

## 402XT - Family

Surge Protective Device

For Installation in the Service Entrance Power Distribution Panel

299-500-15

### 1.0 GENERAL

#### 1.1 DESCRIPTION

These specifications describe the electrical and mechanical requirements for a high-energy transient voltage surge suppressor. The specified surge protective device shall provide effective high-energy surge diversion for application in ANSI/IEEE C62.41-2002 Location Category C3 environments. Testing per ANSI/IEEE C62.45-2002 using ANSI/IEEE C62.41-2002 Category C3 waveforms and amplitudes. UL1449 second edition listed, including the requirements of February 9, 2007. The specified surge protective device shall provide:

- 400,000 amps, per phase, of surge protection
- Ten times redundancy per phase. Three times redundancy N-G (Wye and Split-Phase models)
- SCCR: 100kA AIC
- $I_n$  : 20kA
- UL96A Lightning Protection Master Label Compliant
- All mode protection, L-N, L-G, L-L, N-G
- Each MOV protected from over-current, thermal overload and monitored individually
- Self-diagnostics with comprehensive LED bar graph on front panel showing protection status of each phase and neutral-ground
- Audible fault alarm with silence switch
- Event counter with date and time of last event
- Remote alarm relay contacts (surge protected), Form C
- Micro-Z low impedance installation cable
- Twenty year warranty on entire system
- LIFETIME "NO NONSENSE" WARRANTY ON FIELD REPLACEABLE INTERNALLY FUSED PROTECTION MODULES. Replacement fused modules are sent from factory stock, located in Deer Park, Long Island, New York, USA.

#### 1.2 STANDARDS

The specified SPD shall be designed, manufactured, tested and installed in compliance with:

- American National Standards Institute and Institute of Electrical and Electronic Engineers (ANSI/IEEE C62.11, C62.41, and C62.45)
- Federal Information Processing Standards Publication 94 (FIPS PUB 94)
- National Electrical Manufacturer Association (NEMA LS-1)
- National Fire Protection Association (NFPA 20, 70, 75 and 78)
- Underwriters Laboratories (UL 1449, second edition) listed, including the requirements of February 9, 2007
- CAN/C22.2 No. 8-M1986; CSA Electrical Certification Notice No. 516

The system individual units shall be UL listed under UL 1449 3<sup>rd</sup> Ed. Standard for Safety for Surge Protective Devices and the Voltage Protection Ratings (VPR) shall be permanently affixed to the SPD.

## 1.3 ENTRANCE PANEL EQUIPMENT ELECTRICAL REQUIREMENTS

### 1.3.1 Environmental Requirements

#### A. Operating Requirements:

1. Operating temperature range shall be -40 to +70 degrees C (-40 to +160 degrees F).
2. Storage temperature range shall be -40 to +85 degrees C.
3. Operation shall be reliable in an environment with 0% to 95% non-condensing relative humidity.
4. The system shall be capable of operation up to an altitude of 13,000 feet above sea level.
5. Maximum continuous operating voltage of varistors shall be no less than 125% of the nominal rated line voltage.
6. The power frequency range shall be at 47 to 63 Hertz.

### 1.3.2 Electrical Requirements

#### A. Electrical Requirements:

1. Preferred method of connection via #10 AWG Micro-Z cable.
2. The rated single pulse current capacity for each mode of protection shall be no less than L-N 240 kA, L-G 160 kA, L-L 400 kA, N-G 120 kA ( Delta L-L 400 kA, L-G 400 kA ) as per NEMA LS-1-1992.
3. The maximum listed surge rating of the specified protection modes shall not exceed the following in any mode as per UL1449 3rd Edition VPR 6kV, 3kA (8/20 $\mu$ s waveform).

| Service Voltage | 6kV, 3kA<br><u>Line-Neutral</u><br>VPR | 6kV, 3kA<br><u>Line-Ground</u><br>VPR | 6kV, 3kA<br><u>Neutral-Gnd</u><br>VPR | 6kV, 3kA<br><u>Line-Line</u><br>VPR | 20kV, 10kA<br><u>Line-Neutral*</u><br>6" lead length |
|-----------------|--|---------------------------------------|---------------------------------------|-------------------------------------|--|
| 120/240 VAC     | 900V                                   | 900V                                  | 700V                                  | 1200V                               | 552V   |
| 120/208 VAC     | 900V                                   | 900V                                  | 700V                                  | 1200V                               | 552V   |
| 220/380 VAC     | 1500V                                  | 1500V                                 | 1200V                                 | 2500V                               | 1096V  |
| 240/415 VAC     | 1500V                                  | 1500V                                 | 1200V                                 | 2500V                               | 1096V  |
| 277/480 VAC     | 1500V                                  | 1500V                                 | 1200V                                 | 2500V                               | 1096V  |
| 240/120/120 VAC | 900/1500V                              | 900/1500V                             | 800V                                  | 1200/2500V                          | 552/1096V  |
| 240VAC (Delta)  | N/A                                    | 1500V                                 | N/A                                   | 2500V                               | 1096V  |

\* Delta Models – Measurement is made from Line – Ground.

4. The life expectancy of the device shall be measured by a minimum joules rating (8/20 $\mu$ s waveform):

| Service Voltage | Joules Total |
|-----------------|--------------|
| 120/240 VAC     | 24,300j      |
| 120/208 VAC     | 24,300j      |
| 220/380 VAC     | 74,000j      |
| 240/415 VAC     | 74,000j      |
| 240 VAC         | 67,200j      |
| 240/120/120 VAC | 43,840j      |
| 277/480 VAC     | 74,000j      |

5. The maximum surge current capacity per phase of the specified system, based on the standard IEEE 8/20 microsecond waveform, shall be at least: 1 Event at 400 kA. The surge life (8/20us) shall be at least 10,000 occurrences @15 kA The transient suppression capability shall be bi-directional and suppress both positive and negative impulses.
6. The SPD shall be capable of interrupting a 100 kAIC, short circuit current delivered from the AC power line. The interrupt capability must be confirmed and documented by a recognized independent testing laboratory.
7. The SPD shall be designed so as to minimize the internal surge path impedance. Direct point-to-point internal wiring is inherently inductive and not acceptable. Connection to the power service shall be constructed as shown in the installation notes for best performance.
8. Equipment shall be as manufactured by MCG Surge Protection; Model: 402XT - Family or engineering department approved equal with supporting test data.

## 2.0 ENTRANCE PANEL PROTECTION SYSTEM COMPONENTS

**A. Protection Modules:** The SPD shall be constructed using field replaceable protection modules. The SPD shall have multiple surge paths per phase. Each surge path shall be individually over-current fused, employ a thermal disconnect, and a monitored 40kA Metal Oxide Varistor (MOVs), including neutral to ground protection mode. Each module will provide five times (5X) redundant protection (3x for N-G module), with two modules per each phase and five fuses per module. The transient Ipeak rating of the fuse shall be coordinated with the Ipeak handling capability of the MOV so that the surge path capability is not limited by the series fusing. In addition, each MOV circuit shall incorporate a thermal disconnect means to remove a shorted MOV safely from the power line.

**B. Self-Diagnostics:** Red and green solid-state LED indicators shall be provided on the hinged front cover to indicate protection status. An illuminated green LED indicates power and protection is present at each phase, an illuminated red LED shall indicate protection reduced and/or when protection is lost. In addition to front panel LEDs a required comprehensive Bar Graph indicating status of each phase and the neutral to ground module to provide power and fault indications in the event of even the loss of a single fuse or MOV. Also provided is an event count with time and date of last event. Relay operation shall be in a fail-safe operating mode i.e., continuously energized so that power failure, reduced protection, or a break in the remote monitoring line will cause a fault indication at the remote monitor. Neon indicators are not permitted.

- C. Remote Alarm Capability:** Relay alarm contacts shall be provided for remote alarm monitoring capability of unit status. Form C normally open and normally closed contacts shall be provided with voltage and current limiting protection.
- D. Audible Alarm:** The specified system shall be equipped with an audible alarm, which shall be activated when any one or more of the modules has a reduced protection condition. A mute option shall be provided for the audible alarm.
- E. NEMA 4 Enclosure:** 14 gauge steel.
- F. Dimensions:** 12" X 18" X 8.5" (305mm X 457mm X 216mm)
- G. Weight:** 42 lbs. (19.1 kg)

### 3.0 INSTALLATION AND MAINTENANCE

- A.** The unit shall be installed in accordance with the manufacturer's printed instruction to maintain warranty. All local and national codes must be observed.
- B.** Units shall be installed as close as possible to the panel board to which it is connected, using low impedance Micro-Z cable provided.
- C.** Detailed installation/maintenance instructions shall be provided to insure safety of maintenance personnel.
- D.** Replaceable fused protection modules are required for simple maintenance. Internal construction should facilitate rapid repair. Repair time should not exceed 5 minutes.

### 4.0 20 YEAR WARRANTY

Manufacturer to provide 20-year warranty to cover repair or replacement with a new device. Manufacturer to provide no cost replacement of fused protection modules for the life of the SPD.