

## SENSOR SOLUTIONS FOR TRANSPORT REFRIGERATION

### Background

Refrigerated transport solutions are a vital component of the logistics world, reducing food waste and keeping other goods such as refrigerated medical supplies safe during shipment. These transport solutions rely on special temperature-controlled vehicles such as trucks, ships, and containers, equipped with built-in refrigeration systems that maintain cooling throughout the entire journey.

Transport refrigeration systems require precise temperature control and constant monitoring to operate their complex thermal cycles with cargo integrity and regulatory compliance. As the industry adopts low global warming potential (GWP) refrigerants for environmentally responsible operations, performance expectations on electronics within the system continue to rise.

Unlike household refrigerators, transport refrigeration systems must be built to withstand vibration, environmental extremes, and power fluctuations. The demanding environment poses a risk of impacting critical monitoring and control systems. Mechanism failures may result in product spoilage, financial loss, and safety risks. Because refrigerated transportation is a necessity in the global cold chain, it is essential that these systems are safe, compliant, and effective.

To meet environmental demands and rising performance expectations, transport refrigeration systems need electronic components they can rely on, with accurate monitoring and control under rugged operating conditions.

### Solution

Sensata's sensors and switches are engineered to help mobile cooling systems operate efficiently, safely, and continuously.

Gas detection sensors compatible with A2L refrigerants are an ideal solution for the recent adoption of low global warming potential refrigerants. By constantly monitoring the acoustic resonance of the surrounding air, the Sensata Resonix™ RGD leak detection sensor can detect even low-level leaks of mildly flammable A2L gases, supporting safety and environmental objectives.

Pressure sensors & switches maintain refrigerant safety by delivering accurate pressure measurements throughout the system. Sensata's pressure line products are configurable, accurate, and durable -- designed for performance in rugged environments. Our 20PS pressure switch is developed specifically to meet HVAC demands to perform under harsh conditions and high vibration levels.

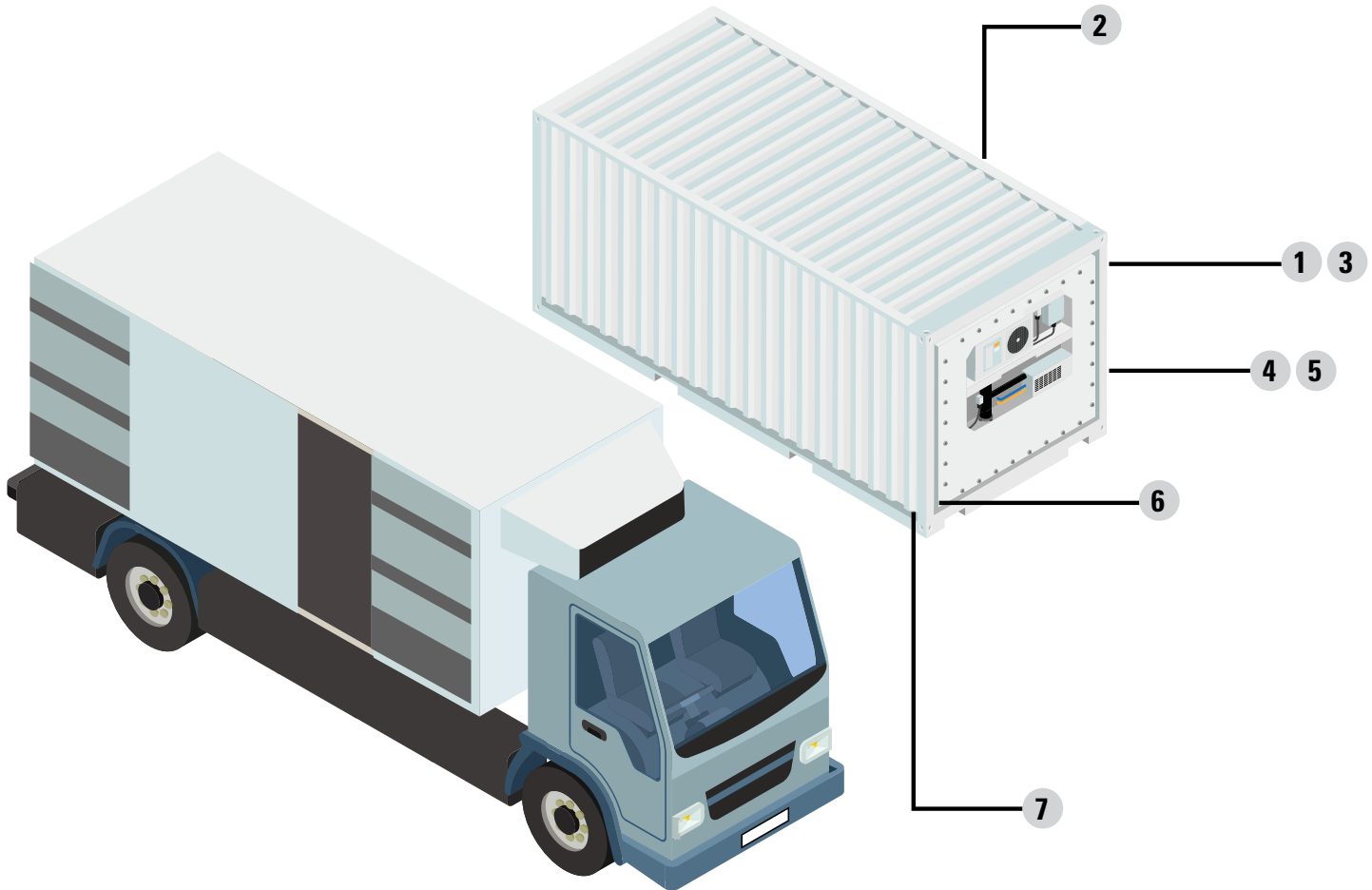
Temperature sensors & switches are used for precise superheat measurement and play a key role in cargo temperature maintenance. Our temperature products enable fine control over system performance with fast, in-stream temperature measurements and fast thermal response.

Float switches are essential for liquid level detection to prevent compressor damage, overflow, and system failure. Sensata's float switches can indicate level changes in shallow condensate trays and offer diesel generator tank level control, allowing the diesel generator to drive the refrigeration compressor when the truck is stationary.

Sensata's comprehensive portfolio of sensors and switches provides accurate control, operational safety, and system efficiency to meet the strict environmental and performance demands for refrigerated transport.

## RECOMMENDED PRODUCTS

Reference on Diagram	Product	Features	Function
1	 Resonix™ RGD Leak Detection Sensor	<ul style="list-style-type: none"> <li>• Comply to UL60335-2-40 ed.4, UL 60335-2-89, CE</li> <li>• Works with R32, R454A, R454B, R454C, R455A and R1234yf refrigerants</li> <li>• 15+ year lifetime</li> <li>• Relay and Modbus interface</li> <li>• Multi-refrigerants detection</li> </ul>	Located in the evaporator coil; detects A2L refrigerant leaks and helps trigger mitigation
2	 20PS, PS80, 25PS, 29PS Pressure Switches	<ul style="list-style-type: none"> <li>• Compatible with A2L refrigerants</li> <li>• High quality standards, huge manufacturing scale and high-volume cost-effective supplier base</li> <li>• Automatic and manual reset; environmentally sealed or vented switch, hermetically sealed, high current</li> </ul>	High & low pressure switches for refrigerant safety pressure management
3	 2CP5, 35CP, 2HMP, PTE Family Pressure Sensors	<ul style="list-style-type: none"> <li>• Rugged seal ideal for outdoor environments, industry leading accuracy over broad temperature range. Hermetic sensor design with high dielectric strength</li> <li>• Highly configurable, high accuracy, stainless steel housing, durable, compact, low-cost design</li> </ul>	Refrigerant system regulation
4	 112CP Pressure and Temperature Sensor	<ul style="list-style-type: none"> <li>• Pressure and temperature measurement in one package</li> <li>• Fast, in-stream temperature measurement</li> </ul>	Precise superheat measurement
5	 1NT, 3NT Thermostat	<ul style="list-style-type: none"> <li>• Automatic reset, small and easy to mount, fast thermal response</li> <li>• Innovative dry seal design protects from moisture and dust</li> </ul>	Precise superheat measurement
6	 LLF40 Series Compact Internal Fitting, Low Level, Float Switch	<ul style="list-style-type: none"> <li>• Suitable for low specific gravity liquids (0.7 S.G.)</li> <li>• Very low level sensing. Class leading compact design</li> <li>• Available in Nylon, Polypropylene, PPS or PVDF. 25VA &amp; 100VA versions</li> </ul>	Indicates level changes in shallow water in condensate trays
7	 RSF50 Vertical Plastic Float Switch with Internal Mount	<ul style="list-style-type: none"> <li>• Compact Design. M12 or 1/8NPT mounting thread</li> <li>• User configurable N/O or N/C operation. WRAS and NSF approved variants</li> <li>• Available in PPS, Polypropylene, Nylon and PVDF</li> </ul>	Diesel generator tank level control



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