



## Position Sensors Handle Hostile Environments

**These hermetic position sensors work with hydraulic systems at high pressures and temperatures to provide load leveling under some of the most severe operating conditions.**

**P**osition sensors are critical to many military electronic systems, and the HSTA 750 Series of AC-operated linear variable differential transformer (LVDT) position sensors from Macro Sensors ([www.macrosensors.com](http://www.macrosensors.com)) are rugged stainless-steel and hermetically sealed units built to withstand the rigors of military environments. They are available in position measurement ranges from  $\pm 0.050$  in. ( $\pm 1.25$  mm) to  $\pm 10.0$  in. ( $\pm 250$  mm), with worst-case linearity error of  $\pm 0.25\%$  for a full-range (maximum travel) output.

High-temperature LVDT position sensors such as the HSTA 750 Series units are electromagnetic transducers that can translate physical motion into an electrical signal. They consist of primary and secondary coil windings and a low-mass core that moves through the secondary windings. AC energy from the primary winding is coupled through the core to the secondary windings, with the position of the core resulting in a differential output AC voltage. In a null position, the output is zero. When the core changes direction through the null position, the output voltage shifts 180 deg. to denote the direction change.

The rugged, high-temperature HSTA 750 Series LVDT linear position sensors are suitable for a plethora of military and defense applications. These include, but are not limited to, fuel/oil-level monitoring, artillery-platform load leveling, and controlling airplane flight surfaces and rudder positions on submarines and other sea crafts. Essentially position feedback components for closed-loop servo systems, members of the HSTAR 750 Series hermetically-sealed position sensors can safely

endure extremely harsh environments and survive temperature spikes to  $+400^\circ\text{F}$ . Depending on redundancy and reliability requirements, they can perform as single- or multiple-channel components. Typically, they are in quad-channel aircraft, such as the C-17 and Joint Strike Fighter (JSF) aircraft.

Viable for use with land vehicles, HSTAR sensors act as feedback devices on active suspensions for both load leveling and artillery platform



**The ICT080 in-cylinder linear position contactless sensors handle pressure levels to 670 bar and temperatures to  $+200^\circ\text{C}$ .**

leveling. Pairing the sensors with hydraulic actuators ensures quick, precise leveling even in motion. Teaming with hydraulics and a suitable gyro system they measure roll and yaw—by way of example, enabling tank canons to shoot on the run as opposed to a stop-and-shoot scenario.

In addition to the aforementioned defense applications, HSTAR LVDT position sensors are viable for monitoring moving surfaces such as the skew of flaps of a Boeing 777, the exhaust nozzle of an F-14, and the hydraulic reservoir of an F-22. The LVDTs are also in the field monitoring

the position of the Thrust Reverser vanes of the 787.

The AC-powered HSTAR 750 sensors are available with standard options such as 19-mm or smaller diameters, metric threaded cores, and low mass cores. Custom sensors for immersion in pressurized fluids and exposure to radiation at  $3 \times 10^7$  rads for 40 years are also available. In contrast, the ICT080 in-cylinder linear position contactless sensors from Penny + Giles combine the features of LVDTs and potentiometers, also for use in demanding environments.

They are designed to handle extreme conditions, to working pressures of 670 bar and operating temperatures to  $+200^\circ\text{C}$  (see figure). The components sport a body diameter of 8 mm, allowing for easy installation into tight cylinders.

For use on small-bore actuators, the sensors offer a choice of internal or threaded flange mounting configurations to suit tie-rod, welded, and rear clevis-mounted cylinder types in stroke ranges from 25 to 1000 mm. Two core configurations offer the choice of either a sleeved or threaded core. Other sensor features include infinite resolution, absolute measurement, flexible mounting styles, rugged stainless steel construction, and CE approval.

A separate module, the EICT, performs signal conditioning at distances to 10 m from the sensor. The IP66-compliant module with adjustment for zero and gain operates from a  $+10$  to  $+60$  VDC source and provides a wide range of output voltages, as well as a standard 4-to-20-mA option.

For more information on Macro Sensors HSTAR 750 Series, view a datasheet at <http://www.macrosensors.com/downloads/datasheets/HSTA750series-080307.pdf> or call MACRO SENSORS, Pennsauken, NJ. (856) 662-8000. For more details on the ICT080 linear position sensors, visit <http://www.pennyandgiles.com/Military-Ground-Vehicles-mc-20,1,,.php> or call Penny + Giles, City of Industry, CA. (626) 480-2150. **DE**