

HeatManager Troubleshooting / Application Guide

Question

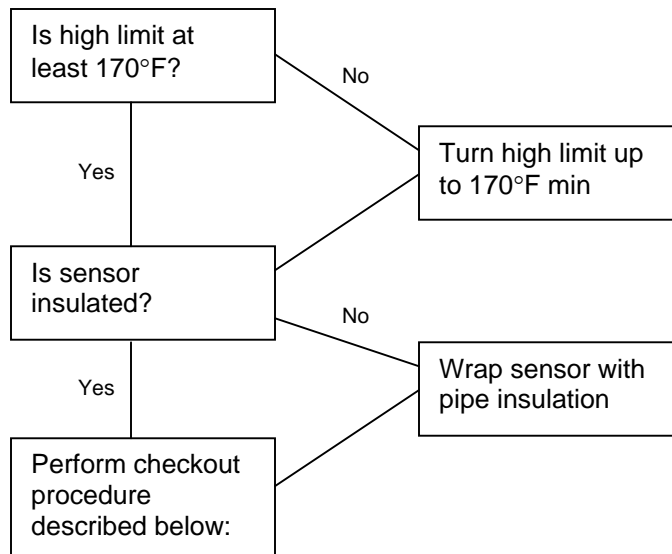
User thinks that HeatManager isn't working properly because the red "Low Temperature Limit" light is on along with the "Burner Enabled" light whenever the burner is on.

Answer

HeatManager is designed to let the boiler water temp drop as low as 145° *during a call for heat*. If boiler water temp is *already* below 145° when call for heat comes, the HeatManager will go into bypass mode and the burner will fire up immediately. When this happens, the red low-temperature limit light will turn on along with the green burner enabled light. Red light will stay on through duration of burner firing cycle.

The "Low Temperature Limit" light does not indicate a problem – it is just alerting the user that there was no economizing period. Performing the actions in the solution tree and checkout procedure below will verify that the HeatManager is functioning properly.

Solution Tree



Checkout

Force a call for heat until boiler water temp is at 180° and then end call. When boiler water temp drops to 170°, force another call for heat. At this time, verify that HeatManager goes into economizing mode or burner enabled mode and that red light is off.

If HeatManager immediately goes into economizing mode, then it is working properly. If the red light comes on again immediately, then the HeatManager wiring should be rechecked. If wiring is verified to be correct, then the HeatManager is probably defective and should be replaced.

Question

What is the difference between the high limit and the low limit on the aquastat?

Answer

First of all, it is important to realize that the boiler water temperature *does not* cycle back and forth between the high and low limits.

High Limit: This is a safety limit that will shut the burner off when the boiler water reaches the high limit setpoint. The high limit has a fixed 10° differential. This means that, once the boiler water temperature hits the high limit setpoint and the burner shuts off, the water temperature must drop 10° below the high limit setpoint before the burner will be allowed to turn back on. The high limit feature is found in these common Honeywell aquastats: L8124, L8148, L4006

Low Limit: This is the temperature about which the boiler water is maintained if there is no call for heat. The low limit typically has an adjustable differential of 10° - 25°. The burner will turn on when the water temperature hits 10° *below* the low limit setting, and will run until the water temperature climbs through the differential. See the example below:

Example 1

Low limit setting: 150°
Differential setting: 15°

Assuming there is no call for heat, the burner will automatically turn on when the water temp is 10° below the low limit setpoint; in this case 140°. The burner will then run until it climbs through the 15° differential up to 155°, where it will shut off. The water temp will then gradually fall back down to 140°, at which time the cycle will repeat itself.

Example 2

Low limit setting: 150°
Differential setting: 25°

This is the same as Example 1, except that the boiler water temperature will now climb 25°, up to 165°, before the burner will shut off. The water temp will then gradually fall back down to 140°, at which time the cycle will repeat itself.

The most common type of aquastat that has a low limit setting is the Honeywell L8124. These aquastats are typically used on boilers that have tankless coils, because the boiler needs to stay hot at all times in order to keep the coil hot to provide domestic hot water.

Question

How does the aquastat work (assuming there is no HeatManager on the system)?

Answer

On a call for heat (meaning the low voltage circuit through the aquastat's T-T terminals is completed), both the burner (B1) and circulator (C1) will be powered. They will continue to run until the heat call is satisfied, or until the boiler water temp hits the high limit. If the heat call is satisfied, both the burner and circulator shut off. If the water temp hits the high limit before the heat call is satisfied, then only the burner shuts off and the circulator continues to run. The burner will then turn back on when the water temp falls through the 10° differential. This cycle will repeat itself until the heat call is satisfied.

The low limit in the aquastat has an additional function: When the boiler water temp hits 10° below the low limit set point and the burner turns on, the *circulator will be held off*. Even if there is a subsequent call for heat, the circulator will remain off until the boiler water temperature climbs through the low limit differential, at which point the circulator will be allowed to run. Because of this feature, it is extremely important that the low limit on the aquastat be set to a maximum of 150° if used with a HeatManager. See the example below:

Example 1

Honeywell L8124 aquastat with following settings - High limit: 190°, Low limit: 170°
There is a HeatManager installed on the system

Assume there is a call for heat when the boiler water temperature is at 175°, but based on the measured heat load, the HeatManager has decided that ideal boiler water temp is 145°. At heat call, aquastat will turn on the circulator, but the burner will be held off by the HeatManager. The boiler water continues to circulate to provide heat until it hits 160°, which is 10° below the low limit setting. At this point, the aquastat automatically shuts off the circulator. All of a sudden there is an overlap between the HeatManager hold-off temperature and the circulator cut-out temperature in the aquastat. The end result is that the HeatManager is holding the burner off because it thinks the circulator is running to provide heat, and the aquastat is holding the circulator off because it thinks the burner is running to heat up the tankless coil. The bottom line is that there is a heat call and neither the burner nor the circulator are running, and the house will get cold.

By setting the low limit at a maximum of 150°, it ensures that the HeatManager hold-off temperature (min of 145°) and the circulator cut-out temperature (low limit - 10° = 140°) will not overlap, and the situation described above will not happen.

Question

What is the difference between a “maintained” boiler and a “cold-start” boiler?

Answer

A maintained boiler is a boiler that will maintain temperature even if there is no call for heat. This is typically done to keep the boiler hot enough to support a tankless coil, although some installers recommend maintaining boiler water temperature even if there isn't a tankless coil in order to avoid thermal shock to the boiler. A maintained boiler is kept warm by using an aquastat with a low limit setting, such as a Honeywell L8124.

A cold start boiler is a boiler that only runs when there is a call for heat. If there is no call for heat, the boiler water temperature will be allowed to fall as low as ambient. Typical cold start aquastats include Honeywell L8148 and L4006.

Question

Can the HeatManager be used on a cold start boiler?

Answer

During the heating season, a cold start boiler must run hot (i.e. 150°+) in order to provide enough heat to the home. When it is running at these hot temperatures, it performs no differently than a maintained boiler, and is a perfect application for the HeatManager.

A general rule of thumb is that the HeatManager will work with any boiler as long as it regularly runs in excess of 150° during the heating season.

Question

What is the best application for a HeatManager?

Answer

The ideal application is a large, oversized boiler with many heating zones and fin tube baseboards. This is because a boiler must be sized to heat all zones at once if necessary, but it's very rare that all zones are calling for heat at once. When only one or two zones are calling, it further amplifies the oversizing of the boiler. The HeatManager will compensate for the oversizing and will eliminate short-cycling.

Question

What is the difference between a tankless coil and an indirect hot water heater?

Answer

A tankless coil is a coil through which domestic hot water flows that is submerged in the boiler water. The heat from the boiler water is transferred to the water in the coil to heat it up.

An indirect hot water heater has a coil through which hot boiler water flows that is submerged in a tank of domestic hot water. The heat from the hot water in the coil is transferred to the surrounding domestic water to heat it up.

Question

When do you need to use the second HeatManager temperature sensor?

Answer

The second sensor only needs to be used on a system that has a tankless coil. Some systems with tankless coils also have storage tanks to increase the volume of hot water that is created by the tankless coil. A system with a tankless coil and storage tank still must use the second sensor.

The second sensor is needed with tankless coils because the HeatManager has no other way of detecting if there is a demand for domestic hot water.

Question

Why don't you have to use the second sensor on systems with indirect hot water heaters?

Answer

Because the indirect hot water heater functions just like any other zone of the heating system. Basically, when more hot water is needed, the indirect will "call for heat" and hot water from the boiler will flow out the boiler supply pipe and through the coil submerged in the indirect tank. The HeatManager detects this heat load through its standard temp sensor that is installed on the boiler supply pipe.

Question

What does the second sensor do?

Answer

If the second sensor detects a drop in temperature of the domestic hot water, it will override the HeatManager economizing mode and allow the burner to fire. It will *not* automatically fire the burner if it detects a demand for domestic hot water – there must be something else telling the burner to turn on in order for it to fire. It is important to remember that the HeatManager cannot

turn the burner on by itself. The HeatManager can only hold the burner off if there is a call for heat.

Question

Can the HeatManager be used on a system with a millivolt gas valves?

Answer

No. There must be either a 24, 110, or 220 VAC burner control circuit in order for the HeatManager to function with the system.

Question

Can the HeatManager be used on a stand-alone hot water heater?

Answer

Yes, although it is not highly recommended and the savings will be minimal. If the HeatManager is used on a stand-alone water heater, the temperature sensor should be plugged into the "Domestic How Water" jack on the side of the HeatManager.

It is not a very good application because the HeatManager will let the domestic hot water temperature drop based on heat load. However, this could cause the user dissatisfaction as they always expect the DHW temperature to be constant.

Question

Does the HM white wire have to go to the Aquastat L2 terminal and does the HM brown wire have to go to the Aquastat B2 terminal, as it's shown in the wiring diagrams?

Answer

No. The L2 and B2 terminals in the Aquastat are just shown as convenient locations for the wires, but they can be wired into any 110V neutral. The L2, B2, and C2 terminals in the aquastat are all internally connected.