OUR SOLUTIONS

MULTIZONE POWER CONTROLLERS

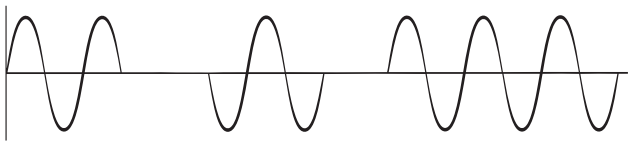
FOR INDUSTRIAL HEATING APPLICATIONS

04-2023

Heat plays a key role in many industrial processes, and keeping it at a precise and accurate level is often essential to ensure high product quality.

In one application, celduc® relais has developed **infrared lamp temperature control units**. The technology used, based on solid state relays together with complex electronics, make it possible **to provide precise and efficient accurate control of up to 12 lamps**.

Accurate control of electrical heating elements



Controlling electrical heating elements precisely and accurately

Here are the **main features of celduc's multizone power controller :**

1- Diagnostics

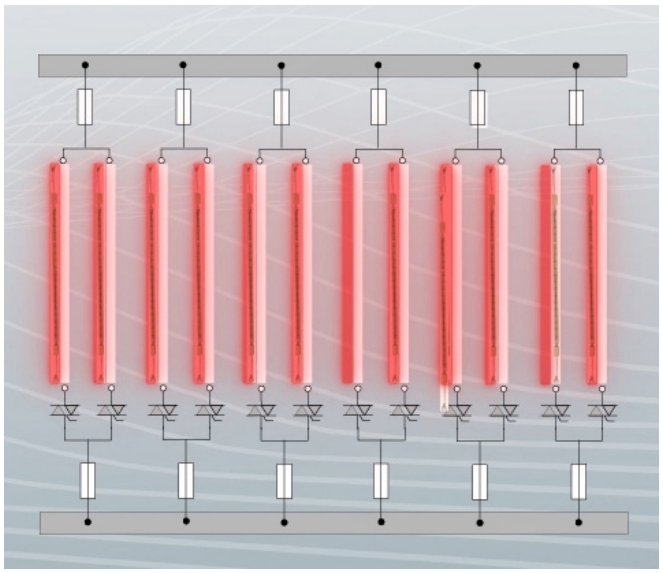
A program is used to **inform the PLC of the operating state and possible faults in the manufacturing process.**

Detection of :
-**external faults in the load circuit** : broken lamps < 250ms or overvoltage/undervoltage/frequency out of range
-**internal faults** : overheating, blown fuse, blocked fans

2- All-in-one modular heating control system in a low profile case

All the required functions for precise and accurate temperature control are gathered in this space saving solution for faster integration into equipment.

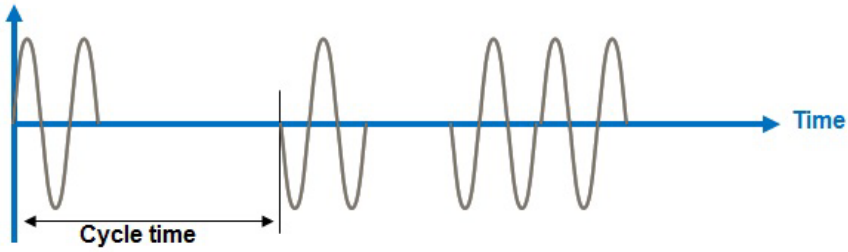
3- Heating unit for a maximum of 12 IR channels (4kW max. per channel and 36kW max. per unit)



Versions available for 8, 10 or 12 IR channels.

4- "Fast burst" firing method

This control mode consists of switching the streams of full sine waves equally distributed along a fixed modulation period in accordance with the analog input signal. With a "Fast burst" firing method, firing is possible on one or more half periods (time base of 10ms @ 50Hz) to **ensure the right functionning point** as well as **a finer regulation**.
Our multizone power controller uses the **fast burst firing method** as it's the **best control mode for infra-red lamps.**



5- U^2 type mains power variation correction (syncopated)

The EIRC controller uses as a standard a U^2 type mains power variation correction.
Mains RMS voltage is measured on each half waves. This value is comparated to the nominal value (400Vac).
The module constantly compares after each half-wave the setpoint sent by the master (PLC) and apply a correction factor in order to realize the voltage compensation :

$$Setpoint\_n+1 = Setpoint\_n * correction\ factor$$

$$Correction\ factor = \frac{U^2}{U_{Nominal}^{\ 2}}$$

EIRC modules regulation accuracy is +/- 0.5%, this regulation method allows for a very good quality of transmitted power thanks to its reactivity and to the precision of the measurement chain.

6- Built-in protection using fuses

All channels are protected using fuses on each phase.
If one fuse or more is blown, the "Fuse Fault" is detected and all lamp outputs are deactivated.
Maximun delay for detection : 50ms

Fuses are only used to protect thyristors and IR lamps.
These fuses are not designed to ensure the protection of the installation and equipment operators.

7- Control using Profibus DP

EIRC Series complies with the PROFIBUS DP-V0 slave type specifications according to EN50170 / IEC 61158 with its RS-485 5V differential line.
Approved according to the PNO criteria: PROFIBUS Nützer Organization reference : Homologation in progress.

8- Prevents inrush currents when heating elements are switched on

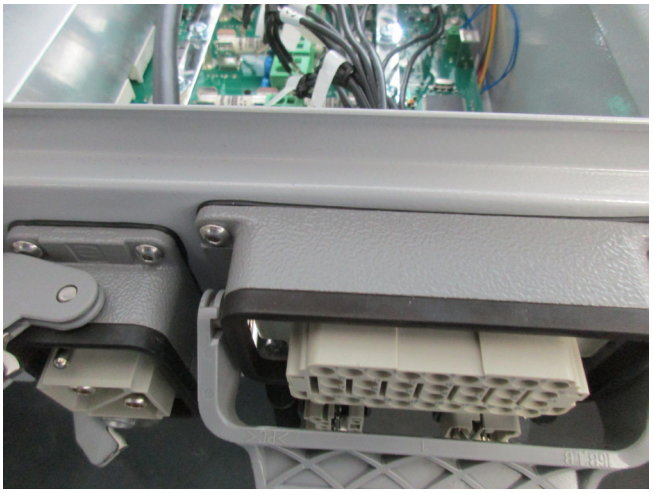
In general, Infrared lamps have inrush currents up to 8 or 10 times the nominal current when turning on the infrared lamps.
In order **to avoid inrush currents** when turning on the heater with cold heating elements, the "cold" start of the infrared lamps is done sequentially at intervals of 200ms.

9- Thyristors with TMS^2 technology for improved lifetime

celduc's Solid State Relays are manufactured with Wire Bonding Technology : the copper clips used in the "Standard" technology, used by the majority of Solid State Relay manufacturers, are replaced by a multitude of bonding wires with several anchor points that can withstand significant overload currents. Furthermore, this manufacturing process is fully automated, giving rise to total control of the production process. In addition, the connections between the wires and the chip are tested after connection (pull test) and by sampling (pull and shear tests). **This increases the product's reliability.**

10- Standards and approvals

11- Connectors allowing quick connections for fast and robust installation !



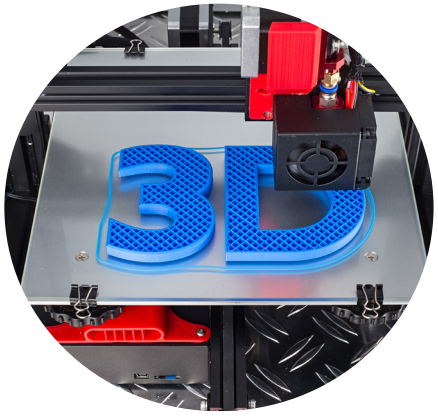
All connections are made using connectors with the following benefits: **designed for rugged use, quick and easy handling, flexibility of use and long life cycle.**

With our multizone power controller, your heating elements are always at the right temperature.

Applications

Thermoforming

Blow molding



3D printing process

Paint drying

Glass processing

Heating control solutions developed by celduc® relais can be found in a wide range of sectors and applications all over the world : some examples can be found in the drying of paint and coatings, in the molding of plastics, in the production of PET bottles, in plastic welding and in infrared cooking ovens ...

Thanks for reading

www.celduc-relais.com