

Geothermal Power Generation

Fire and Gas Hazards within this Clean, Green Power Source

Geothermal Power Generation

Geothermal power plants derive their energy from heat deep within the earth's core. Power plants use steam produced from geothermal reservoirs to generate electricity. There are three geothermal power plant technologies being used to convert hydrothermal fluids to electricity—dry steam, flash steam, and binary cycle. The type of conversion used depends on the state of the fluid (steam or water) and its temperature.

Dry Steam Power Plant

Dry steam plants use hydrothermal fluids that are primarily steam. The steam travels directly to a turbine, which drives a generator that produces electricity. The steam eliminates the need to burn fossil fuels to run the turbine (also eliminating the need to transport and store fuels). These plants emit only excess steam and very minor amounts of gases.

Flash Steam Power Plant

Flash steam plants are the most common type of geothermal power generation plants in operation today. Fluid at temperatures greater than 360°F (182°C) is pumped under high pressure into a tank at the surface held at a much lower pressure, causing some of the fluid to rapidly vaporize, or "flash." This flashing vapor then drives a turbine, which drives a generator. Any liquid remaining in the tank can be flashed again in a second tank to extract even more energy.

Binary Cycle Power Plant

Binary cycle geothermal power generation plants differ from Dry Steam and Flash Steam systems in that the water or steam from the geothermal reservoir does not come in contact with the turbine/generator units. Low to moderately heated (below 400°F) geothermal fluid and a secondary ("binary") fluid with a much lower boiling point than water pass through a heat exchanger. Heat from the geothermal fluid causes the secondary fluid to flash to vapor then driving the turbines and subsequently, the generators.



Gas & Flame Hazards in Geothermal Power Generation

While the source for geothermal power is clean and the by-products are limited, the process does have its hazards. In dry steam and flash steam processes deep wells have the potential to draw a mixture of gases, notably carbon dioxide (CO₂), hydrogen sulfide (H₂S), methane (CH₄), and ammonia (NH₃). If these gases are released within the facility or accumulate they could cause significant harm to facility workers.

Within the binary cycle process the second substance [hence the name binary] with a lower boiling point than water is added to the geo-heated steam, is commonly dissolved pentane. Due to the low boiling point this additive flashes to a vapor. Since a fuel, oxygen, and ignition source are present the potential for an explosion exists.

Solutions for Geothermal Power Generation Hazards

Installation of reliable fixed gas detection helps ensure a safe production environment. Fixed gas detectors with the appropriate sensor should be installed in all production and control room areas where workers are present as each of the potential gases hazards could cause harm to plant workers. Where methane or pentane gases are potentially present high-performance combustible gas detectors should be installed along with electro-optical flame detection.

See the reverse for a helpful product guide

Gas Detection for Geothermal Power Generation Facilities

SENSIDYNE
Industrial Health & Safety Instrumentation



1/2 Width and Full Length
Panel/Rack Mount



Compact Fiberglass NEMA 4X
Wall Mount



Large Fiberglass NEMA 4X
Wall Mount



NEMA 7 Aluminum
Wall Mount

Plus Series Gas Detectors

Plus Series gas detection transmitters from Sensidyne are designed for critical safety applications where personnel, process, or facilities are at risk. The Universal Platform is deployed across one of three transmitter systems; SensAlert Plus, SensAlert ASI, or SensAlarm Plus. Each transmitter accepts and automatically configures for any Plus Series sensor including toxic, combustible, or oxygen.

At the heart of Plus Series instruments is a powerful and versatile instrument controlled by a non-intrusive user interface. The menus allow full control and configuration without complex remote interfaces or need to declassify the area. And thanks to their I.S. maintenance, calibration, and sensor exchange can also be completed without declassifying the area.

Plus Series instruments meet customer's requirements for ultimate application flexibility, easiest to install and maintain, and instrument standardization for all sensor types. Sensidyne Plus Series instruments are the ideal point gas detectors for critical safety applications.

Visit www.SensidyneGasDetection.com to learn more about Plus Series instruments and to review a list of available sensor types and ranges.

Model 7200 Controller

The model 7200 is a highly capable controller designed to provide maximum accessibility and management of up to 64 inputs. The large color display with non-intrusive keypad and embedded webserver ensure complete access to control and data from anywhere.

Large color screen for display of trends, bar graphs, and engineering units with color indication for Faults and Alarm

- Accepts up to 64 Analog, bridge sensor, ModBus RTU, ModBus TCP, and wireless inputs
- Ethernet with Modbus TCP Master/Slave and embedded webserver
- Available wireless interface with Modbus
- Five standard SPDT 5-amp common alarm relays including Horn and Fault
- Password protected lockout protects configuration variables during general use
- One-year datalogging onto SD memory card recording minimum, maximum, and average values for up to one year

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