

Sensing Products Selection Guide



A guide to selecting the right sensing components for your applications



About This Guide

This guide provides an overview of magnetic and temperature sensing technologies, key consideration factors, descriptions of technologies Littelfuse offers, and product selection tables. It is designed to help you quickly find a sensing solution appropriate to your application.

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Littelfuse: Everywhere, Every Day

Founded in 1927, Littelfuse is a diversified industrial technology manufacturing company empowering a sustainable, connected, and safer world. Across more than 20 countries, and with approximately 18,000 global associates, we partner with customers to design and deliver innovative, reliable solutions.

Littelfuse offers an extensive technology portfolio—fuses, semiconductors, polymers, ceramics, relays, sensors, switches, and more. Serving over 100,000 end customers, our products are found in a variety of industrial, transportation, and electronics end markets—everywhere, every day.

Your Design Challenges, Solved

Our history of innovation, combined with our customer-first culture, drives us to collaborate with you to develop safer, more reliable products that are energy efficient and compliant with global regulations. We will partner with you to solve complex problems wherever electrical energy is used, bringing design, engineering, and technical expertise to deliver business results.

Our product designs are backed by experts committed to delivering the best solutions for your specific needs. Our global organization provides:

- custom sensor designs per customer specifications;
- vertically integrated manufacturing;
- in-house magnetic sensing simulation support;
- quick turnaround for custom sensor prototypes.

Customer Focus

A customer-first approach is at the heart of our company-wide culture, driving us to build long-lasting relationships and exceed expectations. Every day, it's our employees who make the difference for your business. They listen to your needs and understand your challenges. They use their knowledge and expertise to develop the best solutions and solve your problems.

Application Expertise

At Littelfuse, we partner with customers to design, manufacture, and deliver innovative solutions for a wide range of markets including automotive and commercial vehicles, industrial applications, data and telecommunications, medical devices, consumer electronics, appliances, and transportation.

Our expertise involves applying reliable and efficient product solutions, innovative technologies, and global resources to address technical challenges in a variety of applications. Our worldwide network of research teams focuses on product development and support, design-in programs, and application testing in our global labs.

Technology Innovation

Littelfuse offers a diverse magnetic and temperature sensor line. If we do not have a standard sensor that meets your needs, we will work with you to develop a forward-thinking solution that does. When you partner with us, you'll stay focused on making great products, not navigating the offerings of multiple vendors. The breadth and depth of our product portfolio ensure that the ideal solution for your application is readily available.

Global Support

Through our network of global labs in China, Germany, Italy, Japan, Lithuania, Mexico, the Philippines, and the United States, we design innovative solutions and provide customer applications support and testing. Our unique capabilities include performance testing, material analysis, and regulatory compliance testing. The dedication of our global labs ensures the outstanding performance, safety, and reliability of our products and support services for our worldwide customer base.

With more than 12,000 employees in over 50 locations throughout the Americas, Europe, and Asia, Littelfuse products, applications knowledge, and technical support are available around the globe. Our network of regional customer support offices and hundreds of authorized distributors work to help you solve problems quickly.

Operational Excellence

With our global manufacturing footprint, Littelfuse is firmly committed to manufacturing quality products at a competitive price. We build quality into our products and services, striving for zero defects in everything we do, thereby reducing cost and increasing your total satisfaction. We strive to exceed your expectations every day.

Quality Assurance

Our global manufacturing facilities abide by strict quality assurance requirements and hold the following quality management system registrations:

- ISO 9001
- ISO 14001
- IATF 16949



Littelfuse is a global leader in providing magnetic sensing solutions. Our selection of Magnetic Sensors includes Reed Switches, Reed Sensors, Hall Effect Sensors, and Reed Relays, as well as bare and packaged Magnetic Actuators.

Reed Switches

A Reed Switch has two ferromagnetic blades (reeds) contained within a tubular glass envelope that is hermetically sealed at each end. The contacts on each reed blade have a thin layer of precious metal material deposited on them. There is usually nitrogen gas inside of the glass envelope to eliminate the presence of oxygen and ensure that the contacts will not oxidize. Reed Switches are activated by a permanent magnet or an electromagnet. The Reed Switch and magnetic field combination is commonly known as the “magnetic circuit.”

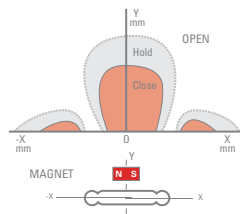


Figure 1. Two-pole linear activation, parallel orientation

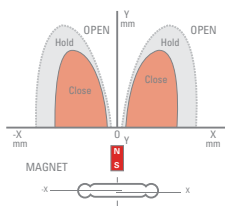


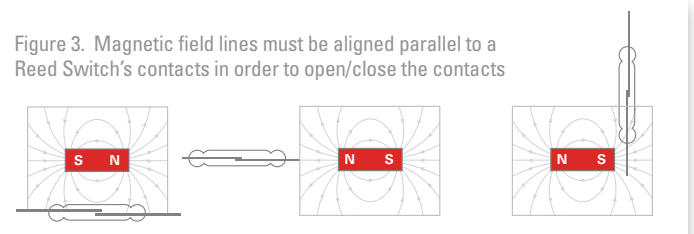
Figure 2. Single-pole linear activation, perpendicular orientation

The relative stiffness of the reed blades, along with the small gap and overlap between the two contacts, controls the sensitivity of the Reed Switch. The sensitivity of the switch is the amount of magnetic field that is required to actuate the contact into an open or closed mode. It is measured in units of ampere-turns (AT). Most Reed Switches have a sensitivity range of 10–30 AT, where 10 AT is more sensitive than 30 AT.

Reed Sensors

Reed Sensors are Reed Switches that are packaged within an external housing for simplified mounting/connecting and additional protection against environmental influences. These Sensors are typically mounted in mechanical systems. A bare Reed Switch can easily be mounted on circuit boards. However, for an application such as a door security sensor, the Reed Switch needs a protective shell/housing for handling and mounting. These packages offer resistance to mechanical stress by protecting the bare glass of the Reed Switch.

Figure 3. Magnetic field lines must be aligned parallel to a Reed Switch's contacts in order to open/close the contacts



Reed Relays

A Reed Relay is made by combining a Reed Switch with a copper coil. Like other relays, this provides galvanic isolation between the coil input and the controlled contact(s). However, because of the small size and magnetic efficiency of the Reed Switch, the power required to drive the coil is lower than in most other types of relays. Other advantages include high insulation resistance, low contact resistance, and long contact life. Reed Relays are used in many applications including test equipment and security, medical, and process control equipment.

Reed Technology Applications

Reed Switches are very popular for battery-powered applications. Because Reed Sensors can switch AC or DC loads, they are a popular choice for digital on/off applications, such as door-closure detection for the security and household appliance markets.

Hall Effect Sensors

A Hall Effect device is a semiconductor-based integrated circuit with Hall plates that respond to magnetic fields. Additional circuitry is added for power supply, signal conditioning, temperature compensation, and EMC/ESD protection. Hall Effect devices provide digital or analog output signals that are used for proximity and continuous rotary or linear positioning. Unlike a Reed Switch, a Hall Effect Sensor contains active circuitry, so it always draws a small amount of current. Hall Effect devices come in two- or three-wire versions. Some devices are programmable.

Hall Effect Technology Applications

Digital Hall Effect Sensors are very popular for high-speed sensing applications such as washing machines. Analog Hall Effect Sensors are used in detecting dial position in appliances and as Level Sensors for monitoring fluid levels in appliances such as dishwashers.

Introduction to Magnetic Sensing

TMR Technology Applications

TMR (Tunnel Magneto Resistance) digital sensors have better temperature stability, higher sensitivity, and significantly lower power consumption over other solid state magnetic sensing technologies. TMR sensors come in three-wire version and are ideal for battery-powered applications such as metering and portable tools applications.

Parameter	Reed	Hall	TMR
Current Consumption ¹ (µA)	0 ●	2000 ●	0.2-1.5 ●
Sensitivity (Gauss)	10+ ●	55+ ●	5+ ●
Digital Output	Yes ●	Yes ●	Yes ●
Analog Output	No ●	Yes ●	Yes ●
Sensing Direction	Omnipolar (X, Y, Z) ●	Omnipolar/Unipolar/Bipolar (Z) ●	Omnipolar/Unipolar/Bipolar (X, Z) ●
Carry Current (mA)	6000 ●	2 ●	2 ●
Carry Voltage (V)	400 ●	5.5 ●	5.5 ●
External ESD Protection Needed ²	No ●	Yes ●	Yes ●
Operating Temp (°C)	- 50 to 150 ●	- 40 to 125 ●	- 40 to 125 ●
High Speed Switching Speed (kHz)	< 1 ●	15 ●	15 ●
Size (mm ²)	12 (7 mm reed) ●	3.5 (SOT-23) ●	3.5 (SOT-23) ●
Shock ³ (G)	100 ●	1500 ●	1500 ●

Notes:
 1. Calculated when each component is in the OFF state.
 2. In high ESD environments, Hall and TMR will require a TVS diode and two resistors.
 3. Per JESD22-B104 AEC-Q100 Mechanical Shock.
 4. Hall and TMR require a capacitor. In high noise environments, they also require a TVS diode and two resistors.

● Excellent
 ● Good
 ● Poor

Magnetic Actuators

Littelfuse offers a wide range of Magnetic Actuators that are packaged in shapes similar to the relative mating sensors. We also offer a limited family of bare magnets with various grades of materials, including ferrite (ceramic), AlNiCo, and neodymium iron boron (NdFeB) materials.

Comparing Reed Switch vs. Hall Effect vs. TMR. Although there are differences between Reed Switch, TMR, and Hall Effect technologies, all platforms offer practical advantages for various applications. Here is a comparison of the benefits of each technology.

Customizable Options

- Modifications are available to existing standard product packages, such as adding connectors or changing wire size or length, as well as offering special Reed Switch sensitivities, custom lead forming, bending, and modifications to bare reed switches
- Fully new custom sensor package designs and/or circuitry
- Magnetic circuit (actuator magnet and sensor) design for a variety of applications

Engineering Services

- 3D CAD mechanical design services
- Electronic circuitry design
- Magnetic simulation support analyzing feasibility of the design options
- 3D mapping of magnetic actuation of the sensor
- Rapid prototyping and quick-turn concept parts including 3D printed parts
- Prototype units using prototype tooling
- Reliability/validation testing options
- Fully designed, production-capable sensor and tooling

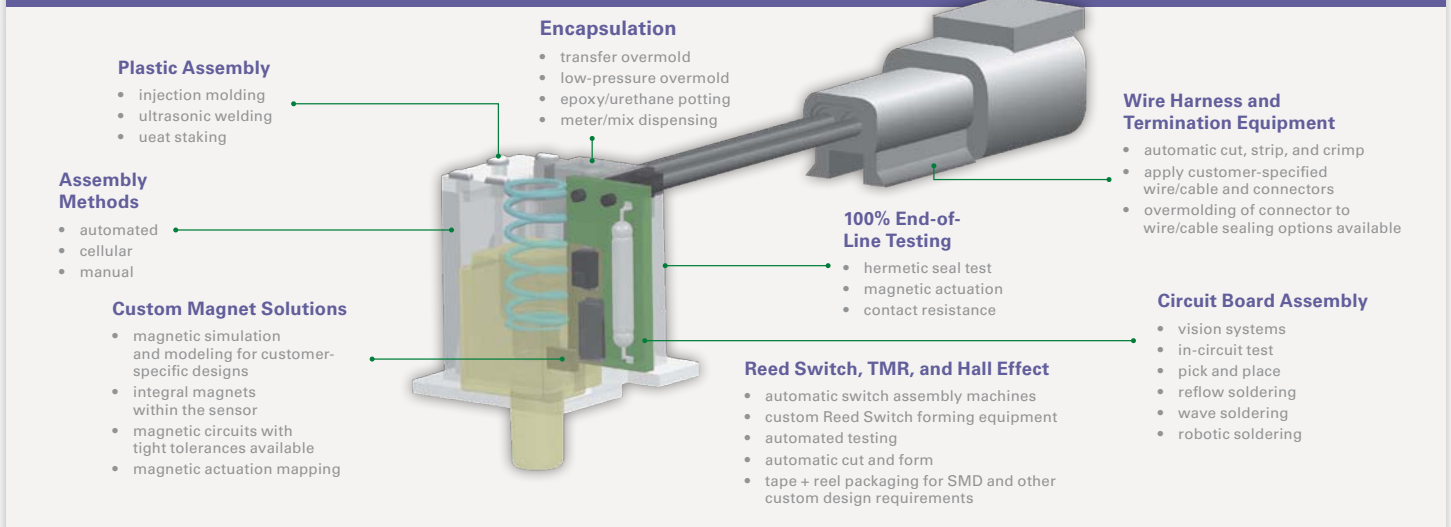
Design Your Custom Magnetic Sensor

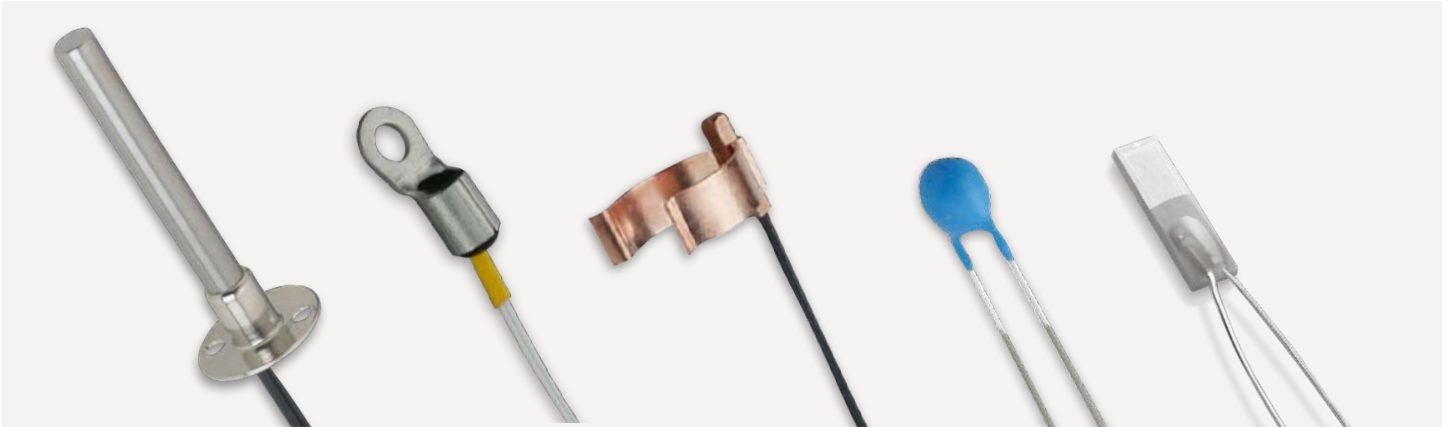
Littelfuse specializes in custom design packages that meet our customers' needs for both Reed Switch and Hall Effect Sensor designs.

Our manufacturing processes are vertically integrated.

Littelfuse's dedicated application engineers are available to assist you in every step of the custom product development process. Contact our sensor application experts today at littelfuse.com/sensorscontact

Magnetic Sensor Manufacturing Process Capabilities





A Temperature Sensor is a device that detects and measures the average heat or thermal energy in a medium and converts it into an electrical signal. A wide variety of temperature sensing devices are available today. Littelfuse offers a broad range of Thermistors, Resistance Temperature Detectors (RTDs), Digital Temperature Indicators, and probes and assemblies for temperature sensing applications worldwide. Each has its own set of operating principles, features, benefits, considerations, and limitations for optimal use.

Thermistors (NTCs and PTCs)

Thermistors are thermally sensitive resistors whose prime function is to exhibit a large, predictable, and precise change in electrical resistance when subjected to a corresponding change in body temperature. Negative Temperature Coefficient (NTC) thermistors exhibit a decrease in electrical resistance when subjected to an increase in body temperature. Positive Temperature Coefficient (PTC) thermistors exhibit an increase in electrical resistance when subjected to an increase in body temperature.

Applications

Based on the predictable characteristics and their excellent long-term stability, Thermistors are generally accepted to be the most advantageous sensor for many applications, including temperature measurement and control.

RTDs

Platinum Resistance Temperature Detectors (Pt-RTDs) are temperature sensors that have a positive, predictable, and nearly linear change in resistance when subjected to a corresponding change in their body temperature.

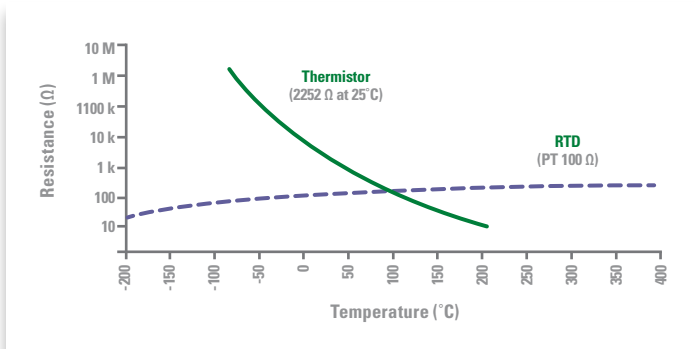
Applications

The nearly linear output needed to precisely measure temperature over a very wide range makes RTDs ideal for digital measurement and control applications. Typical applications include industrial controls, medical electronics, HVAC-R, aerospace systems, white goods, small appliances, and food handling.

Introduction to Temperature Sensing

NTC Thermistors	RTDs (Pt Thin Film)
Both are electrical resistors in which resistance changes with temperature Both require excitation current	
Metal oxide on ceramic substrate	Precious metal (typically Pt) on ceramic substrate
Very good accuracy suitable for most applications—most commonly used cost-effective temperature sensor	For more specialized applications requiring very high accuracy (e.g. 0.06%/0.15 °C) For applications requiring a lot of precision
Exponential resistance – temperature curve	Nearly linear resistance-temperature curve provides ease and consistency of measurement
Wide operating temperature ranges from - 50 °C to 300 °C	Extremely wide temperature ranges, specifically on the higher end, from - 50°C to well above 500°C
Resistance values such as 100 Ω, up to 5M Ω at 25 °C	Resistance values such as 100 Ω, 500 Ω and 1000 Ω at 0 °C

Comparing NTC Thermistors vs. RTDs. Although both technologies sense temperature, they each exhibit different characteristics as shown in the comparison table above. Shown below is a comparison of the resistance-temperature behavior.



Digital Temperature Indicators

Digital Temperature Indicators have a positive relationship between resistance and temperature. The response is very much like a digital signal; below the trip temperature, resistance will be low, above the trip temperature, resistance will be very high. This digital response is ideal for applications where knowing the temperature has increased beyond a specific value is required. With the digital response, no analog to digital conversion is necessary, allowing designers to save time and space.

Applications

Typical applications include USB Type-C cables, power supplies, servers, and other similar systems where monitoring for a specific temperature is required.

Customizable Options

Modifications are available to existing standard product packages, such as adding connectors or changing wire size or length, as well as offering special resistance – temperature (R-T) curves, R-T curve matching, and custom lead forming and bending to discrete thermistors. In addition, the following options and services are available:

- complete custom sensor packages, including moisture-resistant designs;
- custom resistance – temperature (R-T) characteristics;
- specialized resistance tolerance or temperature accuracy within specified temperature ranges;
- sensing element design for best long-term stability;
- rapid prototyping and quick-turn concept parts including 3D printed parts;
- prototype units using prototype tooling;
- reliability/validation testing options;
- fully designed, production-capable sensor and tooling.

Quality and Reliability Testing

In addition to providing custom-designed products, we provide options to evaluate performance and long-term stability for the most demanding applications. Some of our testing capabilities include:

- salt water immersion;
- freeze/thaw temperature cycling;
- thermal shock;
- sinusoidal vibration.

Design Your Custom Temperature Sensor

Littelfuse specializes in custom design packages that meet our customers' needs for both Thermistor and Resistance Temperature Detector (RTD) sensor designs.

If a standard sensor style doesn't meet your needs, contact us for further assistance at littelfuse.com/sensorform. Our application engineers are ready to help design the sensor you need.

Applications



We partner with customers to develop **new solutions.**



Electronic Sensor










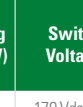
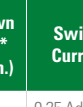


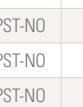
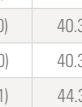

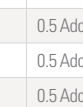
Application Matrix









Littelfuse Magnetic and Temperature Sensors are used in a wide variety of applications. As applications evolve, we continue to partner with customers to develop new solutions, including customizations to cater to their needs. The following application-matrix will help you visualize where Littelfuse can solve design challenges for your specific project.

Vertical Markets	Applications	Temperature Sensing			Magnetic Sensing		
		NTC Thermistors ¹	RTDs ²	Digital Temperature Indicators	Reed Switches	Hall Effect Sensors	TMR Switches
Transportation	Position sensing-door/window/kickstand (2-wheeler)	-	-	-	●	-	-
	Diesel exhaust fluid (AdBlue [™]) ⁽³⁾ level measurement	-	-	-	●	-	-
	Hydraulic arm position sensing	-	-	-	●	-	-
EV Infrastructure	Position detection of access doors and panels for security	-	-	-	●	●	●
	Temperature sensing and fan speed control	●	-	-	-	-	-
	Temperature sensing for power converter heat sink	●	-	-	-	-	-
Datacenter	Analog temperature sensing	●	-	-	-	-	-
	MCU cooling fan on/off controls	-	-	●	●	-	-
	MCU cooling fan speed controls	●	-	-	●	-	-
	Position sensing for racks-door/safety/access interlocks	-	-	-	●	-	-
	Temperature sensing and fan speed control	●	-	●	●	-	-
	Position sensing for module activation and safety interlocks	-	-	-	●	-	-
Consumer and Mobile Electronics	Paper tray position detection	-	-	-	●	-	-
	Charging cradle detection	-	-	-	●	-	-
	Lens rotation detection	-	-	-	●	-	-
	Battery pack temperature monitoring	●	-	●	-	-	-
	USB-C connector overheating detection	-	-	●	-	-	-
	Power supply temperature indication	-	-	●	-	-	-
Appliances	Open/closed sensing for doors	-	-	-	●	●	●
	Position of compartments and drawers	-	-	-	●	●	●
	General fluid level sensing (e.g., water, detergent)	-	-	-	●	●	●
	Temperature-sensing air/liquids/refrigerants	●	●	-	-	-	-
	Battery pack temperature monitoring	●	-	●	-	-	-
	Motor or power semiconductor temperature monitoring	●	-	●	-	-	-
	General safety and functional interlocks	-	-	-	●	●	●
Industrial	Temperature measurement and general process controls	●	●	-	-	-	-
	Position and speed sensing on robotic arms	-	-	-	●	●	●
	Temperature sensing to monitor semiconductor performance	●	-	●	-	-	-
	Fan/cooling system speed controls	●	-	-	-	-	-
	Fan/cooling system activation controls	-	-	●	-	-	-
	Level sensing for fluid flow	●	●	-	●	●	●
Building Automation	HVAC ⁽⁴⁾ and water heating systems temperature controls	●	●	-	-	-	-
	Building temperature controls	●	-	-	-	-	-
	Smart meter anti-tamper detection	-	-	-	●	-	●
	Smart meter gas and water flow measurement	-	-	-	●	-	●
	General fluid flow measurement	-	-	-	●	●	●
	Access control IoT systems	-	-	-	●	-	●
	Door and window position detection	-	-	-	●	●	●
	Temperature detection in fire and safety systems	●	-	-	-	-	-

Notes: (1) NTC – Negative Temperature Coefficient (2) RTD – Resistance Temperature Detectors (3) AdBlue (AUS 32) is a registered trademark of the German Association of the Automotive Industry (VDA) (4) HVAC – Heating, ventilation, and air conditioning

Reed Switches

Leads												
Product Series	Switch Type	Package	Body Length mm (inch)	Lead-Lead Length mm (inch)	Switching Power (W)	Switching Voltage (V)	Breakdown Voltage** (Vdc - min.)	Switching Current (A)	Contact Resistance (Ω)	Operating Temperature (°C)	Magnetic Sensitivity (AT)	
 MITI-7	A: SPST-NO	Glass	7.00 (.276)	40.38 (1.590)	10	170 Vdc, 120 Vac	175	0.25 Adc, 0.18 Aac	0.15	-40 to +125	6–20	•
 MDSR-10	A: SPST-NO	Glass	10.16 (.400)	40.38 (1.590)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.12	-40 to +125	10–25	•
 MDSR-7	A: SPST-NO	Glass	12.70 (.500)	40.38 (1.590)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.1	-40 to +125	10–25	•
 FLEX-14	A: SPST-NO	Glass	14.00 (.551)	44.30 (1.744)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.1	-40 to +125	10–30	•
 MDCG-4	A: SPST-NO	Glass	15.24 (.600)	40.38 (1.590)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.1	-40 to +125	12–38	•
 MACD-14	A: SPST-NO	Glass	14.00 (.551)	44.30 (1.744)	10	200 Vdc, 140 Vac	200	0.5 Adc, 0.35 Aac	0.1	-40 to +125	10–30	•
 MDRR-DT	C: SPDT-CO	Glass	14.73 (.580)	51.66 (2.034)	5	175 Vdc, 120 Vac	200	0.25 Adc, 0.18 Aac	0.1	-40 to +125	15–30	•
 59045-1	A: SPST-NO	Overmolded	17.78 (.700)	15.24 (.600)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.2	-40 to +105	15–30	•
 59050-1	A: SPST-NO	Overmolded	22.86 (.900)	20.32 (.800)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.2	-40 to +105	12–33	•
 HA15-2	A: SPST-NO	Glass	15.24 (.600)	40.38 (1.590)	20 ¹	200 Vdc, 265 Vac	400 450	0.4 Adc, 0.3 Aac 0.5 Adc, 0.35 Aac	0.1	-20 to +125	17–23 22–33	•
 MLRR-4	A: SPST-NO	Glass	15.24 (.600)	40.38 (1.590)	20	200 Vdc, 140 Vac	250	1.0 Adc, 0.7 Aac	0.1	-40 to +125	17–38	•
 MLRR-3	A: SPST-NO	Glass	15.24 (.600)	56.64 (2.230)	20	200 Vdc, 140 Vac	250	1.0 Adc, 0.7 Aac	0.1	-40 to +125	17–38	•
 MVSF-20	A: SPST-NO	Glass	19.69 (0.775)	56.77 (2.235)	10	1000 Vdc	2000	0.5 Adc, 0.35 Aac	0.1	-75 to +125	17–38	•
 59050-3	A: SPST-CO	Overmolded	22.86 (.900)	20.32 (.800)	5	175 Vdc, 120 Vac	200	0.25 Adc, 0.18 Aac	0.2	-20 to +105	10–20	•
 MRPR-20	A: SPST-NO	Glass	20.32 (.800)	56.64 (2.230)	50	250 Vdc, 265 Vac	750	1.5 Adc, 1.1 Aac	0.1	-20 to +125	17–43	•
 DRS-DTH	C: SPDT-CO	Glass	39.67 (1.562)	85.73 (3.375)	30	350 Vac, 500 Vdc	1200	0.50 Adc, 0.35 Aac	0.125	-20 to +125	50–80	•

Surface Mount												
Product Series	Switch Type	Package	Body Length mm (inch)	Lead-Lead Length mm (inch)	Switching Power (W)	Switching Voltage (V)	Breakdown Voltage** (Vdc - min.)	Switching Current (A)	Contact Resistance (Ω)	Operating Temperature (°C)	Magnetic Sensitivity (AT)	
 MISM-7	A: SPST-NO	Glass	7.00 (.276)	13.72 (.540)	10	170 Vdc, 120 Vac	175	0.25 Adc, 0.18 Aac	0.15	-40 to +125	6–20	•
 MDSM-10	A: SPST-NO	Glass	10.16 (.400)	15.62 (.615)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.12	-40 to +125	10–25	•
 MDSM-4	A: SPST-NO	Glass	15.24 (.600)	19.30 (.760)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.1	-40 to +125	12–38	•
 MASM-14	A: SPST-NO	Glass	14.00 (.551)	44.30 (1.744)	10	200 Vdc, 140 Vac	200	0.5 Adc, 0.35 Aac	0.1	-40 to +125	10–30	•
 MDSM-DT	C: SPDT-CO	Glass	14.73 (.580)	25.40 (1.000)	5	175 Vdc, 120 Vac	200	0.25 Adc, 0.18 Aac	0.1	-40 to +125	15–30	•
 MLSM-4	A: SPST-NO	Glass	15.24 (.600)	19.56 (.770)	20	200 Vdc, 140 Vac	250	1.0 Adc, 0.7 Aac	0.1	-40 to +125	17–38	•
 MLSM-3	A: SPST-NO	Glass	15.24 (.600)	19.56 (.770)	20	200 Vdc, 140 Vac	250	1.0 Adc, 0.7 Aac	0.1	-40 to +125	17–38	•


For details on electrical specifications, visit littelfuse.com.

A: SPST-NO = Single Pole Single Throw – Normally Open.
C: SPDT-CO = Single Pole Double Throw – Change Over.
NO = Normally Open.

All Reed Switches are RoHS compliant.
Certification: Contact Littelfuse for certified ratings.

**Breakdown Voltage – per MIL-STD-202, Method 301. '20 W for 100-265 VAC loads, 10 W for all other loads.

Reed Switches

Overmolded												
Product Series	Switch Type	Package	Body Length mm (inch)	Lead-Lead Length mm (inch)	Switching Power (W)	Switching Voltage (V)	Breakdown Voltage** (Vdc - min.)	Switching Current (A)	Contact Resistance (Ω)	Operating Temperature (°C)	Magnetic Sensitivity (AT)	
59165	A: SPST-NO	Overmolded	16.00 (.630)	20.20 (.795)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.1	-40 to +125	10–25	•
59166	A: SPST-NO	Overmolded	16.00 (.630)	19.51 (.768)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.1	-40 to +125	10–26	•
59170	A: SPST-NO	Overmolded	11.43 (.450)	16.25 (.640)	10	200 Vdc, 140 Vac	250	0.5 Adc, 0.35 Aac	0.15	-40 to +125	10–25	•

Reed Sensors

Flange/Flat Pack										
Product Series	Description	Overall Dimensions			Contact Rating	Switching Voltage	Breakdown Voltage	Switching Current	Contact Resistance, Initial	Mating Actuator
		mm (inch)			W	Vdc	Vdc	A	Ohms	
		L × W × H			Max.	Max.	Min.	Max.	Max.	
59105	Terminal Flange Mount Sensor, Normally Open	40.17 (1.582) × 19.05 (0.750) × 6.60 (0.260)			10	200	250	0.5	0.2	57105
59135	High-Temp Flange Mount Sensor, Normally Open	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			10	200	250	0.5	0.2	57135
	High-Temp Flange Mount Sensor, Normally Open High Voltage	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			10	300	450	0.5	0.2	
	High-Temp Flange Mount Sensor, Changeover	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			5	175	200	0.25	0.2	
	High-Temp Flange Mount Sensor, Normally Closed	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			5	175	200	0.25	0.2	
59140	Mini Flange Mount Sensor, Normally Open	23.0 (0.906) × 14.00 (0.551) × 6.00 (0.236)			10	200	250	0.5	0.2	57140
	Mini Flange Mount Sensor, Normally Open High Voltage	23.0 (0.906) × 14.00 (0.551) × 6.00 (0.236)			10	300	450	0.5	0.2	
	Mini Flange Mount Sensor, Changeover	23.0 (0.906) × 14.00 (0.551) × 6.00 (0.236)			5	175	200	0.25	0.2	
	Mini Flange Mount Sensor, Normally Closed	23.0 (0.906) × 14.00 (0.551) × 6.00 (0.236)			5	175	200	0.25	0.2	
59141	Mini Flange Mount Sensor, Normally Open	23.0 (0.906) × 14.00 (0.551) × 6.00 (0.236)			10	200	250	0.5	0.2	57140
	Mini Flange Mount Sensor, Normally Open High Voltage	23.0 (0.906) × 14.00 (0.551) × 6.00 (0.236)			10	300	450	0.5	0.2	
	Mini Flange Mount Sensor, Changeover	23.0 (0.906) × 14.00 (0.551) × 6.00 (0.236)			5	175	200	0.25	0.2	
59145	Mini Flange Mount Sensor, Normally Closed	23.0 (0.906) × 14.00 (0.551) × 6.00 (0.236)			5	175	200	0.25	0.2	57145
	Flange Mount Sensor, Normally Open	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			10	200	250	0.5	0.2	
	Flange Mount Sensor, Normally Open High Voltage	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			10	300	450	0.5	0.2	
	Flange Mount Sensor, Changeover	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			5	175	200	0.25	0.2	
59150	Flange Mount Sensor, Normally Closed	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			5	175	200	0.25	0.2	57145
	Flange Mount Sensor, Normally Open	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			10	200	250	0.5	0.2	
	Flange Mount Sensor, Normally Open High Voltage	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			10	300	450	0.5	0.2	
59150	Flange Mount Sensor, Normally Open	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			10	200	250	0.5	0.2	57150
	Flange Mount Sensor, Changeover	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)			5	175	200	0.25	0.2	

For details on electrical specifications, visit littelfuse.com.

A:SPST-NO = Single Pole Single Throw – Normally Open.
C:SPDT-CO = Single Pole Double Throw – Change Over.
NO = Normally Open.

All Reed Switches are RoHS compliant.
Certification: Contact Littelfuse for certified ratings.

**Breakdown Voltage – per MIL-STD-202, Method 301. 120 W for 100-265 VAC loads, 10 W for all other loads.

How is the Sensor Used Here?




59145 Reed Sensor

There are four magnets on the dust filter and one Sensor on the vacuum cleaner. If the dust filter is assembled, the Sensor will be actuated by the magnet, and the vacuum cleaner is ready to be used.








Reed Sensors (Continued)



Cylindrical Sensor									
		59010		59021		59025		59040	
Product Series	Description	Overall Dimensions	Contact Rating	Switching Voltage	Break-down Voltage	Switching Current	Contact Resistance, Initial	Mating Actuator	
		mm (inch)	W	Vdc	Vdc	A	Ohms		
		Ø × L	Max.	Max.	Min.	Max.	Max.		
59010	Ultra-Mini Cylindrical	3.13 (0.123) × 9.00 (0.354)	5	170	175	0.25	0.25	57020	
59020	Mini Cylindrical	5.10 (0.201) × 15.24 (0.600)	10	170	175	0.25	0.25	57020	
59021	Aluminum Mini Cylindrical	5.10 (0.201) × 15.24 (0.600)	10	170	175	0.25	0.25	57020	
59022	Cylindrical, Normally Open	5.80 (.228) × 25.4 (1.000)	10	200	250	0.5	0.2	57022	
	Cylindrical, Changeover	5.80 (.228) × 25.4 (1.000)	5	175	200	0.25	0.2		
	Cylindrical, Normally Closed	5.80 (.228) × 25.4 (1.000)	5	175	200	0.25	0.2		
59025	Cylindrical, Normally Open	6.22 (0.245) × 25.40 (1.000)	10	200	250	0.5	0.2	57025	
	Cylindrical, Normally Open High Voltage	6.22 (0.245) × 25.40 (1.000)	10	300	450	0.5	0.2		
	Cylindrical, Changeover	6.22 (0.245) × 25.40 (1.000)	5	175	200	0.25	0.2		
	Cylindrical, Normally Closed	6.22 (0.245) × 25.40 (1.000)	5	175	200	0.25	0.2		
59040	Press-Fit Cylindrical, Normally Open	9.5 (0.375) Hole Ø × 31.00 (1.220)	10	200	250	0.5	0.2	57040	
	Press-Fit Cylindrical, Changeover	9.5 (0.375) Hole Ø × 31.00 (1.220)	5	175	200	0.25	0.2		
	Press-Fit Cylindrical, Normally Closed	9.5 (0.375) Hole Ø × 31.00 (1.220)	5	175	200	0.25	0.2		

Threaded Barrel									
		59060		59065		59070		59075	
Product Series	Description	Overall Dimensions	Contact Rating	Switching Voltage	Breakdown Voltage	Switching Current	Contact Resistance, Initial	Mating Actuator	
		mm (inch)	W	Vdc	Vdc	A	Ohms		
		Thread Pitch × L	Max.	Max.	Min.	Max.	Max.		
59060	Stainless Steel Threaded Barrel Sensor, Normally Open	M8 × 1.25 Pitch × 36.00 (1.420)	10	200	250	0.5	0.2	57060	
	Stainless Steel Threaded Barrel Sensor, Changeover	M8 × 1.25 Pitch × 36.00 (1.420)	5	175	200	0.25	0.2		
	Stainless Steel Threaded Barrel Sensor, Normally Closed	M8 × 1.25 Pitch × 36.00 (1.420)	5	175	200	0.25	0.2		
59065	Threaded Barrel Sensor (Standard), Normally Open	(5/16 × 24) Pitch × 38.10 (1.500)	10	200	250	0.5	0.2	57065	
	Threaded Barrel Sensor (Standard), Normally Open High Voltage	(5/16 × 24) Pitch × 38.10 (1.500)	10	300	450	0.5	0.2		
	Threaded Barrel Sensor (Standard), Changeover	(5/16 × 24) Pitch × 38.10 (1.500)	5	175	200	0.25	0.2		
	Threaded Barrel Sensor (Standard), Normally Closed	(5/16 × 24) Pitch × 38.10 (1.500)	5	175	200	0.25	0.2		
59070	Threaded Barrel Sensor (Metric), Normally Open	M8 × 1.25mm Pitch × 38.10 (1.500)	10	200	250	0.5	0.2	57070	
	Threaded Barrel Sensor (Metric), Normally Open High Voltage	M8 × 1.25mm Pitch × 38.10 (1.500)	10	300	450	0.5	0.2		
	Threaded Barrel Sensor (Metric), Changeover	M8 × 1.25mm Pitch × 38.10 (1.500)	5	175	200	0.25	0.2		
	Threaded Barrel Sensor (Metric), Normally Closed	M8 × 1.25mm Pitch × 38.10 (1.500)	5	175	200	0.25	0.2		
59075	Heavy Duty Threaded Barrel, Normally Open	M12 × 1mm Pitch × 46.00 (1.810)	10	200	250	0.5	0.2	57075	
	Heavy Duty Threaded Barrel, Changeover	M12 × 1mm Pitch × 46.00 (1.810)	5	175	200	0.25	0.2		

Reed Sensors (Continued)

Float							
 							
Product Series	Description	Overall Dimensions	Contact Rating	Switching Voltage	Breakdown Voltage	Switching Current	Contact Resistance, Initial
		mm (inch)	W	Vdc	Vdc	A	Ohms
		Ø × L	Max.	Max.	Min.	Max.	Max.
59630	Float Sensor, Normally Open	23.70 (0.930) × 43.70 (1.720)	10	200	250	0.5	0.2
	Float Sensor, Normally Closed	23.70 (0.930) × 43.70 (1.720)	10	200	250	0.5	0.2
59300	Level Sensor, Normally Open (Float Not Included)	19.90 (0.783) × 67.55 (2.660)	10	200	250	0.5	0.2

Vane							
  							
Product Series	Description	Overall Dimensions	Contact Rating	Switching Voltage	Breakdown Voltage	Switching Current	Contact Resistance, Initial
		mm (inch)	W	Vdc	Vdc	A	Ohms
		L × W × H	Max.	Max.	Min.	Max.	Max.
59085	Vane Sensor, Normally Open	25.40 (1.000) × 19.05 (0.750) × 6.35 (0.250)	5	175	200	0.25	0.2
	Vane Sensor, Normally Closed	25.40 (1.000) × 19.05 (0.750) × 6.35 (0.250)	10	200	250	0.5	0.2
59086	Vane Sensor, Normally Open	25.40 (1.000) × 19.05 (0.750) × 6.35 (0.250)	5	175	200	0.25	0.2
	Vane Sensor, Changeover	25.40 (1.000) × 19.05 (0.750) × 6.35 (0.250)	5	175	200	0.25	0.2
	Vane Sensor, Normally Closed	25.40 (1.000) × 19.05 (0.750) × 6.35 (0.250)	10	200	250	0.5	0.2
59090	Heavy Duty Vane Sensor, Normally Closed	32.50 (1.280) × 32.25 (1.271) × 23.25 (0.915)	10	200	250	0.5	0.2
	Heavy Duty Vane Sensor, Changeover	32.50 (1.280) × 32.25 (1.271) × 23.25 (0.915)	5	175	200	0.25	0.2

Seat Occupancy							
 							
Product Series	Description	Overall Dimensions	Contact Rating	Switching Voltage	Breakdown Voltage	Switching Current	Contact Resistance, Initial
		mm (inch)	W	Vdc	Vdc	A	Ohms
		L × W × H	Max.	Max.	Min.	Max.	Max.
59250	Push-Button Seat Sensor (Reed)	32.51 (1.280) × 26.67 (1.050) × 37.34 (1.470)	10	200	250	0.5	0.2
59251	Seat Sensor with Dome (Reed)	108.20 (4.260) × 69.85 (2.750) × 39.88 (1.570)	10	200	250	0.5	0.2

TMR Switches

TMR Magnetic IC



TMR

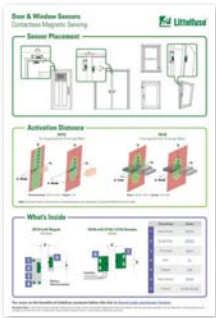
Catalog #	Switch Type	Bop Threshold (Gauss)	Brel Threshold (Gauss)	Vsupply Current (uA)	Frequency Response (Hz)	Min. Supply Voltage (V)	Max. Supply Voltage (V)	Output Type	Sensing Axis	Operating Temperature
LF11115TMR	Bipolar	17	-17	0,2	50	1,8	5,5	Push Pull	X	-40° to 125°C
LF21115TMR	Omnipolar	17	12	0,2	50	1,8	5,5	Push Pull	X	-40° to 125°C
LF21215TMR	Omnipolar	17	10	1,5	1000	1,8	5,5	Push Pull	X	-40° to 125°C
LF21235TMR	Omnipolar	17	10	1,5	1000	1,8	5,5	Push Pull	Z	-40° to 125°C
LF22214TMR	Omnipolar	14	10	1,5	1000	1,8	5,5	Open Drain	X	-40° to 125°C
LF32115TMR	Unipolar	17	13	0,2	50	1,8	5,5	Open Drain	X	-40° to 125°C

For details on electrical specifications, visit littelfuse.com.

A:SPST-NO = Single Pole Single Throw – Normally Open.
C:SPDT-CO = Single Pole Double Throw – Change Over.
NO = Normally Open.

All Reed Switches are RoHS compliant.
Certification: Contact Littelfuse for certified ratings.

**Breakdown Voltage – per MIL-STD-202, Method 301. 120 W for 100-265 VAC loads, 10 W for all other loads.



Design Guide Door and Window Sensor Design Guide

This design guide contains an overview of contactless magnetic sensing, and components inside the sensors.



Scan or click to download now

How is the Sensor Used Here?

59170 Reed Switch

Our Overmolded Reed Switch 59170 is used as wireless door opening detector. It senses door position to verify full closure.



Reed Relays

Single-in-Line (SIL)



Product Series	Description	Overall Dimensions		Coil Voltage		Coil Resistance	Contact Ratings, Switching			Contact Form
		Transfer Molded Body	External Shield Body	Vdc	Vdc	Ohms	Vdc	A	W	
		mm (inch)	mm (inch)							
		L x W x H	L x W x H							
HE3321A0400	Reed Relay, SIL, SPST-NO	24.13 (0.950) x 7.00 (0.276) x 7.40 (0.291)	24.90 (0.980) x 7.60 (0.299) x 7.80 (0.307)	5	22	500	200	0.5	10	Form A
HE3321A1200				12	22	500				
HE3321A2400				24	44	2000				
HE3321C0500	Reed Relay, SIL, SPDT-CO	24.13 (0.950) x 7.00 (0.276) x 7.40 (0.291)	24.90 (0.980) x 7.60 (0.299) x 7.80 (0.307)	5	11	125	175	0.25	5	Form C
HE3321C1200				12	22	500				
HE3321C2400				24	44	2000				
HE3351A0500	Reed Relay, SIL, SPST-NO, High Voltage	24.13 (0.950) x 7.00 (0.276) x 7.40 (0.291)	24.90 (0.980) x 7.60 (0.299) x 7.80 (0.307)	5	14	125	300	0.5	10	Form A
HE3351A1200				12	22	500				
HE3351A2400				24	44	2000				

Miniature Single-in-Line (SIL)



Product Series	Description	Overall Dimensions		Coil Voltage		Coil Resistance	Contact Ratings, Switching			Contact Form
		Transfer Molded Body	External Shield Body	Vdc	Vdc	Ohms	Vdc	A	W	
		mm (inch)	mm (inch)							
		L x W x H	L x W x H							
HE3621A0500	Reed Relay, SIL, SPST-NO	19.05 (0.750) x 5.08 (0.200) x 7.45 (0.293)	19.70 (0.776) x 5.65 (0.222) x 7.87 (0.310)	5	14	500	200	0.5	10	Form A
HE3621A1200				12	22	1000				
HE3621A2400				24	31	2150				

How is the Sensor Used Here?

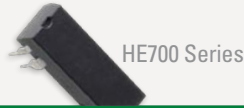
59141 Reed Sensor

There are two Sensors in the coffee machine: one is to detect if the coffee machine top lid is open or closed; the other one does the same for the rotating door.



Reed Relays (Continued)

Dual-in-Line (DIL)

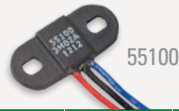


HE700 Series

Product Series	Description	Overall Dimensions		Coil Voltage		Coil Resistance	Contact Ratings, Switching			Contact Form
		Transfer Molded Body	External Shield Body	Vdc	Vdc	Ohms	Vdc	A	W	
		mm (inch)	mm (inch)							
		L × W × H	L × W × H	Nominal	Max.	Nominal	Max.	Max.	Max.	
HE721A0500	Reed Relay, DIL, SPST-NO	19.05 (.750) × 7.22 (0.284) × 5.50 (0.217)	20.14 (0.793) × 7.62 (0.300) × 5.82 (0.229)	5	12	500	200	0.5	10	Form A
HE721A1200				12	31	1000				
HE721A2400				24	46	2150				
HE721B0500	Reed Relay, DIL, SPST-NC	19.05 (.750) × 7.22 (0.284) × 5.50 (0.217)	20.14 (0.793) × 7.62 (0.300) × 5.82 (0.229)	5	6.5	500	200	0.5	10	Form B
HE721B1200				12	14	500				
HE721B2400				24	28	2150				
HE721C0500	Reed Relay, DIL, SPDT-CO	19.05 (.750) × 7.22 (0.284) × 5.50 (0.217)	20.14 (0.793) × 7.62 (0.300) × 5.82 (0.229)	5	14	200	175	0.25	5	Form C
HE721C1200				12	22	500				
HE721C2400				24	44	2000				
HE721E0500	Reed Relay, DIL, SPDT-CO	19.05 (.750) × 7.22 (0.284) × 5.50 (0.217)	20.14 (0.793) × 7.62 (0.300) × 5.82 (0.229)	5	14	200	175	0.25	5	Form C
HE721E1200				12	22	500				
HE721E2400				24	44	2000				
HE721R0500	Reed Relay, DIL, SPDT-CO	19.05 (.750) × 7.22 (0.284) × 5.50 (0.217)	20.14 (0.793) × 7.62 (0.300) × 5.82 (0.229)	5	14	200	175	0.25	5	Form C
HE721R1200				12	22	500				
HE721R2400				24	44	2000				
HE722A0500	Reed Relay, DIL, DPST-NO	19.05 (.750) × 7.22 (0.284) × 5.50 (0.217)	20.14 (0.793) × 7.62 (0.300) × 5.82 (0.229)	5	12	200	200	0.5	10	Form A
HE722A1200				12	22	500				
HE722A2400				24	46	2150				
HE751A0500	Reed Relay, DIL, SPST-NO, High Voltage	19.05 (.750) × 7.22 (0.284) × 5.50 (0.217)	20.14 (0.793) × 7.62 (0.300) × 5.82 (0.229)	5	12	500	300	0.5	10	Form A
HE751A1200				12	31	1000				
HE751A2400				24	46	2150				

Hall Effect Sensors

Flat Flange Mount



55100

Product Series	Description	Overall Dimensions	Operating Supply Voltage	Operating Supply Current	Output Type	Output High	Output Low	Temperature Rating	
		mm (inch)						°C	
		L × W × H	Vdc	mA			Max.	Operating	Storage
55100	Miniature Flange Mount Hall, 2-Wire	25.50 (1.004) × 11.00 (0.433) × 3.00 (0.118)	3.75 to 24	N/A	Current	N/A	N/A	-40 to +100	-65 to +105
	Miniature Flange Mount Hall, 3-Wire	25.50 (1.004) × 11.00 (0.433) × 3.00 (0.118)	3.8 to 24	N/A	Voltage	Sinking/Open Collector	0.4 V @ 10 mA	-40 to +100	-65 to +105
	Miniature Flange Mount Hall, Analog	25.50 (1.004) × 11.00 (0.433) × 3.00 (0.118)	4.5 to 5.5	N/A	Analog Voltage	4.65 V	0.35 V	-40 to +100	-65 to +105

For details on electrical specifications, visit littelfuse.com.

A:SPST-NO = Single Pole Single Throw – Normally Open.
C:SPDT-CO = Single Pole Double Throw – Change Over.
NO = Normally Open.

Hall Effect Sensors (Continued)

Flat Pack



Product Series	Description	Overall Dimensions	Operating Supply Voltage	Operating Supply Current	Output Type	Output High	Output Low	Temperature Rating	
		mm (inch)		mA				°C	
		L × W × H	Vdc	Max.			Max.	Operating	Storage
55140	Flange Mount Hall, 2-Wire	23.00 (0.906) × 14.00 (0.551) × 6.00 (0.236)	3.75 to 24	N/A	Current	N/A	2.2 - 5.6 mA	-40 to +100	-65 to +105
	Flange Mount Hall, 3-Wire	23.00 (0.906) × 14.00 (0.551) × 6.00 (0.236)	3.8 to 24	N/A	Voltage	Sinking/Open Collector	0.4 V @ 20 mA	-40 to +100	-65 to +105
	Flange Mount Hall, Analog	23.00 (0.906) × 14.00 (0.551) × 6.00 (0.236)	4.5 to 5.5	N/A	Analog Voltage	4.65 V	0.35 V	-40 to +100	-65 to +105
55300	Flat Pack Rotary Hall	28.50 (1.122) × 20.40 (0.803) × 6.35 (0.250)	4.5 to 5.5	16	Analog Voltage or PWM	4.5 V	0.5 V	-40 to +105	-65 to +105

Round Flange Mount



Product Series	Description	Overall Dimensions	Operating Supply Voltage	Operating Supply Current	Output Type	Output High	Output Low	Temperature Rating	
		mm (inch)		mA				°C	
		L × W × H	Vdc	Max.			Operating	Storage	
55505	Flange Mount Geartooth Hall	17.86 (0.703) × 36.75 (1.447) × 41.40 (0.551)	4.75 to 25.2	N/A	Digital	Vdd-2	0.6 V @ 25 mA	-40 to +125	-65 to +125

Threaded Barrel



Product Series	Description	Overall Dimensions	Operating Supply Voltage	Operating Supply Current	Output Type	Output High	Output Low	Temperature Rating	
		mm (inch)		mA				°C	
		Thread Pitch × L	Vdc	Max.			Operating	Storage	
55075	Stainless Steel M12 Geartooth Hall	M12 × 1 Pitch × 46.00 (1.811)	4.75 to 25.2	N/A	Digital	Vdd-2	0.6 V @ 25 mA	-40 to +125	-65 to +125

Rotary/Angular



Product Series	Description	Overall Dimensions	Operating Supply Voltage	Operating Supply Current	Output Type	Output High	Output Low	Temperature Rating	
		mm (inch)		mA				°C	
		L × W × H	Vdc	Max.			Operating	Storage	
55250	Rotary Hall	50.00 (1.968) × 37.30 (1.469) × 28.25 (1.112)	4.5 to 5.5	16	Analog Voltage or PWM	4.5 V	0.5 V	-40 to +125	-65 to +125

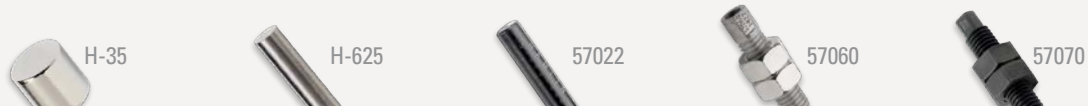
Magnetic Actuators

Rectangular



Product Series	Description	Overall Dimensions		Material	Recommended Operating Temp.	
		mm (inch)			°C	
		L x W x H				Max.
H-31	AlNiCo Magnet	12.70 (0.500) × 1.60 (0.062) × 1.60 (0.062)		AlNiCo-5	450	
H-32	AlNiCo Magnet	25.40 (1.000) × 4.80 (0.190) × 4.80 (0.190)		AlNiCo-5	450	
H-33	AlNiCo Magnet	19.10 (0.750) × 3.20 (0.120) × 3.20 (0.120)		AlNiCo-5	450	
H-34	AlNiCo Magnet	25.40 (1.000) × 6.35 (0.250) × 6.35 (0.250)		AlNiCo-5	450	
H-40	Neodymium Magnet	7.62 (0.300) × 3.18 (0.125) × 3.18 (0.125)		NdFeB 45H	120	
H-41	Neodymium Magnet	19.05 (0.750) × 3.18 (0.125) × 3.18 (0.125)		NdFeB 35H	120	
H-58	Neodymium Magnet	21.00 (0.827) × 7.00 (0.276) × 4.70 (0.185)		NdFeB 35H	120	
57105	Actuator for Terminal Flange Mount Sensor	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)		AlNiCo-5	105	
57125	Actuator for Pinned Flange Mount Sensor	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)		AlNiCo-5	105	
57135	Actuator for High-Temp Flange Mount Sensor	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)		AlNiCo-5	150	
57140	Actuator for Mini Flange Mount Sensor	23.00 (0.906) × 14.00 (0.551) × 6.00 (0.236)		AlNiCo-5	105	
57141	Actuator for Mini Flange Mount Sensor	23.00 (0.906) × 14.00 (0.551) × 6.00 (0.236)		AlNiCo-5	105	
57142	Actuator for Mini Flange Mount Sensor	23.00 (0.906) × 14.00 (0.551) × 6.00 (0.236)		NdFeB 35H	105	
57145	Actuator for Flange Mount Sensor	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)		AlNiCo-5	105	
57150	Actuator for Flange Mount Sensor	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)		AlNiCo-5	105	
57045	Actuator for Mini PCB Mount Overmolded	17.78 (0.700) × 3.30 (0.130) × 4.32 (0.170)		AlNiCo-5	105	
57050	Actuator for PCB Mount Overmolded	22.86 (0.900) × 4.57 (0.180) × 4.57 (0.180)		AlNiCo-5	105	

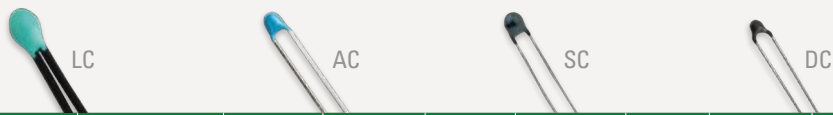
Cylindrical

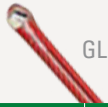


Product Series	Description	Overall Dimensions		Material	Recommended Operating Temp.	
		mm (inch)			°C	
		ø × L				Max.
H-35	Neodymium Magnet	6.35 (0.250) × 6.35 (0.250)		NdFeB 35H	120	
H-48	Neodymium Magnet	4.40 (0.173) × 6.00 (0.236)		NdFeB 35SH	150	
CM-1	Ceramic Magnet	12.70 (0.500) × 5.08 (0.200)		Ceramic-5	250	
H-36	AlNiCo Magnet	4.60 (0.182) × 25.40 (1.000)		AlNiCo-5	450	
57020	Actuator for Mini Cylindrical	5.10 (0.201) × 15.24 (0.600)		AlNiCo-5	105	
57022	Actuator for Cylindrical	5.80 (0.228) × 25.40 (1.000)		AlNiCo-5	105	
57025	Actuator for Cylindrical	6.22 (0.245) × 25.40 (1.000)		AlNiCo-5	105	
57030	Actuator for Long Cylindrical	6.22 (0.245) × 38.10 (1.500)		AlNiCo-5	105	
57040	Actuator for Cylindrical with Retaining Ribs	9.5 (0.375) × 31.00 (1.220)		NdFeB 35H	105	
57041	Actuator for Cylindrical with Retaining Ribs	10.70 (0.420) × 31.00 (1.220)		AlNiCo5	105	
57060	Actuator for Stainless Threaded Barrel Sensor	M8 × 1.25 Pitch × 36.00 (1.420)		AlNiCo-5	105	
57065	Actuator for Threaded Barrel Sensor (Standard)	(5/16 × 24) Pitch × 38.10 (1.500)		AlNiCo-5	105	
57070	Actuator for Threaded Barrel Sensor (Metric)	M8 × 1.25 Pitch × 38.10 (1.500)		AlNiCo-5	105	
57075	Actuator for Heavy Duty Threaded Barrel	M12 × 1.00 Pitch × 46.00 (1.810)		Ceramic-2	105	

For details on electrical specifications, visit littelfuse.com.

Leaded Thermistors

Epoxy-Coated Thermistors											
											
Product Series	Description	Overall Dimensions	Resistance	Resistance Tolerance	R-T Curve	Temperature Coefficient	Beta Nominal	Dissipation Constant, Nominal	Thermal Time Constant, Max. – Still Air	Thermal Time Constant, Max. – Well-Stirred Oil	Temperature Rating
		Inches	Ohms	± %		% / °C	K	mW / °C	Seconds	Seconds	°C
		Bead W × Lead L	@ 25 °C	@ 25 °C		@ 25 °C	0-50 °C				
KC	Miniature Leaded Epoxy Coated Thermistors (135 °C), Kynar Insulated Lead Wire	0.095 × 1.5	100 - 100,000	1; 10	B, F, G, J, N1, R	3.3–4.68	2941–4140	1	10	1	-55 to +135
LC	Miniature Leaded Epoxy Coated Thermistors (150 °C), Tinned Solderable Wire	0.095 × 1.5	100 - 100,000	2; 5; 10	B, E, F, G, H, J, R	3.3–4.68	2941–4140	1	10	1	-55 to +150
SC	Miniature Leaded Epoxy Coated Thermistors (150 °C), Tinned Solderable Wire	0.095 × 1.5	50,000 - 100,000	5	J	4.4–4.5	3892	2	10	---	-55 to +150
TC	Miniature Leaded Epoxy Coated Thermistors (150 °C), Teflon Insulated Wire	0.095 × 1.5	100 - 100,000	10	B, F, G, J, R	3.3–4.68	2941–4140	1	10	1	-55 to +150
AC	Miniature Leaded Epoxy Coated Thermistors (125 °C), Tinned Solderable Lead Wire	0.140 × 0.675	10,000	1	E1, J	4.4	3892	2	15	3	-55 to +125
DC	Miniature Leaded Epoxy Coated Thermistors (150 °C), Tinned Solderable Lead Wire	0.125 × 1.0	100 - 100,000	1; 2; 10	B, F, G, J, R	3.3–4.68	2941–4140	3	15	2–3	-55 to +150

Glass Probe Thermistors											
											
Product Series	Description	Overall Dimensions	Resistance	Resistance Tolerance	R-T Curve	Temperature Coefficient	Beta Nominal	Dissipation Constant, Nominal	Thermal Time Constant, Max. – Still Air	Thermal Time Constant, Max. – Well-Stirred Oil	Temperature Rating
		Inches	Ohms	± %		% / °C	K	mW / °C	Seconds	Seconds	°C
		Body ø × Body L	@ 25 °C	@ 25 °C		@ 25 °C	25-85 °C				
GL	High-Temperature Glass Housing Thermistors (300 °C), Tinned Solderable Lead Wire	0.070 × 0.500	2252	10	J	4.4	3977	---	---	---	-55 to +250

For details on electrical specifications, visit littelfuse.com.

Leaded Thermistors (Continued)

Glass-Coated Chip Thermistors											
Product Series	Description	Overall Dimensions	Resistance	Resistance Tolerance	R-T Curve	Temperature Coefficient	Beta Nominal	Dissipation Constant, Nominal	Thermal Time Constant, Max. – Still Air	Thermal Time Constant, Max. – Well-Stirred Oil	Temperature Rating
		Inches	Ohms	± %		% / °C	K	mW / °C	Seconds	Seconds	°C
		Bead ϕ × Lead L	@ 25 °C	@ 25 °C		@ 25 °C	25-85 °C				
GQ	Radial Leaded Glass Coated Chip Thermistors (0.140" Dia.), Solderable Lead Wire	0.140 × 1.00	2252	10	J	4.4	3977	---	---	---	-55 to +250
GR	Radial Leaded Glass Coated Chip Thermistors (0.090" Dia.), Solderable Lead Wire	0.090 × 1.00	100–100,000	10; 20	B7, E1, F, J, R	3.18–4.68	2826–4263	1.3	14	---	-55 to +300
GS	Radial Leaded Glass Coated Chip Thermistors (0.060" Dia.), Solderable Lead Wire	0.060 × 1.00	200–1,000,000	10	E1, G, J, R	3.38–5.25	3047–4668	0.7	5	---	-55 to +300
GT	Radial Leaded Glass Coated Chip Thermistors (0.039" Dia.), Solderable Lead Wire	0.039 × 1.00	1,000–1,000,000	10	B, E1, F, J, L1, N1, U1	3.3–4.52	3009–4350	0.45	2.5	---	-55 to +300

Glass Encapsulated Thermistors											
Product Series	Description	Overall Dimensions	Resistance	Resistance Tolerance	R-T Curve	Temperature Coefficient	Beta Nominal	Dissipation Constant, Nominal	Thermal Time Constant, Max. – Still Air	Thermal Time Constant, Max. – Well-Stirred Oil	Temperature Rating
		Inches	Ohms	± %		% / °C	K	mW / °C	Seconds	Seconds	°C
		Body ϕ × Body L	@ 25 °C	@ 25 °C		@ 25 °C	0-50 °C				
DO-34 Standard	Glass Encapsulated Thermistors (300 °C), DO-34 Package, Tinned CCS Lead Wire	0.065 × 0.110	2,000–330,000	10	F, J, N1, R	3.86–4.68	3419–4263	2	5	0.5	-55 to +300
DO-35 Standard	Glass Encapsulated Thermistors (300 °C), DO-35 Package, Tinned CCS Lead Wire	0.075 × 0.160	500–5,000,000	1; 2; 3; 5; 10	B, E, E1, F, F13, G, H, J, L1, N1, R, V3, V4, Y, Y1	3.3–5.33	2941–4640	2	2–8	0.5–1	-55 to +300
DO-41 Standard	Glass Encapsulated Thermistors (300 °C), DO-41 Package, Tinned CCS Lead Wire	0.110 × 0.170	100–33,000	10	B, F, J, R	3.31–4.68	2941–4140	3	8	2	-55 to +300
JL	Interchangeable Glass Encapsulated Thermistors, DO-35 Package, ± 0.5°C Accuracy	0.075 × 0.160	10,000–100,000	---	J	4.4	3892	2	5	0.5	-55 to +300
JM	Interchangeable Glass Encapsulated Thermistors, DO-35 Package, ± 1.0°C Accuracy	0.075 × 0.160	10,000–100,000	---	J	4.4	3892	2	5	0.5	-55 to +300
USUG1000	UL Recognized Glass Encapsulated Thermistors, DO-35 Package	0.075 × 0.160	10,000–250,000	2; 5; 10	J	3.67	3892	2	---	---	-40 to +150

For details on electrical specifications, visit littelfuse.com.



Product Overview

Thermal Sensing Solutions: Thermistors, RTDs, Probe Assemblies

Littelfuse offers a broad range of thermistors, RTDs, probes, and assemblies for demanding temperature sensing applications worldwide. To learn more, download the Temperature Sensors Product Overview.



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Leaded Thermistors (Continued)

Interchangeable Thermistors												
Product Series	Description	Overall Dimensions	Resistance	Accuracy	R-T Curve	Temperature Coefficient	Beta Nominal	Dissipation Constant, Nominal	Thermal Time Constant, Max. - Still Air	Thermal Time Constant, Max. - Well-Stirred Oil	Temperature Rating	Max. Storage & Operation Temperature for Best Long-Term Stability
		Inches	Ohms	± °C		% / °C	K	mW / °C	Seconds	Seconds	°C	
		Bead W × Bead L	@ 25 °C	0-70 °C		@ 25 °C	0-50 °C					
KS	Standard Precision Interchangeable Thermistors (135 °C), ± 0.1°C Accuracy, Kynar Insulated Leads	0.095 × 1.5	1,000–100,000	±0.1°C	G, J, R	4.04–4.68	3575–4140	1	10	1	-80 to +135	-80 to +75
KT	Standard Precision Interchangeable Thermistors (135 °C), ± 0.2°C Accuracy, Kynar Insulated Leads	0.095 × 1.5	1,000–100,000	±0.2°C	G, J, R	4.04–4.68	3575–4140	1	10	1	-80 to +135	-80 to +120
KW	Precision Interchangeable Thermistors (135 °C), ± 0.5°C Accuracy, Kynar Insulated Leads	0.095 × 1.5	1,000–100,000	±0.5°C	G, J, R	4.04–4.68	3575–4140	1	10	1	-80 to +135	-80 to +120
KX	Precision Interchangeable Thermistors (135 °C), ± 1.0°C Accuracy, Kynar Insulated Leads	0.095 × 1.5	1,000–100,000	±1.0°C	G, J, R	4.04–4.68	3575–4140	1	10	1	-80 to +135	-80 to +120
PR	Ultra Precision Interchangeable Thermistors (80 °C), ± 0.05°C Accuracy, Uninsulated Leads	0.095 × 1.5	2,252–50,000	±0.05°C	J	4.4	3892	1	10	1	-55 to +80	-55 to +50
PS	Standard Precision Interchangeable Thermistors (150 °C), ± 0.1°C Accuracy, Uninsulated Leads	0.095 × 1.5	1,000–100,000	±0.1°C	G, J, R	4.04–4.68	3575–4140	1	10	1	-80 to +135	-80 to +75
PT	Standard Precision Interchangeable Thermistors (150 °C), ± 0.2°C Accuracy, Uninsulated Leads	0.095 × 1.5	1,000–100,000	±0.2°C	G, J, R	4.04–4.68	3575–4140	1	10	1	-80 to +135	-80 to +120
PW	Precision Interchangeable Thermistors (150 °C), ± 0.5°C Accuracy, Uninsulated Leads	0.095 × 1.5	1,000–100,000	±0.5°C	E, G, J, R	3.67–4.68	3263–4140	1	10	1	-80 to +135	-80 to +120
PX	Precision Interchangeable Thermistors (150 °C), ± 1.0°C Accuracy, Uninsulated Leads	0.095 × 1.5	1,000–100,000	±1.0°C	E, G, J, R	3.67–4.68	3263–4140	1	10	1	-80 to +135	-80 to +120

Surface Mount Thermistors

End-Banded Chip Thermistors									
Product Series	Description	Overall Dimensions	Resistance	Resistance Tolerance	Temperature Coefficient	Beta Nominal	Max. Power Rating	Temperature Rating	
		Inches	Ohms	± %	A	K	mW	°C	
		L × W × T	@ 25 °C	@ 25 °C	@ 25 °C	25–85 °C			
RA	Surface Mount End-Banded Chip Thermistors 0402 Style (125 °C)	0.0394 × 0.0197 × 0.208	10,000–200,000	1; 5	-4.4	3800–4250	40mW	-40 to +125	
RB	Surface Mount End-Banded Chip Thermistors 0603 Style (125 °C)	0.063 × 0.0315 × 0.0395	1,000–200,000	5	-4.4	3250–4250	150mW	-40 to +125	
KR	Surface Mount End-Banded Chip Thermistors 0805 Style (125 °C)	0.0787 × 0.0492 × 0.050	1,000–200,000	5	-4.4	3250–4250	300mW	-40 to +125	
LR	Surface Mount End-Banded Chip Thermistors 1206 Style (125 °C)	0.126 × 0.063 × 0.050	1,000–500,000	5	---	3250–4250	320–400 mW	-40 to +125	

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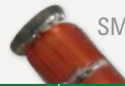
Surface Mount Thermistors (Continued)

Leadless Top/Bottom Terminated Chip Thermistors



Product Series	Description	Overall Dimensions	Resistance	Resistance Tolerance	R-T Curve	Temperature Coefficient	Beta Nominal	Dissipation Constant, Nominal	Thermal Time Constant, Max. - Still Air	Temperature Rating
		Inches	Ohms	± %		% / °C	K	mW / °C	Seconds	°C
		L × W × T	@ 25 °C	@ 25 °C		@ 25 °C	0-50 °C			
BC	Leadless Top/Bottom Terminated Chip Thermistors (150 °C)	Various Sizes	100–100,000	10	B, F, J, R	- 4.68 to -3.31	2941 - 4140	1	2	- 55 to +150

MELF Style Thermistors



Product Series	Description	Overall Dimensions	Resistance	Resistance Tolerance	R-T Curve	Temperature Coefficient	Beta Nominal	Dissipation Constant, Nominal	Thermal Time Constant, Max. - Still Air	Temperature Rating
		Inches	Ohms	± %		% / °C	K	mW / °C	Seconds	°C
		ø × L	@ 25 °C	@ 25 °C		@ 25 °C	0-50 °C			
MM	Surface Mount NTC LL-31 MicroMELF Style (220 °C)	0.049 × 0.075	2,186–200,000	1; 10	E1, F, G, J, R	- 4.68 to -3.82	3320–4140	1	5	- 55 to +220
HM	Surface Mount NTC LL-34 MiniMELF Interchangeable (220 °C) ±0.5°C Accuracy	0.0603 × 0.135	10,000–100,000	0.5	J	- 4.4	3892	2	8	- 55 to +220
SM	Surface Mount NTC LL-34 MiniMELF Style (220 °C)	0.060 × 0.135	500–1,000,000	1; 10	B, D2, E, E1, F, G, J, R, V3	- 4.93 to -3.3	2941–4369	2	8	- 55 to +220
WM	Surface Mount NTC LL-34 MiniMELF Interchangeable (220 °C) ±1.0°C Accuracy	0.060 × 0.135	10,000–100,000	---	---	- 4.4	3892	2	8	- 55 to +220
SB	Surface Mount NTC LL-41 MELF Style (220 °C)	0.060 × 0.135	1,000–20,000	10	F, J, R	- 4.68 to -3.68	3419–4140	3	8	- 55 to +220

Technical Information

What is a Thermistor?

Thermistors are thermally sensitive resistors whose prime function is to exhibit a large, predictable, and precise change in electrical resistance when subjected to a corresponding change in body temperature. To learn more, visit the Thermistor Technical Information page.



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Leaded RTDs

Thin-Film Plated RTD Sensors												
Product Series	Description	Overall Dimensions		Resistance	Resistance Tolerance	DIN 43760 Class	IEC 60751 Class	Temperature Deviation	Temperature Coefficient of Resistance	Dissipation Constant, Nominal	Thermal Time Constant, Max. - 1 m/s Moving Air	Temperature Rating
		Inches	Ohms	± %	± °C			ppm / °C				mW / °C
		Body L × W × T	@ 0 °C	@ 0 °C	@ 0 °C							
PPG	Thin-Film Platinum RTDs	0.0315 × 0.1181 × 0.049 or 0.0472 × 0.063 × 0.049 or 0.118 × 0.079 × 0.049		100–1000	0.06; 0.12; 0.24	B, C	F 0.15	0.15–0.6	3750–3850	1.8–2.2	1.2–15	- 200 to +600



Digital Temperature Indicators

Digital Temperature Indicators																			
Product Series	Description	Overall Dimensions			Indicating Temperature			Resistance		Hold Current	Trip Current	Withstand Voltage	Max. Fault Current	Power Dissipated	Time-to-Trip Current	Time-to-Trip	R _{min}	R _{1max}	Temperature Rating
		Inches	°C		Ohms		A	A	Vdc	A	W	A	Seconds	Ohms	Ohms	°C			
		L × W × T	Minimum	Typical	Maximum	Max. @ 25 °C											Indicating	Maximum	Maximum
setP [®]	Digital Temperature Indicators, Surface Mount, 0805 Size	0.087 × 0.059 × 0.024	90	100	110	6; 12	35,000	0.06–0.075	0.25–0.30	6	1	0.6	0.3	1–5	0.5	6–12	- 40 to +85		

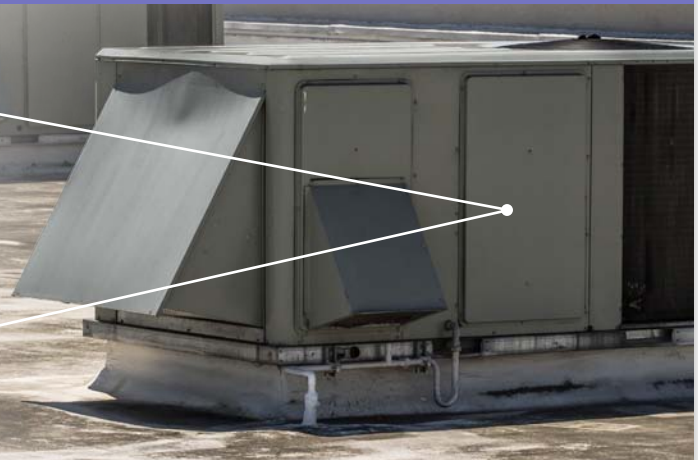


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How Is the Sensor Used Here?

USP10973 NTC Thermistor Probe With Copper Housing

At least two sensors per system are measuring the refrigerant line temperature in the water source heat pump.



Thermistor Probes and Assemblies

Straight/Cylindrical										
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	Temperature Accuracy	R-T Curve	Temperature Coefficient	Beta	Operating Temperature	Max. Storage & Operation Temperature for Best Long-Term Stability
		Inches	Ohms	± %	± °C		% / °C	K	°C	°C
		Probe ϕ × Probe L	@ 25 °C	@ 25 °C	0-70 °C		@ 25 °C	0-50 °C	°C	Maximum
USP3275	Stainless Steel Housing—Pointed Tip, Teflon Insulated Lead Wire	0.188 × 10.00	10,000	5	---	J	- 4.4	3892	- 55 to +105	---
USP7806	Stainless Steel Housing, PFA-Insulated Zip Cord	0.125 × 1.500	100,000	4.78	1.0 (+25 °C)	V	- 4.78	---	- 55 to +150	---
USP8528	Stainless Steel Housing and Spring, PFA-Insulated Lead Wire	0.188 × 2.250	10,000	---	0.20 (+25 to +80 °C)	J	- 4.4	3892	- 55 to +125	---
USP10972	Stainless Steel Housing, PVC-Insulated Zip Cord, Moisture Resistant	0.250 × 2.00	10,000	1	---	J	- 4.4	3892	- 55 to +105	---
USP11491	Stainless Steel Housing, Teflon-Insulated Lead Wire	0.125 × 2.50	10,000	---	0.20	J	- 4.4	3892	- 55 to +150	+120
USP11492	Stainless Steel Housing, Teflon-Insulated Lead Wire	0.188 × 1.50	10,000	---	0.20	J	- 4.4	3892	- 55 to +150	+120
USP12920	Stainless Steel Housing, Glass Braid-Insulated, Glass Braid Jacketed Wire	0.250 × 2.00	100,000	1	---	J	- 4.4	3892	- 55 to +300	---

Flanged									
Product Series	Description	Overall Dimensions		Nominal Resistance	Resistance Tolerance	R-T Curve	Temperature Coefficient	Beta	Operating Temperature
		Inches		Ohms	± %		% / °C	K	°C
		Probe ϕ × Probe L	Flange L × Flange W	@ 25 °C	@ 25 °C		@ 25 °C	0-50 °C	°C
USP9728	Stainless Steel Housing, #6 Stud Mounting Holes, Glass Braid-Insulated, Glass Braid-Jacketed Wire	0.250 × 2.250	0.815 ϕ	100,000	2	J	- 4.4	3892	- 55 to +300
USP10979	Stainless Steel Housing, #6 Stud Mounting Holes, Moisture-Resistant	0.250 × 2.250	0.815 ϕ	10,000	1	J	- 4.4	3892	- 55 to +105
USP12836	Stainless Steel Housing, 0.1772" Dia. Mounting Hole, PVC Zip Cord Lead Wire	0.1772 × 1.1811	0.7874 × 0.4724	10,000	1	J	- 4.4	3977	- 55 to +105

For details on electrical specifications, visit littelfuse.com.

Technical Information

Thermistor Terminology and Technical Vocabulary

Thermistors have specific terminologies and definitions related to their unique types, characteristics, and measurements. Littelfuse created a glossary page defining these terms. Read on to learn more.



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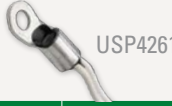
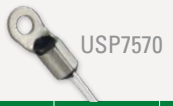

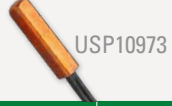
Thermistor Probes and Assemblies (Continued)

Plastic											
		USP4065		USP10680		USP14579		USP11493		USP12838	
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	Temperature Accuracy	R-T Curve	Temperature Coefficient	Beta	Operating Temperature	Max. Storage & Operation Temperature for Best Long-Term Stability	
		Inches	Ohms	± %	± °C		% / °C	K	°C	°C	
		Probe Ø × Probe L	@ 25 °C	@ 25 °C	0-70 °C		@ 25 °C	0-50 °C	°C	Maximum	
USP4065	Vinyl Housing, PVC-Insulated Zip Cord	0.225 × 0.580	2,000	---	1.67 (-26.1 to +4.4 °C)	F	-3.86	3419	-40 to +100	---	
USP7537	Polyimide Tube Housing, Kynar-Insulated Lead Wire	0.060 × 0.250	2,500	---	0.05 (0 to +50 °C)	J	-4.4	3892	-55 to +80	+50	
USP10680	Vinyl Housing, PVC-Insulated Zip Cord	0.290 × 1.060	10,000	---	0.56 (+18.3 to +29.4 °C)	J	-4.4	3892	-40 to +105	---	
USP10975	Plastic Housing, Kynar-Insulated Lead Wire	0.100 × 0.215	10,000	1	---	J	-4.4	3892	-55 to +125	---	
USP10982	Vinyl Housing, PVC-Insulated Lead Wire, Moisture-Resistant	0.230 × 1.350	10,000	1	---	J	-4.4	3892	-40 to +80	---	
USP11493	Vinyl Housing, PVC-Insulated Zip Cord	0.225 × 0.580	2,252	---	0.10 (0 to +70 °C)	J	-4.4	3892	-40 to +105	+75	
USP12838	Vinyl Housing, PVC-Insulated Lead Wire	0.089 × 0.340	10,000	1	---	J	-4.4	3892	-40 to +80	---	
USP14439	Polyimide Tube Housing, Two-Conductor PVC-Insulated Lead Wire	0.085 × 0.375	10,000	---	0.10 (0 to +50 °C)	J	-4.4	3892	-40 to +105	+75	
USP14579	Positive Temperature Coefficient Thermistor, Plastic Housing, Teflon-Insulated Lead Wire	0.155 × 0.500	1,000	2	---	---	---	---	-40 to +105	---	
USP17957	Positive Temperature Coefficient Thermistor, Plastic Housing, Teflon-Insulated Lead Wire	0.140 × 0.380	1,000	2	---	---	---	---	-40 to +105	---	

Micro Probes										
		USP12837								
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	Temperature Accuracy	R-T Curve	Temperature Coefficient	Beta	Operating Temperature	Max. Storage & Operation Temperature for Best Long-Term Stability
		Inches	Ohms	± %	± °C		% / °C	K	°C	°C
		Probe Ø × Probe L	@ 25 °C	@ 25 °C	0-70 °C		@ 25 °C	0-50 °C	°C	Maximum
USP12837	Polyimide Tube Housing, Poly-Nylon-Insulated Lead Wire	0.020 × 0.150	10,000	1	---	J	-4.4	3892	-55 to +125	+100


Laboratory Grade										
		USP3986								
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	Temperature Accuracy	R-T Curve	Temperature Coefficient	Beta	Operating Temperature	
		Inches	Ohms	± %	± °C		% / °C	K	°C	°C
		Probe Ø × Probe L	@ 25 °C	@ 25 °C	-20 to +70 °C		@ 25 °C	0-50 °C	°C	
USP3021	Stainless Steel Housing, PVC Insulated Zip Cord, Supplied with NIST Traceable Calibration Certificate	0.250 × 9.50	10,000	2	0.01 (-20 to +70 °C)	J	-4.4	3892	-55 to +105	
USP3986	Stainless Steel Housing, PVC Insulated Zip Cord, Supplied with NIST Traceable Calibration Certificate	0.250 × 9.50	100,000	---	0.01 (0 to +105 °C)	J	-4.4	3892	-55 to +105	

Thermistor Probes and Assemblies (Continued)


Surface Temperature Sensing										
    										
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	Temperature Accuracy	R-T Curve	Temperature Coefficient	Beta	Operating Temperature	Max. Storage & Operation Temperature for Best Long-Term Stability
		Inches	Ohms	± %	± °C		% / °C	K	°C	°C
		Body L × W × T	@ 25 °C	@ 25 °C	0-70 °C		@ 25 °C	0-50 °C	°C	Maximum
TO-220	TO-220 Package Thermistors	0.595 × 0.400 × 0.165	5,000 - 10,000	1; 5; 10	---	J	- 4.4	3892	- 55 to +150	---
USUR1000	UL Recognized NTC Thermistor Assemblies #6 Ring Lug Housing	0.615 × 0.280 × 0.215	1,000 - 100,000	2; 3; 5; 10	---	J	- 4.4	3892	- 40 to +125	---
USP4261	Ring Lug Housing, #6 Mounting Hole, PVC-Insulated Zip Cord	0.615 × 0.280 × 0.215	10,000	1	---	J	- 4.4	3892	- 40 to +105	---
USP5510	Flag Terminal Housing, #6 Mounting Hole, Teflon-Insulated Lead Wire	0.310 × 0.645 × 0.220	10,000	---	0.50 (0 to +70 °C)	J	- 4.4	3892	- 55 to +150	---
USP6295	Ring Lug Housing, #4 Mounting Hole, Kynar-Insulated Lead Wire	0.620 × 0.281 × 0.215	10,000	5	---	J	- 4.4	3892	- 55 to +125	---
USP6998	Ring Lug Housing, 1/4" Mounting Hole, Teflon-Insulated Lead Wire, Harwin Connector	1.270 × 0.445	200,000	1	---	R	- 4.68	4140	- 55 to +150	---
USP7570	Ring Lug Housing, #6 Mounting Hole, Teflon-Insulated Lead Wire	0.620 × 0.281 × 0.215	10,000	---	5.0 (+60 to +100 °C)	J	- 4.4	3892	- 55 to +135	---
USP10976	Ring Lug Housing, #6 Mounting Hole, Teflon-Insulated Lead Wire	0.620 × 0.281	10,000	1	---	J	- 4.4	3892	- 55 to +150	+120
USP7765	Overmolded Plastic Housing, UL1015 Style Lead Wire, Moisture-Resistant	1.300 × 0.400 × 0.250	10,000	1	---	J	- 4.4	3892	- 40 to +105	---
USP7766	Copper Housing, Supplied with 3 Copper-Plated Clips for Mounting to 0.3125", 0.375" & 0.500" Dia. Pipes, PVC Insulated Zip Cord, Moisture-Resistant	0.787 × 0.164	10,000	1	---	J	- 4.4	3892	- 40 to +105	---
USP8798	Copper Housing, Copper-Plated Clip for Mounting to 0.250" Dia. Pipe, PVC Insulated Zip Cord, Moisture-Resistant	0.787 × 0.220 × 0.167	10,000	---	0.50 (+20 to +35 °C)	J	- 4.4	3892	- 40 to +105	---
USP10973	Copper Housing, PVC Insulated Zip Cord, Moisture-Resistant	0.787 × 0.177 × 0.164	10,000	1	---	J	- 4.4	3892	- 40 to +105	---
USP18967	Copper Housing, Copper-Plated Clip for Mounting to 0.875" Dia. Pipe, PVC Insulated Zip Cord, Moisture-Resistant	0.787 × 0.233 × 0.164	10,000	1	---	J	- 4.4	3977	- 40 to +105	---


Threaded										
    										
Product Series	Description	Overall Dimensions		Nominal Resistance	Resistance Tolerance	R-T Curve	Temperature Coefficient	Beta	Operating Temperature	
		Inches		Ohms	± %		% / °C	K	°C	
		Probe Ø × Probe L	Hex Head W × Plug L	@ 25 °C	@ 25 °C		@ 25 °C	0-50 °C	°C	
USP3121	Aluminum Hex Housing, 6-32 Thread, Kynar-Insulated Lead Wire	---	0.250 × 0.625	10,000	5	J	- 4.4	3892	- 55 to +125	
USP10978	Brass Housing, 1/4"-18 NPT Thread, PVC-Insulated Lead Wire	0.250 × 0.650	0.562 × 0.880	10,000	1	J	- 4.4	3892	- 55 to +105	
USP10981	Stainless Steel Housing, 1/8"-27 NPT Thread, PVC-Insulated Zip Cord, Moisture Resistant	0.250 × 1.250	0.4375 × 0.625	10,000	1	J	- 4.4	3892	- 55 to +105	
USP10997	Brass Plug, 1/8"-27 NPT Thread, PVC-Insulated Lead Wire	---	0.4375 × 0.560	10,000	5	J	- 4.4	3892	- 55 to +105	
USP12755	Stainless Steel Housing, 5/16"-24 UNJF-3A Thread, PVC-Insulated Lead Wire	0.188 × 0.500	0.500 × 0.650	10,000	---	E1	---	3435	- 55 to +105	
USP12840	Stainless Steel Hex Head Screw, 10-32 Thread, Kynar-Insulated Lead Wire	---	0.3125 × 0.370	10,000	1	J	- 4.4	3892	- 55 to +125	




Thermistor Probes and Assemblies (Continued)

Special Probes											
 USP16673											
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	Temperature Accuracy	R-T Curve	Temperature Coefficient	Beta	Dissipation Constant, Nominal	Thermal Time Constant, Nominal - Still Air	Operating Temperature
		Inches	Ohms	± %	± °C		% / °C	K	mW / °C	Seconds	°C
		Body L × W × T	@ 25 °C	@ 25 °C	0-70 °C		@ 25 °C	0-50 °C			
USP16673	Ultra-Thin Polyimide Insulation Film, Solderable Lead Wires	1.260 × 0.197 × 0.040	10,000	1	---	E1	---	3435	0.7	5	-30 to +90

RTD Probes and Assemblies

Threaded								
 USW3483								
Product Series	Description	Overall Dimensions		Nominal Resistance	Resistance Tolerance	DIN 43760 Class	Temperature Coefficient of Resistance	Temperature Rating
		Inches		Ohms	%		ppm / °C	°C
		Probe Ø × Probe L	Hex Head W × Plug L	@ 25 °C				Maximum
USW3483	Stainless Steel Housing, 3/8"-18 NPT Thread, PVC-Insulated Lead Wire	0.250 × 3.00	0.6875 × 0.750	1,000	0.06	A	3850	105

Plastic							
 USW2883							
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	DIN 43760 Class	Temperature Coefficient of Resistance	Temperature Rating
		Inches	Ohms	%		ppm / °C	°C
		Probe Ø × Probe L	@ 25 °C				Maximum
USW2883	Polyimide Housing, Uninsulated Nickel Lead Wire	0.110 × 0.220	500	0.12	B	3850	150

Surface Temperature Sensing								
 USW2295  USW2299  USW3866								
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	DIN 43760 Class	IEC 60751 Class	Temperature Coefficient of Resistance	Temperature Rating
		Inches	Ohms	%			ppm / °C	°C
		Ring Lug L × Ring Lug W	@ 0 °C					Maximum
USW2295	Ring Lug Housing, #6 Mounting Hole, Teflon-Insulated Lead Wire	0.620 × 0.281	100	0.24	C	---	3850	150
USW2299	Ring Lug Housing, #8 Mounting Hole, Teflon-Insulated Lead Wire	0.720 × 0.312	1,000	0.12	B	---	3850	105
USW3866	Ring Lug Housing, #10 Mounting Hole, PVC-Insulated Lead Wire	0.750 × 0.375	1,000	0.12	B	F 0.3	3850	105

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- Slide Switches
- Dip Switches
- Detect Switches
- Navigation Switches
- Toggle Switches
- Rocker Switches
- Switchlock Switches
- Rotary Switches

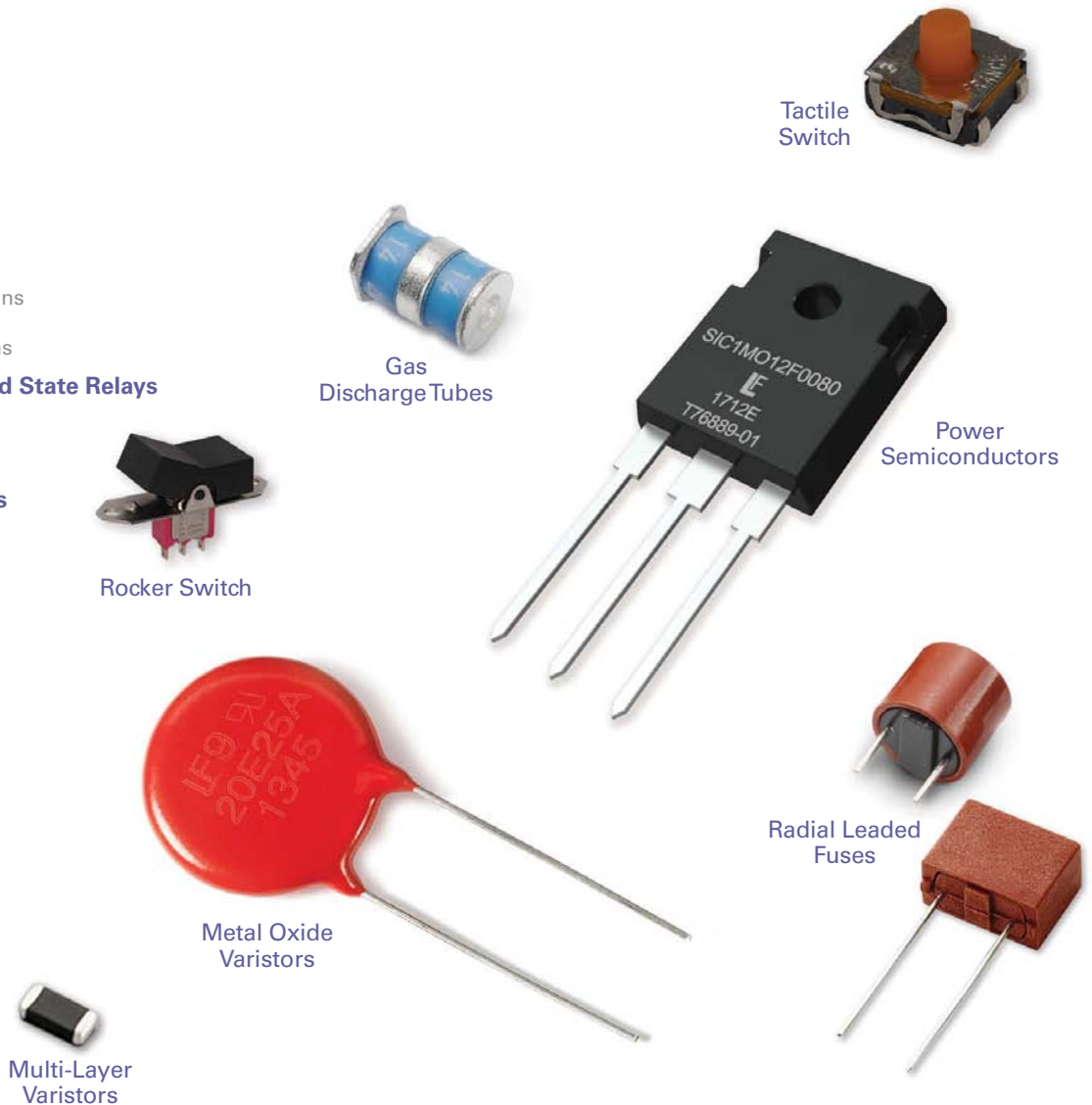
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- application expertise
- global support
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- technology innovation
- collaboration
- customer focus



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- H3TRB
- HAST
- High & Low Temperature Storage
- High Temperature Loading
- Ingress Protection (IP)
- HTGB
- HTRB
- Temperature & Humidity
- Temperature Cycling
- Thermal Shock
- Salt Fog

Physical-Mechanical Characteristics

- Acceleration
- Die Shear
- Leak Detection
- Mechanical Shock
- Resistance to Soldering Heat (Dip, Reflow, Wave)
- Resistance to Solvents
- Solderability
- Terminal Strength (Push, Pull, Bend)
- Vibration
- Wetting Balance
- Wire Pull

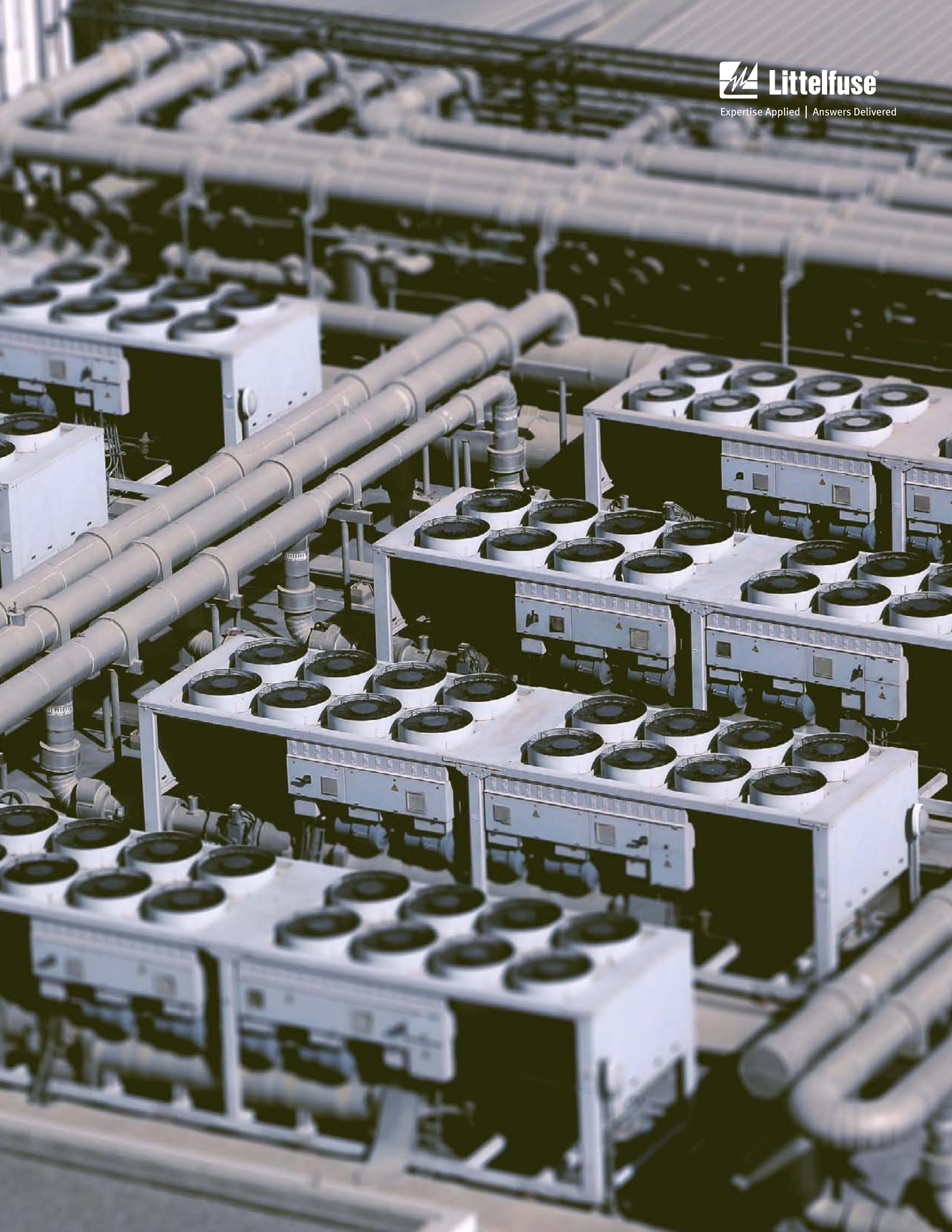
Electrical

- BCI
- Capacitance
- EFT
- ESD
- Impedance
- Insulation Resistance
- I-V
- Life
- Lightning Surge
- Overload
- Parametric Tests
- Power-Cross
- Power Cycling
- Ring Wave
- R-T
- S-Parameter Measurements (Insertion Loss, Isolation, Reflection)
- Short Circuit
- Step Current
- Surface Resistivity
- Surge
- TDR (Eye Diagram)
- Telecom
- Thermal Cut-Off
- Time-to-Trip
- TLP
- Transient
- Trip Cycle
- Trip Endurance
- Voltage Drop

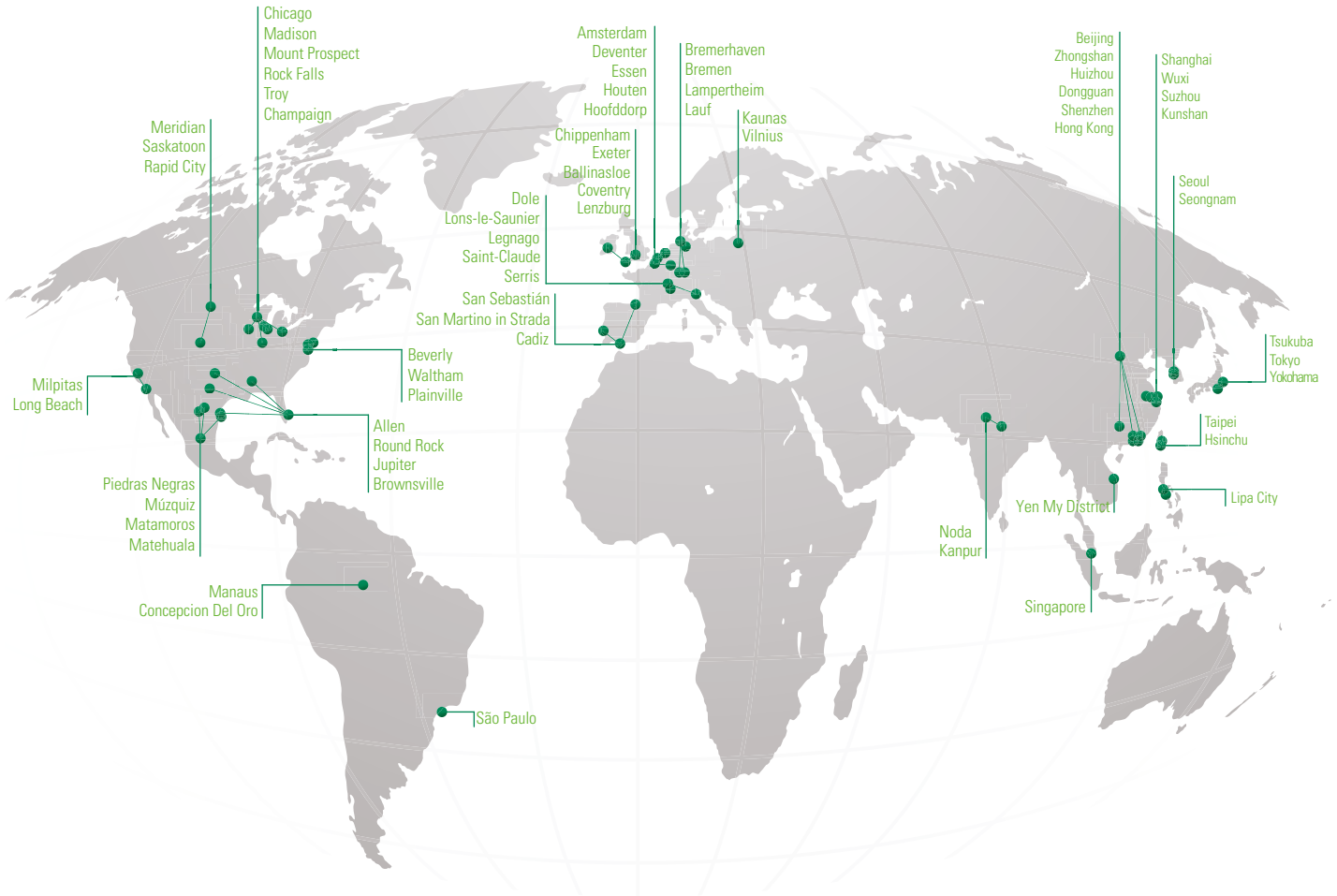


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