Littelfuse®

Expertise Applied | Answers Delivered

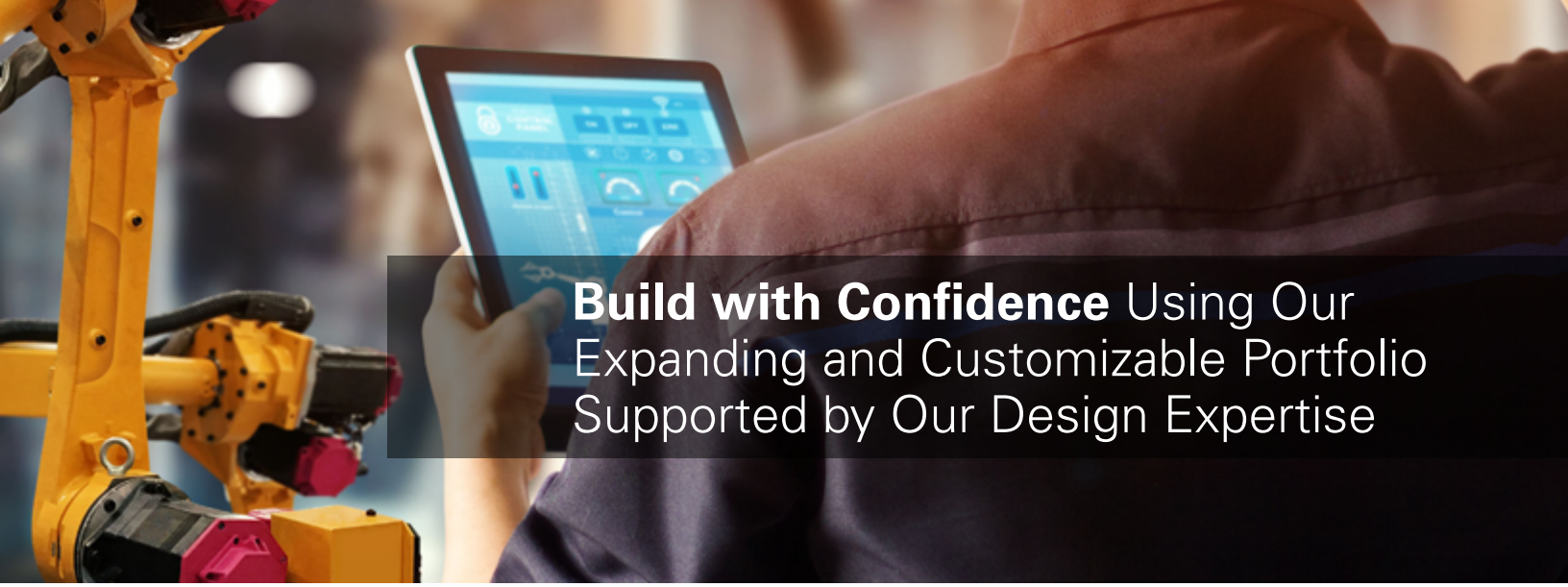
Sensing Products
Selection Guide

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.

Specifications, descriptions, and illustrative material in this literature are as accurate as known at the time of publication but are subject to changes without notice. Visit **littelfuse.com** for more information.



Build with Confidence Using Our Expanding and Customizable Portfolio Supported by Our Design Expertise

Littelfuse: Everywhere, Every Day

Founded in 1927, Littelfuse has become the world's most respected circuit protection brand with well-established and growing platforms in power control and sensing technologies. Today, we are a global company, offering a diverse and extensive product portfolio—fuses, semiconductors, polymers, ceramics, relays, sensors, and more—serving the electronics, automotive, and industrial markets. Each is manufactured to exacting quality standards and backed by an unwavering commitment to technical support and customer service.

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.

Your Design Challenges, Solved

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
- ISO14001
- 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 on the 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."

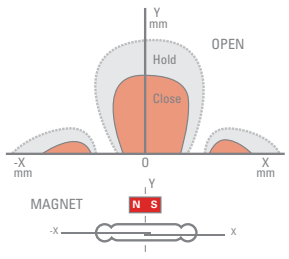


Figure 1-Two-pole linear activation, parallel orientation

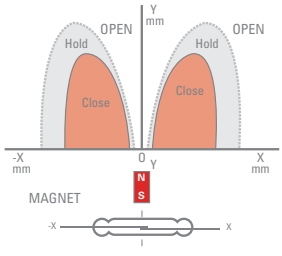


Figure 2-Single-pole linear activation, perpendicular orientation

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.

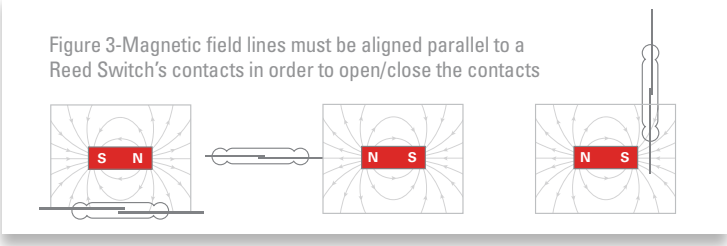


Figure 3-Magnetic field lines must be aligned parallel to a Reed Switch's contacts in order to open/close the contacts

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.

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 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 automotive, test equipment, security, medical, and process control equipment.

Reed Technology Applications

Reed Switches are very popular for battery-powered applications. The Switches are also used in automotive safety products, such as seatbelt buckle clamping/closure detection sensors and crash sensors for collision detection. 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.

Introduction to **Magnetic** Sensing

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.

Parameter	Reed Switch	Hall Effect Sensor
No-contact sensing element	•	•
Current consumption	0	~20mA(Continuous) /6µA (Duty cycle)
Sensitivity (Gauss)	10+	42+
Maximum operating temperature	125	150
High-frequency operation	-	•
Digital switching	•	•
Linear sensing	-	•
Integrated circuitry	-	•
Electrical load capability	•	-
EMC/ESD Immunity	•	-
Ultra-small package size	-	•

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

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.

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

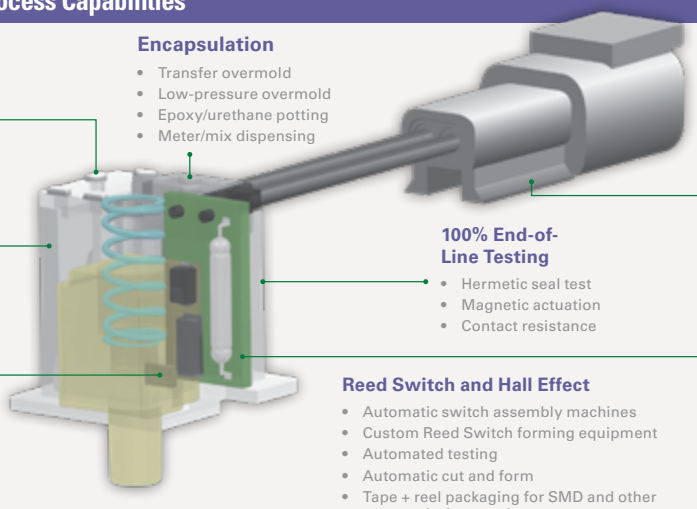
- 3D CAD mechanical design services
- Electronic circuitry design
- Magnetic simulation support analyzing feasibility of the design options
- 3D mapping of magnetic actuation of the sensor
- Rapid prototyping and quick-turn concept parts including 3D printed parts
- Prototype units using prototype tooling
- 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



Plastic Assembly
- Injection molding
- Ultrasonic welding
- Heat staking

Encapsulation
- Transfer overmold
- Low-pressure overmold
- Epoxy/urethane potting
- Meter/mix dispensing

Assembly Methods
- Automated
- Cellular
- Manual

Custom Magnet Solutions
- Magnetic simulation and modeling for customer-specific designs
- Integral magnets within the sensor
- Magnetic circuits with tight tolerances available
- Magnetic actuation mapping

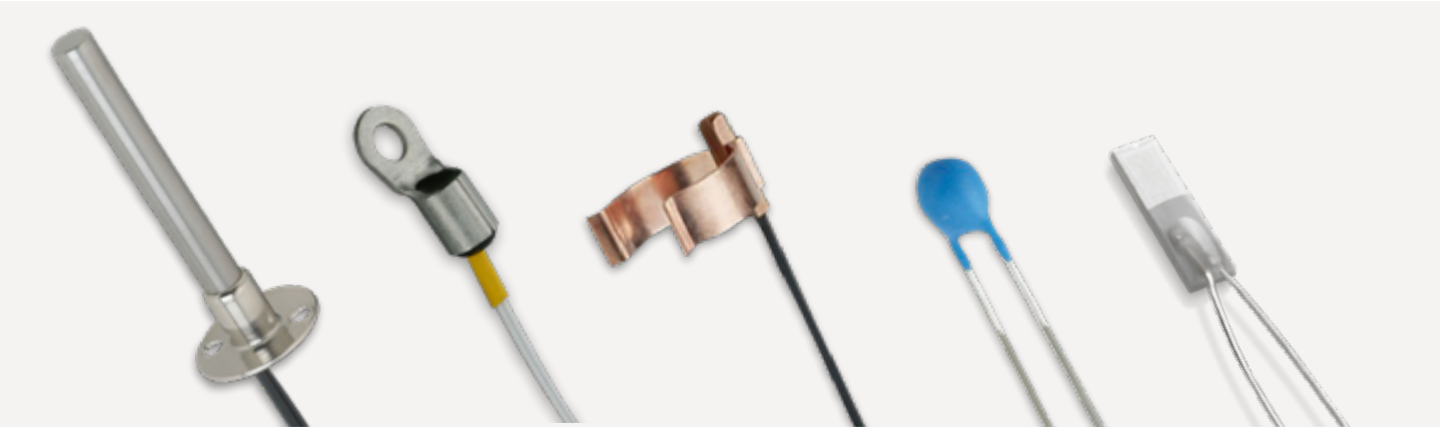
Wire Harness and Termination Equipment
- Automatic cut, strip, and crimp
- Apply customer-specified wire/cable and connectors
- Overmolding of connector to wire/cable sealing options available

100% End-of-Line Testing
- Hermetic seal test
- Magnetic actuation
- Contact resistance

Circuit Board Assembly
- Vision systems
- In-circuit test
- Pick and place
- Reflow soldering
- Wave soldering
- Robotic soldering

Reed Switch and Hall Effect
- Automatic switch assembly machines
- Custom Reed Switch forming equipment
- Automated testing
- Automatic cut and form
- Tape + reel packaging for SMD and other custom design requirements

Introduction to **Temperature** Sensing



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

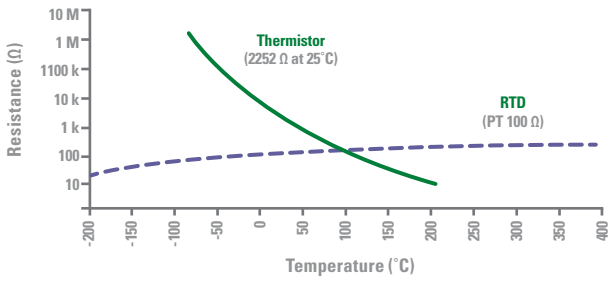
Platinum Resistance Temperature Detectors (Pt-RTDs) are temperature sensors that have a positive, predictable, and nearly linear change in resistance when subjected to a corresponding change in their body temperature.

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.

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 (ex. 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 100Ω, up to 5MΩ at 25°C	Resistance values such as 100Ω, 500Ω and 1000Ω 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, from position sensing in doors to temperature sensing in electric vehicle battery packs. 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
Automotive and Transportation	Temperature sensing EV battery packs	●	●	-	-	-
	Detect seat belt buckle engagement	-	-	-	-	●
	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


MITI-7


FLEX-14


MDRR-DT


MLRR-3


DRS-50

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)	c UL us
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†	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	•
MVSR-20	A: SPST-NO	Glass	19.69 (0.775)	56.77 (2.235)	10	1000 Vdc	2000	0.5Adc,0.35 Aac	0.1	-75 to +125	17-38	•
59050-2	A: SPST-NO	Overmolded	22.86 (.900)	20.32 (.800)	20	200 Vdc, 265 Vac	400	0.5 Adc, 0.35 Aac	0.2	-20 to +105	17-33	•
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-50	A: SPST-NO	Glass	50.80 (2.000)	82.55 (3.250)	100	280 Vac, 400 Vdc	600	3.0 Adc, 2.1 Aac	0.1	-40 to +125	42-83	•
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


MDSM-10


MDSM-DT


MLSM-3

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)	c UL us
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 (1.00)	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 (Continued)

Overmolded

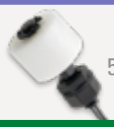

59166


59170

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)	c UL us
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

Float


59630


59300

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 Open High Voltage	23.70 (0.930) × 43.70 (1.720)	10	300	450	0.5	0.2
	Float Sensor, Changeover	23.70 (0.930) × 43.70 (1.720)	5	175	200	0.25	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


59085


59086


59090

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, 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
	Vane Sensor, Normally Closed High Voltage	25.40 (1.000) × 19.05 (0.750) × 6.35 (0.250)	10	300	450	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
	Vane Sensor, Normally Closed High Voltage	25.40 (1.000) × 19.05 (0.750) × 6.35 (0.250)	10	300	450	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, Normally Closed High Voltage	32.50 (1.280) × 32.25 (1.271) × 23.25 (0.915)	10	300	450	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

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 Sensors (Continued)

Seat Occupancy


59250


59251

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

Firecracker


59010


59021


59025


59030

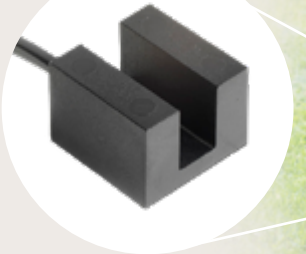

59040

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 Firecracker	3.13 (0.123) × 9.00 (0.354)	5	170	175	0.25	0.25	57020
59020	Mini Firecracker	5.10 (0.201) × 15.24 (0.600)	10	170	175	0.25	0.25	57020
59021	Aluminum Mini Firecracker	5.10 (0.201) × 15.24 (0.600)	10	170	175	0.25	0.25	57020
59022	Firecracker, Normally Open	5.80 (.228) × 25.4 (1.000)	10	200	250	0.5	0.2	57022
	Firecracker, Changeover	5.80 (.228) × 25.4 (1.000)	5	175	200	0.25	0.2	
	Firecracker, Normally Closed	5.80 (.228) × 25.4 (1.000)	5	175	200	0.25	0.2	
59025	Firecracker, Normally Open	6.22 (0.245) × 25.40 (1.000)	10	200	250	0.5	0.2	57025
	Firecracker, Normally Open High Voltage	6.22 (0.245) × 25.40 (1.000)	10	300	450	0.5	0.2	
	Firecracker, Changeover	6.22 (0.245) × 25.40 (1.000)	5	175	200	0.25	0.2	
	Firecracker, Normally Closed	6.22 (0.245) × 25.40 (1.000)	5	175	200	0.25	0.2	
59030	Firecracker, Normally Open	6.22 (0.245) × 38.10 (1.500)	10	200	250	0.5	0.2	57030
	Firecracker, Normally Open High Voltage	6.22 (0.245) × 38.10 (1.500)	10	300	450	0.5	0.2	
	Firecracker, Changeover	6.22 (0.245) × 38.10 (1.500)	5	175	200	0.25	0.2	
	Firecracker, Normally Closed	6.22 (0.245) × 38.10 (1.500)	5	175	200	0.25	0.2	
59040	Press-Fit Firecracker, Normally Open	9.5 (0.375) Hole Ø × 31.00 (1.220)	10	200	250	0.5	0.2	57040
	Press-Fit Firecracker, Changeover	9.5 (0.375) Hole Ø × 31.00 (1.220)	5	175	200	0.25	0.2	
	Press-Fit Firecracker, Normally Closed	9.5 (0.375) Hole Ø × 31.00 (1.220)	5	175	200	0.25	0.2	

How is the Sensor Used Here?

59090 Reed Sensor

Our Reed Vane Sensor 59090 senses when the grass bag is in the proper position on the electric powered lawn mower. If not sensed, the mower will not activate.



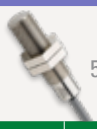
Reed Sensors (Continued)

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, Normally Open High Voltage	M8 × 1.25 Pitch × 36.00 (1.420)	10	300	450	0.5	0.2	
	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, Normally Open High Voltage	M12 × 1mm Pitch × 46.00 (1.810)	10	300	450	0.5	0.2	
	Heavy Duty Threaded Barrel, Changeover	M12 × 1mm Pitch × 46.00 (1.810)	5	175	200	0.25	0.2	
	Heavy Duty Threaded Barrel, Normally Closed	M12 × 1mm Pitch × 46.00 (1.810)	5	175	200	0.25	0.2	

Lever Arm


59210

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.
59210	Lever Arm Sensor	24 (0.945) × 23 (0.906) × 10 (0.394)	10	200	250	0.5	0.2

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)

Flange/Flat Pack


59105


59135


59140


59145


59150

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
	Terminal Flange Mount Sensor, Normally Open High Voltage	40.17 (1.582) × 19.05 (0.750) × 6.60 (0.260)	10	300	450	0.5	0.2	
	Terminal Flange Mount Sensor, Normally Closed	40.17 (1.582) × 19.05 (0.750) × 6.60 (0.260)	5	175	200	0.25	0.2	
59125	Pinned Flange Mount Sensor, Normally Open	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)	10	200	250	0.5	0.2	57125
	Pinned 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	
	Pinned Flange Mount Sensor, Normally Closed	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)	5	175	200	0.25	0.2	
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	
	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	
59145	Flange Mount Sensor, Normally Open	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)	10	200	250	0.5	0.2	57145
	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	
	Flange Mount Sensor, Normally Closed	28.57 (1.125) × 19.05 (0.750) × 6.35 (0.250)	5	175	200	0.25	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, 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	
	Flange Mount Sensor, Normally Closed	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.

Reed Relays

Single-in-Line (SIL)

HE3300 Series

Product Series	Description	Overall Dimensions		Coil Voltage		Coil Resistance	Contact Ratings, Switching			Contact Form
		Transfer Molded Body	External Shield Body							
		mm (inch)	mm (inch)	Vdc	Vdc	Ohms	Vdc	A	W	
		L × W × H	L × W × H	Nominal	Max.	Nominal	Max.	Max.	Max.	
HE3321A0400	Reed Relay, SIL, SPST-NO	24.13 (0.950) × 7.00 (0.276) × 7.40 (0.291)	24.90 (0.980) × 7.60 (0.299) × 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) × 7.00 (0.276) × 7.40 (0.291)	24.90 (0.980) × 7.60 (0.299) × 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) × 7.00 (0.276) × 7.40 (0.291)	24.90 (0.980) × 7.60 (0.299) × 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)

HE3600 Series

Product Series	Description	Overall Dimensions		Coil Voltage		Coil Resistance	Contact Ratings, Switching			Contact Form
		Transfer Molded Body	External Shield Body							
		mm (inch)	mm (inch)	Vdc	Vdc	Ohms	Vdc	A	W	
		L × W × H	L × W × H	Nominal	Max.	Nominal	Max.	Max.	Max.	
HE3621A0500	Reed Relay, SIL, SPST-NO	19.05 (0.750) × 5.08 (0.200) × 7.45 (0.293)	19.70 (0.776) × 5.65 (0.222) × 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							
		mm (inch)	mm (inch)	Vdc	Vdc	Ohms	Vdc	A	W	
		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

55110

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
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
55110	LED Flange Mount Hall	34.00 (1.399) × 14.00 (0.551) × 10.00 (0.394)	3.8 to 24	N/A	Voltage	Vdd-2 @ 0.1 mA	0.4 V @ 20 mA	-40 to +85	-65 to +85

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


55140


55300


55310

Product Series	Description	Overall Dimensions mm (inch) L × W × H	Operating Supply Voltage Vdc	Operating Supply Current mA Max.	Output Type	Output High	Output Low Max.	Temperature Rating °C Operating	Temperature Rating °C 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
55310	Flat Pack Digital Hall	28.50 (1.122) × 20.40 (0.803) × 6.35 (0.250)	4.75 to 24	6	Current	N/A	20 mA	-40 to +105	-65 to +105

Round Flange Mount


55505

Product Series	Description	Overall Dimensions mm (inch) L × W × H	Operating Supply Voltage Vdc	Operating Supply Current mA	Output Type	Output High	Output Low Max.	Temperature Rating °C Operating	Temperature Rating °C Storage
55505	Flange Mount Geartooth Hall	17.86 (0.703) × 36.75 (1.447) × 41.40 (0.551)	4.75 to 24	N/A	Digital	Vdd-2	0.6 V @ 20 mA	-40 to +125	-65 to +125

Threaded Barrel


55075

Product Series	Description	Overall Dimensions mm (inch) Thread Pitch × L	Operating Supply Voltage Vdc	Operating Supply Current mA	Output Type	Output High	Output Low Max.	Temperature Rating °C Operating	Temperature Rating °C 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 @ 20 mA	-40 to +85	-65 to +85

Rotary/Angular


55250

Product Series	Description	Overall Dimensions mm (inch) L × W × H	Operating Supply Voltage Vdc	Operating Supply Current mA	Output Type	Output High	Output Low Max.	Temperature Rating °C Operating	Temperature Rating °C 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


H-31


H-58

57140


57045

Product Series	Description	Overall Dimensions mm (inch) L x W x H	Material	Recommended Operating Temp. °C 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


H-35


H-625


57022


57060

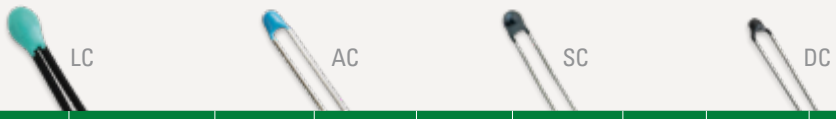

57070

Product Series	Description	Overall Dimensions mm (inch) ø × L	Material	Recommended Operating Temp. °C 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
H-315	AlNiCo Magnet	3.00 (0.118) × 15.00 (0.590)	AlNiCo-5	450
H-420	AlNiCo Magnet	4.00 (0.157) × 20.0 (0.787)	AlNiCo-5	450
H-625	AlNiCo Magnet	6.00 (0.236) × 25.0 (0.984)	AlNiCo-5	450
57020	Actuator for Mini Firecracker	5.10 (0.201) × 15.24 (0.600)	AlNiCo-5	105
57022	Actuator for Firecracker	5.80 (0.228) × 25.40 (1.000)	AlNiCo-5	105
57025	Actuator for Firecracker	6.22 (0.245) × 25.40 (1.000)	AlNiCo-5	105
57030	Actuator for Long Firecracker	6.22 (0.245) × 38.10 (1.500)	AlNiCo-5	105
57040	Actuator for Firecracker with Retaining Ribs	9.5 (0.375) × 31.00 (1.220)	NdFeB 35H	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.

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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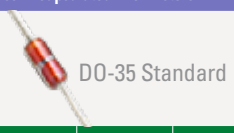
Leaded Thermistors (Continued)

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 ø × 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

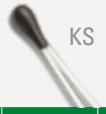


Product Series	Description	Overall Dimensions	Resistance	Resistance Tolerance	R-T Curve	Temperature Coefficient	Beta Nominal	Dissipation Constant, Nominal	Thermal Time Constant, Max. - Still Air	Thermal Time Constant, Max. - Well-Stirred Oil	Temperature Rating
		Inches	Ohms	± %		% / °C	K	mW / °C	Seconds	Seconds	°C
		Body ø × 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.

Leaded Thermistors (Continued)

Interchangeable Thermistors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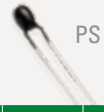

PS

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


RB

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

For details on electrical specifications, visit littelfuse.com.

Surface Mount Thermistors (Continued)

Leadless Top-Bottom Terminated Chip Thermistors

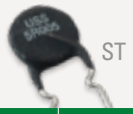
Product Series	Description	Overall Dimensions	Resistance	Resistance Tolerance	R-T Curve	Temperature Coefficient	Beta Nominal	Dissipation Constant, Nominal	Thermal Time Constant, Max. - Still Air	Temperature Rating
		Inches	Ohms	± %		% / °C	K	mW / °C	Seconds	°C
		L × W × T	@ 25°C	@ 25°C		@ 25°C	0-50°C			
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

Power Thermistors

Inrush Current Limiting Thermistors



Product Series	Description	Disc Dimensions	Resistance	Resistance Tolerance	Max Steady State Current	Nominal Resistance @ Max. Current	Lead Diameter Nominal
		Inches	Ohms	± %	A	Ohms	Inches
		Diameter	@ 25°C	@ 25°C	I_{max}	RI_{max}	
ST	Inrush Current Limiters (Power Thermistors)	0.275 - 1.475	0.7 - 200	15; 20; 25; 30	0.1 - 30	0.015 - 6.3	0.018 - 0.04

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	Seconds	°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_{tmax}	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	Typical		Maximum	Minimum	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°C to +85°C

For details on electrical specifications, visit littelfuse.com.

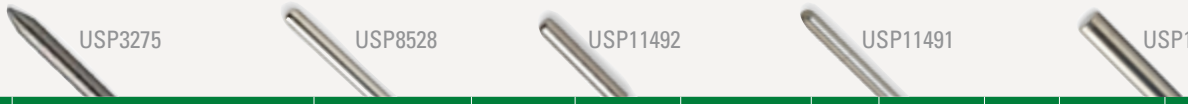
How is the Sensor Used Here?

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 ø × Probe L	@ 25°C	@ 25°C	0-70° C		@ 25°C	0-50°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 ø × Probe L	Flange L × Flange W	@ 25°C	@ 25°C		@ 25°C	0-50°C	
USP9728	Stainless Steel Housing, #6 Stud Mounting Holes, Glass Braid Insulated, Glass Braid Jacketed Wire	0.250 × 2.250	0.815 ø	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 ø	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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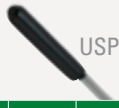
Thermistor Probes and Assemblies (Continued)

Plastic


USP4065


USP10680

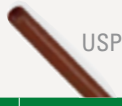

USP14579


USP11493


USP12838

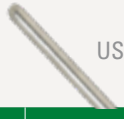
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	Temperature Accuracy	R-T Curve	Temperature Coefficient	Beta	Operating Temperature	Max. Storage & Operation Temperature for Best Long-Term Stability
		Inches	Ohms	± %	± °C		% / °C	K	°C	°C
		Probe ø × Probe L	@ 25°C	@ 25°C			@ 25°C	0-50°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		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

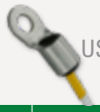
Laboratory Grade

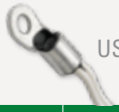

USP3986

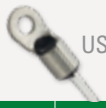
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	Temperature Accuracy	R-T Curve	Temperature Coefficient	Beta	Operating Temperature
		Inches	Ohms	± %	± °C		% / °C	K	°C
		Probe ø × Probe L	@ 25°C	@ 25°C	-20 to +70°C		@ 25°C	0-50°C	
USP3021	Stainless Steel Housing, PVC 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

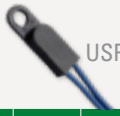
Thermistor Probes and Assemblies (Continued)

Surface Temperature Sensing


USUR1000


USP4261


USP7570


USP7765

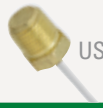

USP10973

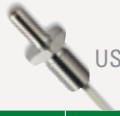
Product Series	Description	Overall Dimensions	Nominal Resistance	Resistance Tolerance	Temperature Accuracy	R-T Curve	Temperature Coefficient	Beta	Operating Temperature	Max. Storage & Operation Temperature for Best Long-Term Stability
		Inches	Ohms	± %	± ˚C		% / ˚C	K	˚C	˚C
		Body L × W × T	@ 25˚C	@ 25˚C	0-70˚ C		@ 25˚C	0-50˚C		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 with #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	---

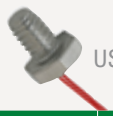
Threaded


USP3121


USP10978


USP10997

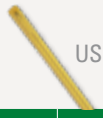

USP12755


USP12840

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	
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)

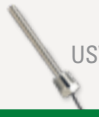
Special Probes



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

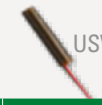
RTD Probes and Assemblies

Threaded



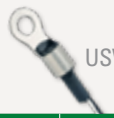
Product Series	Description	Overall Dimensions		Nominal Resistance	Resistance Tolerance	DIN 43760 Class	Temperature Coefficient of Resistance	Temperature Rating
		Inches		Ohms	%		ppm / ˚C	˚C
		Probe ø × Probe L	Hex Head W × Plug L	@ 25˚C				Maximum
USW3483	Stainless Steel Housing, 3/8"-18 NPT Thread,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

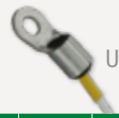
Plastic



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





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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Littelfuse offers leading technologies in circuit protection, power control, and sensing. We continue to expand our broad and diverse portfolio of products into adjacent markets including Power Semiconductors, heavy-duty Switches, Magnetic, Optical, Electromechanical, and Temperature Sensors; and products that provide safe control and distribution of electrical power.

Overcurrent Protection
- Fuses
- Resettable Positive Temperature Coefficient (PPTC) Devices

Overvoltage Suppression
- Gas Discharge Tubes (GDTs)
- TVS Diode Arrays
- PLED Series Open LED Protectors
- SIDACtor® Protection Thyristors
- PulseGuard® ESD Suppressors
- Switching Thyristors
- TVS Diodes
- Varistors
- Power Control
- TRIAC Thyristors

Power Semiconductors
- Bipolar Devices
- IGBTs
- MOSFETs
- Silicon Carbide Technology
- High Power Devices
- Discrete and Module Solutions
- Bare Die Devices
- Fully Engineered Subsystems

Integrated Circuits and Solid State Relays
- High-Voltage ICs
- Solid-State Relays
- Gate Drivers

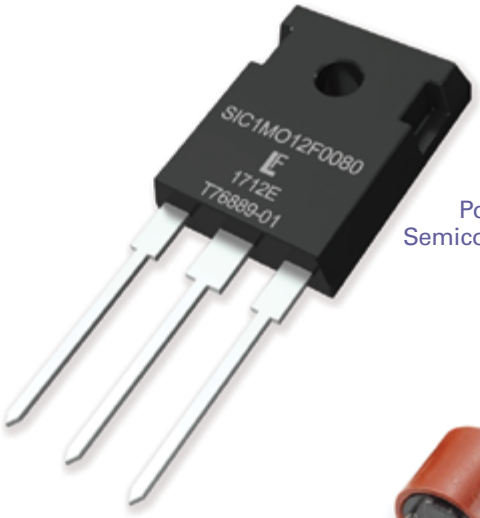
Global Footprint

At Littelfuse, our mission is to develop innovative circuit protection, power control, and sensing solutions that meet our customers' unique needs. This customer-focused philosophy has helped us become the top circuit protection brand in the world.

Our industry-leading product portfolio includes reliable circuit protection, power control, and sensing products that are designed for a variety of markets and applications. We have assembled unparalleled expertise and developed a global footprint that puts our facilities close to our customers and target markets. As our global manufacturing and R&D teams objectively recommend the best circuit protection, power control, or sensing solution for each customer application, they form partnerships that will lead to the development of the next generation of advanced products.

Littelfuse provides:
- Application Expertise
- Global Support
- Operational Excellence
- Technology Innovation
- Collaboration
- Customer Focus

Gas Discharge Tubes



Power Semiconductors

Metal Oxide Varistors

Radial Leaded Fuses

Multi-Layer Varistors

Additional Resources

Circuit Protection Products Selection Guide
This guide provides a summary of key circuit protection consideration factors, descriptions of the technologies Littelfuse offers, and product selection tables. It is designed to help you quickly find a protection solution appropriate to your application.

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Datacenter Selection Guide
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Asia Sensors Technical Support: +86 512 67613189
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PolySwitch® Resettable PPTC Devices

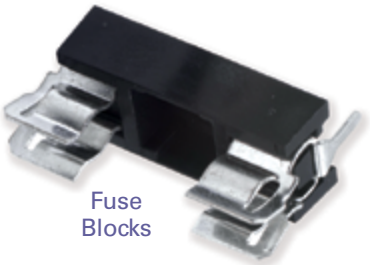

TVS Diode Arrays


TVS Diodes


Fuse Holders


PLED LED Protectors


PulseGuard® ESD Suppressors


Fuse Blocks


SIDACtor® Protection Thyristors


Switching Thyristors


Surface Mount Fuses


Fuses

Global Lab Capabilities

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TESTING CAPABILITIES

Environmental

- Autoclave
- Dust
- 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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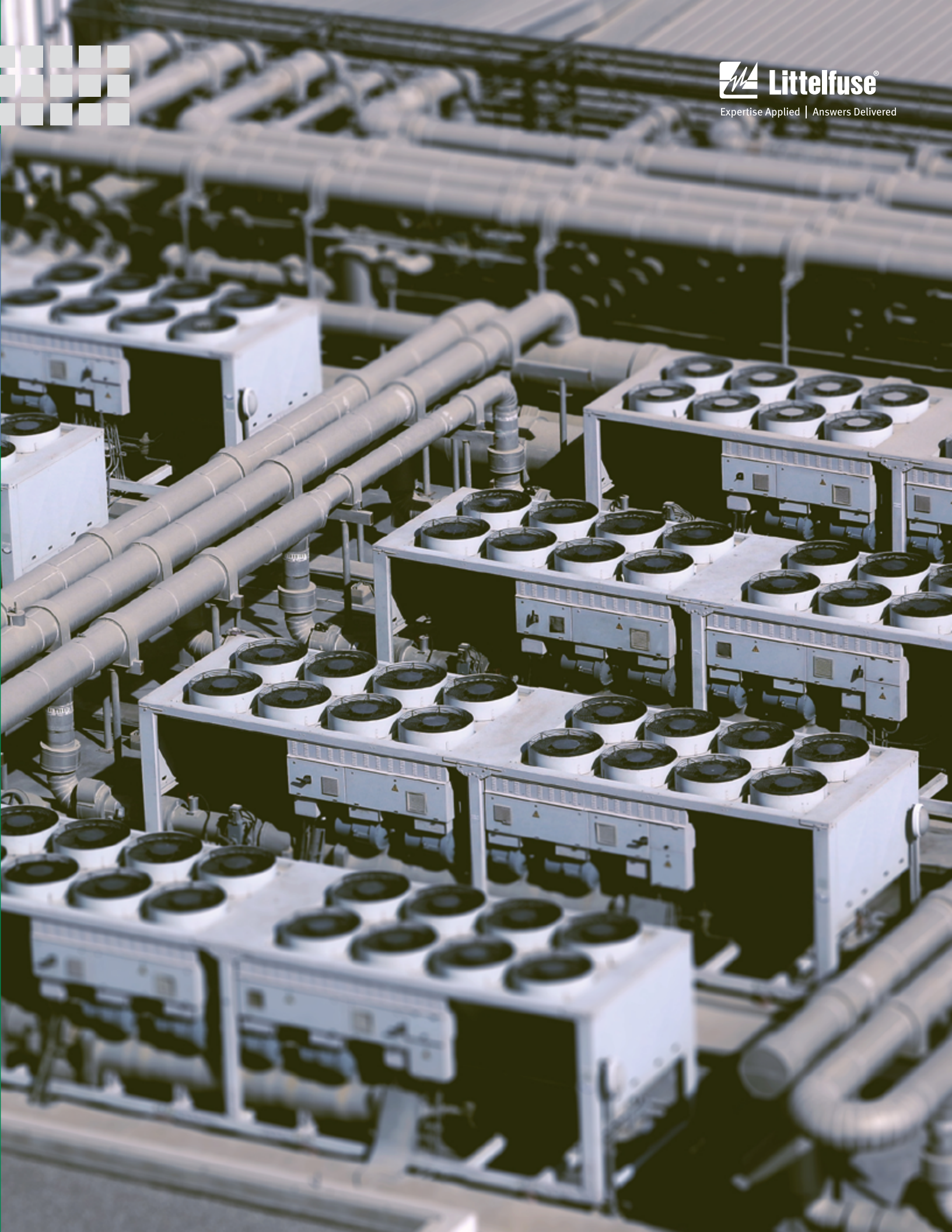
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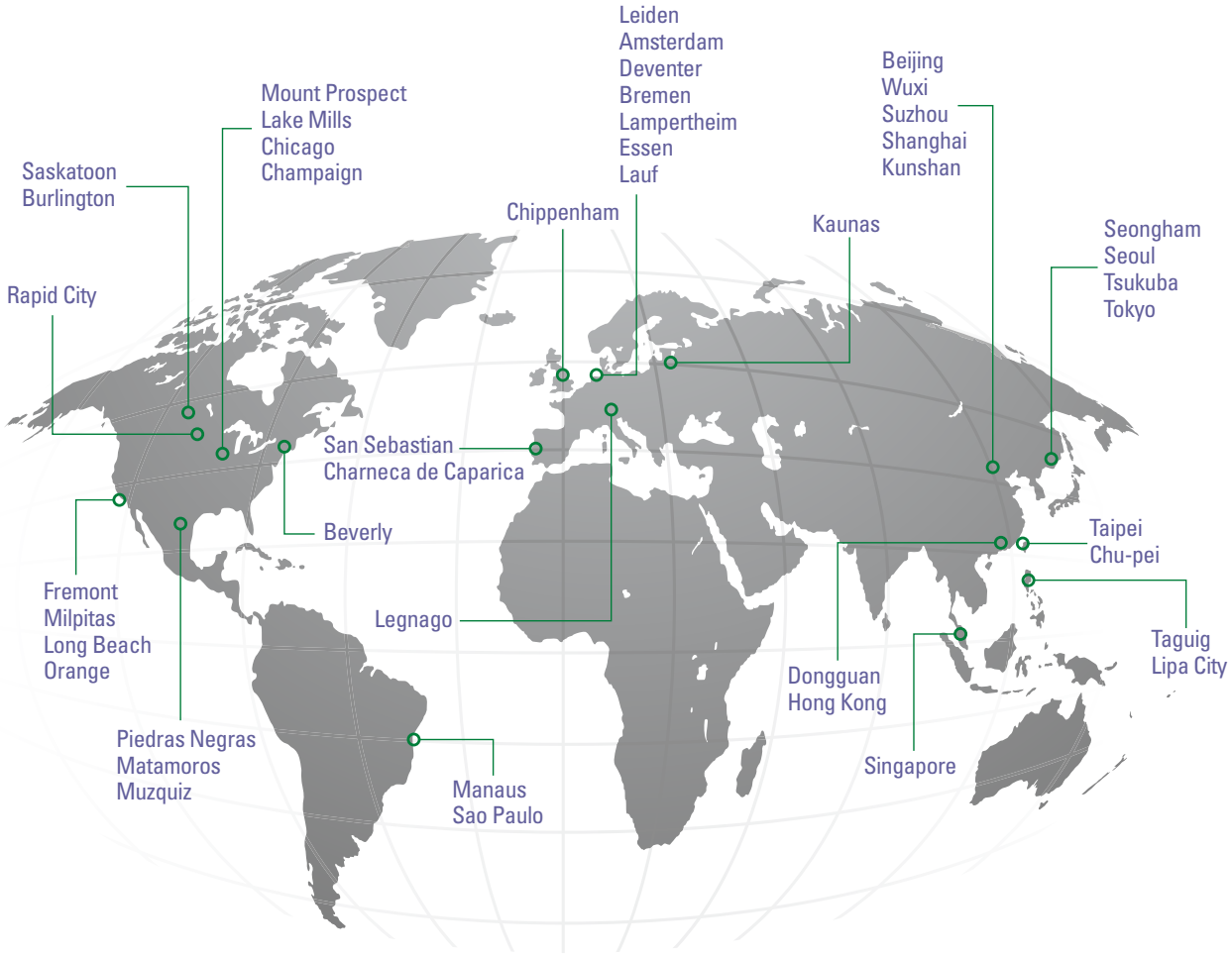
Expertise Applied | Answers Delivered

LOCAL RESOURCES FOR A **GLOBAL** MARKET



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