

HydraElectric™



Breakthrough Technology in Sensors and Switches



PRESS KIT

Contact

MEDIA CONTACT

Cory Plachy

818.843.6211

marketing@hydraelectric.com

PRESS RELEASES

<https://hydraelectric.com/about/news-2/>

SENSOR & SWITCH PRODUCT INFO

<https://hydraelectric.com/sensors/>

<https://hydraelectric.com/switches/>

PROGRAMS

Hydra-Electric products have been used across a wide variety of commercial and military programs.

<https://hydraelectric.com/programs/>

WHITE PAPERS

<https://hydraelectric.com/knowledge-center/blog/>



<https://www.linkedin.com/company/hydra-electric-company/>



<https://twitter.com/hydraelectric>

About Hydra-Electric Company

Hydra-Electric Company is a designer and manufacturer of breakthrough technology in sensors and switches for the aerospace industry. Its suite of solutions includes pressure, temperature, flow and multi-function sensors and switches. Since 1948 the company has been dedicated to research and development, and holds numerous patented/patent-pending designs. Headquartered in Burbank, California, Hydra-Electric diligently focuses on innovation, quality, accuracy, and reliability.

Hydra-Electric's sensing solutions excel where older technologies fail. They are designed to deliver high accuracy, extend service life, eliminate pressure spike damage, and remain safe at millions of pressure cycles. Hydra sensors feature innovations able to survive high speed impulses, extremely high cycle counts, as well as pump ripple, and to stay protected from electrical transients, severe environmental conditions, and electromagnetic interference.

Hydra-Electric products meet exceedingly high standards for accuracy, durability, and manufacturing excellence. Hydra-Electric is ISO9001:2015 and AS9100D Certified, ITAR Compliant, and is an Authorized FAA Repair Station.



3151 Kenwood Street, Burbank, CA 91505 | 818.843.6211

www.hydraelectric.com | info@hydraelectric.com

Hydra-Electric Beginnings

Over seven decades ago, Hydra-Electric developed and patented the snap action sensing of pressure by means of the negative rate disk spring, employing an additional trim spring for pressure adjustment. This environmentally superior powered snap action design has since become the standard for critical aerospace applications.

As the sole supplier of negative rate disk spring pressure switches, Hydra-Electric rapidly grew, furnishing pressure switches for fuel, hydraulic, pneumatic airspeed and barometric (altitude) applications for most high performance jet powered aircraft programs. Hydra-Electric continued to innovate the negative rate spring and pressure sensing systems, applying its designs to thousands of aircraft and missile systems.

**AEROSPACE
INDUSTRY
PIONEER** Hydra-Electric has played an integral role in the growth and innovation of the aerospace industry, a distinction no other developer of switches and sensors can claim. From our first pressure switch—designed for the Lockheed T-33—to our pressure and temperature sensors based on breakthrough technology, we've cultivated a reputation as an innovator in the industry.

Historical Overview

In 1948, Hydra-Electric invented the “negative rate disk spring” design that is still the standard for most aerospace pressure, temperature and liquid flow switches.



Hydra-Electric products were selected for numerous early military and space applications:

P80, F86, F100 through F104, X15, SR71 and U2 Aircraft; Mercury, Gemini, Saturn, and Apollo Space Programs



Over the past seven decades, Hydra’s solutions have been used in hundreds of commercial and military applications:

- ▶ Fixed wing and rotary aircraft
- ▶ Missiles
- ▶ Rockets
- ▶ Ships
- ▶ Armored tanks
- ▶ Submarines
- ▶ UCAVs



Hydra-Electric sensors and switches across a wide range of aircraft systems

- ▶ Environmental control systems
- ▶ Landing gear systems
- ▶ Engine systems
- ▶ Flight control systems
- ▶ Hydraulic systems
- ▶ Filter systems
- ▶ Anti-icing systems
- ▶ Fuel systems
- ▶ Crew oxygen systems
- ▶ Force fight hydraulic systems
- ▶ Waste water/potable water systems
- ▶ and more

HydraElectric A PIONEER IN AVIATION HISTORY

1948

COMPANY FOUNDED

Hydra-Electric is founded, and invents the first negative rate disc spring. Fuel tank valves are Hydra's first products.

1950

FIRST CUSTOMER



Lockheed becomes Hydra-Electric's first switch customer.

1952

B-52



Hydra's hydraulic pressure switches are utilized on the B-52.

1954

BOEING 707



Boeing purchases Hydra's switches for the fuel and pneumatic systems of its first jet airliner, the Boeing 707.

1955

LOCKHEED U2



Lockheed selects Hydra-Electric for the U2, its reconnaissance aircraft nicknamed "Dragon Lady."

1956

LOCKHEED L-1649A



Hydra-Electric designs switches for Lockheed's premium passenger aircraft, the Constellation "Starliner."

1970

BOEING 747



The first wide body jumbo jet, the Boeing 747 incorporates hydraulic and fuel flow switches from Hydra-Electric.

1969

SATURN V ROCKET



Switches from Hydra-Electric are utilized on Saturn V rocket used to transport Neil Armstrong and team to the moon. Company's products are used as part of the fuel and pneumatic systems.

1963

DASSAULT, LEARJET



Hydra-Electric products are selected by two pioneering biz jet programs – Dassault Falcon 20 (left) and Learjet 23 (right)

1961

NASA



Hydra-Electric develops switches for Atlas launch vehicle, part of NASA's Mercury project for human spaceflight in which John Glenn was the first U.S. astronaut to orbit the earth.

1958

GULFSTREAM I



Hydra-Electric is selected to provide all the pressure switches on the Grumman Gulfstream I, a twin turbo-prop business aircraft.

1974

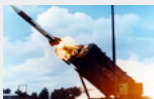
F-14 TOMCAT



Hydra-Electric supplies pressure switches for the Grumman F-14 Tomcat.

1975

PATRIOT MISSILE



Company's switch technology is utilized on the Raytheon Patriot Missile.

AH-64 APACHE



Hydra's switches selected for Army's AH-64 Apache – a 4-blade, twin-engine attack helicopter still in use today.

1981

F-117A NIGHTHAWK



Program incorporates Hydra-Electric's products for its stealth ground-attack aircraft.

1983

EMBRAER



Began providing sensing technology for Embraer, beginning with the EMB 120 and other programs to follow.

1987

AIRBUS A320



Hydra's hydraulic switches are utilized on this commercial aircraft program.

2006

AIRBUS A380



Hydra-Electric provides high performance sensing instruments for this wide body commercial aircraft program.

1997

LOCKHEED F22 RAPTOR



Hydra-Electric provides high performance sensing technology on this all-weather stealth fighter developed for USAF.

1994

EUROFIGHTER TYPHOON



Hydra-Electric provides fuel switches for the Eurofighter Typhoon.

1991

MCDONNELL DOUGLAS C-17



Hydra-Electrics provides sensing instruments including hydraulic switches aircraft.

1989

BELL TEXTRON V22 OSPREY



Hydra-Electric provided numerous different switches for this rotary wing aircraft.

2009

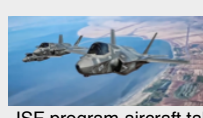
BELL 429 GLOBALRANGER



Hydra-Electric's high performance sensors are utilized in the light twin-engine helicopter.

2011

JOINT STRIKE FIGHTER



JSF program aircraft take advantage of Hydra-Electric's breakthrough technology in high performance pressure sensors.

2012

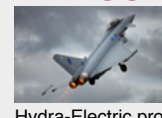
A320 NEO



Hydra-Electric provides engine switches for the A320 Neo.

2013

EUROFIGHTER TYPHOON



Hydra-Electric provides high performance sensors for world's most advanced swing-role combat aircraft.

2015

PILATUS PC 24



Hydra-Electric provides sensors for the environmental controls system of this twin-engine business jet.

Future

MORE
Hydra-Electric innovations on the way.



A350-XWB

Over 20 of Hydra's switches and sensors were selected for the Airbus long haul, twin-engine wide-body jet airliner.

2017



RTCA

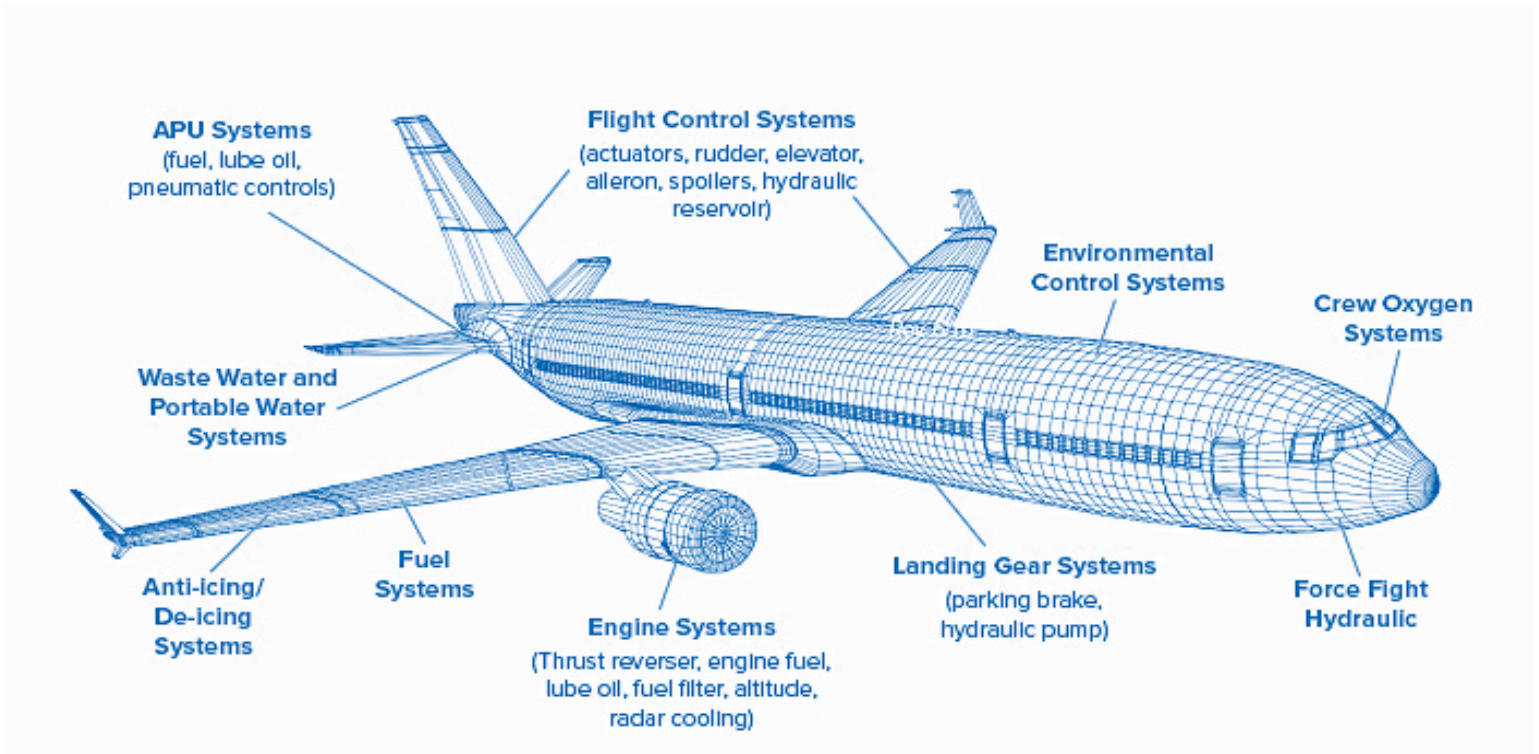
DO-160 Level 5
Hydra-Electric sensor designs achieve highest level of lightning protection for the most severe electromagnetic environments.

2016



APPLICATION

Hydra-Electric's sensors and switches have been put to the test across a wide range of critical aircraft systems



for a variety of media
OIL | FUEL | HYDRAULIC | AIR | BLEEDAIR

Hydra-Electric Sensors



RELIABLE
ROBUST
TECHNOLOGY



Highly Robust Thin Film Sensor

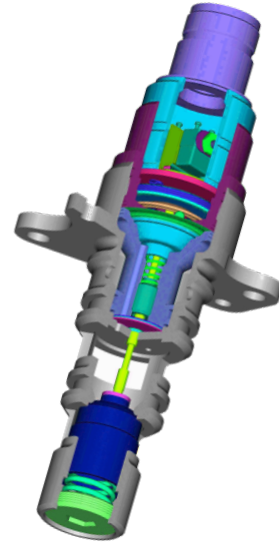
Patented "Zero Error" Automated Compensation

Scaling Any Electrical or Pressure Parameter

Unmatched Endurance Cycle Limit

Hydra-Electric Switches

INDUSTRY
STANDARD FOR
PERFORMANCE
AND RELIABILITY



Highest Level of Accuracy for Achieving Deadband

Manufacturability
We have perfected the rough set.

Design Capabilities
Standard. Enhanced. Custom.



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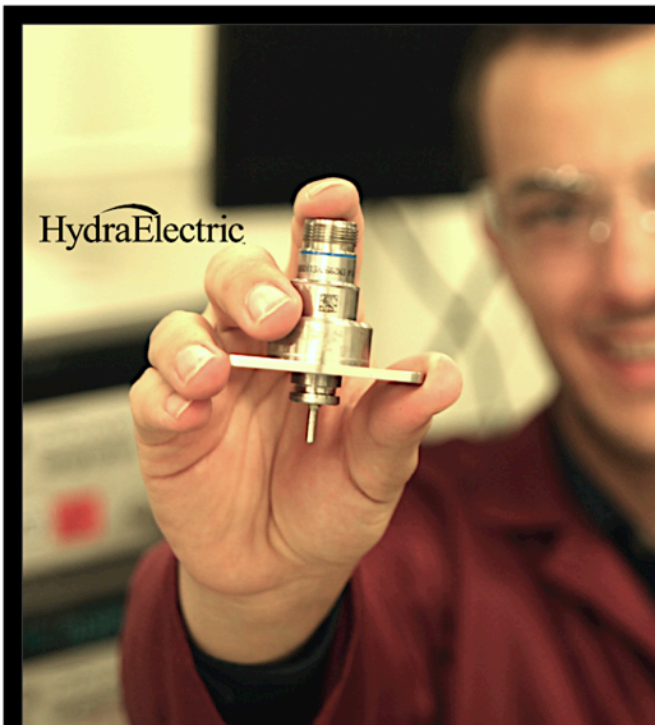
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Photos



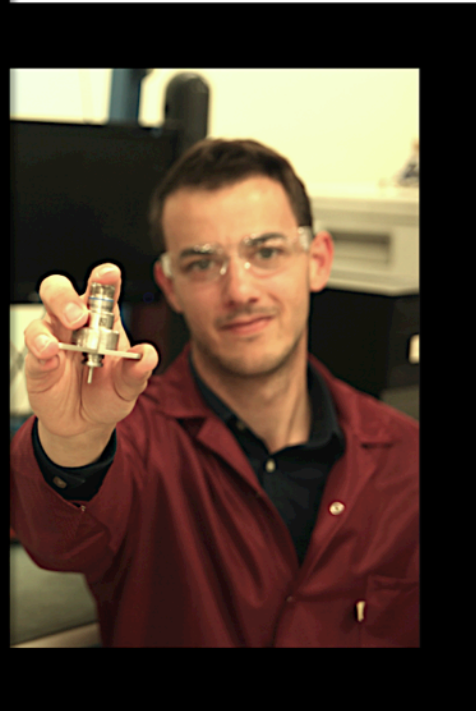
PHOTO BY DAVID SPRAGUE

Torqued: Worker prepares pressure sensors.



HydraElectric

New Hydra-Electric patent-pending electronic temperature switch provides for greater accuracy and repeatability, even in high vibration environments.



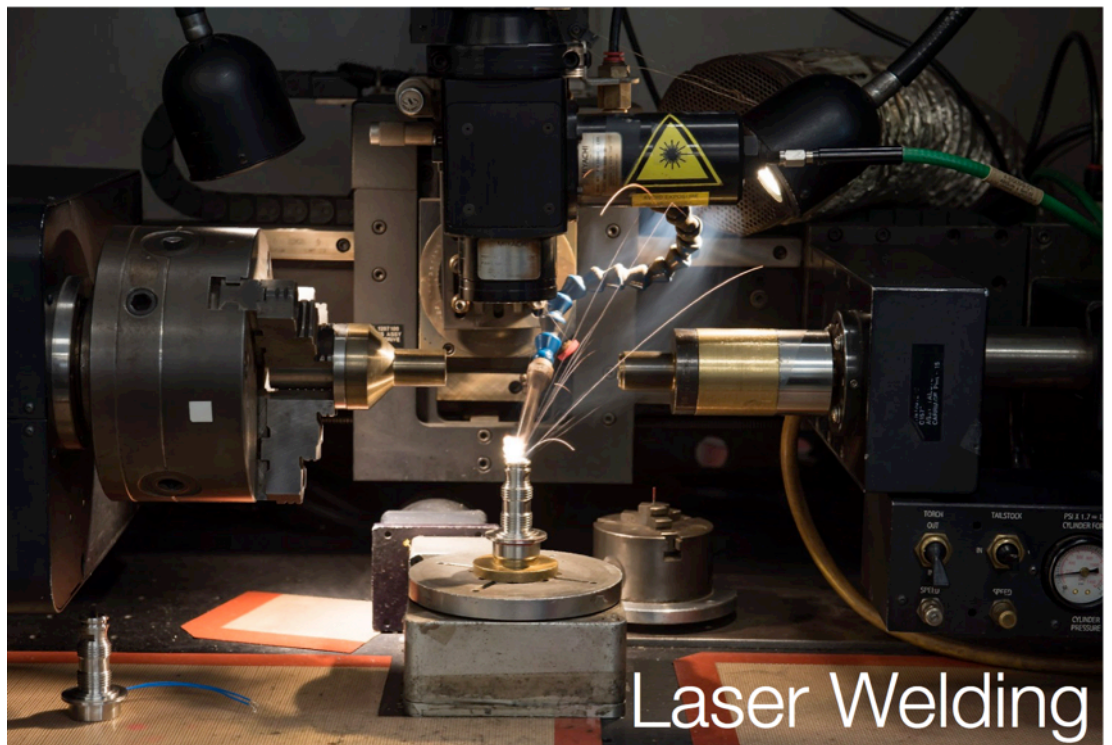
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Photos



Electronic Beam Welder



Laser Welding

Photos



Photos



Photos



Press

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Aerospace & Defense Technology **Single Event Effects in High Altitude Aerospace Sensor Applications**

Dec 2018



Aviation Business Daily **Celebrating 70 Years as an Aerospace Innovator, Hydra-Electric Looks Ahead to Continued Growth**

Oct 16, 2018



San Fernando Valley Business Journal **Long-Time Switch Maker Expands into Sensors**

Aug 6, 2018



Aviation Business Daily **New, Unique Venturi Design Introduced for Business Aircraft**

Oct 11, 2017



Aviation Business Daily **New White Paper on Weight Economy and Aircraft Component**

Nov 19, 2015



Aviation Business Daily **The Growing Market for Aerospace Sensors**

Nov 18, 2015



San Fernando Valley Business Journal **Manufacturer Switched to Sensors**

Sep 7, 2015



Flight Daily **Impressing the Switch Market**

June 18, 2015

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White Papers

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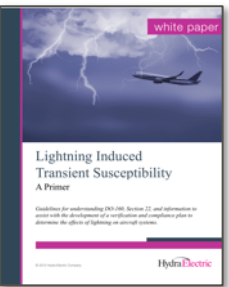
Neutron Fluence Single Event Effect in High Altitude Aerospace Sensor Applications

Understanding neutron fluence effect on embedded electronics.



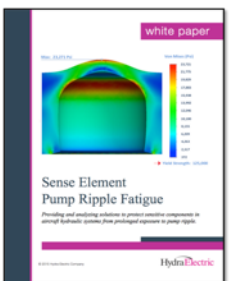
Next-Generation Aerospace Sensors Respond to New Demands

New composite technologies and other advancements create increasingly demanding requirements for sensor and transducer designs.



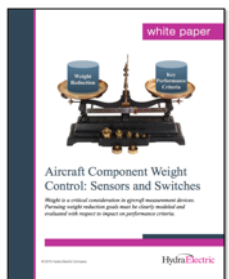
Lightning Induced Transient Susceptibility— A Primer

Guidelines for understanding DO-160, Section 22, and information to assist with the development of a verification and compliance plan to determine the effects of lightning on aircraft systems.



Sense Element Pump Ripple Fatigue

Providing and analyzing solutions to protect sensitive components in aircraft hydraulic systems from prolonged exposure to pump ripple.



Aircraft Component Weight Control: Sensors and Switches

Weight is a critical consideration in aircraft measurement devices. Pursuing weight reduction goals must be clearly modeled and evaluated with respect to impact on performance criteria.