Flat Panel Display System

Background

The Westinghouse Flat Panel Display System (FPDS) is a human-machine interface for safety systems. The PC node box and flat panel display (FPD), which work together to display safety-related and nonsafety-related information from the field, are at the heart of the system. The system is complemented by a safety-related trackball and safety-related keyboard, which are available in a variety of installation configurations designed to meet the customer's needs. This robust system has been qualified to the Electric Power Research Institute's TR102323, Revision 2, and U.S. Nuclear Regulatory Commission Regulatory Guide 1.180, Revision 1.

Description

PC Node Box

The PC node box is a custom-designed industrial computer that provides the interface between the safety system processor and the flat panel display. It comes equipped with digital outputs, a fiber optic media converter, serial links for RS-422 and RS-485 communication, and USB ports. The PC node box uses the QNX® 4.25 Operating System and QNX Photon graphical interface for developing screens and the software application.

PC node box

Flat Panel Display

The display is a thin-film transistor color display with capacitive touch screen capability. Four sizes are available: 6.5 inches (16.51 cm), 12.1 inches (30.73 cm), 15.0 inches (38.1 cm) and 19.0 inches (48.26 cm) diagonal measurement in the standard 4:3 image ratio. The high precision capacitive touch screen accurately and easily allows the operator to access the data within the PC node box. Data visibility has wide viewing angles and low-glare screens that allow the screen image to be visible up to 160 degrees horizontally and 160 degrees vertically under indirect lighting. The on-screen display settings can be accessed from the front of the display for easy image adjustments, and the integrated USB coupler in the 15-inch (38.1-cm) and 19-inch (48.26-cm) FPD allows for a direct connection into the PC node box without the need to open the control boards. For displays that are inaccessible or require significant data entry, the FPDs can be equipped with a safety-related trackball and/or a safety-related keyboard.

Trackball

The trackball is a panel-mounted pointing device intended for installation on a control board or operator station. It can be used in conjunction with the FPD touch screen or it can replace the touch screen functionality when the FPD is installed beyond the reach of the operator. The unit contains a two-inch (5-cm) trackball and is permanently set up for right-handed operation with the standard three-button mouse configuration (left, middle, right). The trackball is also equipped with an additional drag-lock button that allows the operator to move icons in the Windows® Operating System without depressing the left mouse button while operating the trackball. The unit can be installed up to 35 cable-feet (10.67 meters) from the PC node box and interface via a standard PS/2 connector.

Keyboard

The keyboard is a panel-mounted device intended for installation in a cabinet in either a Westinghouse-designed 1U- or 4U-height keyboard tray configuration. It can also be installed on a control panel or operator station on a project-by-project basis. The keyboard contains a QWERTY key layout and comes with an integrated 1.375-inch (3.5-cm) trackball. The standard keyboard assembly contains a five-foot (1.5-meter) cable with a PS/2 connector that interfaces to the PC node box.

Benefits

This system installs within existing control panel cutouts and 19-inch (48.26-cm) cabinets, providing the capability to upgrade existing systems.

Experience

As of 2012, the FPDS is implemented in various systems in 25 nuclear power plants in operation or under construction in Europe, the United States and Asia.