LABFACILITY
TEMPERATURE & PROCESS TECHNOLOGY

A Versatile Approach to Multi-Zone Temperature Control & Monitoring in Training, R&D and Experimentation Applications

A new, unique instrument, the L300 from Labfacility provides up to 8 channel simultaneous temperature measurement & logging with independent on-off control or alarms on each channel. Inputs can be Pt100 or thermocouple and, in the case of thermocouples, any type can be selected for each channel (types J,K,T,E,N,R,S&B). Real time charting of any or all channels can also be selected, displayed as a 2D or 3D presentation.

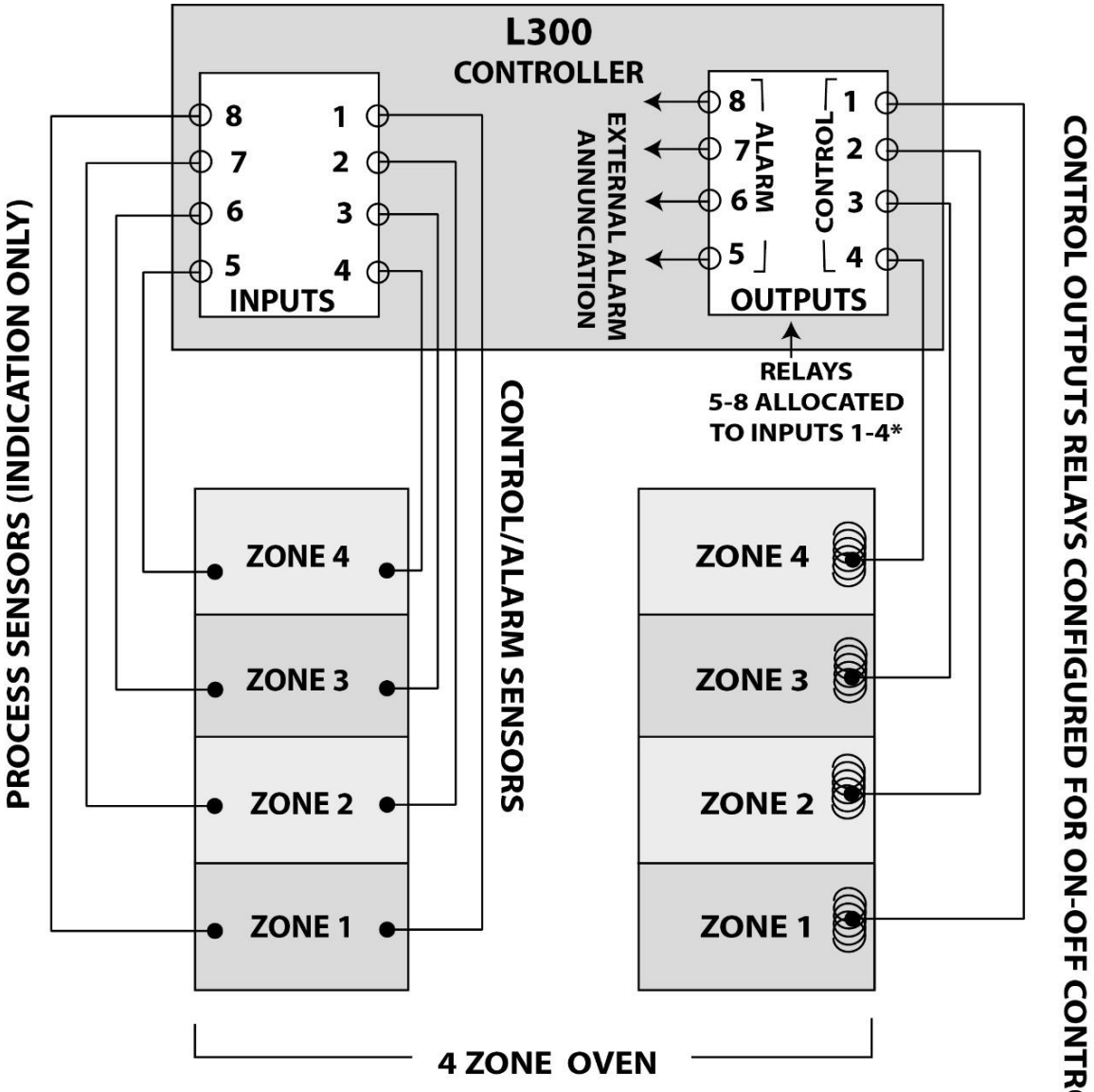
Each of the 8 alarm outputs can be fully configured by the user and allocated to any input as required. The contacts are rated 10A/250V.
The instrument can be configured and used on a stand-alone basis or with the PC software provided.

Typical R&D and experimental applications include multi-zone comfort control (heating & cooling), annealing ovens, profiling ovens, cake manufacturing and baking ovens.

Case Study

Temperature Control and Alarm Monitoring applied to a 4 zone oven.
In this application,4 channels of the L300 Controller are utilised for control of the oven zones and the other 4 channels are used to indicate the process temperature and provide alarm monitoring.

This arrangement allows the operator to optimise the control settings whilst relying on alarm functions to indicate any under- or over-temperature condition which may occur.

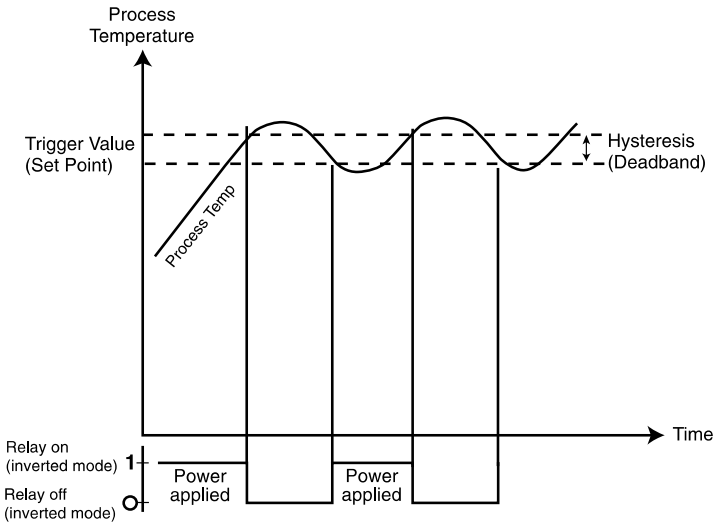


*ALARM OUTPUTS STATUS IS INDICATED BY
L300 FRONT PANEL LEDs
CONTACTS CAN BE USED FOR EXTERNAL ALARM FUNCTION
RELAYS CONFIGURED FOR HIGH/LOW OR BAND ALARM

The L300 provides On-Off control, the simplest form of control, which, with a carefully chosen hysteresis value and ideally a reasonable thermal mass will result in accurate temperature regulation.

Processes with potentially rapid changes in temperature will benefit from a greater degree of hysteresis to ensure the best stability.

ON/OFF Control



With On-Off temperature control, the output from the instrument is either on or off; the output is switched from one state to the other when the process temperature goes above or below the set point (trigger value). For the control of heating, the output is 'on' when the temperature is below the trigger value and 'off' when it is above the trigger value.

Since the process temperature rises above and falls below the trigger point to cause the output to change state, the temperature will cycle above and below the trigger point to some extent (the actual extent to which this occurs will be a function of the amount of heating energy applied to the process and of the thermal mass of the process).

Hysteresis is an On-Off differential (dead band) applied to the trigger point region to minimise or eliminate excessively rapid output switching around the trigger point region (ie: due to rapid cycling of process temperature around the trigger point). The Hysteresis will ensure that the process temperature exceeds the trigger value by a certain amount (user selectable) before the output will switch on or off again (the diagram indicates how this works). The hysteresis value (or 'dead band') is normally adjusted when the process is commissioned.

Process Cooling, if required, can be controlled by allocating an additional relay to the ' control ' channel/input. Configuring this output as a High Alarm with Normal relay operation and using the Normally Open contact to operate some form of cooling device. Such a device is typically a fan or fluid control valve (on-off type, not proportioning in the case of on-off control).
The hysteresis must be set to allow optimum application of the cooling medium.

Sensor Location

Sensor location is an important consideration to achieve the best possible control. Heater temperature and process temperature are separate, although closely related parameters. Ideally, the ‘control’ sensor would be located reasonably close to the heater to allow ‘tight’ control to be achieved.

The Process temperature is the most important consideration for product quality; measurement is ideally carried out with a separate sensor located in this zone. The relationship between the two sensor locations is also a function of the thermal mass of the process; for example, changes in heater temperature will usually occur more rapidly than those in the process. Hysteresis values may need to be adjusted to achieve the best compromise.

www.labfacility.com
Tel: +44(0)1243 871280
sales@labfacility.com