

Application Note AN0205: Additional Instructions and Considerations when setting up Controllers

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1.) General Informations

This application note provides additional instructions and considerations when installing a bentrup controllers in your control panel resp. your application.

2.) EMC considerations

All bentrup controllers are designed to be operated in difficult electrical environments as specified in IEC801/4. However, we recommend to properly damp components that are subject to noise emission. Use properly sized RC-bridges or varistors on the coil of a contactor. The compliance to EMC emissions limits is mandatory by CE regulations.

Note that the electrical noise filters need proper earth connection for optimum filter performance. Make sure that the earth (PE) link exists and the control panel is grounded properly. On old buildings where electrical installation is not state of the art additional earthing is recommended.

3.) EMC problems

Under all normal circumstances the operation of bentrup controllers is not affected by non-compliance of EMC guidelines (see also bentrup PCN0303). However, if you experience symptoms like controller restart (showing version number) or flickering display you might face extreme strong EMC noise. To confirm that you are actually facing EMC problems check as follows: Does the controller fail exactly and immediately when contactor goes OFF? If yes, you are probably facing EMC problems and you have to add dampers to the coil of the contactor. If no, please read comments in chapter 4.).

4.) Mains supply problems

All industrial series (as well as TC500) bentrup controllers are fitted with a switching power supply. Therefore the mains supply range is quite large. We guarantee from 160 up to 250 volts although the actual lower limit is even less. To use the controllers on 110V (USA / Kanada) a jumper bridge must be changed on the controllers board. This option is only available if the controller has been specially ordered. Mains frequency (50 or 60 Hz) does not have any affect on the controller. As a further option the controllers are also available for 24 Volt AC supply.

If the kiln power pickup exceeds the mains supply limits you might experience controller restarts or similar controller problems. Please also read comments in chapter 3.) to verify the cause. To confirm mains supply problems please check as follows: Does the controller fail when the contactor goes ON? If this is the case you are likely in lack of power supply since your kiln power pickup exceeds the mains supply limits and therefore is pulling down whenever heating elements are activated. Since the

controller releases the output on restart, the voltage level returns to normal and the controller tries to continue. The cycle continues again and again.

5.) Problems of oscillating Temperature indications on high Temperature multizone kilns

The following possible problem only applies if all of the following circumstances are true:

- multizone kiln (using one or more thermocouples per zone)
- 3 phase kiln directly electrically heated (no gas kiln or air convection kiln)
- kiln is operated extended periods on temperatures above 1300°C
- certain kind of isolation material, certain arrangement of thermocouples and ceramic cover

If any of these criterias are NOT met you do NOT have to read the following considerations.

Explanation: Under above described circumstances it can happen that current from the heating elements is flowing over the kiln isolation into the thermocouple. If one side of the thermocouple wire is connected to the thermocouple wire of another zone (which is the case if multiple thermocouples are connected to one controller) a current of up to several milliamps is flowing in between the thermocouples. This causes remarkable deviations of the thermocouple signal causing the temperature reading to become unsteady and oscillating. The basic problem has nothing to do with the controller itself.

Error picture: If you find one or more temperatures in the 3 zones moving up and down very fast (eg. within seconds 1350 - 1354 - 1349 - 1346 ...) during the kiln is heating (becoming steady whenever the heating is interrupted) you are facing the mentioned problem

Workaround: The problem can be solved in either of the 3 ways:

- 1.) Connect all positive poles directly on the thermocouple clamp to ground. Connect the poles in a row, ie. start the wire at earth ground and connect one after the other by the shortest path. Use standard copper minimum 1.5mm² diameter isolated cable. This causes the remains current to be lead directly to earth ground.
- 2.) Using an isolating transmitter in between the thermocouple signal
- 3.) Using the new bentrup AIM4 as analog input extension. AIM4 is a programmable, 4 channel analog input module suitable for all industrial bentrup controllers, fitted with 4 electrically completely isolated inputs.

Although option 1.) is the easiest choice it is not the best solution thinking in technical terms. Option 3.) is the optimal choice since it even increases accuracy (because of the excellent accuracy of AIM4).

6.) Further Considerations

Keep in mind that any of the above described szenarios are very rare. Perform your installation as you are used to and don't expect that any of the described problems will happen. However, if a problem occurs you are prepared for the appropriated counteractions.