canfield connector
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SERIES EOS

TACTILE END OF STROKE PNEUMATIC / HYDRAULIC WELD FIELD IMMUNE SENSOR

General Description

The Canfield Connector EOS differential pressure switch is a compact device used, in place of proximity switches, to sense the end of stroke and/or clamping pressure of a linear actuator. The basic working principle of the EOS is that port “A” and “B” connect in the pressure line between the actuator and the valve. Using a highly accurate differential solid state pressure sensor, the pressures are compared electronically within the EOS. Extremely consistent and repeatable proximity sensing based on reference pressure (from exhaust line) and dependent pressure (from input line) bring an added dimension to end of stroke sensing. The EOS is unaffected by changes in stroke length. Trip points are adjustable based on forces applied by the actuator. This unit is especially useful for clamping various size work pieces, for spot welding applications, or where electronic magnetic proximity devices need to be constantly re-calibrated if the application requires changing trip points. Installation does not require specialized cylinders (i.e. magnetic pistons, special flanged end caps, specialized keyways, or aluminum barrels) and works especially well on short stroke cylinders. The EOS features an analog output for analysis of pressure profiles used in clamping, staking, swaging or welding. This output can be connected to data acquisition or S.P.C. programs for process monitoring and control. The EOS is 100% AC or DC weldfield immune since its function is not dependent on magnetic or electrical fields.

Patent # 5,585,536

Features

- Remote installations / Can be mounted away from the cylinder and work area
- Quick Connect circular electrical connector
- Sub-based pneumatic / hydraulic interface
- Senses proximity in both directions from one unit
- Simple connection between valve and cylinder
- One sensor for both ends of stroke
- Adjustable precise trip points
- Sensing independent of magnetic bands or metal proximity
- Designed for welding operations but can sense any clamping or end of stroke movement
- No electronics affected by stray magnetic fields
- User selectable sinking or sourcing output
- Weld field immune (AC or DC)
- Designed to NEMA 4 environmental protection

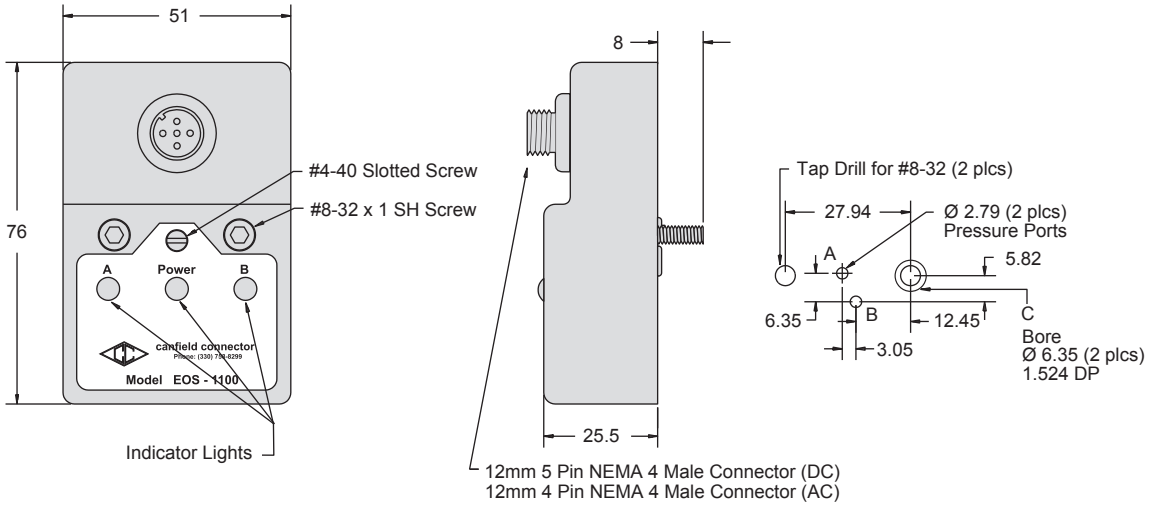
Technical Data

- Supply Volt. Range: 12 - 30 VDC
  24 - 48, 120 VAC
- Supply Current: 20 mA max.
- Current Output: .5 Amps AC / DC
- Analog Output: 3 -5 VDC (4v @ 0 PSI) 5 mA max.
- Sensing Range: 0 to 100 PSI
- Response Time: 10 ms
- Repeatability: +/- 0.1 PSI
- Hysteresis: 4 PSI max.
- Max. Pressure: 200 PSI
- Adjustability: 0.1 PSI
- Temp. Range: -25° to +85°C
- Enclosure Material: Polyetherimide
- Flame Rating: (UL94) V-O
- Media Compatibility: Liquids and gas compatible with glass, ceramic, silicone, RTV and nickel.

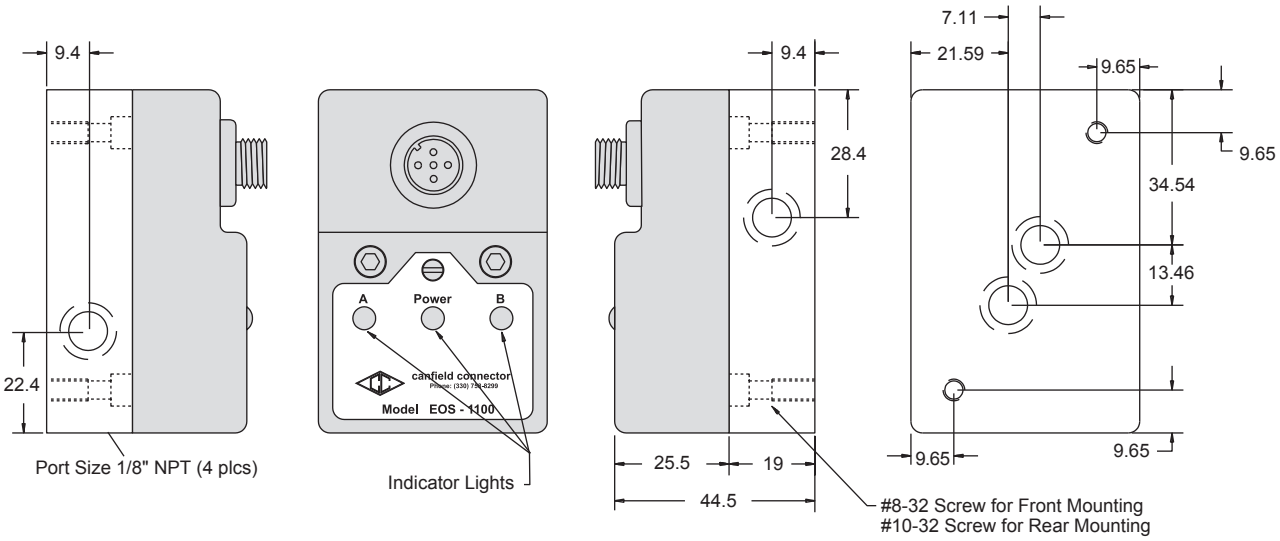
Dimensional Data

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

Base Module (no sub-base) option 0



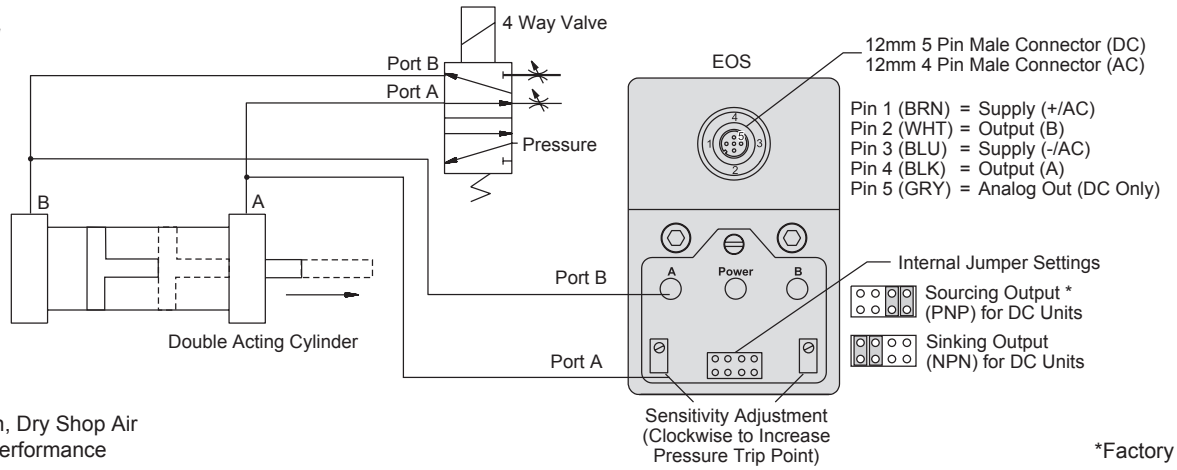
Base Module and Standard Sub-base option 1



Typical Application and Installation

Connect Anywhere Between Valve and Cylinder, but for Best Sensitivity Adjustment, Connect Between Cylinder and Flow Control.

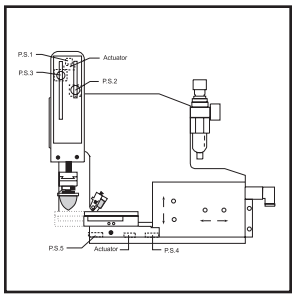
Figure 1



Note:
Use Clean, Dry Shop Air
for Best Performance

*Factory Settings

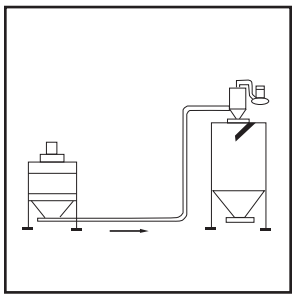
Pad Printing



Offset Gravure, commonly known as Pad Printing, uses air valves and cylinders in order to place high quality markings on custom made products. Although there are many configurations of machines, all commonly use a motion which moves the pad down to pick up the ink image. The next motion moves the pad into an up position, then the last motion has the pad moving down again to place the image on the product. Conventional stops and proximity switches are commonly used to accomplish this marking motion as shown by items P.S.1, P.S.2 and P.S.3 in the graphic.

EOS Advantage: Replace conventional proximity switches with the EOS. Very important in this process is the pressure applied to the cliche image and then again to the product. The EOS gives +/- 1% repeatability on this force essentially giving the cylinder a tactile "feel". Since the EOS triggers on precise pad force (independent of proximity), changing work piece height settings are eliminated. The result is highly repeatable images with lower setup costs.

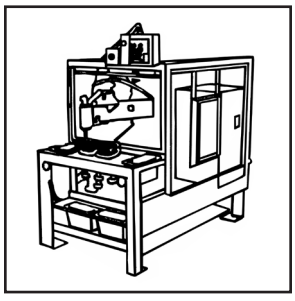
Material Handling



A pneumatic conveyor system uses the constant flow of low pressure air to move powder material at 3 PSI. Along the way the material often clogs and the flow becomes stopped.

EOS Advantage: Large 2 way air valves under high pressure are stationed along the way. The EOS is connected In the upstream and downstream flow of air. If the blockage creates a pressure differential in the line, the EOS senses, trips and sends a signal to the valve to throw a burst of air down the line in just the right area to unstop the clog.

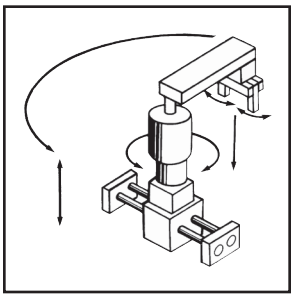
Riveting



Rivet machines use an anvil and swaging tool in order to join two or more parts together. One manufacturer offers a .250 inch diameter rivet which comes in many lengths from .250 inch to 3.5 inches. In an automated installation a ram cylinder is used to swage the cupped end of the rivet.

EOS Advantage: Changing rivet lengths play havoc with proximity devices which need elaborate adjustment systems in order to sense the ram stroke and deliver the correct amount of force. The EOS ensures consistency of force applied and triggers at the same force every time regardless of rivet length without proximity adjustment.

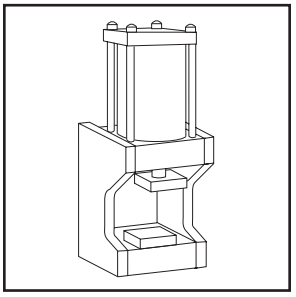
Pick and Place



Pick and place machines are a key feature in modern specialized assembly equipment. In fact, these machines are actually dedicated robots which have the responsibility of material handling of products in and out of processing work stations. While these machines vary broadly in their scope, it is a common application to have stacks of paper, metal slabs or for the use of our example, printed circuit boards (PCBs) waiting in a que to be used by the work cell. In the queuing area for a PCB assembly machine, PCBs are stacked one on top of the other. A pick and place robot feeds the PCBs one at a time into the equipment as is needed. An expensive DC drive mechanism is used in order to present the PCB to the exact height the pick and place robot needs in order to acquire it properly.

EOS Advantage: Using a pick and place robot equipped with a cylinder and EOS combination saves time and is more forgiving to variations in workplace height. The Z axis cylinder becomes positioned over the PCB stack which is stationary. The cylinder extends toward the PCB until the EOS senses that the proper preset force (tactile) is met and grasps the top PCB regardless of stack height. The EOS switches sending a signal immediately back to the control whereby the cylinder retracts and feeds the PCB into the machine. The next cycle repeats and the EOS senses regardless of stroke length until the last PCB is removed.

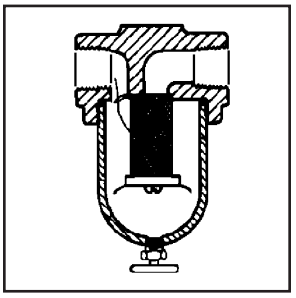
Wire Terminal Crimping



A well known maker of wire harnesses for automobiles cuts, strips and terminates wires in several operations on automated machinery. The problem was that their crimping tools would often times crush the terminations or not apply enough force to ensure a good continuity and crimp connection.

EOS Advantage: By applying the EOS to the ram cylinders of the termination presses, crimp forces were brought under control and quality of the process was attained. Now the machines apply the same force each time regardless of fluctuations in input pressures.

Field Service Indicator for Air Filters

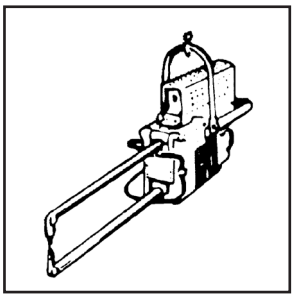


Many air systems need clean, consistent air quality for instrumentation and working components.

EOS Advantage: Connection of the EOS In the upstream (port A) and downstream (port B) will sense differentials of pressures and trigger when the pressure reaches a set point indicating electronically when filters are becoming obstructed with debris.

Typical Application and Installation

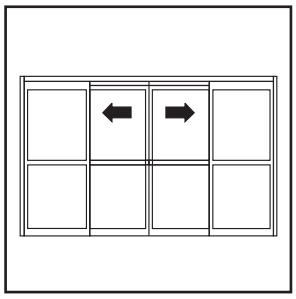
Resistance Welding



Many resistance welders used in the automotive industry rely on proximity devices in order to sequence the force, time and current needed to produce welds.

EOS Advantage: Since the EOS adjusts to finite triggering based on cylinder (tactile) force, precise trip points based on those forces save time to weld. The reason for this is that the weld can be accomplished without the need to add time frames for flow restrictions and pressure drops inherent in each system. The EOS also remains unaffected by weld fields as the principle of operation and does not use magnetism or inductive sensing. Additionally, differing thicknesses of metals and weld tip erosion can not change the trip points of the EOS. The EOS can be mounted either at or away from the cylinder. The EOS will not trip in low pressure situations as proximity sensors would ensuring quality welds. The EOS is also available with an SPC output in the DC version. Pressure profiles can be fed back into a computer data acquisition terminal where the pressure profiles for each individual weld can be stored for quality assurance.

Automatic Door Closing and Obstacle Sensing



Some doors and covers which are used to separate rooms in plants or sections of machinery are closed by use of air cylinders.

EOS Advantage: An EOS attached to the circuit replaces electric eyes and tape switches. Setting the EOS to the proper force, an obstacle of varying sizes can be placed anywhere along the path of the door. A resistance great enough to create a pressure differential signals the control that an obstacle is in the way of normal travel which in turn reverses the travel of the door. A conventional proximity device is in place at the end of the door travel which negates the EOS output and signals to the control that the door is in fact closed. The EOS gives the door a tactile response. In this application the EOS is simply a single component of a more elaborate safety system.

How It Works

Refer to Schematic (***Figure 1)*** and Graph (***Figure 2***).

1.) Four way valve shifts switching pressure from port “A” to port “B”.

2.) Pressure builds in line “B” and drops in line “A” until cylinder load / friction are overcome.

3.) Dependent upon the response time and valve flow, “B” line pressure exceeds “A” line pressure.

4.) Friction / load overcome, cylinder travel begins.

5.) End of stroke or clamping force begins, “B” line pressure increases and “A” line pressure decays.

6.) When the pressure differential between port “A” and “B” (B PSI - A PSI = Δp) increases to the preset trip point output “B” will activate.

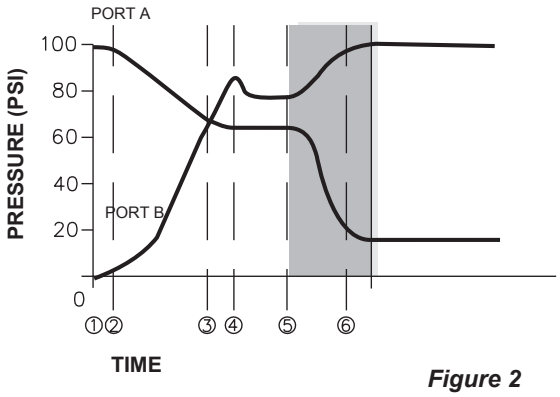


Figure 2

The sensor can be set to trip anywhere in the shaded region depending on desired clamping force and/or delay.

Ordering Information

EOS -1 □□□

Supply Voltage
1 - 12-24 VDC
2 - 24-48 VAC *
3 - 120 VAC *

* AC voltage versions are not available with analog output

Module Style
0 - Module only
1 - Module and standard sub-base

Cordset
0 - Without cordset
1 - With 6 ft straight female cordset
2 - With 6 ft 90° female cordset

Ordering Example:

EOS-1111

12-24 VDC, module and subbase, 6 ft. straight female cordset