

Application Note AN0100: Safety switch off feature for kilns using bentrup controls

Issued January 10th 1992

1.) General Informations

Safe and proper operation is a very important matter when operating a kiln. A defect in one of the kiln components can cause severe damage of the kiln or the contents. Therefore our controllers are equipped with many supervisory and checking functions that ensure all parts of the controller and the kiln are monitored continuously. All important parts of the controller are fitted double and/or are tested by the controller automatically.

One of the most important components, the contactor (power relay) in the kiln, is not protected against malfunction. If the power relay fails and sticks in ON position, there is no way for the controller to cut off the power from the kiln.

2.) New Safety Feature

In November 1991, we introduced a safety system for kilns equipped with our controller that works as follows:

The kiln is equipped with a 2nd contactor; both contactors control in series the power to the heating elements. The bentrup controller supplies an additional control output signal that drives the 2nd contactor. When starting a program, the controller first switches the 2nd contactor to ON and then controls the temperature by switching the 1st contactor to ON/OFF as usual. The 2nd contactor stays to ON during the whole firing.

If the 1st contactor fails, the controller recognizes this because of an uncontrolled heat up. If the kiln exceeds the maximum temperature of the actual entered programme plus 20°C, the controller turns off the kiln by setting the 2nd power relay to OFF and showing an error message (eg. „F2 2“) that clearly points to this problem. Because of the automatically adjusting alarm temperature (max. program temperature + 20°C) this feature protects kiln **and** contents as well.

3.) Further considerations

There is another reason for recommending the usage of a 2nd contactor: Regulations (e.g. German VDE 0700 part 244 or corresponding IEC regulations) require that the mechanism for

power cut off when opening the kiln is not allowed to be the same component like used for temperature control. This ensures that in case of a contactor failure the user is not hurt by an electrical shock when opening the kiln. When using the 2nd contactor insert the door switch in the energizing (coil) circuit of the 2nd contactor to comply to this regulation easily.

4.) Applicable Regulations

However, this regulation is not binding on all kilns. But as our experience, especially schools and public institutions are asking for a maximum of safety. Furthermore, this feature really improves safety when operating kilns.

5.) Requirements of the bentrup Controller

The required safety relay control output (2nd output) is optional on our controllers. Depending on plug being used, the pin carrying the 2nd output signal is different. On the HAN7D plug, we use pin 7 for this signal. Please refer to the last page in the bentrup controller manual for a typical schematic diagram of a kiln fitted with 2nd power relay.