

# **ISIMET Laboratory Safety System**

## **Theory of Operation of the Laboratory Utility Controller**

The primary objective of our control system is to promote safety for the student as well as the instructor in the science laboratory learning environment. In order to achieve this goal, it is our belief that the instructor should be granted sole, local authority to determine those utilities that should be available to the student during the course of the classroom day.

Dividing focus between not only response to the potential emergency but likewise the prevention, our theory of operation states that utility outlets that are readily available to the student should remain inactive unless specific need for use is determined and thus granted by the instructor enables the definition of hierarchies for the Controller.

ISIMET defines four distinct operating hierarchies or states:

1. Enabled or Operational
2. Disabled or Non-operational
3. Panic
4. Alarm

## **Sequence of Operation for the Laboratory Utility Controller**

### 1. The Operational Mode: (occupied state of the facility)

The Operational Mode is dependent upon an enabling control signal received from the facility's energy management control system. In this mode, activation of the utilities at the student workstations is permitted. First placing the desired operating switch in the "ON" position, and then engaging the service key achieves restrictive activation. Whereby, a 24-vac control signal activates the solenoid valves for the gas or water, as well as an electrical contactor for the 110-vac receptacles. An illuminated panel mounted lamp is indication that the utility is active. Selective deactivation is accomplished by placing the corresponding operating switch to "OFF". Intent of operation is such that utilities remain "OFF" unless selectively activated or turned "ON".

The exhaust fan fitted as an auxiliary output module permits its restrictive operation. The fan circuit remains in a disabled mode until first engagement of the service key. Thereafter during the classroom day, the auxiliary switch permits convenient "ON" and "OFF" operation without the otherwise required engagement of the service key.

A Separate Control Panel permits independent activation of the utilities at the Instructor's Demo Stand. A single switch simultaneously activates all utility outlets at this stand upon engagement of its service key. This panel, companioned with the Utility Controller as a remote output circuit, is dependent upon the enabling control signal for operation.

## 2. The Non-operational Mode: (unoccupied state of the facility)

Upon withdrawal of the enabling control signal from the facility's energy management control system, the Utility Controller as well as all companioned devices are disabled and become non-operational. All utilities including exhaust fans fitted as auxiliary circuit modules are deactivated. An illuminated panel mounted lamp is indication that a utility output circuit was left active at withdrawal of the enabling control signal. Upon return to operational mode, output circuits require re-keying of the service key switch in order to become again active. Exhaust fans having their module configured for after-hours operation are permitted to operate if a panic mode is achieved during an unoccupied state.

## 3. Panic Mode:

Panic is achieved by the pressing of the "EMERGENCY" button located on the Controller's door panel, or by striking any remote panic button including that located on the Instructor's Demo Stand Control Panel. Upon "PANIC", all utilities are deactivated. All panel mounted indicators illuminate to indicate "PANIC". The fan circuit becomes instantly active, purging the classroom of toxic fumes. The monitoring pulse lamp located exterior of the classroom in the adjoining corridor will flash, providing notification that the classroom has a potential emergency within.

Reset of the panic mode is accomplished only by either re-keying of the service key switch or by reset of the internal "RESET" button. Thereafter, all utilities again become enabled. The Demo Stand control panel when so configured resets independent of the primary Controller.

Emergency Shower units within the classroom having their operation monitored by the Controller will place the system into "PANIC" upon operation of the shower. Providing a flow switch in the unit's water supply will close contact upon flow, sending a remote panic signal to the Controller.

## 4. Alarm Mode:

Upon receipt of a notification signal from the facility's fire alarm system, the Utility Controller as well as all integrated utility systems including the exhaust fan will become instantly disabled. Likewise, any auxiliary electrical circuits or other utilities receiving secondary control from the system will also become disabled. Reset from "Alarm" is accomplished solely by manual reset, thus preventing unauthorized reactivation until a positive clear from alarm can be confirmed.