

The "Load Pairing" feature allows two compatible loads to run simultaneously. This feature has been implemented in V3.00.8 and later versions of the IBC Boiler Controller firmware.

There are 5 parameters associated with "Load Pairing":

Parameter	Default	Minimum	Maximum
Primary	0	1	3
Secondary	0	1	3
Initial Delay	5	2	15
Off Delay	5	2	15
Retry Delay	10	5	60
Max. Throttle	75	50	90

1) Primary Load

This is the load that will be in control of the boiler operation while the load pairing is active. This load must have a higher initial priority than the Secondary load. Load Pairing is disabled if this is set to 0.

2) Secondary Load

This load will be serviced if the supply temperature requirements for the Primary load are being met, the supply temperature is within the temperature range requirements of the Secondary load, and the boiler has the capacity to service the Secondary load (as set by the "Max. Throttle"). Load Pairing is disabled if this is set to 0.

3) Initial Delay

The numbers of minutes after the Primary load has started to be serviced before the boiler will add the Secondary load. A sufficient amount of time should be allowed for the Primary load to stabilize before the boiler adds the Secondary load.

4) Off Delay

The number of minutes after the loads have been paired where an under temperature condition will not cause the loads to be unpaired. Over temperature conditions will still cause the loads to be unpaired immediately.

5) Retry Delay

If the boiler has to drop the Secondary load due the supply temperature going out of range for either the Primary or the Secondary loads, or the Max. Throttle threshold being exceeded, this is the number of minutes the boiler will wait before attempting to pair the Secondary load again.

6) Max. Throttle

This is the maximum throttle percentage for which Load Pairing will be allowed. The Secondary Load will not be engaged if the boiler's throttle is above this value before the loads have been paired. This parameter is not referenced once the loads have been paired.

The Primary and Secondary loads must have compatible temperature parameters, or the Secondary load will not be paired. The type of load generally doesn't matter, as long as the target temperature requirements for the loads to be paired are similar.

Load Pairing does not interfere with the normal Load Priority scheme implemented by the boiler. Therefore, the Secondary load must be configured with a lower initial priority than the Primary load (a priority difference of at least 15 is recommended). If the Secondary load's running priority becomes higher than the Primary load, then it will be serviced in the normal priority rotation, just as if the load were not paired. The Primary load will be dropped, and the Secondary load will be serviced in the normal priority rotation. The priority scheme also means that the Load Pairing will only occur while the Primary Load is the active load. The same would apply if an unpaired load's priority became higher than the Primary's. The Primary load, and therefore the Secondary load if paired at the time, would be dropped and the unpaired loaded serviced in the normal priority rotation.

Compatible temperature ranges are the load's target temperature, +/- the differential temperature (the load's minimum and maximum supply temperatures). Note that any system or load temperature limits will still be in effect.

It should be noted that in the case of Reset Heating or External Control loads, the target temperature is dynamic. So it is possible that as outdoor and/or indoor temperatures change, reset and external control heating loads could drift in and out of compatibility for load pairing.

For example:

	Secondary Load	Reset Load @ 5°C	Reset Load @ -20°C
Target	45°C	45°C	57°C
Minimum	40°C	39°C	51°C
Maximum	50°C	51°C	63°C

Let's assume that a secondary load in this example is a Setpoint load, and its target and differential temperatures produce an operating range of 40°C to 50°C. Now let's assume that the primary load is a Reset Heating Load. When the Indoor temperature is 21°C and the Outdoor temperature is 5°C, the Reset load's target temperature would be 45°C, with a differential temperature resulting in an operating range of 39°C to 51°C. This would mean that the loads would be compatible and could pair when the boiler's supply temperature was between 40°C and 50°C. However, the same Reset Heating load when the Outdoor temperature is -20°C would have a target temperature of 57°C, with the differential giving it an operating range of 51°C to 63°C. The loads would no longer be compatible as their operating temperature ranges no longer overlap, and therefore the loads would not be paired. In this case, the boiler's normal load rotation scheme would then be used.

Load Pairing Examples**Example 1:**

Primary: min: 140°F max: 180°F
Secondary: min: 140°F max: 180°F
Initial Delay: 5 minutes
Off Delay: 5 minutes
Retry Delay: 10 minutes
Max. Throttle: 75%

- The boiler will wait a minimum of 5 minutes (Initial Delay) after it begins servicing the primary load before allowing the Secondary load to be added.
- The supply temperature must be between 140°F and 180°F, and the throttle below 75%, before the secondary load will be added.
- If the supply temperature goes above 180°C, the load will be dropped.
- If the supply temperature drops below 140°F after the 5 minute "Off Delay", then the Secondary load will also be dropped.
- If the secondary load is dropped, boiler will wait a minimum of 10 minutes (Retry Delay) before attempting to add the Secondary load again. The supply temperature must be between 140°F and 180°F again.

Example 2:

Primary: min: 140°F max: 180°F
Secondary: min: 150°F max: 170°F
Initial Delay: 5 minutes
Off Delay: 5 minutes
Retry Delay: 10 minutes
Max. Throttle: 75%

- The boiler will wait a minimum of 5 minutes after it begins servicing the primary load before allowing the Secondary load to be added.
- The Secondary load will not be added until the supply temperature is between 150°F and 170°F (the compatible temperature range for both loads), and the throttle below 75%.
- If the supply temperature goes above the Secondary load's 170°F maximum, the load will be dropped.
- If the supply temperature is or goes below 150°F after the 5 minute Off Delay, then the Secondary load will also be dropped.
- If the load is dropped, the boiler will wait at least 10 minutes, and the supply temperature must be within the Secondary's 150°F to 170°F requirements before it will attempt to engage the Secondary load again.

Example 3:

Primary: min: 140°F max: 180°F
Secondary: min: 130°F max: 150°F
Initial Delay: 5 minutes
Off Delay: 5 minutes
Retry Delay: 10 minutes
Max. Throttle: 75%

- The compatible temperature range will be 140°F to 150°F.
- The boiler will wait a minimum of 5 minutes after it begins servicing the primary load before allowing the Secondary load to be added.
- The Primary load's minimum supply temperature of 140°F must be met, and be below the Secondary's Maximum of 150°F, with the throttle below 75%, before the Secondary load will be added.
- The Secondary load will be dropped if the supply temperature drops below the Primary's 140°F minimum after the 5 minute off delay.
- The Secondary load will be dropped if the supply temperature exceeds the Secondary's 150°F maximum.
- If the load is dropped, the boiler will wait at least 10 minutes, and the supply temperature must be within the compatible range of 140°F and 150°F before it will attempt to engage the Secondary load again.

Example 4:

Primary: min: 140°F max: 180°F
Secondary: min: 120°F max: 140°F
Initial Delay: 5 minutes
Off Delay: 5 minutes
Retry Delay: 10 minutes
Max. Throttle: 75%

- In this example the Secondary load will never be engaged, as its operating temperature of 120°F to 140°F is outside of the Primary load's operating range of 140°F to 180°F. "Not compatible" will be displayed on the Load Pairing screen.