Ever Wonder If Your Bore Field Has Excess Capacity Available? Or, How is Your Bore Field Operating Compared To Design? Could Your Geothermal System Operate More Efficiently? Or...?

MultiGEO Can Answer These Questions and More...

The MultiGEO™ Data Collection module resides on the BAS system that controls the geothermal system, and collects Ground Heat Exchanger (GHX) data thru the BAS system. MultiGEO Data Collection can:

- Provide early indication of Ground Heat Exchanger (GHX) overheating or over-cooling trends so preventative action can be taken rather than being blind-sided by a crisis.
- Compare actual GHX performance with design performance.
- Monitor actual average Thermal Conductivity (Tc) of the GHX.
- Determine if the GHX has any capacity that can be used on a future project.

Why Is The GHX Loop Temperature So Important?

System Efficiency & Reliability

Typical GHX design conditions are 45°F minimum and 90°F maximum. But in the real world things don’t always go according to plan. When the building puts more BTUs into the ground during cooling than it uses for heating, the building is said to be “cooling dominant” and over time the bore field can overheat. Conversely, if the building uses more BTUs than are put into the ground, it is said to be “heating dominant” and over time the bore field can cool below the minimum design temperature.

Overheated bore field temperatures can exceed 120°F. Whenever the bore field exceeds the maximum design temperature, the mechanical heating/cooling equipment must work harder, using more energy during cooling operation. The graph below shows the impact that an over-heated bore field has on system energy consumption using 85°F ENT to the Chiller/Heater as the design point (water warmer than 85°F causes compressors to work harder in cooling.)

Yes, you are reading this graph correctly. When the chiller/heater is getting 100°F water from the bore field, the mechanical system is using 25 percent more energy than when receiving 85°F water. The compressors are also subjected to higher head pressures that can lead to mechanical failures. Look at 120°F. The required energy input is 62 percent more than 85°F—if the compressor(s) will even start.

In heating, compressor power increases as the bore field temperature drops below design temperature.

What causes bore fields to overheat or overcool? There can be different causes including:

1) Actual building loads are higher/lower than design or building use has changed from design.
2) Thermal Conductivity (Tc) of the sample bore may not reflect the Tc of the whole bore field.
3) A problem with other HVAC component(s). For example, on a job where ventilation air was pre-treated with DX dedicated outdoor air units, the outdoor air units had massive compressor failures. The outdoor air load was then being handled by the WSHP units and the extra BTUs were going right into the bore field, causing it to overheat. On this job, MultiGEO made the customer aware there was a problem and helped resolve the problem before significantly impacting the building’s comfort and utility costs.
If you find that your bore field is operating out of design, or that it is trending out of design conditions, MultiGEO will give recommendations to get the GHX operating within design parameters again—and keep it within design conditions.

The MultiGEO™ Data Collection module is leased for six months and installed on the BAS system. MultiGEO collects flow and temperature data through the BAS system using Modbus, BACnet or LON. The more data collected, the more precise the results. Reports can be generated to meet the customer’s needs for an additional fee. Remote access allows MultiGEO to use the “cloud” for data retention and to transfer data to MultiGEO required for any reports.

After six-months of data collection, the customer has two options:

1. The customer may decide to purchase the MultiGEO control algorithms and let MultiGEO control the bore field operation. The data collection module would be left in place to provide the control algorithms it has generated in machine-to-machine language expressly for this project, to attain the highest possible system efficiency. MultiGEO would then control the bore field components by sending commands through the BAS system. If connected to the Cloud via a remote connection, MultiGEO will re-run the control generating algorithms weekly, using data collected during the previous week and revise the control algorithms using the new data, to further improve system efficiency.

2. Or, if the customer decides they have enough information and needs no further assistance from MultiGEO, they simply return the MultiGEO module to Multistack. But now they have the answers to their questions.

If you or a customer has a bore field that is being questioned as far as performance, efficiency, Thermal Conductivity (Tc) or that might be trending outside of design conditions, think of MultiGEO from Multistack. MultiGEO will collect the data to show how that system is truly operating, how to reduce energy consumption and how to improve system efficiency. MultiGEO is compatible with decentralized unitary heat pumps and centralized heat pumps or simultaneous heating/cooling chillers such as Multistack’s VME units.

For more information, contact your Multistack representative.