

Trouble Shooting Guide

*Theory of Lindberg Blue M Three-Zone Furnace
Control Operations*

Lindberg Blue M Furnaces
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Three styles of control operations are available on the Lindberg/Blue M brand of three-zone furnaces that operate up to the maximum temperatures of 1200°C and 1500°C.

Generally a three-zone furnace is selected instead of a single-zone furnace to expand or lengthen the uniformity of the center area of the furnace. The end zone temperatures can be increased slightly more than the center-zone to compensate for heat losses near the ends of the furnace cabinet.

An optional **Excess Temperature controller** is available on all three-zone control consoles. This option is represented near the end of the Control Console model number with a "B". The excess temperature controller will accept a tripping set point for the same temperature range as the main controllers. When tripped this controller will open a latching relay that will stay open until an operator resets the controller. With the latching relay open, voltage to the furnace heaters is disconnected.

The first style uses **three single-set point temperature controllers** to regulate the temperature, one for each of the three heated zones of the furnace. This style allows for simple selection of the operating temperature in each furnace zone.

An example of an application for this style would be when the process required a single constant temperature throughout the process time.

This Control Console model will end with "C" or "BC".

An over-temperature function is operational in each of these controllers that will trip and deenergize the furnace heaters when the over-temperature set point is exceeded.

However when the furnace temperature falls below the trip set point, the control will automatically reset and reenergize the furnace heaters.

The next style of control console uses **one programmable controller and two single-set point controllers**. Here the programmer controller is made to operate the center-zone, while the single-set point controllers are operated as slaves to the operating temperature of the center-zone. These slave controllers have a differential set point range of -50°C to +50°C from the center-zone temperature.

This style allows the programmer controller to operate through a series of ramp and dwell temperature profiles of time, with the end-zone temperatures following by a selected differential.

This style of Control Console model number ends with "PC" or "PBC".

An over-temperature function is operational in ONLY the programmer of these controllers that will trip and deenergize the furnace heaters when the over-temperature set point is exceeded. However when the furnace temperature falls below the trip set point, the control will automatically reset and reenergize the furnace heaters.

The last style of Control Console uses **three programmable temperature controllers** to regulate the temperature, one in each of the three heated zones of the furnace.

In this style of control console, the controllers vary each furnace zone temperature with a program controller profile of time.

Each program and controller operates independently of the other controllers. Typically the programs for the three controllers would be started at the same time to synchronize their programs.

The application for this style would be where a variety of temperatures in each zone are needed over a profile of time.

An over-temperature function is operational in each of these controllers that will trip and deenergize the furnace heaters when the over-temperature set point is exceeded.

However when the furnace temperature falls below the trip set point, the control will automatically reset and reenergize the furnace heaters.

The model numbers for this style of control console would end with "3PC" or "3PBC".