■AIR CONDITIONING CONTROL

1. Hot-gas Type Power Heater (Cold Area Specification Models for Europe)

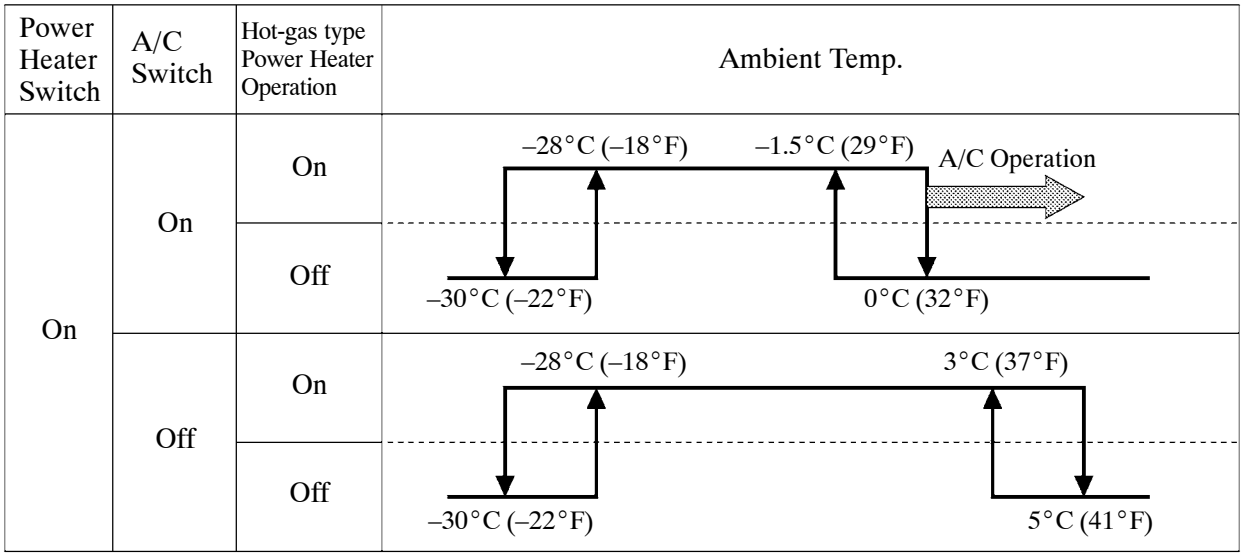
Control		Outline
Hot-gas Type Power Heater Control	Hot-gas type Power Heater Operation Judgment	The air conditioning amplifier operates the hot-gas type power heater in accordance with the signals from the power heater switch, A/C switch, blower controller switch, ambient temperature sensor and water temperature sensor. For details, see page BE-44.
	Ambient Temp. Sensor Judgment	The air conditioning amplifier turns the hot-gas type power heater on/off in accordance with the signals from the ambient temperature sensor. For details, see page BE-44.
	Refrigerant Pressure Judgment	The air conditioning amplifier turns the hot-gas type power heater on/off in accordance with the refrigerant pressure, in order to protect the cycle. ● The hot-gas heater turns off when the pressure is above 2.4 MPa, turns back on when the ignition switch is turned off, and resumes operating if the pressure is below 2.4 MPa.
	Evaporator Temp. Sensor Judgment	The air conditioning amplifier turns the hot-gas type power heater on/off in accordance with the evaporator temperature, in order to protect the cycle. For details, see page BE-44.
	Prevent from Frosting Windshield	When the operation is switched from air conditioning to heater, the moisture that has accumulated on the evaporator vaporizes and fogs the windshield. To prevent this from occurring, this function estimates the windshield temperature based on the ambient temperature and the water temperature, and compares it to the target air outlet temperature. The hot-gas type power heater turns off when the windshield temperature is lower than the target air outlet temperature.
	Refrigerant Shortage Judgment	● The hot-gas type power heater turns off when a shortage of refrigerant is determined from the ambient temperature and the refrigerant pressure. ● The hot-gas type power heater turns off when the ambient temperature is –11°C (12°F) or below, the power heater switch is on, and the refrigerant pressure has increased to a specific pressure within 5 seconds.

Hot-gas type Power Heater Operation Judgment

Hot-gas type power heater operates when all of the following conditions have been met:

- The power heater switch and blower switch are on.
- The ambient temperature is between –30°C (–22°F) and 5°C (41°F).
- The blower controller switch is turned on.
- The water temperature is 70°C (158°F) or less.

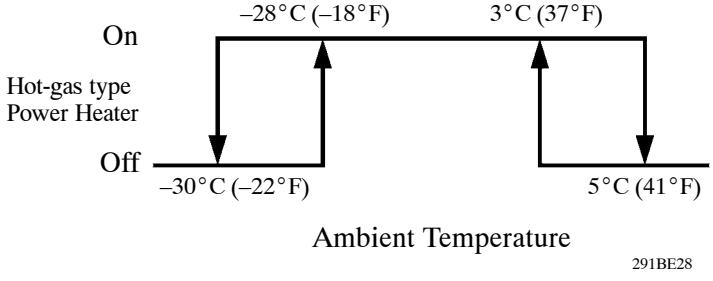
The hot-gas operation range will be as shown below when the A/C switch is turned on during a hot-gas type power heater operation, because the cycle is being shared:



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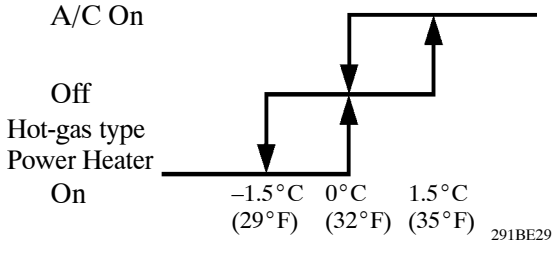
Ambient Temperature Sensor Judgment

The air conditioning amplifier turns the hot-gas heater on and off in accordance with the ambient temperature sensor signal when it determines that the heater is unnecessary because the ambient temperature is high, or to protect the compressor at extremely low temperatures.



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Only Power Heater Switch On

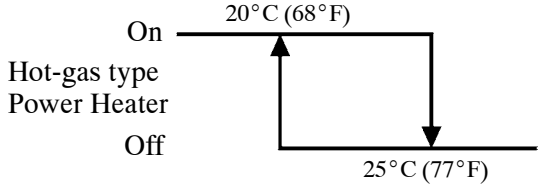


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Power Heater and A/C Switches On

Evaporator Temperature Sensor Judgment

To protect the cycle, the air conditioning amplifier turns the hot-gas heater on and off in accordance with the evaporator temperature sensor signal.



Evaporator Temperature

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2. PTC Heater

The on and off function of the PTC heater is controlled by the air conditioning amplifier in accordance with the water temperature, engine speed, air mix setting, and electrical load (alternator power ratio).
For example, with water temperature, the number of PTC heater operations varies as shown in the graph below:

