

# Heat Treatment

## INDUSTRY

- Fail Safe Process Operation
- Alarm on Sensor Failure
- Alarm On Power Interruption
- Parameter Security

## Over Temperature Alarms to FM/DIN 3440

### Application Note

#### Why protect against Over Temperature?

Over Temperature Alarm Units, sometimes referred to as *Policemen* are essential in any Oven or Furnace application, where in the event of an excessive temperature, personnel safety can be compromised. To ensure failsafe operation, these alarm units must be on a separate circuit to the main temperature controller.

#### Why not include this Alarm in the Temperature Controller?

Including the alarm within the temperature controller would not provide failsafe operation in the event of a low reading of temperature caused for example by shorting of the thermocouple leads.

The reason for this is that the furnace temperature will move whilst the measured temperature does not. In this example the temperature will keep rising until a problem occurs or the system hits its temperature saturation point.

#### FM Approval

FM (Factory Mutual) is an agency based in Boston who specialise in equipment functionality and ensure it works in a prescribed way. They list all manner of equipment from fire systems and sprinklers to industrial switches. Since FM is a US based agency it is mandatory on processes over 1000°F installed in the USA to be protected with an FM approved Alarm Unit.

The FM standard which applies to Eurotherm® products is Class Number 3545, which sets the requirements for temperature limit devices used to ensure safety within industrial temperature control systems. An FM approved installation requires the following:

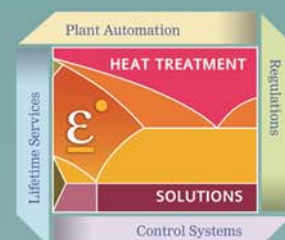
- Changes to the alarm setpoint require some form of security, i.e. password protection.
- Reset of the alarm relay cannot be made until the process temperature has returned to a safe condition.
- Sensor failure shall result in the alarm relay becoming active.
- The installation should be failsafe with the relay de-energised in alarm.
- The alarm circuit should be independent from the main temperature controller.

#### DIN 3440 Approval

DIN 3440 is a safety approval from the German TÜV Rheinland Group. TÜV is responsible for documenting the safety and quality of both new and existing products, systems and services. One of the product types referred to by DIN 3440 is temperature limiting devices used in thermal process applications, including ovens and furnaces. It is normal that any thermal processing application in Germany and some other mainland European countries will require the fitting of a safety device approved to this standard.

The requirements of DIN 3440 are almost identical to that of FM with the two main criteria being:

- After an alarm becomes active and then returns to a safe condition it cannot be reset until acknowledged by an operator.
- If the process input detects a fault the alarm should become active.



## Typical Application

A typical application is shown in Figure 1. In this case the temperature is being controlled by a PID controller modulating a thyristor. The relay contact of the Alarm Unit is connected in series with the live feed to the thyristor. If, therefore, this contact is broken no heat will be applied to the heater. At the same time as the alarm becomes active, the other contact of the changeover relay will light a lamp or ring a bell to alert the operator of the problem.

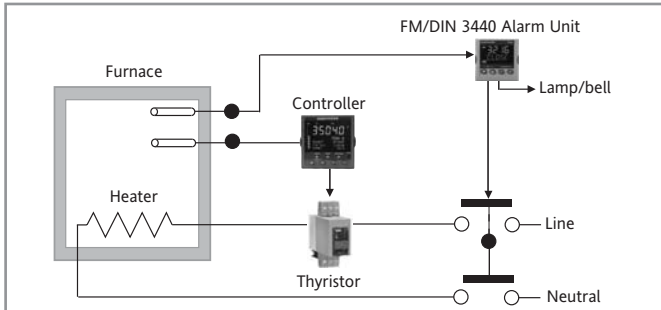


Figure 1

Figure 2 shows an example of how a 3216i can be used in the application shown in Figure 1.

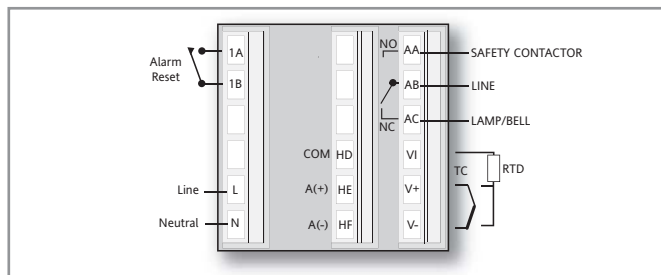


Figure 2

## 3200i Indicator and Alarm Units



Available in three formats, 3216i, 32h8i and 3204i, the 3200i range of indicators offer Over Temperature protection to both FM and DIN 3440 with the following features being available:

- FM/DIN 3440 Approved Changeover Relay (Form C)
- Alarm on Sensor Break or Power Interruption
- Alarm Reset via User Interface or Digital Input
- Scrolling Text Alarm Message
- Display Colour Change on Alarm (32h8i)
- Alarm Setpoint Change protected by Password
- Modbus RTU communications

The emphasis on the 3200i is ease of use. A simple 'quick start' code is used to configure all the functions that are essential for indicating and protecting the process. This includes input sensor type, measurement range and alarms - making out-of-the-box operation truly achievable.

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