

## Test Stands for Aerospace Hydraulic Testing

### An Application Note

#### Background

Throughout an aircraft, there are many systems and subsystems that utilize hydraulics. In flight, these systems help ensure pilot control, along with safety and reliability of the aircraft. Hydraulic systems are also used for control, monitoring, indication, power generation, and fluid storage/distribution. Aircraft actuator hydraulics are built into landing gear, aircraft flaps, and weapon systems. Throughout the plane, they perform critical functions, and may require certification prior to inclusion to an aircraft build.

The actuator's hydraulic system must be rigorously tested and certified by the subcontractor before sending to the aircraft manufacturer. Through their performance/test analysis, these systems are certified to operate as stipulated.

Test stands are designed to test aircraft actuators and hydraulics by simulating the actuators in various directions that they will likely see in use. Equipped with products to measure actuator speed, load, current, pressure, voltage, and more, the stand's measurement devices must be very accurate and reliable to deliver factual results for certification.

#### Solution

Subcontractors test and certify their hydraulic systems before shipping them to the aerospace manufacturer as part of the acceptance testing for product quality control. Test validation provides that the systems are properly functioning through the collection of data, control data, and validation results. Pressure transducers play an important role in measuring and certifying the flow and rate of the hydraulic fluid within the aircraft actuator being tested.

Where hydraulic fluid is running through the system, Honeywell's Model TJE pressure sensors are connected to measure the hydraulic fluid pressure in these lines. The points of connection and number of sensors vary, but they may be inserted at either the front or end of the direct fluid line.

The test stand's data acquisition system takes the Model TJE's 0 Vdc to 5 Vdc output for recording and reporting purposes. Honeywell's Model TJE helps to measure the aircraft actuator functionality to ensure repeatable performance during aircraft utilization.



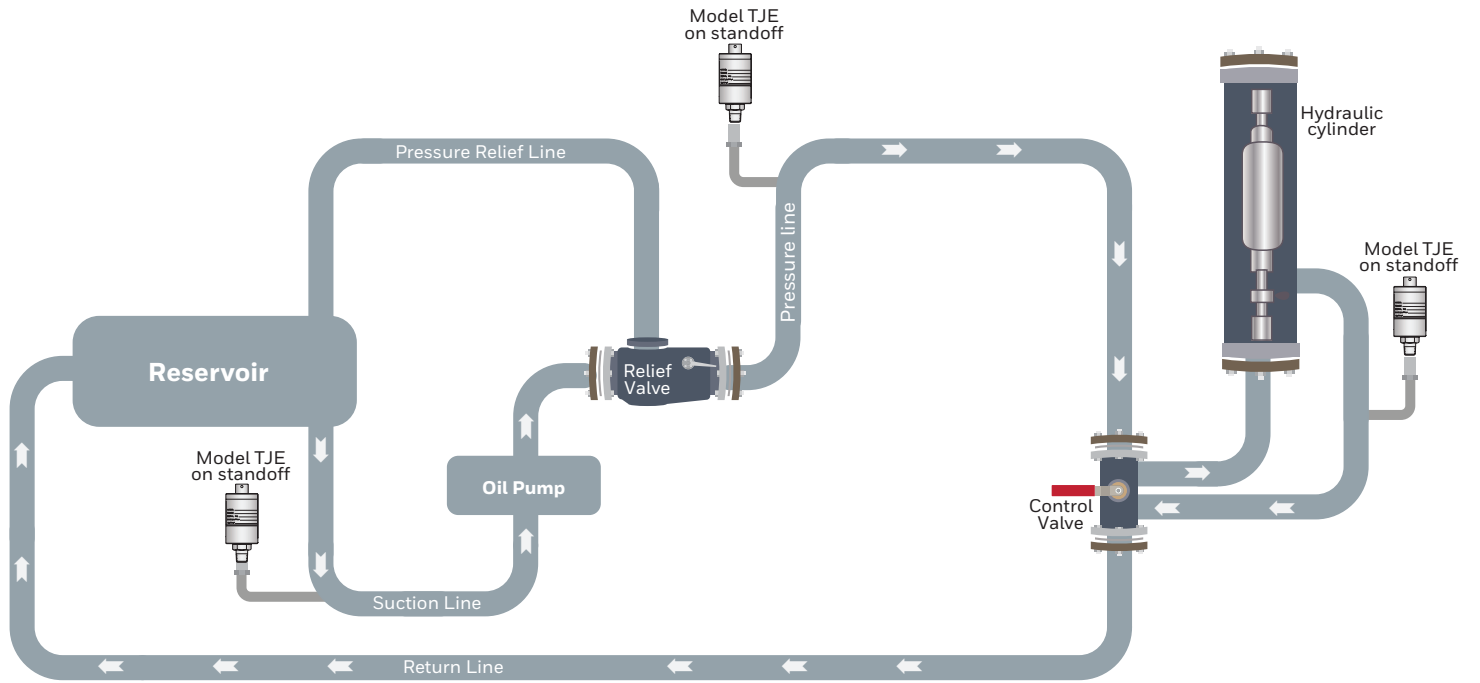
The gage Model TJE is a strain gage based transducer with unique features such as a "true gage" design which utilizes all-welded stainless steel diaphragms that hermetically seals the strain gage circuitry from media contamination, but allows for slight atmospheric pressure changes thus providing an accurate and stable zero reference in varied transducer environments.

The absolute Model TJE has an all-welded vacuum reference chamber assuring long-term stability. "Honeywell pressure sensors provide durable, repeatable performance in aerospace test stand applications.

#### Features and Benefits

- 0.1 % accuracy
- 0.10 %FS linearity
- 0.0025 % FS/°F temperature effect
- 1 psig/a to 60000 psig/a range
- mV/V, 4 mA to 20 mA, 0 Vdc to 5 Vdc, or 0 Vdc to 10 Vdc output
- All-welded, stainless steel construction
- Intrinsically safe available (2N option only)
- Five-point calibration
- CE approval

**Figure 1. Model TJE Pressure Transducers Used in an Hydraulic Test Stand**



**⚠️ WARNING**  
**IMPROPER INSTALLATION**

- Consult with local safety agencies and their requirements when designing a machine control link, interface and all control elements that affect safety.
- Strictly adhere to all installation instructions.

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

**Warranty/Remedy**

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement 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.**

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