



S.M.A.R.T. (Suppression Monitoring and Recording Technology)

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, PTE160/PTX160, 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.

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 voltage(s) are present. In this example, the display shows that all phases of a 3-phase system are present.
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PHASE A OUT	If a phase voltage is lost, however, the following four events occur:
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- 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 described in Section *S.M.A.R.T. Unit Setup and Test*.

LOW SRG
00001537

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.

MED SRG
00000432

HIGH SRG
00000015

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.

TOTAL
00565890

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
- Test the operation of the LEDs, relay, and buzzer

HOLD FOR
SETUP

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.

SETUP
MODE

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.

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PHASE(S)
MUTE: OFF

Phase Loss Buzzer Setup

The factory sets the unit to beep when a phase is lost (MUTE:OFF).

PHASE(S)
MUTE: ON

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(S)
MUTE: OFF

Surge Counter Buzzer Setup

The factory sets the unit to beep upon the detection of each surge event (MUTE:OFF).

SURGE(S)
MUTE: ON

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.

CLEAR?
SURGE(S)

Clear Surge Counter

To clear the LOW/MED/HIGH SURGES counter, press and hold down the MUTE/RESET pushbutton until "SURGES CLEARED!" is displayed.

SURGE(S)
CLEARED!

CLEAR?
TOTAL

Clear Total Surge Counter

The Total Surge Counter is a factory setting and can only be cleared by an authorized factory representative.

TEST?
MODE

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.

TURN ON
LED(S) ?

Toggle the LEDs ON by pressing and holding down the MUTE/RESET pushbutton until the LEDs turn ON.

TURN OFF
LED(S) ?

Toggle the LEDs OFF by again pressing and holding down the MUTE/RESET pushbutton until the LEDs turn OFF.

TURN ON
RELAY ?

Toggle the Form C Relay ON by pressing and holding down the MUTE/RESET pushbutton until the relay energizes.

TURN OFF
RELAY ?

Toggle the Form C Relay OFF by again pressing and holding down the MUTE/RESET pushbutton until the relay de-energizes.

TURN ON
BUZZER ?

Toggle the buzzer (audible alarm) ON by pressing and holding down the MUTE/RESET pushbutton until the buzzer turns ON.

TURN OFF
BUZZER ?

Toggle the buzzer (audible alarm) OFF by again pressing and holding down the MUTE/RESET pushbutton until the buzzer turns OFF.

TEST?
MODE

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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