

## SYSTEM COMPARISONS

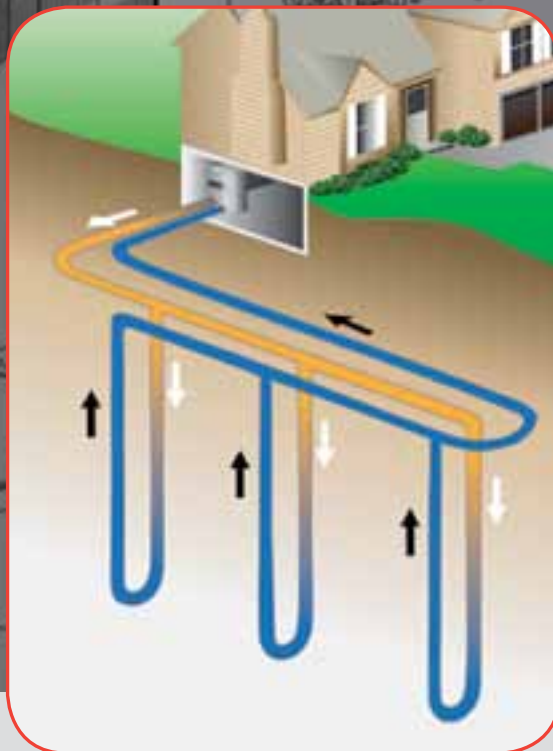


### **iQ Drive® Heat Pump System**

iQ Drive heat pump systems consist of basically four parts: the outdoor heat pump, the indoor air handler or furnace with coil, an iQ Drive thermostat, and the air delivery system (ductwork).

An air-source heat pump pulls heat out of the air and pumps it into your home in the winter. The process reverses in the summer, and the heat pump pulls heat out of your home and releases it into the air.

In colder climates where the outdoor temperature falls near or below freezing on a regular basis, a gas furnace is recommended over an air handler with electric heat for greater energy efficiency when backup heat is needed. While a number of furnace options exist, the iQ Drive fully modulating furnace is the most efficient at 97+% AFUE.



### **Geothermal Heat Pump Closed Loop System**

Geothermal heat pump systems consist of basically four parts: the ground heat exchanger, the heat pump unit, the indoor air handler, and the air delivery system (ductwork). The heat exchanger is basically a system of pipes called a loop, which is buried in the shallow ground near the building. A fluid (usually water or a mixture of water and antifreeze) circulates through the pipes to absorb or relinquish heat within the ground.

Horizontal Loops are installed in areas where the soil conditions allow for economical excavation. Taking up more land area than any other loop type, they are used where space permits. Trenches are normally 5 feet deep. Normally, several hundred feet of trench is required.

Vertical Loops are used extensively where land area is limited. A pair of pipes with a special U-Bend assembly at the bottom is inserted into a bore hole that averages between 150 to 250 feet in depth per ton of equipment capacity.

***TAPPAN***  
Heating and Cooling Products



## iQ Drive® Heat Pump



From \$ \_\_\_\_\_  
To \$ \_\_\_\_\_

## Geothermal Heat Pump Closed Loop System

### Equipment and Installation Costs

Total cost can average around \$20,000 for an installed 3-ton system with vertical loops.

For a fair comparison with an iQ Drive heat pump, you should consider geothermal systems with variable-speed motors. Installation costs vary depending on home location, soil type and loop type. Horizontal loops can be the most economical; vertical loops can average \$12,000 - \$18,000 for drilling alone.

### Installation Concerns

While a proper installation is always needed to maximize the efficiency of the system, an air-source heat pump is more common and, therefore, easier for a wider range of contractors to service.

In a geothermal system, the quality of the installation is critical for proper functioning. The system has a lower tolerance for installation mistakes than an air-source system.

### Operating Costs (based on 36,000 Btuh unit, \$0.08/ kWh in the Southeast.)

For a more accurate estimation in your area, please contact your contractor.

The iQ Drive heat pump operates on either all electric (paired with an air handler) or electric and gas (paired with a gas furnace). Costs vary depending on local utility rates and heating and cooling load hours.

Average annual operating cost is \$560.00

A geothermal system operates on either all electric (paired with an air handler) or electric and gas (paired with a gas furnace). Costs vary depending on local utility rates and heating and cooling load hours.

Average annual operating cost is \$450.00

### Maintenance Costs

Exposed to air and elements requires more regular maintenance. Components are easy to access and service.

Less exposure to elements minimizes maintenance needs. On the downside, they can be costly to repair if you need to access an underground portion of the system. The system also requires maintenance of antifreeze.

### Durability

Up to 15 years on average.

Underground piping: 25-50 years. Heat pumps: Up to 15-20 years on average. Water pumps may fail earlier.

## iQ Drive® Heat Pump

## Geothermal Heat Pump Closed Loop System

### Efficiency

The iQ Drive heat pump can reduce energy consumption up to 40% over standard air-source heat pumps.

Geothermal heat pumps can reduce energy consumption up to 44% over air-source heat pumps. (source, EPA)

### EER Cooling Ratings (Full-Load)

12.5 – 14.6 EER  
EER at 95° F

10.0 – 22.0 EER  
EER at 77° F E.W.T

### EER Cooling Ratings (Part-Load)

36.0 – 43.0 EER  
EER at 67° F

22.1 – 30.0 EER  
EER at 70° F E.W.T

### SEER Cooling Ratings

Air-source heat pumps use SEER as a more realistic measurement of efficiency over an entire season. It includes losses from starting and stopping the system.

The iQ Drive heat pump has a range of **19.0 – 22.0 SEER**, the highest available.

N/A

### COP Heating Ratings (Full-Load)

2.6 – 2.8 COP  
COP at 17° F

2.6 – 4.2 COP  
COP at 32° F E.W.T.

### COP Heating Ratings (Part-Load)

4.8 – 5.2 COP  
COP at 47° F

3.8 – 5.1 COP  
COP at 41° F E.W.T.

### Dual-Fuel Capable

Yes, furnace recommended in cooler climates.

Yes, furnace recommended in cooler climates.

### Efficiency Concerns

System will lose heating capacity as temperatures drop. Backup heat either via electric heat strips or a gas furnace is needed.

In ground loops, soil contact is needed for the unit to pull heat. During droughts or dry spells, the soil can shrink and pull away from the pipes, making the system less efficient and possibly reducing capacity.

	iQ Drive® Heat Pump	Geothermal Heat Pump Closed Loop System
<b>Sound</b>	Extremely quiet, as low as 59 decibels, due to inverter rotary technology that adjusts capacity to exact needs of home; minimal start-up noise as system runs almost constantly at low levels.	Extremely quiet.
<b>Dehumidification</b>	Excellent.	Excellent.
<b>Aesthetic Concerns</b>	The heat pump sits outside the home, creating possible landscape challenges.	Horizontal loops can cause frost heave in winter, a condition where the loops thaw the ground and the ground buckles, creating spongy mounds throughout the yard.  The heat pump is located in the home.

