

## 400LS – Family

299-500-23D

Surge Protective Device  
For Installation at the Service Entrance Power Distribution Panel

### 1.0 GENERAL

#### 1.1 DESCRIPTION

These specifications describe the electrical and mechanical requirements for a high-energy surge protective device (SPD). 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 Listed to UL1449 5th Ed Safety Standard for Surge Protective Devices. The specified surge protective device shall provide:

- 400,000 amps, per phase, of surge protection.
- Ten times redundancy per phase.
- SCCR: 100kA AIC
- $I_n$  : 20kA
- UL96A Lightning Protection Master Label Compliant
- MCOV (UL1449 5th Ed): 115% minimum of nominal voltage
- MCOV (Varistors): 125% minimum of nominal voltage
- All mode protection, L-N, L-G, L-L, N-G.
- Each MOV protected from thermal overload by integral thermal disconnect that is monitored.
- Each MOV protected from over-current by 200kAIC rated fuses that are monitored.
- Front panel LEDs indicate status of protection circuits. Internal Green/Red LEDs indicate module status.
- NEMA 4 style enclosure – powder coated steel.
- Filtering standard (except for -600D). Models without filtering available upon request.
- Twenty year warranty on entire system.
- LIFETIME "NO NONSENSE" WARRANTY ON FIELD REPLACEABLE PROTECTION MODULES. Replacement fused modules are sent from factory stock, located in Deer Park, Long Island, New York, USA.

#### AVAILABLE OPTIONS

1. Upgraded front panel includes: event counter, remote alarm relay contacts Form C (surge protected), audible fault alarm with mute switch (Suffix UFP).
2. Internal disconnect switch (Suffix DS).
3. Micro-Z connection cable (Suffix MZ).
4. NEMA 4X enclosure (Suffix SS). Type 316 stainless steel.
5. Flush mount kit (Suffix FM).

#### 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, 5th Ed) listed
- CAN/C22.2 No. 8-M1986; CSA Electrical Certification Notice No. 516

The system individual units shall be UL listed under UL 1449 5th. 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 (-40 to +185 degrees F).
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 240 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 5th Edition VPR 6kV, 3kA (8/20µs waveform), as per ANSI/IEEE C62.41 Category C3 waveform 20kV, 10kA (8/20µs waveform).

Service Voltage	6kV, 3kA**	6kV, 3kA**	6kV, 3kA**	6kV, 3kA**	20kV, 10kA
	<u>Line-Neutral</u> VPR	<u>Line-Ground</u> VPR	<u>Neutral-Gnd</u> VPR	<u>Line-Line</u> VPR	<u>Line-Neutral*</u> 6" lead length
120 VAC	900V	900V	800V	N/A	570V
120/240 VAC	900V	900V	800V	1200V	600V
120/208 VAC	900V	900V	800V	1200V	600V
220/380VAC	1500V	1500V	1500V	2000V	1130V
220 VAC	1500V	1500V	1500V	N/A	1070V
240/415 VAC	1500V	1500V	1500V	2000V	1130V
240 VAC	1500V	1500V	1500V	N/A	1070V
277/480 VAC	1500V	1500V	1500V	2000V	1130V
347/600 VAC	1500V	1500V	1500V	2500V	1400V
240/120/120 VAC	900/1500V	900/1500V	900V	2000/1800V	1130/600V
240 VAC Delta	N/A	1500V	N/A	2000V	1130V
480 VAC Delta	N/A	2000V	N/A	4000V	1720V
600 VAC Delta	N/A	2000V	N/A	4000V	1930V

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

\*\* VPR measurement made with standard wiring and upstream over current device (circuit breaker).

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

Service Voltage	Joules Total
120 VAC	26,496
120/240 VAC	26,496
120/208 VAC	26,496
220/380 VAC	80,640
220VAC	80,640
240/415 VAC	80,640
240 VAC	80,640
240/120/120 VAC	48,300
277/480 VAC	80,640
347/600 VAC	92,740
240 VAC (Delta)	67,200
480 VAC (Delta)	93,600
600 VAC (Delta)	108,000

4. 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 (8/20 $\mu$ s) shall be at least 10,000 occurrences @19 kA. The transient suppression capability shall be bi-directional and suppress both positive and negative impulses.
5. The SPD shall be capable of interrupting a 100 kAIC, short circuit current delivered from the AC power line.
6. 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.
7. Equipment shall be as manufactured by MCG Surge Protection; Model: 400LS - 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 suppressor shall have multiple surge paths per phase. Each surge path shall be individually over current and thermally fused and monitored. 34mm Metal Oxide Varistors (MOVs) with integral thermal disconnect shall be used, including neutral to ground protection mode. Each module will provide five times (5X) redundant protection, 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. Dual N-G modules shall be employed, each with three (3X) redundancy and three fuses.
- 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 present, an illuminated red LED shall indicate protection reduced and/or when protection is lost. Internal Bicolor LEDs (green/red) shall indicate module status (green – full protection, red – reduced protection). Relay operation, where equipped, 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:** Optional relay alarm contacts, where required, shall be provided for remote alarm monitoring capability of unit status. Form C (normally open and normally closed contacts) shall be provided. Contacts shall be surge protected.
- D. Audible Alarm:** Optional audible alarm, where required, shall be provided, 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 powder coated steel.
- F. Dimensions:** 17"H X 15"W X 6"D (432mm X 381mm X 153mm)
- G. Mounting:** 17.75" X 13"/0.313" ID - 4 holes (451 X 330mm/7.9mm ID – 4 holes)
- H. Weight:** 43 lbs. (19.5 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. Detailed installation/maintenance instructions shall be provided to insure safety of maintenance personnel.
- C.** Replaceable fused protection modules are required for simple maintenance. Internal construction should facilitate rapid repair. Repair time should not exceed 10 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 suppressor.