Introduction

Since 1980, Eaton’s Innovative Technology has provided Surge Protective Devices (SPDs) to power quality equipment users around the world. Whatever your electrical surge protection need may be, Eaton’s Innovative Technology has a Surge Protective Device to fill it!

General Features

The S.M.A.R.T. (Suppression Monitoring And Recording Technology) Surge Counter is installed on the lid of the I.T. Protector when the suffix “SD” is part of the SPD’s model number.

Description – Multi function surge counter with four (Low, Medium, High, and Total) surge-recording counters, phase loss indicator, and audible alarm.

Application – Available as an option on Innovative Technology’s Protector product lines (PTE048/PTX048, PTE080/PTX080, PTE120/PTX120*, PTE160/PTX160, PTE240/PTX240*, PTE300/PTX300, and PTE400/PTX400).

Mechanical and Electrical Features

Display

2-line, 8 characters per line LCD. The LCD displays the following as applicable:

- Phase loss indication per phase
- Number of low/medium/high surge events since the last counter reset
- Total surge events detected since installation
- S.M.A.R.T display configuration and circuitry test menus

LEDs

Phase voltage LEDs, visible through the front cover, glow green when an LED’s associated phase voltage is present.

Buzzer (Audible Alarm)

When enabled, a 3.7 kHz, 90 dB buzzer will beep at a rate of one-per-second upon the loss of any phase voltage. The buzzer will also beep once for each detected surge event, and also beep each time the MUTE/RESET button is pressed.
* Available in low voltage configuration only

MUTE/RESET Pushbutton

Located to the right of the display, this momentary pushbutton performs the following actions:

- Mutes audible alarm when activated by a phase loss condition
- Cycles through Phase Status and Surge Counter information on the LCD
- Rests surge counter
- Changes operating parameters
- Performs circuit test functions

Remote Alarm Relay Contacts

The S.M.A.R.T unit is equipped with isolated Form C relay contacts. These dry contacts are labeled N/O (Normally Open), N/C (Normally Closed), and COM (Common) with the relay energized. The relay contacts are rated 125 Vac at 0.5 A, or 30 Vdc at 1 A (60 W or 125 VA).

This relay operates in a “fail-safe” mode, causing it to energize only when all phase voltages are present; in turn, causing its N/O and N/C contacts to be open and closed, respectively. By connecting a remote alarm to these contacts, the remote alarm can be made to activate when the relay de-energizes if one of the system phase voltages is lost.

Operation

When power is first applied to the Protector, the S.M.A.R.T. display will show the unit’s revision number and the firmware’s date of compilation, tech support information, followed by the Phase Status Display.

If all phase voltages are present, the three front panel LEDs will glow green (for single-phase systems only a single LED will glow), and the remote alarm Form C relay will be energized.

The LCD can display the following information. Press the MUTE/RESET button for <2 seconds to cycle the display through its Phase Status Display and Surge Count Displays (LOW / MED / HIGH / TOTAL).

PHASES OK

Phase Status Display

Shows “PHASE(S) OK” when all phase voltages are present. In this example, the display shows that all phases of a 3-phase system are present.

If a phase voltage is lost, however, the following four events occur:

- The display shows “PHASE(S), ABC OUT” (depending on the number of system phases and the phase affected). Once a phase voltage returns to normal, the “PHASE ABC OUT” message is removed from the display. In this example, the display shows that Phase A has been lost.
- The corresponding phase voltage LED turns OFF.
- The Form C Relay de-energizes.
- The unit’s internal buzzer produces an audible beep once a second. Note that the buzzer can be muted by pressing the MUTE/RESET pushbutton. The buzzer can also be muted as
If the unit detects a surge, the buzzer produces a single beep and the appropriate SURGES counter will increment by the number of surges that were detected at a particular level (low/med/high). If a surge occurs while the unit is displaying its Phase Status, then the display will automatically switch to the Surge Display. If a surge occurs while the unit is in its Setup Mode, the surge will be recorded but the display will not change. Note that the buzzer can be muted as described in Section S.M.A.R.T. Unit Setup and Test. Each counter can record up to 99,999,999 surges, with the next surge causing the counter to be set back to 00000001.

**Surge Counter Displays (LOW / MED / HIGH)**
These three displays show the number of low, medium, and high surges that have been detected since the SURGES counter was last reset. Surge levels are recorded in approximate accordance with ANSI C62.41-1991, Type A, B, and C surge levels.

**Surge Counter Display (TOTAL)**
This display shows the total number of surges that have been detected since the Protector was first installed. In this example, the display shows that a total of 565,890 surges have been detected. This counter is a factory setting and can only be cleared by an authorized factory representative.

### S.M.A.R.T. Unit Setup and Test

The S.M.A.R.T. unit contains setup and test functions that allow a user to:

- Enable/disable the phase loss buzzer
- Enable/disable the surge counter buzzer
- Clear the low/med/high surge counters

#### Entering the Setup Mode
Enter the Setup Mode by pressing and holding down the MUTE/RESET pushbutton for >2 seconds, or until “SETUP MODE” appears on the display.

Once in the Setup Mode, release the MUTE/RESET pushbutton to display the first set-up parameter. Step through the parameters by momentarily pressing the MUTE/RESET for <2 seconds. Make changes to the parameters as described in the following paragraphs.

#### Phase Loss Buzzer Setup
The factory sets the unit to beep when a phase is lost (MUTE:OFF).

To disable the phase loss buzzer, press and hold down the MUTE/RESET pushbutton until “MUTE:ON” is displayed. To turn the buzzer back ON, again press and hold the MUTE/RESET pushbutton until “MUTE:OFF” is displayed.

#### Surge Counter Buzzer Setup
The factory sets the unit to beep upon the detection of each surge event (MUTE:OFF).

To disable the surge count buzzer, press and hold down the MUTE/RESET pushbutton until “MUTE:ON” is displayed. To turn the buzzer back ON, again press and hold the MUTE/RESET pushbutton until “MUTE:OFF” is displayed.

#### Test Mode (Tests LEDs, Relay, and Buzzer)
To bypass the Test Mode without performing any of the tests, momentarily press and release the MUTE/RESET pushbutton for <2 seconds. To enter the Test Mode, press and hold down the MUTE/RESET pushbutton until “TURN ON LED(S)” is displayed.

- **Test the operation of the LEDs, relay, and buzzer**
- **Test the Form C Relay**
- **Test the relays**

#### Exit Test Mode
To exit the Test Mode, momentarily press the MUTE/RESET pushbutton for <2 seconds to display “TEST? MODE,” and then momentarily press the MUTE/RESET pushbutton a second time to restart the S.M.A.R.T. unit.

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