

Installation Instructions

The Vortex pool package is designed specifically for connection to a tankless water heater or boiler to provide pool heating.

The system can be provided ready for field wiring or can be supplied completely wired ready to connect to the pool pump circuit. Cabinets can be mounted indoors or as a special order can be constructed for outdoor use.

The shell and tube heat exchanger is purchased separately and connected externally. Titanium is recommended for salt water applications.



Dimensions: cabinet 12 x 12 x 8.5in. plus a 1 inch mounting flange top and bottom.

Water Connections: 1 inch copper sweat (optional NPT or PEX crimp)

Electrical: 120vac/60Hz corded, less than 2 Amps.cabinet

Capacity Selection Tables

Pool Heating Performance:
(50gpm pool side flow; pool temperature 72F)

Supply water temperature (F)	Capacity (Btu/hr)	Tankless water heaters required*
130	70,000	1
140	80,000	1
160	120,000	1
160	180,000	2

*Or connect to a boiler of sufficient capacity.

Spa / Hot Tub Heating Performance:
(20gpm tub side flow; tub temperature 104F)

Supply water temperature (F)	Capacity (Btu/hr)	Tankless water heaters required
130	30,000	1
140	40,000	1
160	60,000	1

Mounting

The pool package can be installed with the piping connections facing up, down or sideways as long as the pump shaft is horizontal (for lubrication).

Fasten cabinet to wall or sturdy backboard through screw holes provided along the top and bottom mounting flanges of the cabinet.

The heat exchanger can be mounted remotely from the pool package. It is recommended to mount vertically to minimize air entrainment on the pool side of the heat exchanger.

Plumbing

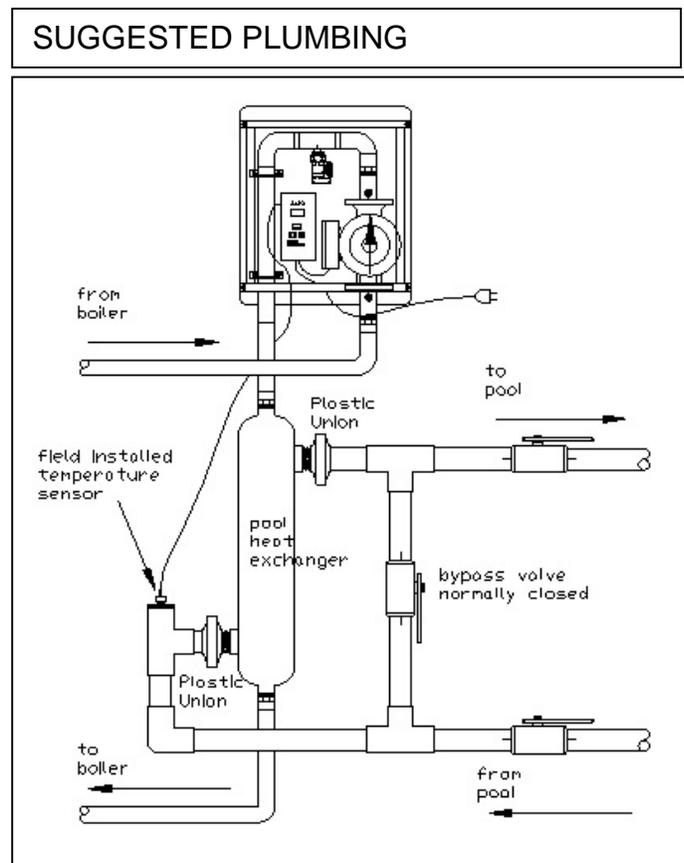
Connect the pool package to the boiler and heat exchanger with copper or PEX. Allow for drains in low points and install full-port ball valves to isolate at the boiler.

The internal hose bib is to aid in air purging during initial fill. The pump isolation valves should be used to isolate one side of the circuit.

Wiring

The temperature sensor wire can be extended with low-voltage (thermostat) wire.

The PP models come complete with line cord for manual operation. It is recommended that it be plugged into a (manually) switched outlet or automatically controlled outlet as part of a pool management package, where the pool package is substituted for the electric heater.

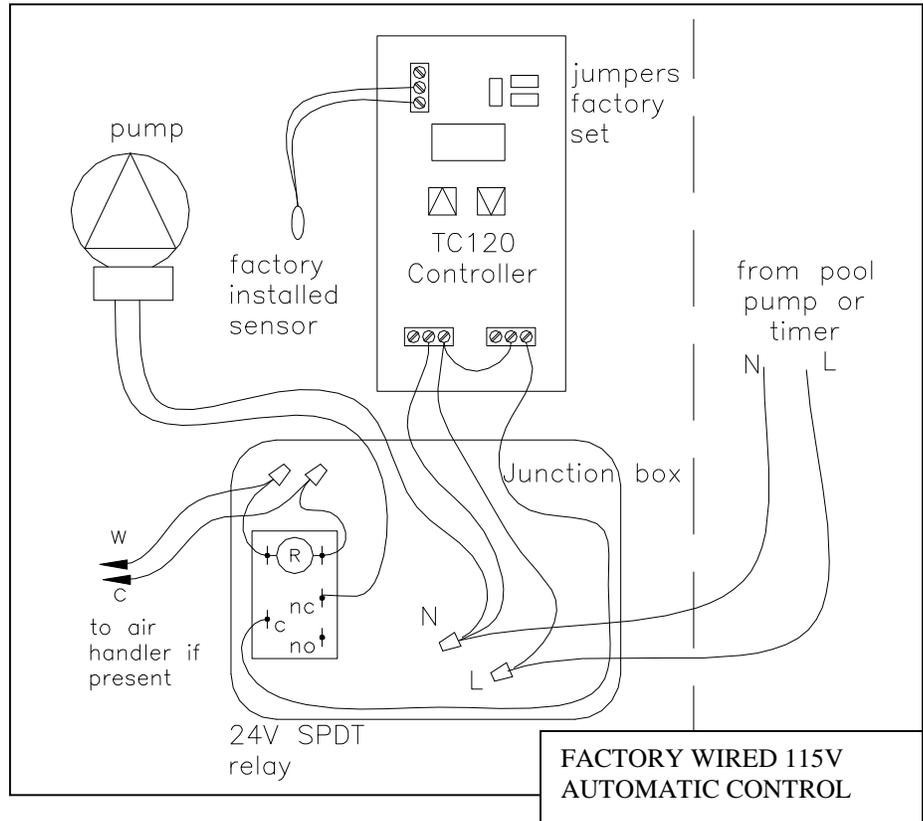


Wiring Options

If boiler/water heater capacity is an issue, a 120vac interlock relay can be used to provide space heating priority over pool heating priority.

The wiring diagram depicts a factory wired control connected to a typical pool timer. Actual timer connections may vary depending on model.

The control is wired with an interlock circuit for a Vortex air handler. This interlock interrupts pool heating when the house thermostat is calling for heat. This feature provides priority control for home comfort heating over pool heating.



For 220V pool pump wiring diagram consult factory.

Pool Heating Needs

- calculating time to heat pool

$$PTM = 62.4 \times (L \times W \times D) \quad (Btu/F) \text{ or } \frac{(Btu/hr)}{(F/hr)}$$

The pool thermal mass (PTM) is equivalent to the heat input (Btu/hr) required to raise the pool temperature at a rate of one degree Fahrenheit per hour.

$$H = \quad PTM \times (TR) / \text{Time} \quad (Btu/hr)$$

$$\text{Time} = \quad PTM \times TR / H \quad (hr)$$

Where:

- L = **Length** of pool (feet)
- W = **Width** of pool (feet)
- D = average **Depth** of pool (feet)
- PTM = **Pool Thermal Mass**
- H = Required **Heating capacity** of pool package
- TR = **Temperature Rise** from cold pool temperature to desired temperature
- Time = **Time** to heat pool to desired temperature

- calculating heat loss without pool cover

$$H = 10.6 \times L \times W \times TD \quad Btu/hr$$

Where:

- L = **Length** of pool (feet)
- W = **Width** of pool (feet)
- H = required **Heating capacity** of pool package
- TD = **Temperature difference** between outdoor air and pool water

The selected heating capacity of the pool package must be greater than the requirement to meet the heat loss without the cover and greater than the capacity required to bring the pool up to temperature in the desired time.

It is **STRONGLY** recommended that a pool cover be used instead of trying to size the pool heater to maintain temperature during periods of non-use in cold weather.

Pool Heating Needs - EXAMPLE

A homeowner has a pool that measures 20' x 30' x 4' average depth
In central Florida the homeowner can expect his pool spring and fall temperature to be 65F without the benefit of heating. The homeowner does not anticipate swimming in their outdoor pool any time when the air temperature is below 65F.

Thermal mass of the pool is:

$$PTM = 62.4 \times 20 \times 30 \times 4 = \mathbf{149,760} \text{ (Btu/hr) / (F/hr)}$$

In words, it will take 149,760 Btu/hr of heating capacity for every degree F per hour of desired temperature rise.

Selecting a B250 heat exchanger at 160F the pool can be heated at a rate of just under 1F rise per hour

The same package at 140F will heat the pool at ½ F per hour.

Time to heat pool from 65F to 78F:

$$\begin{aligned} \text{Time} &= PTM \times TR / H \\ &= 149760 \times (78-65) / 120,000 &&= 16 \text{ hours @ 160F water temperature} \\ &= 149760 \times (78-65) / 80,000 &&= 24 \text{ hours @ 140F water temperature} \end{aligned}$$

Checking the operating use:

$$\begin{aligned} H &= 10.6 \times L \times W \times TD \\ &= 10.6 \times 20 \times 30 \times (78-65) &&= 82,680 \text{ Btu/hr} \end{aligned}$$

At 140F water heater temperature the pool will just be able to maintain temperature with the pool cover off at 65F air temperature. At this rate of fuel consumption, the homeowner would not be happy to see the fuel bill for leaving the pool cover off and the heater running overnight.