

## When Shock and Vibrations Cause Decreased Longevity

Manufacturers of hydraulic cylinders, and machinery using hydraulic cylinders that are looking for automation, need to know the positioning of the cylinders to help automate the process.

Position monitoring should be performed using linear position sensors installed inside the cylinder; they monitor the piston's position.

Some use the old-fashioned potentiometers to accomplish this task; however, the most popular position sensor for hydraulic cylinders today is the more modern type, Magnetostrictive Linear Displacement Transducers, also called LDT.

Magnetostrictive position sensors provide accuracy, speed, and longevity to a wide variety of instrumentation. Due to the design of the machines that need position monitoring, Gemco manufactures linear position sensors in designs such as the Profile style, Rod and barrel style, both used for manufacturing machinery. However, for the Hydraulic cylinders, the sensor needs to handle pressure and temperature swings associated with hydraulic cylinders; therefore, Gemco recommends the 953 VMax Rod-Style Linear Displacement Transducer.

### ► Problem

A Hydraulic cylinders can be used in various applications to help move heavy loads, such as those found in Lumber and Steel Mills. These hydraulic cylinder applications can be subject to extreme shock & vibration as the cylinder accelerates, stops, and changes directions.

In the Lumber industry, the cylinder and sensors are subject to significant amounts of shock and vibration as the log is turned into dimensional lumber.

In the Steel Industry, the cylinders and sensors can be subject to high temperature, shock, and vibrations.

Downtime of the machinery in either of these industries can be very costly. Many hydraulic cylinder manufacturers contact AMETEK Factory Automation to achieve a long-lasting solution in hostile applications.

### ► Solution

AMETEK manufactures Linear Transducers to survive in the most rugged and hostile environments. The product engineers of AMETEK Factory Automation will evaluate the need of the individual machine before recommending the ideal linear position sensor.

For heavy machines like the ones found in the lumber and steel industries, the product engineers often suggest the Gemco 953VMax Linear Displacement Transducer. The LDT provides the necessary accuracy and is proven to handle up to 30G of random vibration.

### ► Installation

Industrial Hydraulic cylinder ports are commonly machined using SAE J1926/1, providing an O-ring seal and mounting threads in the cylinder's end cap. The piston is typically gun-drilled to accept the LDT's guide tube; a magnet is installed on the piston rod's face inside the hydraulic cylinder.

Position magnets can be installed on the cylinder piston by one of two methods: either on the face of the piston or counterbored into the piston. Face mounting requires the use of non-ferrous screws to fasten the magnet to the piston.

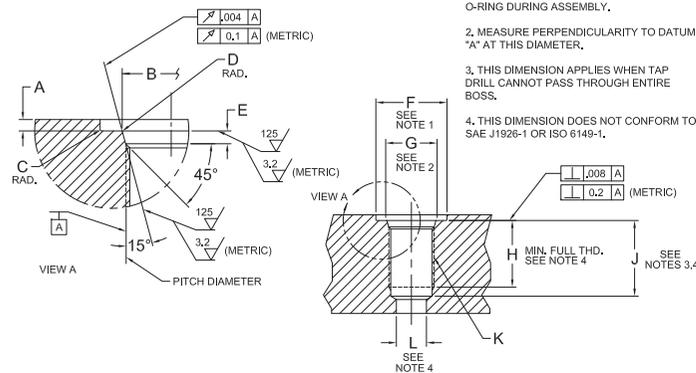
Counterboring requires a snap ring to hold the recessed magnet in place. In either case, the magnet must be separated from the surface of the piston by a non-ferrous spacer.



With the Linear position sensor, Gemco provides an O-ring seal and mounting threads to meet the SAE O-ring port specification commonly used for machining the cylinder.

The Gemco 953 VMax Rod Style LDT is installed into these threads and tightened to torque between 30 to 35-foot pounds.

**Port Detail (SAE J9226/1)**



NOTES:  
 1. IF FACE OF PORT IS ON A MACHINED SURFACE, DIMENSIONS "A" AND "F" NEED NOT APPLY, PROVIDED RADIUS "D" IS MAINTAINED TO PREVENT DAMAGE TO O-RING DURING ASSEMBLY.  
 2. MEASURE PERPENDICULARITY TO DATUM "A" AT THIS DIAMETER.  
 3. THIS DIMENSION APPLIES WHEN TAP DRILL CANNOT PASS THROUGH ENTIRE BOSS.  
 4. THIS DIMENSION DOES NOT CONFORM TO SAE J1926-1 OR ISO 6149-1.

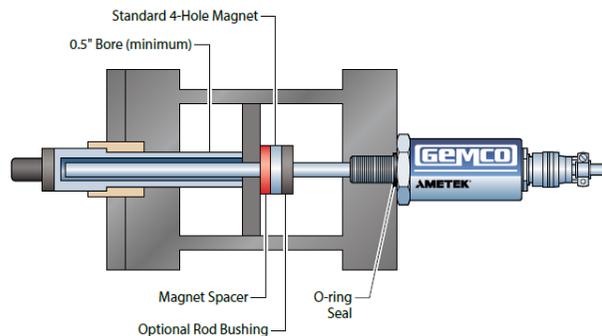
THREAD "K"	A (MAX.)	øB	C (MAX.)	D	E	øF (MIN.)	øG (MIN.)	H	J	øL
3/4-16 UNF-2B	.094	.813 ± .002	.015	.106 ± .002	1.18	.866	1.100	1.250	.500	
M18 X 1.5	2MM	19.9/19.8MM	0.4MM	0.2/0.1MM	2.8/2.4MM	26MM	24.5MM	14.5MM	17MM	12.7MM

PORT DETAIL (SAE J1926-1)

**► What About Service of already mounted pistons?**

All Gemco 953VMax Transducers have AGC (Automatic Gain Control) feature. The AGC feature is very beneficial when retrofitting a cylinder with a transducer from another manufacturer installed previously.

On power-up, the 953 VMax LDT sends a signal down the guide tube to find the magnet installed on the piston. The 953 will automatically adjust its internal signal strengths to match the magnet installed in the cylinder.



**► Benefits**

AMETEK Factory Automation engineers draw on vast experience to create Linear Transducer solutions for hydraulic cylinder.

- Provides a durable source of position feedback
- High Accuracy
- Programmable Zero and Span
- Lab tested up to 1,000 G's of shock - IEC 60068-2-27
- Lab tested up to 30G of vibration - IEC 60068-2-6
- IP68 rated
- Simple installation and Maintenance
- Offers a variety of signals to match user's interface
- Non-contact signal technology eliminates wear on equipment
- Increased productivity

