

Medium Voltage Shunt Power Capacitors for Power Factor Correction (PFC) and other advanced applications, with and without internal fusing



### Introduction

Hubbell Power Systems, Inc (HPS) family of TRINETICS® shunt capacitors incorporate features for top performance and high field reliability in Medium Voltage distribution and substation applications. Capacitors are available in 15kV, 25kV & 35kV classes, offering power factor improvement advanced applications requiring voltage regulation, and loss reduction.

### Applications

- For Medium Voltage distribution and substation applications
- Power Factor Correction (PFC)
- Smart Grid applications including Volt/VAR Optimization (VVO) and Conservation Voltage Reduction (CVR)
- Advanced distribution grid solution applications
- Voltage regulation and loss reduction
- Metal enclosed banks or pole racks
- Harmonic filter banks



### Standard-Duty (SD type) Capacitors

Capacitors are intended to be operated at or below their rated voltage. All of our capacitors are designed with a continuous overvoltage capability of 110% of rated voltage. This overvoltage capability allows the capacitor to withstand unbalanced and system voltages higher than the rated maximum continuous operating voltage. Standard-Duty capacitors are designed for typical utility transmission and distribution applications.

#### Standard-Duty Ratings

- Continuous Overvoltage withstand: 110% of rated (RMS) voltage
- 120% of rated peak voltage (peak voltage not exceeding  $1.2 \times \sqrt{2} \times$  rated RMS voltage)
- 135% of nominal RMS current based on rated kVAR and rated voltage
- 135% of rated kVAR

### Heavy-Duty (HD type) Capacitors

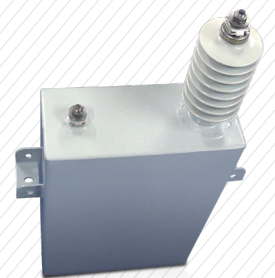
Heavy-Duty capacitors meet or exceed IEEE 18-2012 standards. Heavy-Duty capacitors are designed for applications where higher reliability is desired. The Heavy-Duty capacitor is more resistant to the effects of higher transients, harmonics, and voltage excursions than Standard-Duty capacitors.

#### Heavy-Duty Ratings

- Continuous Overvoltage withstand: 125% of rated (RMS) voltage
- Momentary (15-cycles) Overvoltage withstand: 225% of rated (RMS) voltage
- 135% of nominal RMS current based on rated kVAR and rated voltage
- 135% of rated kVAR
- Meets Performance Test requirements of IEEE 18-2012 standard

### Features and Benefits

- 409 series stainless steel case
- Finish allows superior heat dissipation and offers excellent protection against corrosion in outdoor environments
- Epoxy primer and two coats of polyurethane top coat
- Paint thickness exceeds 85 microns
- Welded terminals are mechanically stronger and provide more consistent mounting than soldered terminals
- Heavy-Duty bolted connections provide superior performance to tab-and-crimp
- Solid stud eliminates inconsistencies associated with solder-filled studs
- All polypropylene film, foil element construction, stainless steel enclosure, and non-PCB dielectric fluid
- High current withstand capability
- Externally fused standard, internally fused available as an option
- Conforms with IEEE-18/IEC60871-1
- 1- or 2-bushing designs
- 50, 100, 150, 200, 300, 400kVAR standard sizes
- 500, 600kVAR and other sizes available\*
- 95, 110, 125 or 150kV BIL (other BIL ratings available upon request)



\*Note: Custom kVAR rating are available

**Technical Specifications**

|                       |  |
|-----------------------|--|
| Applicable standards: | IEEE-18/IEC60871-1   |
| Rated voltage range:  | 2 to 22kV  |
| Rated kVAR range:     | 50kVAR to 750kVAR  |
| Phases:               | 1 Ph/3 Ph  |
| Rated frequency:      | 60Hz or 50Hz   |
| Fuse protection:      | Externally fused ratings (standard): 50-600kVAR, 2.4-19.92kV Internally fused ratings (optional): 100-750kVAR, 2.4-14.62kV |
| Discharge device:     | Internally fitted discharge resistor   |
| Dielectric type:      | All polypropylene film   |
| Impregnating oil:     | Non-PCB, non-toxic oil   |
| Ground connection:    | Unpainted area under mounting bracket  |
| Case material:        | Stainless steel 409 series/CRCA  |
| Paint:                | Gray ANSI-70 polyurethane paint suitable for outdoor application   |

**Bushing**

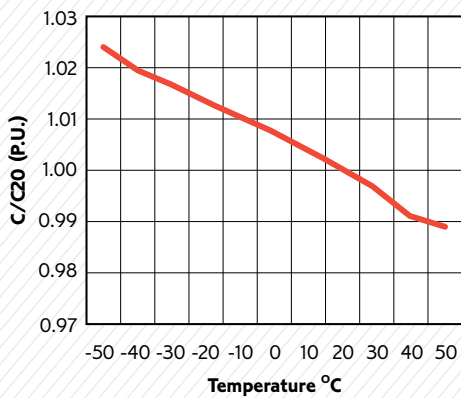
|                          |   |
|--------------------------|---|
| Material:                | Wet process porcelain   |
| Standard creepage (min): | 14.96" (380 mm) up to 15kV (95kV BIL)*<br>23.6" (600mm) up to 24 kV (110 or 125kV BIL)<br>30" (762 mm) for 150kV BIL upon request |
| Special creepage:        | 30" (762 mm) (upon request)   |
| Insulation level:        | 95kV or 110kV up to 15kV  |
| (1.2 x 50 μ sec wave):   | 125kV or 150kV up to 24kV   |

| Permissible overloads      | Standard-Duty                  | Heavy-Duty       |
|----------------------------|--------------------------------|------------------|
| Current:                   | 135%                           | 135%             |
| Voltage:                   | 110%                           | 225% (15-cycles) |
| kVAR                       | 135%                           | 135%             |
| Capacitance tolerance:     | Per respective standard        |                  |
| Weight:                    | Unit specific                  |                  |
| Temperature category:      | -40°C (-40°F) to +55°C (130°F) |                  |
| Routine over voltage test: | 4.3 times rated voltage DC     |                  |

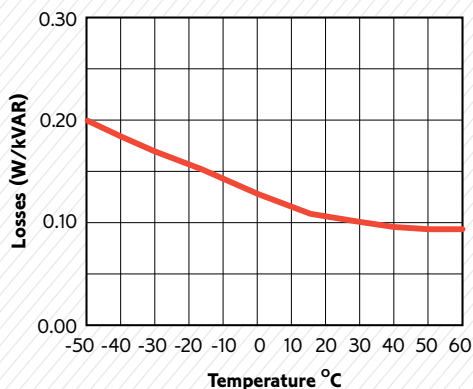
\*If using an 18kV, 450mm bushing for 95kV BIL, total height of 95kV BIL capacitors will be increased by one inch.

**Performance Curves**

**Capacitance vs. Temperature**



**Losses vs. Temperature**



**Probability of Case Rupture Curve**



NOTE: Minimum  $i^2t$  for 100kVAR and larger capacitors is 3,500,000 Amps<sup>2</sup>seconds for fault currents less than 10,000 amperes.

### Standard-Duty Capacitor Dimensions

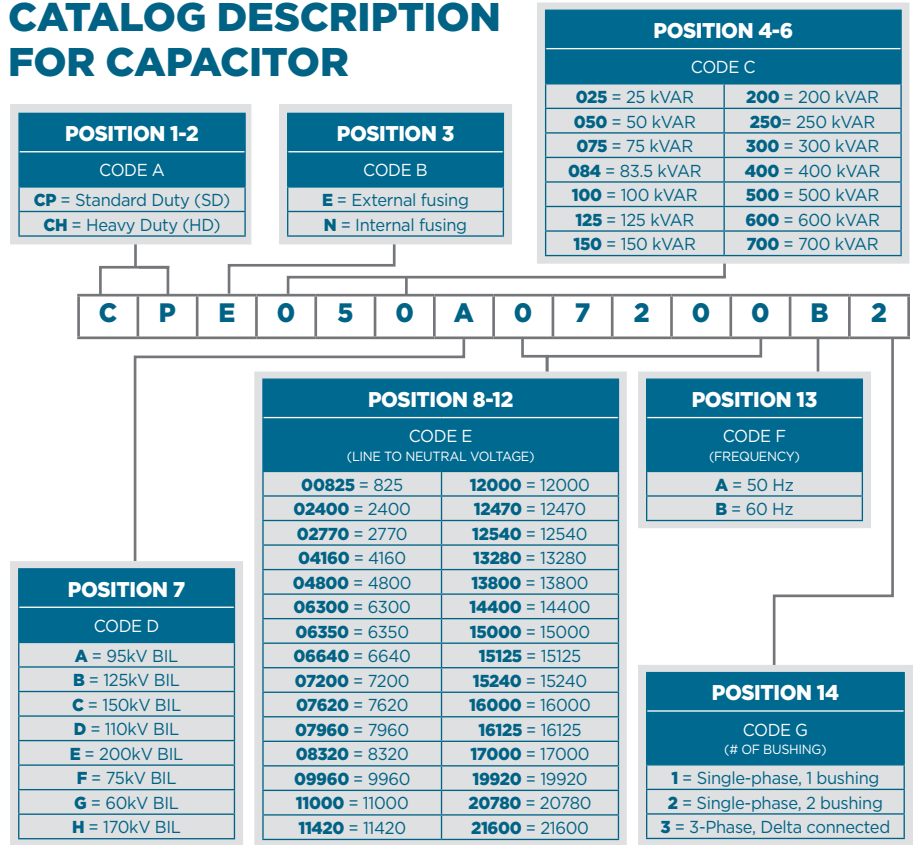
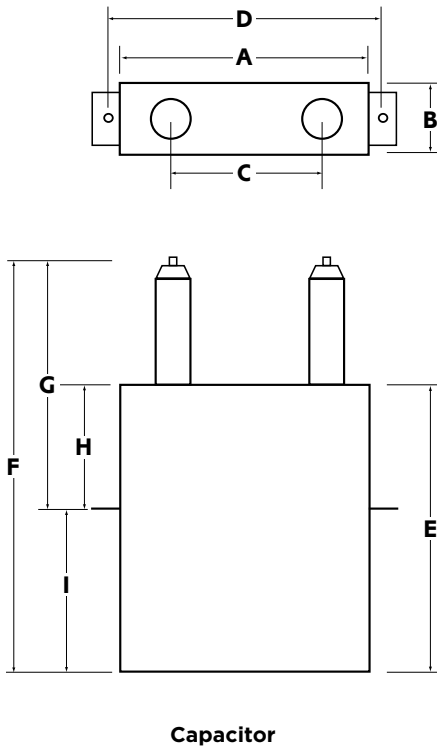
| Class  | 15kV  |       | 15kV  |       | 25kV  |       | 35kV  |       |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| kV BIL | 95    |       | 110   |       | 125   |       | 150   |       |
| kV     | 7.62  |       | 7.62  |       | 14.4  |       | 19.92 |       |
| kVAR   | 200   | 400   | 200   | 400   | 200   | 400   | 200   | 400   |
| A      | 13.7  | 13.7  | 13.7  | 13.7  | 13.7  | 13.7  | 13.7  | 13.7  |
| B      | 5.83  | 6.69  | 5.83  | 6.69  | 5.83  | 5.83  | 5.83  | 5.83  |
| C      | 9.06  | 9.0x6 | 9.06  | 9.06  | 9.06  | 9.06  | 9.06  | 9.06  |
| D      | 15.63 | 15.63 | 15.63 | 15.63 | 15.63 | 15.63 | 15.63 | 15.63 |
| E      | 14.37 | 22.13 | 14.37 | 22.13 | 14.96 | 26.38 | 15.35 | 27.56 |
| F      | 23.81 | 31.57 | 25    | 32.76 | 26.38 | 37.8  | 26.77 | 38.98 |
| G      | 16.69 | 22.82 | 17.88 | 22.82 | 18.5  | 22.82 | 18.5  | 22.82 |
| H      | 7.24  | 13.39 | 7.24  | 12.21 | 7.09  | 11.42 | 7.09  | 11.42 |
| I      | 7.12  | 8.74  | 7.12  | 9.92  | 7.87  | 14.96 | 8.27  | 16.14 |

### Heavy-Duty Capacitor Dimensions

| Class  | 15kV  |       | 15kV  |       | 25kV  |       | 35kV  |       |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| kV BIL | 95    |       | 110   |       | 125   |       | 150   |       |
| kV     | 7.62  |       | 7.62  |       | 14.4  |       | 19.92 |       |
| kVAR   | 200   | 400   | 200   | 400   | 200   | 400   | 200   | 400   |
| A      | 13.7  | 13.7  | 13.7  | 13.7  | 13.7  | 13.7  | 13.7  | 13.7  |
| B      | 5.83  | 6.69  | 5.83  | 7.70  | 6.02  | 7.02  | 6.02  | 7.70  |
| C      | 9.06  | 9.06  | 9.06  | 9.06  | 9.06  | 9.06  | 9.06  | 9.06  |
| D      | 15.63 | 15.63 | 15.63 | 15.63 | 15.63 | 15.63 | 15.63 | 15.63 |
| E      | 18.11 | 25.20 | 18.11 | 25.2  | 19.49 | 27.56 | 18.70 | 25.59 |
| F      | 27.40 | 34.49 | 27.40 | 34.49 | 30.75 | 38.82 | 32.76 | 39.65 |
| G      | 16.54 | 16.54 | 16.54 | 16.54 | 18.74 | 18.74 | 21.54 | 21.54 |
| H      | 7.24  | 7.24  | 7.24  | 7.24  | 7.48  | 7.48  | 7.48  | 7.48  |
| I      | 10.87 | 17.96 | 10.87 | 17.96 | 12.01 | 20.08 | 11.22 | 18.11 |

NOTE: Dimensions shown are in inches and are approximate for Standard-Duty (SD) and Heavy-Duty (HD) capacitors as reference only.

## CATALOG DESCRIPTION FOR CAPACITOR



hubbelpowersystems.com

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