



TECHNICAL SERVICE BULLETIN

PARTS & SERVICE DEPARTMENT

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TO: Manufacturers' Representatives, District Sales Managers, Regional Managers, Technical & Customer Service Personnel, Service Agents, Sales & Marketing Personnel

SUBJECT: Problems of Cascading Multiple Sized Units

Lochinvar has recently received several inquiries regarding potential Knight and XL applications in which the owner wishes to use mixture of boilers with varying BTU inputs the question is "can cascade function be used"?

It is the recommendation of Lochinvar that the cascade function should only be used in systems using boilers with the same BTU input. Boilers with different BTU inputs when placed in cascade, could react in ways unsatisfactory to the design of their programming. The cascade algorithm is based on three principles:

1. System Demand.
2. Total BTUs available to meet demand.
3. All units in cascade are the same size as the leader.

If the sizes of the member units differ from that of the leader the system may not reach a point of temperature equilibrium erratic temperature swings, short cycling and temperature overshoots could occur.

The Cascade feature is designed to make the lead boiler think that it is a single stage of a multi-stage boiler. For example, if there are five 399's in cascade the total boiler load would be roughly two million BTU's with the lead boiler as stage one. When the system demand increases the total demand of the boiler increases and when the demand reaches 120% of the first stage for a short period the second boiler in the cascade would be allowed to fire and run to 20% of rate. The lead boiler would in essence be sending 25% of total the BTU's available roughly 480,000 BTU's. This would represent the correct system demand and the unit would function as designed.

Now if we run the same scenario with different sized units in cascade we can see the potential problem more easily.

In this scenario we will use a 500 model for the leader and a 285 for the member. Although the units will react in cascade if wired and programmed, the potential exists for problems. The leader as stated before is programmed to think it the first stage of a multi-stage boiler. In this scenario the leader would be programmed to think it had 1,000,000 BTU's available when in reality there would only be roughly 785,000 BTU's total. When the first stage percentage reached 120% and the second boiler fires, the leader is programmed to think that it is now delivering 600,000 BTU's when in reality with the smaller 285 attached it is only delivering roughly 557,000 BTU's. As you can imagine this could cause multiple system issues. As the leader monitors the system it will attempt to maintain load based on the known output of the system which is incorrect due to the difference in size. This can cause short cycling as well as temperature overshoot in some scenarios.

If you have any questions regarding this bulletin please feel free to contact our technical Support Staff at 1-800-722-2101.