



## 058: Low Voltage, Indoors

### *Why this is important*

Safety errors with low voltage equipment can be just as lethal as safety errors with any other equipment. Low voltage does not mean harmless voltage.

### *Definitions*

**Low voltage:** The definition varies, depending on the frame of reference. The NEC does not define it. For power distribution on the load side, low voltage is generally 600V or less. For control systems on the load side, low voltage is 50V or below.

**Automated Control System:** Any system that monitors and controls processes or equipment. Examples include energy management systems that control HVAC in commercial buildings, programmable logic controllers that control manufacturing processes, and switchgear that controls load side power distribution.

**ESD:** Electrostatic discharge—basically static electricity—is a major concern for electronics. In some cases, you will need to wear ESD protective devices such as grounding straps to protect the equipment you are working with.

**I/O Board or Module:** With their input and output terminals, these are the interface between field devices and the control system.

### *Energy facts*

Control systems typically operate at multiple voltages, often within the same enclosure or equipment skid. From input power of 480AC or 120VAC, the power supplies in a single enclosure or skid may have outputs that include 480VAC, 120VAC, 48VDC, 24VDC, 10VDC, and 3VDC.

At facilities having large DC power plants (telecommunications in particular) controllers will typically operate on 48VDC. This is usually distributed power.

Controllers usually have voltages from external sources terminated on I/O boards. Even if you shut down the controller, it may have hot terminals.

Electricity isn't the only energy source in a control system. Pneumatic controls will often have low-pressure input air (22 psi) in the controller. Transducers adjust the output air pressure to position dampers, valves and other devices. A control system may also have process piping run to it, with the attendant dangers inherent in various chemicals, pressures, and temperatures.

### *Protecting yourself*

Working in energized equipment is never a one-person job.

Determine how the control system will respond to your work. For example, will interrupting a control point initiate an event that will shut down the air conditioning system, start the engine generators, or turn on all of the outside lighting? Check the drawings and discuss the scope of work with someone who is familiar with the operation of the controller before commencing work.

Identify all sources of energy before commencing work by using the controller drawings and walking down the system.

In some circumstances you may be unable to power down a controller and all of

### *Discussion leader duties for this session:*

Obtain low voltage controller, power supply, or other device used in controls.

### *What this Safety Talk covers:*

Safety considerations for indoor low voltage systems, especially control systems.

### *Discussion notes :*

