

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

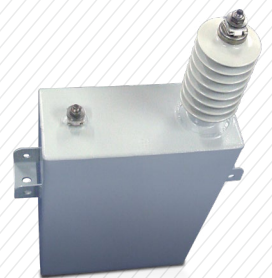
Heavy-Duty capacitors meet or exceed IEEE 18-2012 standards. Heavy-Duty capacitors are designed for applications where higher reliability is desired. The Heavy-Duty capacitor is more resistant to the effects of higher transients, harmonics, and voltage excursions than Standard-Duty capacitors.

#### 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)



### 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 $\mu$ sec wave): | 125kV or 150kV up to 24kV                                                                                                         |

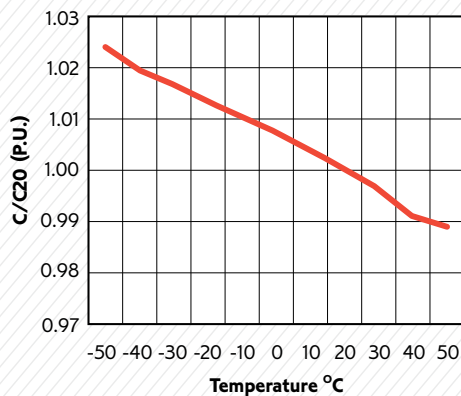
### Permissible overloads

|                            | 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     |                  |

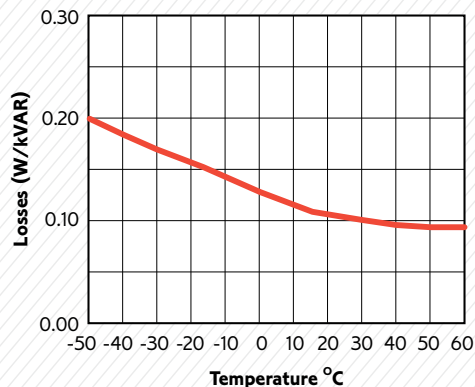
\*If using an 18kV, 450mm bushing for 95kV BIL, total height of 95kV BIL capacitors will be increased by one inch.

### Performance Curves

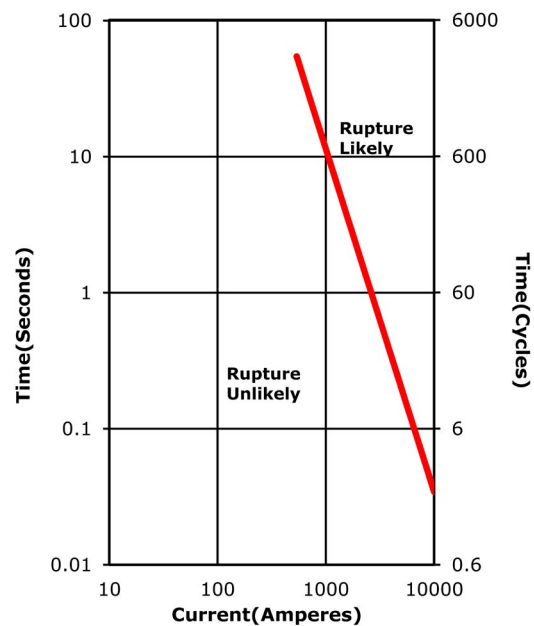
#### Capacitance vs. Temperature



#### 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

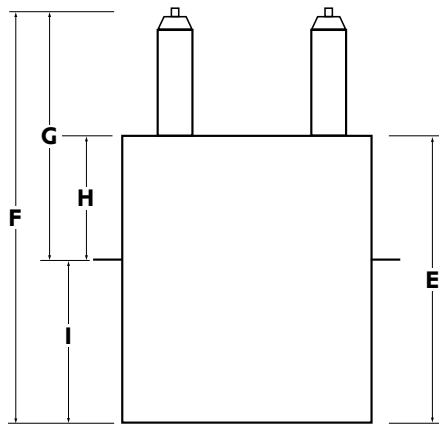
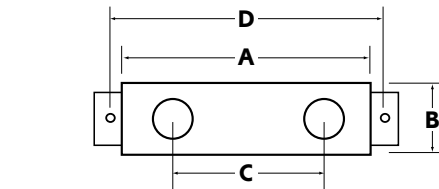
| Class  | 15kV  |       | 15kV  |       | 25kV  |       | 35kV  |       |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| kV BIL | 95    |       | 110   |       | 125   |       | 150   |       |
| kV     | 7.62  |       | 7.62  |       | 14.4  |       | 19.92 |       |
| 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



Capacitor

| POSITION 1-2            |  | POSITION 3          |  | POSITION 4-6    |                |
|-------------------------|--|---------------------|--|-----------------|----------------|
| CODE A                  |  | CODE B              |  | CODE C          |                |
| CP = Standard Duty (SD) |  | E = External fusing |  | 025 = 25 kVAR   | 200 = 200 kVAR |
| CH = Heavy Duty (HD)    |  | N = Internal fusing |  | 050 = 50 kVAR   | 250 = 250 kVAR |
|                         |  |                     |  | 075 = 75 kVAR   | 300 = 300 kVAR |
|                         |  |                     |  | 084 = 83.5 kVAR | 400 = 400 kVAR |
|                         |  |                     |  | 100 = 100 kVAR  | 500 = 500 kVAR |
|                         |  |                     |  | 125 = 125 kVAR  | 600 = 600 kVAR |
|                         |  |                     |  | 150 = 150 kVAR  | 700 = 700 kVAR |

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | P | E | 0 | 5 | 0 | A | 0 | 7 | 2 | 0 | 0 | B | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| POSITION 7    |  | POSITION 8-12                       |               | POSITION 13           |  |
|---------------|--|-------------------------------------|---------------|-----------------------|--|
| CODE D        |  | CODE E<br>(LINE TO NEUTRAL VOLTAGE) |               | CODE F<br>(FREQUENCY) |  |
| A = 95kV BIL  |  | 00825 = 825                         | 12000 = 12000 | A = 50 Hz             |  |
| B = 125kV BIL |  | 02400 = 2400                        | 12470 = 12470 | B = 60 Hz             |  |
| C = 150kV BIL |  | 02770 = 2770                        | 12540 = 12540 |                       |  |
| D = 110kV BIL |  | 04160 = 4160                        | 13280 = 13280 |                       |  |
| E = 200kV BIL |  | 04800 = 4800                        | 13800 = 13800 |                       |  |
| F = 75kV BIL  |  | 06300 = 6300                        | 14400 = 14400 |                       |  |
| G = 60kV BIL  |  | 06350 = 6350                        | 15000 = 15000 |                       |  |
| H = 170kV BIL |  | 06640 = 6640                        | 15125 = 15125 |                       |  |
|               |  | 07200 = 7200                        | 15240 = 15240 |                       |  |
|               |  | 07620 = 7620                        | 16000 = 16000 |                       |  |
|               |  | 07960 = 7960                        | 16125 = 16125 |                       |  |
|               |  | 08320 = 8320                        | 17000 = 17000 |                       |  |
|               |  | 09960 = 9960                        | 19920 = 19920 |                       |  |
|               |  | 11000 = 11000                       | 20780 = 20780 |                       |  |
|               |  | 11420 = 11420                       | 21600 = 21600 |                       |  |

| POSITION 14                  |  |
|------------------------------|--|
| CODE G<br>(# OF BUSHING)     |  |
| 1 = Single-phase, 1 bushing  |  |
| 2 = Single-phase, 2 bushing  |  |
| 3 = 3-Phase, Delta connected |  |



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