

<b>MODULE TITLE</b>	<b>ENERGY MANAGEMENT SYSTEMS FOR COMMERCIAL REFRIGERATION</b>
<b>Nominal Duration</b>	One Module
<b>Module Code or Number</b>	EA 143
<b>Module Purpose</b>	To enable students to set up, operate and fault find a typical Commercial Refrigeration Energy Management System (E.M.S.)
<b>Relationship to Competency Standards</b>	This module will be modified in line with the requirements of the National Metals and Engineering Standards when they become available. The module contains the knowledge and skills identified and agreed by all States and Territories. It has been developed on the assumption that these will be reflected in the Standards.
<b>Prerequisites</b>	NR 18 Merchandising and Display Cabinets NR 19 Cool Rooms/Freezer Rooms
<b>Summary of Content</b>	<b>1. Functions of a Commercial Refrigeration E.M.S.</b> <ul style="list-style-type: none"><li>- General Control Function</li><li>- Inputs</li><li>- Outputs</li><li>- Communications</li><li>- Graphing</li><li>- Supervising</li><li>- Data Logging</li><li>- Scheduling</li><li>- Alarms</li><li>- Power Consumption</li></ul>

## **2. E.M.S. Control Components**

- Identify components
  - Pressure sensors
  - Temperature sensors
  - Timeclocks
  - Humidity sensors
  - Liquid Level sensors
  - Leak Detector sensor
  
- State the function and operating parameters of components
  - Pressure sensors
  - Temperature sensors
  - Timeclocks
  - Humidity sensors
  - Liquid Level sensors
  - Leak Detector sensors

## **3. Installation Requirements and Consideration**

- Installation of controller(s)
- Installation of Refrigerant Leak Detector Systems
- Installation of accessory boards
- Installation of pressure transducers & wiring
- Installation of temperature sensors & wiring
- Control wiring considerations

## **4. System Design and Applications**

- Select control components to suit given applications
  - Determine system operating parameters
  - Pressure sensors
  - Temperature sensors
  - Timeclocks
  - Humidity sensors
  - Liquid Level sensors
  - Leak Detector sensors
  - Defrost
  - Alarm Panel

## **5. Programming a Control System**

- Display terminal and Keypad functions
- Calibration of sensors
- Changing original settings
- Program a given set of parameters to suit an application

## **6. Component Testing and Fault Finding**

- Trouble shooting
- Testing of components

### **Delivery**

This module provides for delivery by off-the-job training in a variety of modes.

Assessment instruments will need to be developed by the module provider. These instruments will need to reflect consistency with stated module learning outcomes and related assessment criteria.

Alternative assessment procedures will need to be considered, and applied as appropriate to student's needs.

Access to a Energy Management System or various types of systems would be desirable.

### **Learning Outcomes**

On completion of this module the learner will be able to:

#### ***Learning Outcome 1***

**Describe the principle operating functions of an energy management system for commercial refrigeration.**

### **Assessment Criteria**

List the operating functions of a Energy Management System.  
State the main characteristics of three given Energy Management Systems

### **Conditions**

Normally learning will take place in classroom or other suitable study environment.

Relevant extracts and materials will be made available to students for reference during lessons.

### **Assessment Method**

Assignment: Short Answer Test

***Learning Outcome 2***

**Identify and describe the operation of all principal components of a Energy Management System.**

**Assessment Criteria**

identify various hardware components on an energy management system or from a selected range.  
Identify hardware components from given control diagrams.  
State the function and ranges of each component.

**Conditions**

Normally learning will take place in classroom or other suitable study environment.

Relevant extracts and charts will be made available to students for reference during lessons.

**Assessment**

Assignment: Short Answer Test  
Practical identification of components

***Learning Outcome 3***

**Describe the installation requirements and considerations of an Energy Management System.**

**Assessment Criteria:**

State the requirements and considerations for the installation of:  
controllers  
sensors  
State the special wiring requirements for the installation of controllers and sensors.

**Conditions**

Normally learning will take place in classroom or other suitable study environment.

Relevant handout material will be made available to students for reference during lessons.

**Assessment**

Assignment: Short Answer Test

<b><i>Learning Outcome 4</i></b>	<b>Design a control system for a given commercial refrigeration application using the manufacturers system configuration forms.</b>
<b>Assessment Criteria</b>	Identify the type of refrigeration system and state its control requirements. Design the control system to meet the operating requirements Select the components needed to meet these control requirements and the sensor ranges. List the special installation requirements of the sensors.
<b>Conditions</b>	Normally learning will take place in classroom or other suitable study environment.  Relevant information will be made available to students for reference during lessons.
<b>Assessment</b>	Project: Design a system to given specifications and include operating pressures, temperatures and control settings.
<b><i>Learning Outcome 5</i></b>	<b>Program a control system to meet operational requirements of a given application.</b>
<b>Assessment Criteria</b>	Program a control system to meet the operating requirements of a given application. Adjust sensors to manufacturers specifications. Change original settings to meet new system requirements.
<b>Conditions</b>	Normally learning will take place in classroom or other suitable study environment.  Relevant information will be made available to students for reference during lessons.
<b>Assessment</b>	Assignment: Practical

**Learning Outcome 6**

**Fault find an E.M.S.**

**Assessment Criteria**

Given a control system fault, list the components that would be tested first when fault finding that system.

Test individual sensors.

Test controller outputs and inputs.

**Conditions**

Normally learning will take place in classroom or other suitable study environment.

Relevant information will be made available to students for reference during lessons.

**Assessment**

Assignment: Practical

**Suggested Learning Resources**

All references used should be the latest

Manufacturers Data and References

Phasefale Safety (1)

Altech Controls (2)

CPC Computer Process Control (3)

1. **Phasefale Safety Controls**

Phasefale Safety Controls Pty Ltd

8 Advantage Road

Highett

Victoria. 3190

Phone: (03) 5530800

Fax: (03) 5533993

2. **Altech Controls**

Frigrite Refrigeration Pty Ltd

27 Grange Road

Cheltenham

Victoria. 3192

Phone: (03) 5842711

Fax: (03) 5845624

3. **CPC Computer Process Control**

Kysor//Warren

66 Glendenning Road

Plumton.

N.S.W. 2761

Phone: (02) 8321611

Fax: (02) 6752897