

# Freeze Protection GS4-45HPC



- System design will have the Outdoor unit & Piping filled with Water so it is important for the system to be capable to handle installations in cold weather locations and how the unit will operate to reduce this cold weather effect
- Interestingly it also gets cold in Japan (Sapporo, design temperature is 15°F). Nothing is done to the system to worry about cold weather, EVEN the tank is outside



# Freeze Protection

## Minimal Water Piping Outdoors

- Plan your job site and unit(s) location to penetrate into the building adjacent to the Heat Pump(s)
- Use  $\frac{3}{4}$ " minimum thick Closed Cell insulation on the external piping – Larger thickness of insulation can be used for colder ambient locations to provide more insulation
- Tape joints and ensure that none of the system is piping is exposed



# Freeze Protection

## Unit Freeze Protection Control Program

- System continually monitors Inlet & Outlet Water Temperatures plus Outdoor Ambient Temperature
- Unit will operate the unit Pump and Compressor to ensure quick heat up of the Inlet and Outlet water before cycling off

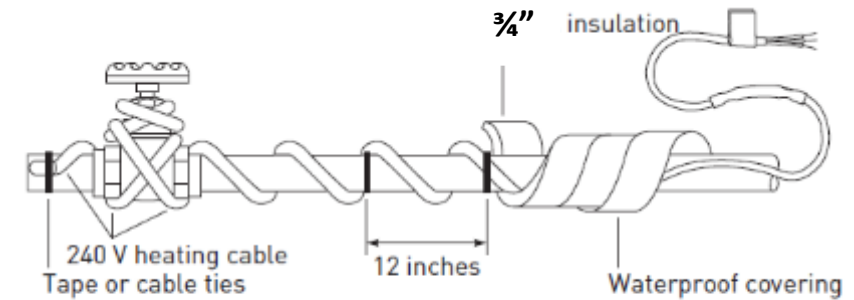
<u>Start trigger</u>	①	Ambient temp. $\leq 37^{\circ}\text{F}$ ( $3^{\circ}\text{C}$ )	Freezing prevention operation started when ① and ② were achieved.
	②	Outlet temp. $\leq 37^{\circ}\text{F}$ ( $3^{\circ}\text{C}$ ) or Inlet temp. $\leq 37^{\circ}\text{F}$ ( $3^{\circ}\text{C}$ )	
<u>End trigger</u>	①	Ambient temp. $\geq 43^{\circ}\text{F}$ ( $6^{\circ}\text{C}$ )	Freezing prevention operation ends when ① or ② is achieved
	②	Outlet temp. $\geq 43^{\circ}\text{F}$ ( $6^{\circ}\text{C}$ ) [Detected for 150 seconds] and Inlet temp. $\geq 125^{\circ}\text{F}$ ( $52^{\circ}\text{C}$ ) [Detected for 150 seconds]	

# Freeze Protection

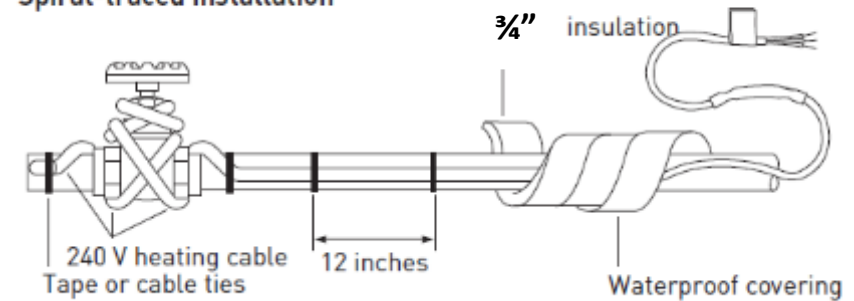


## Heat tape on the pipe work

- Self regulating 5 to 8W Heat Trace used to heat both Cold & Hot Piping
- FG2-6L is a 6ft long Heat Trace with a 3ft lead cord on it to allow the FG2-6L to be directly connected to the 208/230V L1 & L2 Incoming power terminals directly without needing any extra wiring



Spiral-traced Installation



Straight-traced Installation





# Freeze Protection

## Heat tape on the pipe work

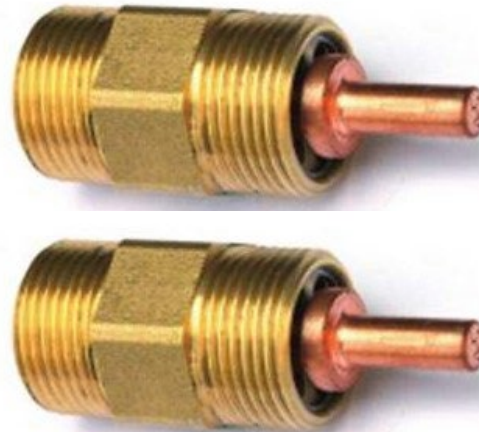
- Install the FG2-6L by wrapping tightly under the insulation on both Hot & Cold Piping to unit – The 6ft length should provide both pipes with Heat
- Start the wrap around process at the Hot Water Outlet connection then around the external piping and cross over to the Cold Water piping in the building and complete all of the FG2-6L wrap process at the Cold Water Inlet Connection at the GS4



# Freeze Protection

## Power Outage

- Use the FPVKT-SMTW Valve kit to allow water to drain from the Cold & Hot piping to the unit
- 2 x FPV Valves & 2 x Tees for easy installation are provided with the Kit
- FPV Valves are installed on both Cold & Hot Piping to the GS4



# Freeze Protection



## Power Outage

- FPKT will open on **BOTH** or **EITHER** of the Cold & Hot piping to start the drain process if the Water temp falls **below 34°F**
- As Valve(s) open the Water Pressure in the piping will allow 34°F Water to be drained out of piping drawing warmer water from inside the Tank or building into the piping to replace the Cold Water being drained
- Valves will close when the Water drained from the system rises **above 39°F** in the piping and GS4 unit





**Notes:**

Isolation Valves/Unions at Heat Pump. PRV on Tank plus Mixing Valve are not shown for clarity

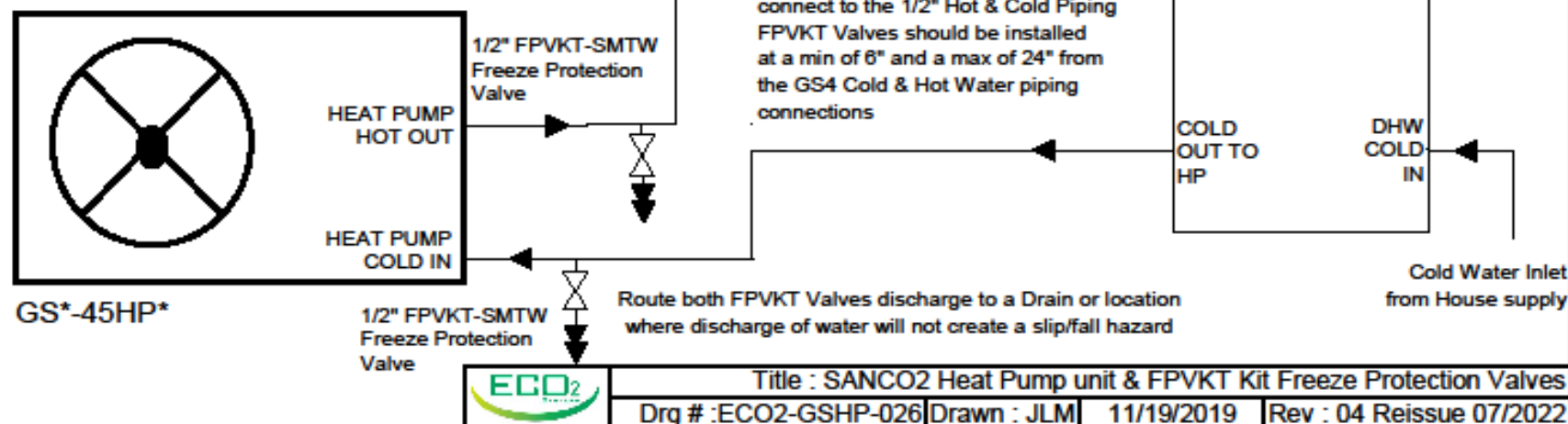
FPVKT Valves will open when the water temperature falls below 34° F  
Water in the Tank and/or Heat Pump will start draining from the Cold & Hot  
piping with the Valve(s) attached as the Water is at this temperature

The Water being drained by each Valve will flow from either  
being inside the Heat Pump or through the Piping that is  
connected to the Tank

As the Valves are opened for draining as this  
process in flowing water to the Valves from the Tank  
or Heat Pump at a warmer temperature to prevent  
possible freezing of the system. Both FPVKT valves  
can be connected to separate drain piping

FPVKT Valves will be fully closed when the water  
temperature sensed is above 39°F

FPVKT Valves should be installed external to  
building





# Manual Drain

Unit and piping can also be drained manually

- Close Isolation Valves installed on the piping to the GS4 unit from the Storage tank
- Open the Air bleed screws on the GS4 Cold Water Inlet Connector and Hot Water Outlet Connector to manually drain down the System
- Also drain water using the Air Bleed on the Water Pump underneath the unit
- After power outage open closed Isolation valves, fill and bleed the system then restart the GS4

