Position Detection in Aerospace Applications
An Application Note

Background
Aerospace design engineers require infinite resolution linear position solutions that are reliable in harsh environments to provide high aircraft performance from a stable supplier. These customers also require engineering support and faster design cycle time to meet aircraft project milestones. Honeywell’s Linear Variable Differential Transformers (LVDT) platform does this by offering a pre-validated, flexible, configurable platform with a variety of channel, stroke, mounting, and termination options as demonstrated by our heritage in providing high quality products within the aerospace industry.

Solution
Honeywell’s new aerospace LVDT provides infinite resolution linear position solutions designed for use in harsh environments. They are an ideal product to be used on next generation aircraft which require expedited design cycle time from an experienced, stable supplier with an extensive aerospace product install base. LVDTs can be used to measure the positions of numerous mechanisms throughout an aircraft. Common mechanisms employing LVDTs for system measurement are:

- **Primary and secondary flight controls (PFC/SFC) – Flap, slat, and spoiler position.** LVDTs can be used to detect mechanism positions within flight control actuation systems. For aircraft with multiple slats or flaps, it is imperative to ensure that all panels/surfaces work in concert. It is critical that there are no left versus right asymmetries in the flaps and slats when they are deployed.

LVDT position data supports this goal by helping to direct flight control actuation systems, thereby contributing to the proper execution of pilot inputs to the controls (which can also internally utilize LVDTs). The data can also be used to drive the flight instruments that provide feedback to the pilot, and to provide the flight computer with data used in other aircraft system logic. (ex: flaps detent changed by pilot and flap in transit and position displayed on cockpit instrument. This is important to the pilot because a pilot cannot visually see the flaps from the cockpit).

- **Engine mechanisms and valves.** LVDTs can also be used to detect positions of engine linkages or valve states. They may be used on engine linkages and many types of aerospace valves to detect movement and current position, then provide that data for use in visual indication of movement to the pilot via instruments in the cockpit and/or within the flight control computers.

Honeywell’s LVDT delivers enhanced reliability in engine mechanisms and valves through improved mean time between failures (MTBF) through industry leading winding techniques and high-strength material selection.

- **Nose-wheel steering.** LVDTs can be used to detect the state of the landing gear nose wheel. As with engine mechanisms and valves, Honeywell’s LVDT delivers enhanced reliability through improved MTBF through industry leading winding techniques and high-strength material selection.

- **Pilot controls.** LVDTs can be used to detect movement and current position of the yoke. The primary flight control inputs are then transferred to the flight control computer for use by control surfaces. They deliver enhanced reliability and durability through improved MTBF through industry-leading winding techniques and high-strength material selection. Their infinite resolution linear position provides exact pilot control system positioning.
Features and Benefits

- Platform approach: Reduces customer design cycle time and increases revenue (speed to market) while minimizing cost to serve (minimizes engineering investment)
- Ease of integration: Install time, rig point position to eliminate shimming
- Enhanced reliability: Improved MTBF through industry-leading winding techniques and high-strength material selection
- Supplier stability: Minimizes cost to serve and ensures reliable, timely supply

Figure 1. LVDT Position Measurement Applications for Aircraft

1. Pilot controls
2. Nose-wheel steering
3. Engine mechanisms and valves
4. PFC/SFC: slat position
5. Landing-gear systems
6. PFC/SFC: spoiler position
7. PFC/SFC: flap position

- Global engineering and application expertise: customers with a global footprint can rest assured that there is local support for new applications and troubleshooting.
**WARNING**

**PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

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**WARNING**

**MISUSE OF DOCUMENTATION**

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

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**Warranty/Remedy**

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective.

The foregoing is buyer’s sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

While Honeywell may provide application assistance personally, through our literature and the Honeywell web site, it is buyer’s sole responsibility to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this writing. However, Honeywell assumes no responsibility for its use.

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