

# STRATIFIED SOLAR TANK



Thermal-Stor, Stratified Solar Thermal Storage Tank uses the natural buoyancy of heated water to efficiently layer the temperatures in the tank to maximize the heat transfer capability of a solar thermal system or other renewable energy source and hydronic space heating system. A spherical heat exchanger is used to transfer the energy from the renewable energy system to the space heating system fluid that is stored in the tank effectively maximizing efficiency and separating the renewable energy source fluid from the hydronic heating system fluid.

Connections on the side of the tank allow for the space heating system to be easily integrated with a renewable energy system. The water volume in the tank acts as a buffer to store energy until it can be consumed by the building.

The Thermal-Stor design is cost effective and makes integration of a renewable resource such as solar thermal or ground source energy into a hydronic space heating system easy.

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THERMAL STORAGE TANK

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HYDRONIC BUFFER TANK

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9 MODELS - 125 TO 900 GALLON CAPACITIES

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ASME SEC. VIII U STAMPED STORAGE VESSEL

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## Stratification Process

The Thermal-Stor uses the natural stratification of hot and cold water to create a layering effect within the external heat exchanger and storage vessel. Since hot water is less dense than cold water it rises to the top of the storage vessel while the cooler water settles to the bottom of the vessel.

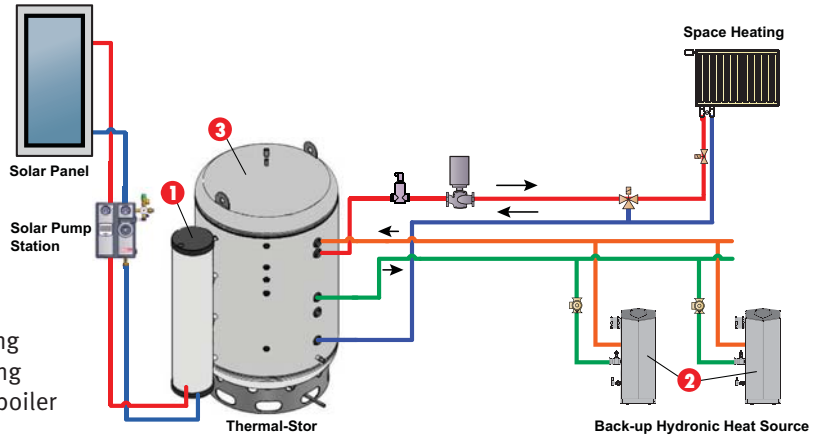


As renewable energy is added to the external spherical heat exchanger the stored water will follow the laws of physics and begin to stratify in the tank. As heat is added, the water will begin to "layer" with the heated water rising to the top and the cooler water settling to the bottom. The external spherical heat exchanger utilizes four distinct connection points to drive the stratification process in the storage tank.

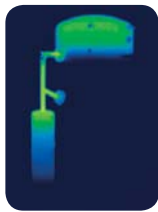
Renewable energy such as solar thermal systems and space heating systems both benefit by keeping the tank stratified. The hot water in the top of the tank permits the space heating system to access the hottest possible water for distribution to the heat emitters. The cooler water in the bottom of the tank allows for greater collector efficiency and greater opportunity for solar thermal heat generation.

## How it Works...

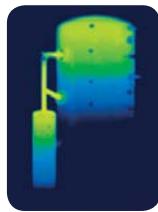
1. Renewable energy is transferred to the storage vessel by way of a copper tube spherical heat exchanger.
2. A back-up hydronic heat source such as a KNIGHT™ Boiler ensures that the storage vessel is at a sufficient temperature to meet hydronic heating demands.
3. As demand for space heating is initialized, the Thermal-Stor acts as a hydraulic separator, decoupling the system demand from the boiler output. Decoupling the system and boiler demands allows for extended times and constant system delivery temperatures.



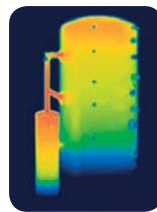
## Time Lapse of Thermal-Stor Charging Through the Spherical Heat Exchanger/Renewable Energy System



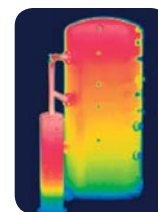
**30 Minutes**  
After 30 minutes of energy gain the upper portion of the tank begins to heat.



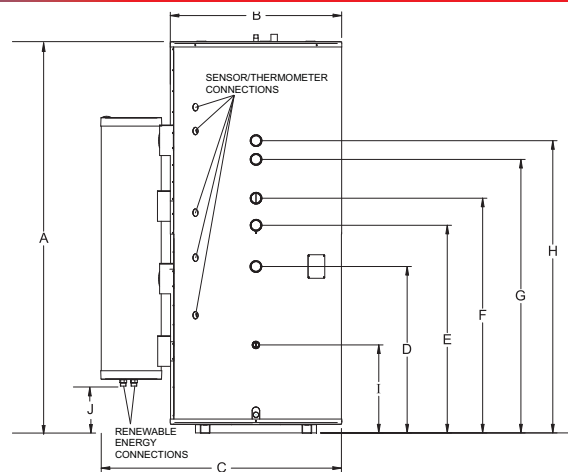
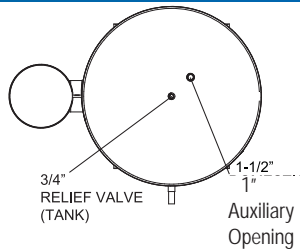
**1 Hour 15 Minutes**  
At the 1 hour 15 minute mark you can begin to see the tank stratification layers begin to form.



**2 Hours 5 Minutes**  
At the 2 hour 5 minute mark almost the entire tank is uniformly stratified.



**2 Hours 50 Minutes**  
After 2 hours and 50 minutes of solar gain the entire tank is uniformly stratified.



### Chart Key

- A= Overall Height
- B= Tank Diameter
- C= Overall Width
- D= Low Temperature Return
- E= High Temperature Return
- F= Heat Source Out
- G= Space Heat Supply
- H= Heat Source In (Hot)
- I= Auxiliary Opening
- J= Renewable Energy Heat Exchanger Supply/Return

Model Number	Tank Volume	A	B	C	D	E	F	G	H	I	J	Renewable Energy Conn.	Shipping Weight
TSU150	125	75-3/4"	28"	44-1/4"	23"	30-1/2"	35"	52-3/4"	57"	14"	4-3/4"	3/4"	800
TSU200	175	79-3/4"	32"	48-1/4"	24-3/4"	35"	40-1/2"	58-1/4"	62-3/4"	15"	5-1/2"	3/4"	950
TSU257	225	91-3/4"	34"	50-1/4"	36-1/2"	45-1/2"	51"	65-1/2"	69-3/4"	19"	9-3/4"	3/4"	1450
TSU350	325	91-1/4"	40"	56"	38-3/4"	48-1/2"	54-3/4"	63-3/4"	68-1/4"	20-1/2"	11"	3/4"	1750
TSU423	400	104"	40"	56"	42-1/4"	54"	60-1/4"	78-1/2"	82-3/4"	20-1/2"	11"	1"	1850
TSU504	475	91-3/4"	46"	62"	35-3/4"	44-1/2"	51-1/4"	62-3/4"	67"	22-1/4"	12-3/4"	1"	2125
TSU650	625	93-1/4"	52"	71-1/4"	39"	46-3/4"	53-1/4"	63-1/2"	68"	24-1/4"	14-1/2"	1-1/4"	2300
TSU752	725	105"	52"	71-1/4"	40-1/2"	52-1/4"	59-3/4"	73"	77-1/4"	24-1/4"	14-1/2"	1-1/4"	2725
TSU940	900	129-1/4"	52"	71-1/4"	51-1/4"	65-1/4"	72-3/4"	91-1/4"	95-3/4"	24-1/4"	14-1/2"	1-1/4"	3400

NOTES: All dimensions in inches. Space heating connections are 2" NPT.

All models standard with a 5 year Limited Warranty Against Tank Failure.  
All parts are warranted for one year.\*



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