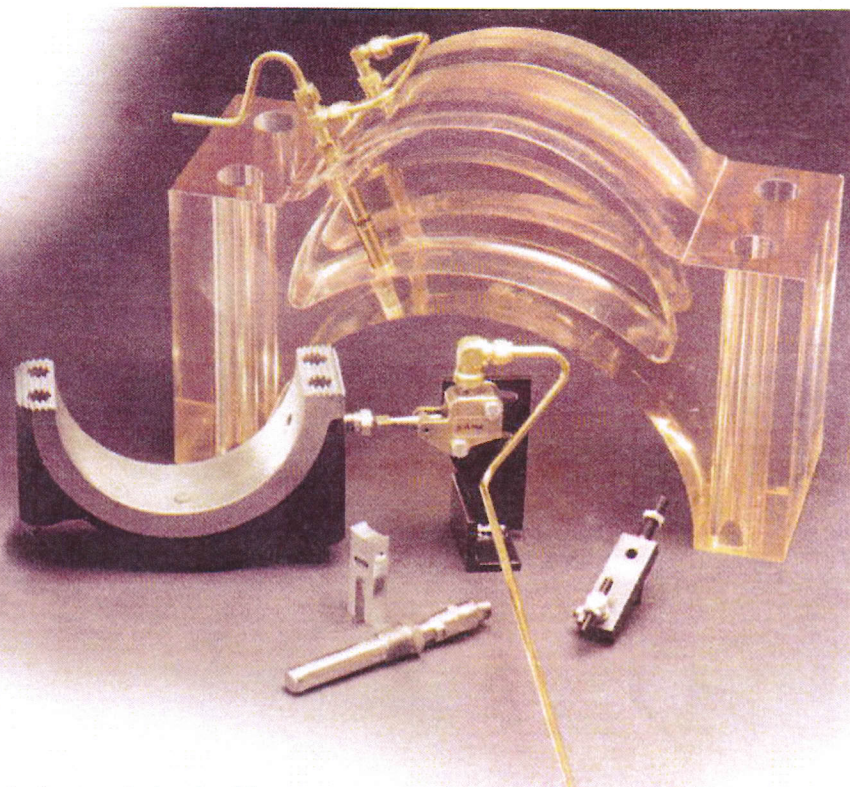
Exline Protective Devices can be installed on stationary or moving parts. Most models are designed to sense excessive temperature buildup. These heat-sensitive devices use eutectic alloy collars or plugs that melt at predetermined temperatures, initiating a pressure drop in pneumatic control systems or activating

electrical control circuits. You can select from a wide range of eutectic alloy melting temperatures, all of which are precise, dependable, and remain stable over time.

Our line of wear-sensitive devices includes the Over-Travel Device, the Compressor Rod Drop Indicator, and the Roller Type Wear Detector. These rely on mechanical contact between component and device to signal excessive wear or out-of-spec motion.

**Save man hours, money, and downtime.**

On the next three pages, you'll find descriptions and application diagrams for many of our versatile protective devices. Models that connect to pneumatic control systems and that are suitable for use in explosive environments are listed first. These are followed, on page 4, by the Electrical Temperature Sensor Assembly, a device designed for use with electric control and alarm circuits. Other Exline equipment designed for use with large engines and compressors is also described on the last page. Additional literature is available for each product. Call us today for more information and expert advice on the most effective and economical approach to protecting your valuable equipment.



**On the job for over twenty years.**

Some of our protective devices have been in service for over a generation, and all of them are backed by a century of experience. Exline has been in continuous operation and under management of the Exline family since 1872.

*Our 100,000 sq. ft. Salina facility provides a broad range of repair, rebuilding, and machine shop services. These include repair of large engines, compressors, precision dynamic balancing, Thermex™ thermal-spray coatings, short-run manufacturing and machine shop services, plus design assistance-to name just a few. Whenever you want to protect, repair, or modify equipment, think "Exline" first.*

**For your protection. . .  
Call Exline at 1-800-255-0111**



**EXPERIENCE the EXCELLENCE**



### Stationary Sensor

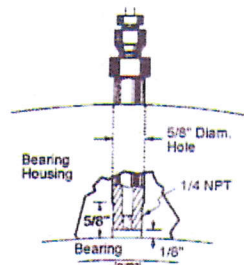
1.0 to 8 inches or 2.54 to 20.3 cm

This is one of the most versatile of all Exline Temperature Sensors. It is designed to detect excessive temperature where protection is necessary or desired on stationary parts or areas.

Excessive temperature causes the fuse-metal material in the form of a plug to melt, creating a pressure drop in the pneumatic control system.

#### Typical Areas Protected by the Stationary Sensor

- Bearings - Main, Pedestal
- Slides - (Compressor & Power)
- Packing Cases
- Fuel Injection Headers
- Jacketwater\*
- Discharge Gas\*
- Oil Sump\*
- Articulated Rod Pins



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\*In conjunction with Thermowell



### Striker Sensor

1.5 to 10 inches or 3.81 to 25.4 cm

The Exline Striker Sensor is used primarily in sensing the temperature of connecting rod bearings and other moving engine parts.

The Striker Sensor contains a temperature sensitive fuse-metal collar which holds a spring-loaded plunger in position. The Striker Sensor is installed with the fuse-metal end closest to the bearing or temperature producing area. A break-off dowel is mounted in a fixed position directly

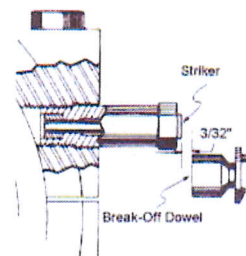
in line with the Striker Sensor.

Clearance is set so that the Striker Sensor passes the break-off dowel on each revolution. If an excessive temperature buildup occurs in the protected area, the fuse-metal collar melts. The plunger strikes the break-off dowel. A pressure drop in the pneumatic control system results. This pressure drop can be used to sound an alarm or shut down the equipment.

#### Typical Areas Protected by the Striker Sensor

- Power Rod Bearing
- Compressor Rod Bearing
- Crosshead Pin
- Skirt of Piston\*

\*Used as part of the Dual Sensor



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### Stationary Striker Sensor Assembly

1.5 to 5 inches or 3.81 to 12.7 cm

The Exline Stationary Striker Sensor Assembly is used primarily in a Thermowell or directly in a surface application, as in a valve flange or packing case.

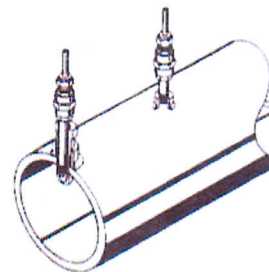
The Sensor is designed to operate in specific areas where it is not practical to utilize the brass Stationary Sensor. The Stationary Striker Sensor Assembly is made of stainless steel to allow positive service in highly corrosive environ-

ments. The fuse-metal material is totally isolated to prevent possible external contamination.

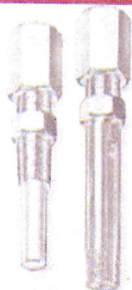
The vent valve assembly is mounted directly to the Sensor and is connected to the control media via tubing. At the predetermined temperature the fuse-metal collar melts and the spring-loaded plunger is released. The plunger makes contact with the vent valve, creating a pressure drop in the pneumatic control system.

#### Typical Areas Protected by the Stationary Striker Sensor Assembly

- Thermowell in header
- Bearing housings
- Motor, pump casings
- Packing cases
- Valve Flanges
- Pedestal bearings
- Crosshead slides



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### Exhaust Gas Temperature Sensor

1.25 to 6 inches or 3.2 to 15.2 cm

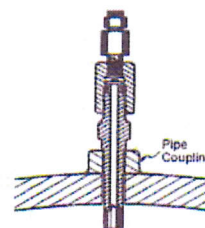
The Exhaust Gas Temperature Sensor is used in high temperature applications. A typical installation of this type of device is in the exhaust header.

The E.G.T. device is made of stainless steel to assure years of

durability. At a predetermined temperature the eutectic solder will melt creating a pressure drop in the pneumatic control system.

#### Available Approximate Melting Temperatures

1170°F (632°C) and 1300°F (704°C)



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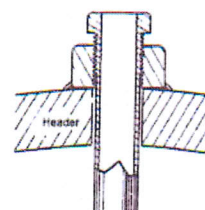
### Thermowell

The Thermowell is a stainless steel unit, used in conjunction with the Exline Stationary Sensor, Exline Stationary Striker Sensor or Exline Exhaust Gas Temperature Sensor.

The Thermowell houses the fuse-metal end of the device, adapting it to be used where the tempera-

ture of oil, water, gas, or other elements is to be monitored. Typical applications are oil sumps, water systems and natural gas headers.

The Thermowell is designed for use in pressures not to exceed 3000 PSI maximum.



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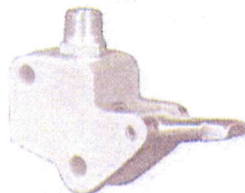
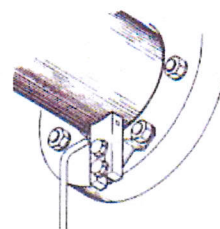
## Compressor Rod Drop Indicator

1.5 to 5.5 inches or 3.81 to 13.97 cm

The Exline Compressor Rod Drop Indicator is primarily a wear indicator installed directly beneath the compressor rod.

If wear occurs on the piston, piston riders or cylinder the compressor rod will drop and make

contact with the C.R.D. This contact creates a friction temperature, which melts the fuse metal plug in the device. This causes a pressure drop in the pneumatic control system. Also available in an electronic version.



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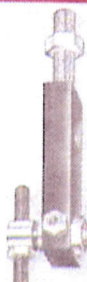
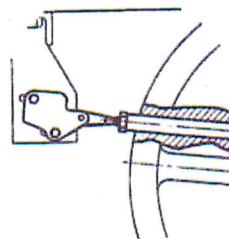
## Trip Valve

The Exline Trip Valve is used in conjunction with Temperature Sensor Strikers installed on moving, rotating, or oscillating components critical to the continued safe operation of the equipment. The Trip Valve is also used with overspeed safety equipment using a centrifugal plunger.

The Exline Trip Valve is available for initial installation and is compatible with existing systems using trip valves. No mounting or bracket changes are required. A superior design has practically eliminated maintenance usually associated with this type of valve. The unique

body design permits crankcase oil "flow-through" which minimizes carbon or varnish build-up in the piston area. No "O" rings are used. A reduced cross sectional area of the trip valve lever lessens the possibility of premature valve tripping due to cold crankcase oil turbulence during "start up."

The Vent Valve used to create the pressure drop in a pneumatic system can be easily removed and replaced without disturbing the setting or adjustments of the trip valve body. The Vent Valve uses a Viton™ seal rated at 375° Fahrenheit and has a 1/4" male NPT to connect it to the Pneumatic Control System.



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## Over-Travel Device

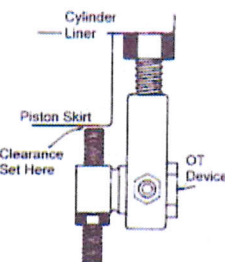
2.5 to 7.0 inches or 6.35 to 17.78 cm

The Exline Over-Travel Device is a wear indicator. The purpose of this device is to detect wear to connecting rod bearings and wrist pin bushings.

The Over-Travel Assembly is installed, in most applications, on the bottom of the cylinder liner. In the event of wear of the pin bushings, etc., a slight variation in piston travel occurs. The piston strikes the adjusting screw, breaking off the dowel. This creates a pressure drop in the

pneumatic control system.

- The device is excellent for protection of articulated rods on 2-cycle engines. Early wear detection saves extensive damage to the master rod.
- The device ideally can be applied for horizontal engine power rod and crosshead "override."



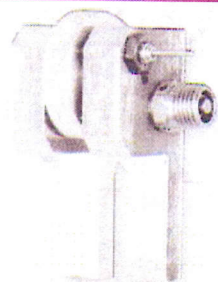
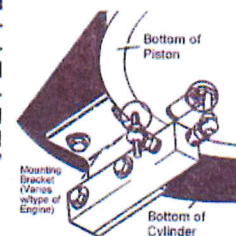
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## Dual Sensor Assembly

The Exline Dual Sensor Assembly provides compact and practical protection for piston pin bushings, cylinders and pistons. This assembly incorporates two devices as a single unit. One senses high piston skirt temperature and the other detects any wear resulting in piston overtravel.

The temperature sensor is installed on the inside diameter of the piston skirt. Any excessive temperature rise of the piston skirt will melt

the fuse-metal alloy permitting a spring-loaded plunger to extend toward the inside of the piston. The plunger strikes a break-off dowel creating a pressure drop in the pneumatic control system. Excessive downward travel of the piston also creates a pressure drop in the control system by striking a separate break-off dowel located on the same header of the "two-in-one" device.



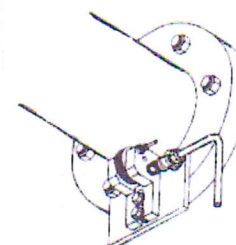
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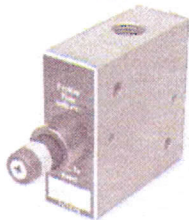
## Roller Type Wear Detector

The Exline Roller Type Wear Detector monitors horizontal or vertical movement of reciprocating or rotating parts. Movement against the knurled aluminum wheel opens a replaceable stainless steel vent valve and locks the wheel in shutdown position.

The Wear Detector is commonly used to

signal compressor rod drop in applications where low ambient temperatures, incompatible rod coatings, or synthetic lubricants rule out the use of heat sensitive friction-type devices. Also available in a vented version for explosive environments.





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### Positive Flow Indicator

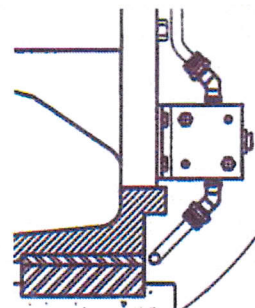
Designed for the protection of hydraulic and pneumatic systems, the Positive Flow Indicator will tell the operator at a glance the current condition of the equipment involved.

Panel mounted or installed in-line in any number of applications, flow of any magnitude from no-flow to full-flow is indicated. The device functions on a differential pressure principle with a number of calculated orifices

to control movement of the color coded indicator pin.

Simply push to reset. This automatically equalizes differential pressure. The indicator is not affected by atmospheric pressure.

Components are fabricated from anodized aluminum. This allows use in most environments including sour gas areas.

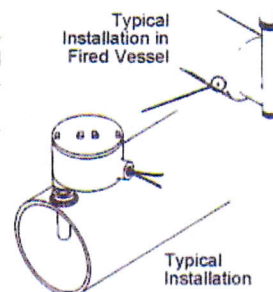


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### Electrical Temperature Sensor Assembly

The Exline Electrical Temperature Sensor Assembly is designed to open or close an electrical circuit when the device senses overheating. The assembly contains a temperature-sensitive eutectic alloy collar that holds a spring-loaded plunger in position to actuate a micro switch. At the predetermined temperature, the collar melts and releases the plunger, tripping the micro switch.

The switch housing is dust-tight, explosion-proof malleable iron. The stainless steel Thermowell and sensor assembly provide positive service in highly corrosive environments. Common applications on engines and compressors include lube oil, jacket water and discharge gas headers. The devices are also suited to heater treaters and similar fired vessels.



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### Electronic Devices Stationary/Thermowell

Exline electronic devices utilize a thermocouple in conjunction with the already proven design of the stationary sensor to allow continuous temperature readout plus remote, unattended, computer-monitored equipment operation. The Exline approach to temperature detection can now be applied to control circuitry to permit direct readout of each stationary bearing temperature and variable set points for alarm or shut down. These Thermocouple Devices are designed for initial installation or to replace pneumatic Exline Stationary Sensors.

They are also available in Thermowell configurations.

Standard units are Type "J" ungrounded thermocouples, housed in brass bodies, with a temperature range of approximately 32° F to 1380° F. Type "K" thermocouples and stainless steel bodies are also available to handle a broader range of applications. TFE-coated lead wires in a flexible braided stainless steel overlay are standard. Applications include bearing caps, slides, packing cases, headers, water jackets, and sumps.

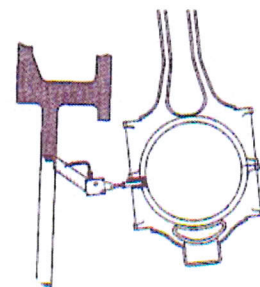


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### Electronic Trip Switch

Exline Trip Switches are used to protect moving, rotating, or oscillating components fitted with Exline Temperature Sensors. When tripped by sensors, these switches can automatically shut down equipment or trigger an alarm. The trip switch is available for initial installation and as a replacement for existing

trip valves. Normally no mounting or bracket changes are required on replacements, and the switch will work with any make or model tripping device. The Trip Switch can handle up to a 15 amp load and, in hazardous locations, must only be used with intrinsically safe controls.



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### Air Start Distributor

The Exline Air Start Distributor, designed for large stationary engines, has a patented feature which automatically retards air injection timing during the initial "breakaway" roll of the crankshaft. With the distributor set in this configuration, there are no "dead spots" and a much higher breakaway torque is achieved.

The air injection timing is accomplished by automatically rotating the distributor housing by means of an air cylinder and lever arm. When the engine stops, the distributor is set in

the retarded position. During the starting sequence, at approximately 20 rpm rate, the distributor position is advanced to the most efficient air injection point.

The Exline Distributor has adjustable pilot valves, push rods and a venting valve timing arrangement. These are adjusted to insure there being no Distributor "dead spots."

The Exline Distributor is installed in place of the original equipment distributor.