

APPLICATION NOTE

Aerospace Fuel Systems, Flow, Temperature and Pressure Switches and Transmitters



Safe and reliable operation of Aircraft Fuel Systems is vital to support critical aircraft operation in Commercial and Military fixed wing and vertical lift aircraft. Flow detection, flow rate measurement, temperature and pressure sensing in fuel system applications is a challenge due to the requirements of mass flow measurement, wide sensing range capability, low/high temperature operation, and explosion-proof compliance. In addition, high reliability, maintenance free service and low-pressure drop is vital to the continual, economic and safe operation of the aircraft and its systems. Simultaneous detection of flow and temperature is an additional design benefit that reduces the number of measurement sensors required to meet system operation parameters. FCI has the perfect solution for this important requirement with its fully qualified Liquid Flow, Temperature and Pressure product lines.



Application Challenges

- Aircraft Fuel Systems require extremely reliable, wide range sensing capability in elevated vibration service to alarm changes in fuel system operation.
- Fuel Flow, Temperature and Pressure Sensors must operate in the harsh aircraft environments found in aircraft cabin and unpressurized locations that include widely varying temperature, pressure, and vibration conditions.
- Commercial and military aircraft components must meet stringent qualification requirements including vibration, Electrical Magnetic Interference (EMI), Radio Frequency Interference (RFI), and high MTBF in salt/fog environments defined by the commercial and military specifications.
- Traditional mechanical devices do not provide simultaneous, independent mass flow and temperature outputs from a single sensor.
- Mechanical switches and meters are inherently unreliable due to fouling and wear of moving parts resulting in very low Mean Time Between Failure (MTBF) performance.
- Differential pressure and mechanical turbine meters have narrow flow range capability, not sensitive to low flow rate detection, and require additional pressure and temperature sensors to measure mass flow rate.

Aircraft Installation Requirements

- **Pipe and Duct Diameters:** 1 to 10 inches+ (25 to 250 millimeter+) fuel piping
- **Typical Fuel Flow/Temperature Range:** 0.1 to 20+ Standard Feet/Second (0.03 to 3+ Standard Meters/Second) available with independent temperature range between -40 to 350+° F (-40° to 175+° C)
- **Media:** Liquid Fuels including JP8, JP5, JP4 and Jet A
- **Fluid Operating Pressures:** 0 to 200 PSIG (0 to 1,380 kpa)
- **Fluid Operating Temperatures:** -40° to 350° F (-40° to 175° C)
- **Environmental Temperatures:** -40° to 250° F (-40 to 125° C)
- **Signal Outputs:** AS-FT, AS-TT & AS-PT 0.5 to 4.5 Volts DC and 0.5 to 9.5 Volts DC; AS-FS, AS-TS & AS-PS - Open/Closed Open Collectors
- **Power Input:** 28 Volts DC Aircraft Power Input





Solution and Benefits: FCI Thermal Dispersion Fuel Flow, Temperature and Pressure Switches and Transmitters

- No moving part thermal dispersion technology provides maintenance free operation and direct mass flow measurement
- Full commercial and aircraft qualification: DO160G, MIL810
- Single flange mount – AS-FS & AS-FT; Single straight thread mount – AS-TS, AS-TT, AS-PS & AS-PT
- Stainless Steel wetted parts and enclosures resists corrosive salt water/fog exposure
- Factory Calibrated across wide flow and temperature range to customer's specified output
- Normally Open or Normally Closed open collector configurations available – AS-FS, AS-TS, AS-PS Switches
- Proven reliability: 50,000+ hours MTBF maintenance free service life
- Compliance with ISO9001 and AS9100 Quality Certification