Littelfuse®

Expertise Applied | Answers Delivered

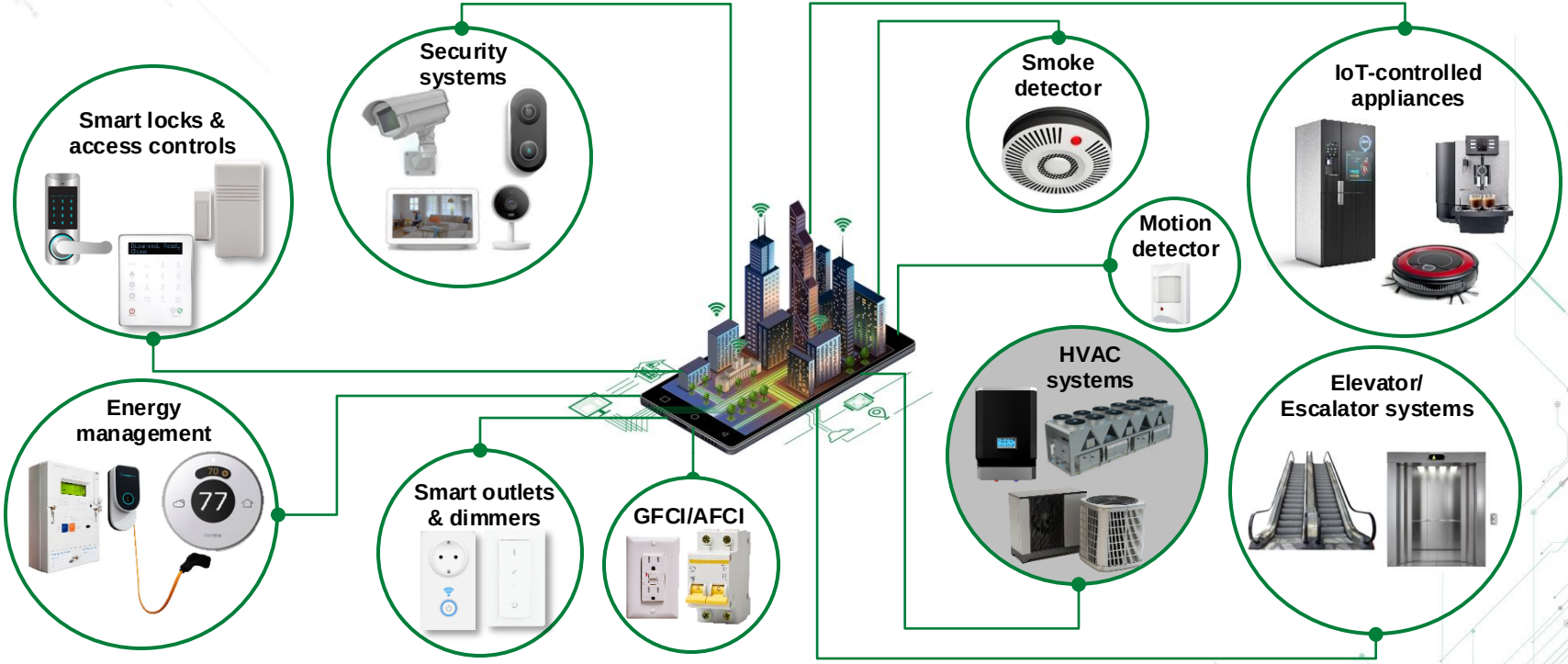
Water Heaters

Building automation

Users must independently evaluate the suitability of and test each product selected for their own specific applications. It is the User's sole responsibility to determine fitness for a particular system or use based on their own performance criteria, conditions, specific application, compatibility with other parts, and environmental conditions. Users must independently provide appropriate design and operating safeguards to minimize any risks associated with their applications and products. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at littelfuse.com/disclaimer-electronics.

REV0622

Smart homes are equipped with intelligent technologies for convenient and energy-efficient living



Littelfuse offers protect, control, and sense technologies to improve the safety, reliability, and energy efficiency of buildings.

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Market trends of water heaters

Market trends and drivers

Global annual water heater installations (includes all sizes of both gas and electric) are expected to increase from 37M in 2022 to 43M in 2026

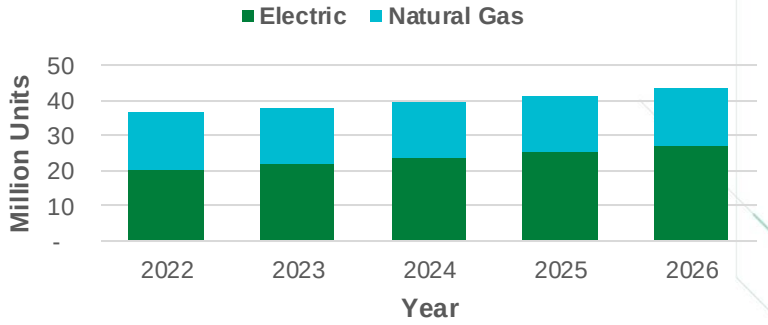
Electric (7.4% CAGR) is expected to outpace natural gas systems (2.5% CAGR) over the next five years driven by Net-Zero Emissions (NZE) initiative

North America accounts for 40% of all units sold by region, followed by Asia 30%, Europe 20%, ROW 10%. Asia is expected to see the most growth over the next 5 years due to development and urbanization

New building codes requiring all-electric new construction, driving growth for electric water heaters and other electric appliances

Government discount and rebate programs are enticing consumers to retrofit their natural gas systems with subsidized electric systems

Water heater installations



Various sizes but similar architecture

Instantaneous (Tankless)
Less than 4 L (~1 gal) of water capacity

Storage (Tank)
More than 4 L (~1 gal) of water capacity

Sources: *Residential Water Heating Initiative (CEE, 2018), Water Heater Market Report (GVR, 2020)*

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Recommended Littelfuse components for electric water heater

1 AC input

- Fuse
- Fuseholder
- MOV

2 Heating element

- TRIAC

3 Water inlet

- Thermistor Probe

4 Auxiliary AC/DC power supply

- Fuse
- TVS Diode

5 Wireless interface + touch screen

- TVS Diode Array
- TVS Diode
- PESD

6 Water outlet

- Thermistor Probe

MOV: Metal Oxide Varistor
TRIAC: Triode Alternating Current Switch
TVS: Transient-Voltage Suppression
PESD: Polymer Electro-Static Discharge

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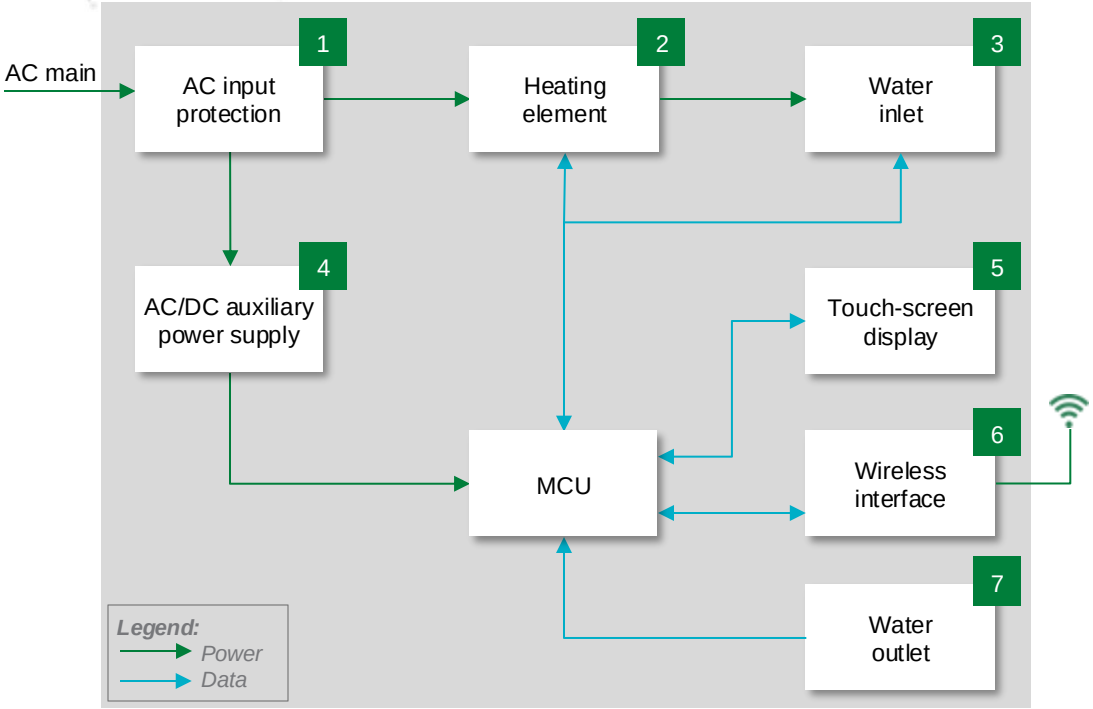
Click on the product series in the table below for more info

Electric water heater block diagram



	Technology	Series
1	Fuse	215, 216, 314/324, 325/326
	Fuseholder	100, 102, 122
	MOV	UltraMOV, TMOV
2	TRIAC*	Qxx25xx, Qxx40xx, MS0690J
3	Thermistor Probe	USPXXX
4	Replaceable Fuse	287
	TVS Diode	SACB, SMAJ, SMF3.3
5	TVS Diode	SMAJ, SMBJ, SMF4L
6	Diode Array	SP3213-01UTG
	Polymer ESD	PESD
7	Thermistor Probe	USPXXX

- *Tankless water heaters typically have ONE element; most larger systems have TWO heating elements, one at the top and bottom of the tank.*
- *Tankless systems typically has 40 A or 90 A TRIAC for fast heating. Tank systems typically use lower power 16 A or 25 A TRIAC.*

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Click on the product series in the table below for more info

Benefits of Littelfuse components used in water heaters

	Technology	Function in application	Product series	Benefits	Features
1	Fuse	Helps to protect from overcurrent faults such as damaged heating elements	215, 216, 314/324, 325/326	Reduces customer qualification time by complying with regulatory safety standards such as UL/IEC	Compliant with UL/IEC standards; low internal resistance; shock safe; vibration resistant
	Fuseholder	Provides enclosure between PCB and fuse for easy replacement	100, 102, 122	Enables easy fuse installation and replacement	Compliant with UL/IEC standards
	MOV	Helps protect equipment from voltage surges	UltraMOV, TMOV	Reduces qualification time for compliance with UL/IEC safe standards	High energy absorption capabilities
2	TRIAC	AC switching to control the heating element	Qxx25xx, Qxx40xx, MS0690J	Solid-state switching with no audible noise and no contact bounce during operation; compact design	High voltage withstand capability and high surge current capability
3	Thermistor Probe	Temperature sensing at the water inlet from supply	USPXXX	Provides accurate temperature (component/ambient) for enabling safe device operation and improved efficiency	High reliability; small form factor; fast thermal response
4	Replaceable Fuse	Helps to protect low-voltage components on control board	287	Protects low voltage electronics from surge events; easily replaceable	Automotive style replaceable fuse with industry standard form factor
	TVS Diode	Power unit protection from voltage transients	SACB, SMAJ, SMF3.3	Protects ICs	Excellent clamping capability
5	TVS Diode	Protects touchscreen ICs from user-induced ESD events	SMAJ, SMBJ, SMF4L	Protects ICs	Excellent clamping capability
6	TVS Array	Protects ICs from ESD	SP3213-01UTG	Absorbs repetitive ESD	Low capacitance of 1.0 pF per I/O
	Polymer ESD	Protects ICs from ESD	PESD	Supports passing agency requirements	Low leakage current
7	Thermistor Probe	Temperature sensing at the water outlet to user	USPXXX	Provides accurate temperature (component/ambient) for enabling safe device operation and improved efficiency	High reliability; small form factor; fast thermal response

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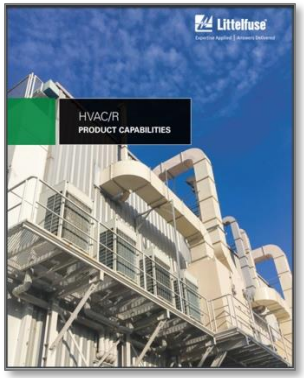
Building Automation Guide

HVAC Capability Brochure



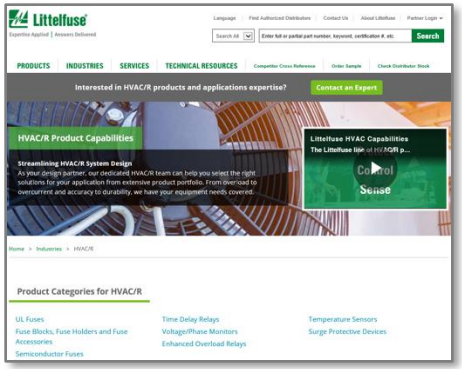
Sensor Selection Guide

Industrial Fuses Catalog

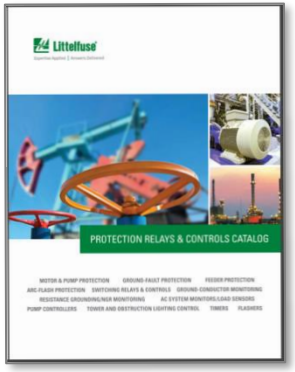
Power Semiconductor Guide

Click on images to open the catalog

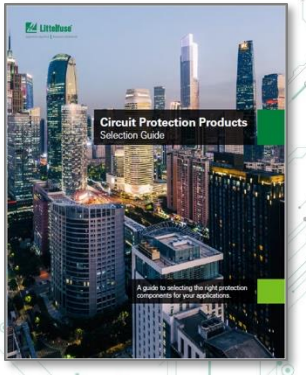
Interactive HVAC Guide



Power Relay & Control Catalog



Circuit Protection Selection Guide



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Legend

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