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POWER SOLUTIONS

# SINEWAVE MOTOR PROTECTION FILTER

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# SineWave Motor Protection Filter

The HPS SineWave Motor Protection Filter is a robust solution to condition the pulse width modulated (PWM) output of a variable frequency drive (VFD) into a nearly perfect sinusoidal waveform.

Motor drive systems with extended cable lengths may encounter elevated high frequency currents and voltage spikes. HPS SineWave Motor Protection Filter effectively filters out high-frequency components, mitigating both common mode and differential mode noise. The result is enhanced protection for the motor and feeder cable insulation systems as well as reduced wear on the motor bearings.

**Elevate the performance and durability of your VFD system with the HPS SineWave Motor Protection Filter.**

## Operation Principle

Variable Frequency Drives (VFDs) are found in many commercial and industrial applications including pumps, ventilators, conveyors, compressors, elevators & cranes. The voltage of the VFD consists of a series of pulses with variable width (PWM– pulse width modulation) characterized by high rise times.

HPS SineWave Motor Protection Filter serves as a low-pass filter designed to effectively eliminate the high-frequency components of the Variable Frequency Drive (VFD) output. This protective measure helps safeguard the motor and feeder cables by reducing:

- Voltage Reflection
- Harmonic Distortion
- Bearing Current (that can lead to failure)
- Insulation Stress
- Motor Noise Level

## Benefits

**Process Optimization**

**Increased Reliability**

**Less Downtime**

**Increased System Efficiency**

## Applications

Designed for applications with long cables up to 15,000 feet (4570 meters) between the VFD and the motor. Typical applications include:

- Oil & Gas (Offshore & Onshore)
- Water & Wastewater Plants
- Mining & Metals
- HVAC
- Chemical

# Product Specifications

## Electrical Product Characteristics

| | |
|---|---|
| **System Voltage Rating:** | 380V – 480V or 600V (consult HPS for other voltage requirements) |
| **Current Rating:** | 9A to 600A |

## Technical Product Characteristics

| | |
|---|---|
| **Harmonic Voltage Distortion:** | Maximum 5% |
| **Inverter Switching Frequency (Carrier Frequency):** | 2kHz to 8kHz |
| **Inverter Operating Frequency (Output Frequency):** | Maximum 90Hz |
| **Insertion Loss (Voltage Drop):** | Maximum 5% |
| **Maximum Cable Length (Motor):** | Up to 15,000 feet (4572 meters) |
| **Insulation System:** | 115°C rise (180°C insulation) up to 16A, 130°C rise (220°C insulation) above 16A |
| **Approvals:** | cULus Listed |

## Environmental Conditions

| | |
|---|---|
| **Ambient Operating Temperature:** | Open Style: Up to 50°C<br>Enclosed Style: Up to 40°C |
| **Altitude:** | Up to 1000m (about 3280.84 ft) |
| **Cooling Method:** | Natural Convection |
| **Enclosure Style:** | Open Style or Type 3R |

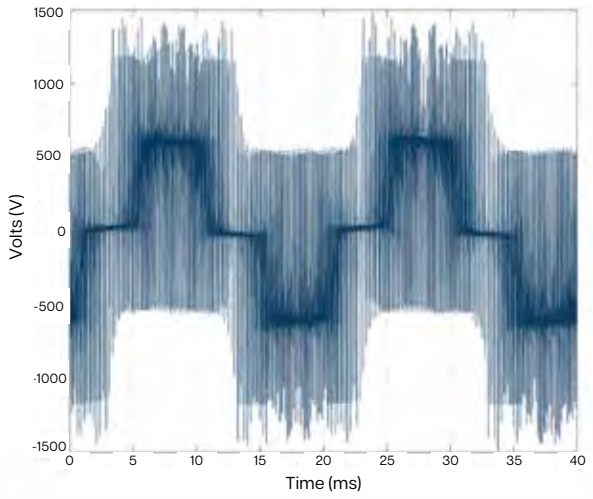
# Sinewave Motor Protection Filter

## Performance

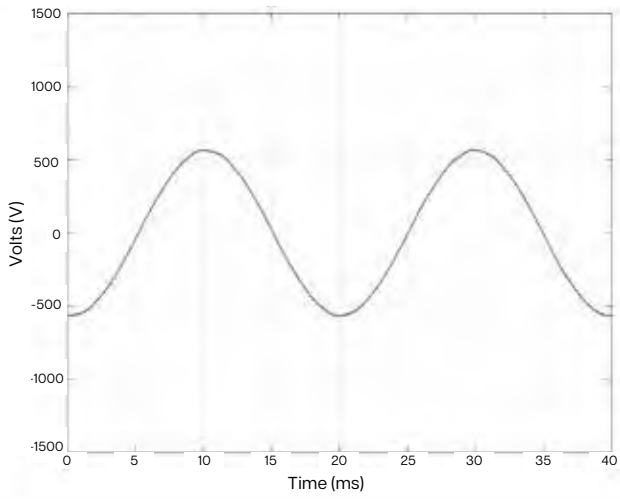
The design of the HPS SineWave Motor Protection Filter employs an LC topology, delivering superior performance and high attenuation across a broader frequency range, all while maintaining a low Total Harmonic Distortion of voltage (THDv) value.

HPS SineWave Motor Protection Filter is integrated into a wide range of HPS Power Quality products including dV/dT Filters, Line Reactors, and Passive Harmonic Filters.

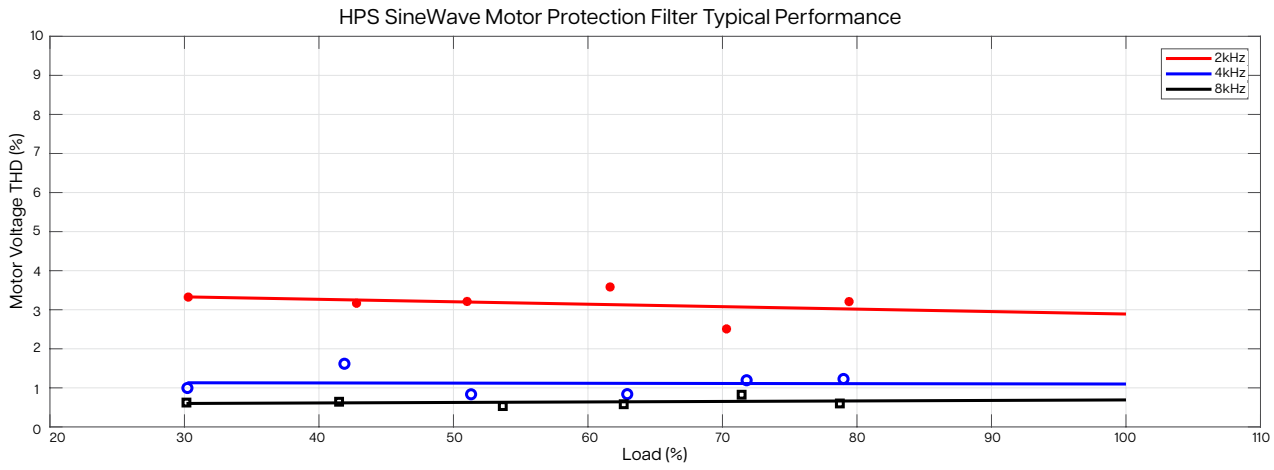
### Motor Voltage
*No Filter*




### Motor Voltage
*With HPS SineWave Motor Protection Filter*




### Typical THDv Values

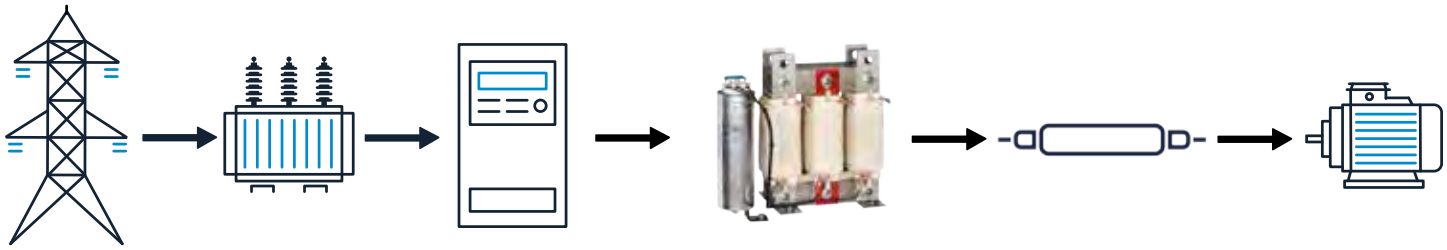


## VFD With Long Cable Length To Motors

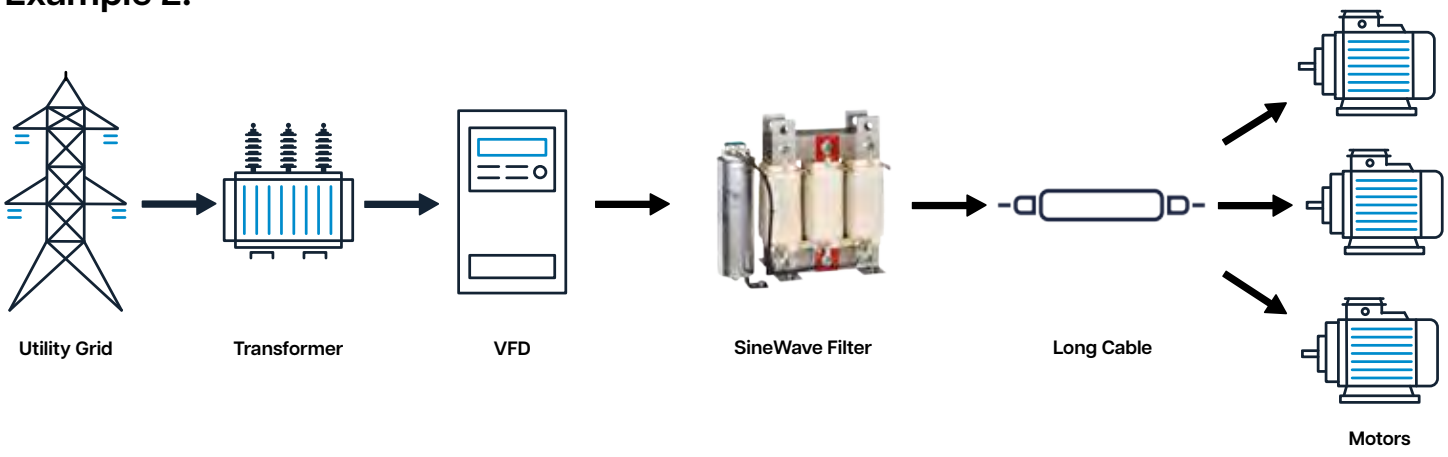
When there are lengthy cable connections between the Variable Frequency Drive (VFD) and the motor, it can cause an impedance mismatch between the cable and the motor. This mismatch leads to high voltage peaks (overshoot) at the motor input terminals due to the reflected wave phenomena. The magnitude of these voltage peaks rises with an increase in cable length and/or VFD switching frequency.

A SineWave filter effectively filters out high-frequency components, mitigating both common mode and differential mode noise. The result is enhanced protection for the motor and feeder cable insulation systems as well as reduced wear on the motor bearings.

## Example 1.



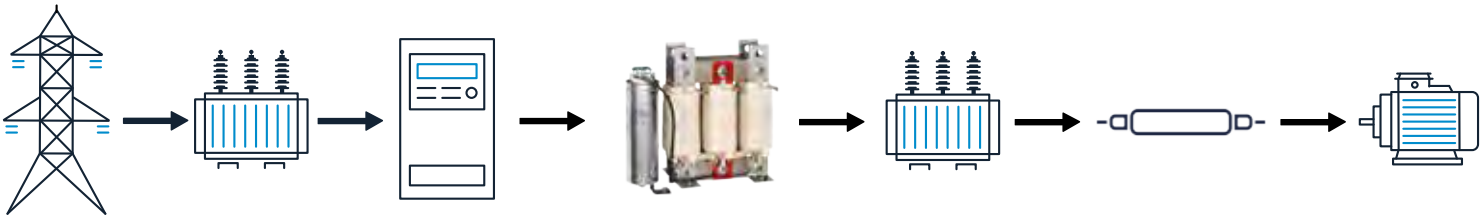

## Example 2.



## Low Voltage VFD With Medium Voltage Motor Or Step-Up Transformer

A low voltage VFD can be used to control medium voltage motors when a step-up transformer is used. A SineWave filter will ensure that a sinusoidal voltage is applied to the step-up transformer, cable, and motor.

The SineWave filter in this installation will increase transformer efficiency and lower the transformer's operating temperature. Additionally, the filter reduces voltage spikes that can overstress the winding insulation of the transformer.




## Part Number Guide

| Family Type | Generation | Voltage | Rating | | | | Enclosure |
|---|---|---|---|---|---|---|---|
| CS | 1 | K | 0 | 0 | 2 | 5 | F |

| Family Type: | Generation: | Voltage: | Output Current: | | Enclosure: |
|---|---|---|---|---|---|
| CS - SineWave Motor Protection Filter | 1 - Current designs* | K 380V - 480V<br>P 600V | 9A to 600A<br>5A 0005<br>55A 0055<br>500A 0500 | | F - Open Frame<br>C - Type 3R |

**Carrier Frequency: 2kHz-8kHz; Fundamental Frequency: maximum 90Hz*

## Selection Guide

HPS SineWave motor protection filters are designed to provide a sine wave output voltage when driven from PWM inverters with switching frequencies between 2 kHz and 8 kHz. These filters offer solutions for variable frequency applications, safeguarding the motor and feeder cables, prolonging its lifespan, enhancing its efficiency, and enabling it to operate at a lower temperature. The filter will also eliminate the high dV/dT and reflected waves associated with the PWM inverter output waveform.

***Select the filter based on Full Load Amps (FLA) of the motor.***

# SELECTION TABLES

## 380V - 480V

| Motor Rating at 480V (HP) - Ref. ONLY | Catalog Number | Filter Current (A) | Encl. Style (F-Floor, W-Wall) | Filter Reactor Dimensions in Inches [mm] | | | | Filter Capacitor Dimensions in Inches [mm][1] | | Capacitor Qty[2] | Weight Lbs. [kg] | Watts Loss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Dimens. Fig. | Width | Depth | Height | H | D | | | |
| 5 | CS1K0009F | 9 | Open (F) | 1 | 7.12 [181] | 4.69 [120] | 6.35 [162] | 6.5 [165] | 2.6 [66] | 1 | 16 [7] | 105 |
| | | | Open (W) | | 7.50 [190] | 5.60 [142] | 8.42 [214] | | | | | |
| | CS1K0009C | | Type 3R | DH1 | 16.9 [480] | 14.0 [356] | 17.6 [448] | Pre-Installed in Enclosure | | | 60 [27] | |
| 7.5 | CS1K0012F | 12 | Open (F) | 1 | 7.12 [181] | 4.69 [120] | 6.35 [162] | 7.5 [191] | 3.5 [89] | 1 | 16 [7] | 105 |
| | | | Open (W) | | 7.50 [190] | 5.60 [142] | 8.42 [214] | | | | | |
| | CS1K0012C | | Type 3R | DH1 | 16.9 [480] | 14.0 [356] | 17.6 [448] | Pre-Installed in Enclosure | | | 60 [27] | |
| 10 | CS1K0016F | 16 | Open (F) | 1 | 7.12 [181] | 5.19 [132] | 6.35 [162] | 7.5 [191] | 3.5 [89] | 1 | 23 [10] | 158 |
| | | | Open (W) | | 7.50 [190] | 5.90 [150] | 8.42 [214] | | | | | |
| | CS1K0016C | | Type 3R | DH1 | 16.9 [480] | 14.0 [356] | 17.6 [448] | Pre-Installed in Enclosure | | | 65 [29] | |
| 15 | CS1K0022F | 22 | Open (F) | 1 | 9.25 [235] | 5.50 [140] | 7.50 [191] | 9.0 [226] | 3.5 [89] | 1 | 30 [14] | 190 |
| | | | Open (W) | | 9.25 [235] | 5.80 [147] | 9.60 [244] | | | | | |
| | CS1K0022C | | Type 3R | DH1 | 21.5 [546] | 20.1 [510] | 22.0 [559] | Pre-Installed in Enclosure | | | 85 [36] | |
| 20 | CS1K0027F | 27 | Open (F) | 1 | 9.25 [235] | 6.00 [153] | 7.50 [191] | 9.2 [235] | 3.5 [89] | 1 | 35 [16] | 200 |
| | | | Open (W) | | 9.25 [235] | 6.30 [160] | 9.60 [244] | | | | | |
| | CS1K0027C | | Type 3R | DH1 | 21.5 [546] | 20.1 [510] | 22.0 [559] | Pre-Installed in Enclosure | | | 90 [41] | |
| 25 | CS1K0035F | 35 | Open (F) | 1 | 9.25 [235] | 6.25 [159] | 7.50 [191] | 7.5 [191] | 3.5 [89] | 1 | 43 [20] | 210 |
| | | | Open (W) | | 9.25 [235] | 6.80 [173] | 9.60 [244] | | | | | |
| | CS1K0035C | | Type 3R | DH1 | 21.5 [546] | 20.1 [510] | 22.0 [559] | Pre-Installed in Enclosure | | | 100 [45] | |
| 30 | CS1K0045F | 45 | Open (F) | 1 | 9.25 [235] | 6.60 [168] | 7.50 [191] | 10.4 [265] | 3.5 [89] | 1 | 50 [23] | 250 |
| | | | Open (W) | | 9.25 [235] | 7.40 [188] | 9.60 [244] | | | | | |
| | CS1K0045C | | Type 3R | DH1 | 21.5 [546] | 20.1 [510] | 22.0 [559] | Pre-Installed in Enclosure | | | 100 [45] | |
| 40 | CS1K0055F | 55 | Open (F) | 2 | 10.6 [269] | 7.80 [198] | 10.0 [254] | 10.4 [265] | 3.5 [89] | 1 | 63 [28] | 305 |
| | | | Open (W) | | 11.5 [292] | 8.30 [211] | 12.0 [305] | | | | | |
| | CS1K0055C | | Type 3R | DH1 | 21.5 [546] | 20.1 [510] | 22.0 [559] | Pre-Installed in Enclosure | | | 120 [54] | |
| 50 | CS1K0065F | 65 | Open (F) | 2 | 11.5 [292] | 7.00 [178] | 14.5 [369] | 12.2 [310] | 3.5 [89] | 1 | 65 [29] | 403 |
| | | | Open (W) | | 11.5 [292] | 7.80 [198] | 16.4 [417] | | | | | |
| | CS1K0065C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 150 [68] | |
| 60 | CS1K0080F | 80 | Open (F) | 2 | 12.0 [305] | 7.80 [198] | 14.5 [369] | 11.8 [301] | 4.6 [117] | 1 | 80 [36] | 460 |
| | | | Open (W) | | 12.0 [305] | 8.00 [203] | 16.4 [417] | | | | | |
| | CS1K0080C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 165 [75] | |
| 75 | CS1K0110F | 110 | Open (F) | 2 | 13.0 [331] | 8.00 [203] | 14.5 [369] | 11.8 [301] | 4.6 [117] | 1 | 100 [45] | 500 |
| | | | Open (W) | | 13.0 [331] | 8.50 [216] | 16.4 [417] | | | | | |
| | CS1K0110C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 185 [84] | |
| 100 | CS1K0130F | 130 | Open (F) | 2 | 13.0 [331] | 9.00 [229] | 14.5 [369] | 11.8 [301] | 4.6 [117] | 1 | 125 [57] | 550 |
| | | | Open (W) | | 13.0 [331] | 9.00 [229] | 16.4 [417] | | | | | |
| | CS1K0130C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 210 [95] | |
| 125 | CS1K0160F | 160 | Open (F) | 2 | 13.0 [331] | 9.50 [242] | 14.5 [369] | 11.8 [301] | 4.6 [117] | 1 | 140 [64] | 600 |
| | | | Open (W) | | 13.0 [331] | 9.50 [242] | 16.4 [417] | | | | | |
| | CS1K0160C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 225 [102] | |
| 150 | CS1K0200F | 200 | Open (F) | 2 | 13.0 [331] | 10.3 [263] | 14.5 [369] | 11.8 [301] | 4.6 [117] | 1 | 190 [86] | 715 |
| | | | Open (W) | | 13.0 [331] | 10.6 [269] | 16.4 [417] | 11.8 [301] | 4.6 [117] | 1 | | |
| | CS1K0200C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 285 [129] | |
| 200 | CS1K0250F | 250 | Open (F) | 2 | 14.5 [368] | 9.50 [242] | 18.5 [470] | 11.8 [301] | 4.6 [117] | 1 | 220 [100] | 800 |
| | | | Open (W) | | 14.5 [368] | 9.50 [242] | 20.4[518] | 11.8 [301] | 4.6 [117] | 1 | | |
| | CS1K0250C | | Type 3R | DH3 | 28.3 [719] | 27.0 [687] | 36.0 [914] | Pre-Installed in Enclosure | | | 360 [163] | |
| 250 | CS1K0305F | 305 | Open (F) | 2 | 15.0 [381] | 10.0 [254] | 18.5 [470] | 11.8 [301] | 4.6 [117] | 1 | 275 [125] | 1000 |
| | | | | | | | | 11.8 [301] | 4.6 [117] | 2 | | |
| | CS1K0305C | | Type 3R | DH3 | 28.3 [719] | 27.0 [687] | 36.0 [914] | Pre-Installed in Enclosure | | | 420 [191] | |

**Weight & dimensions are approximate*
*[1]Capacitors are supplied individually for open-style designs and come pre-installed within enclosed designs*
*[2]Please refer to figure G for capacitor drawing*

# SELECTION TABLES

## 380V - 480V - Continued

| Motor Rating at 480V (HP) - Ref. ONLY | Catalog Number | Filter Current (A) | Encl. Style (F-Floor, W-Wall) | Filter Reactor Dimensions in Inches [mm] | | | | Filter Capacitor Dimensions in Inches [mm][1] | | Capacitor Qty[2] | Weight Lbs. [kg] | Watts Loss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Dimens. Fig. | Width | Depth | Height | H | D | | | |
| 300 | CS1K0362F | 362 | Open (F) | 2 | 16.0 [407] | 11.0 [280] | 18.5 [470] | 11.8 [301] | 4.6 [117] | 1 | 336 [152] | 1100 |
| | | | | | | | | 11.8 [301] | 4.6 [117] | 2 | | |
| | CS1K0362C | | Type 3R | DH3 | 28.3 [719] | 27.0 [687] | 36.0 [914] | Pre-Installed in Enclosure | | | 480 [218] | |
| 350 | CS1K0415F | 415 | Open (F) | 3 | 21.0 [534] | 15.0 [381] | 20.0 [508] | 11.8 [301] | 4.6 [117] | 1 | 305 [138] | 1450 |
| | | | | | | | | 11.8 [301] | 4.6 [117] | 2 | | |
| | CS1K0415C | | Type 3R | DH4 | 31.5 [800] | 29.5 [749] | 44.5 [1130] | Pre-Installed in Enclosure | | | 485 [220] | |
| 400 | CS1K0480F | 480 | Open (F) | 3 | 22.0 [559] | 15.0 [381] | 21.0 [533] | 11.8 [301] | 4.6 [117] | 1 | 330 [150] | 1525 |
| | | | | | | | | 11.8 [301] | 4.6 [117] | 2 | | |
| | CS1K0480C | | Type 3R | DH4 | 31.5 [800] | 29.5 [749] | 44.5 [1130] | Pre-Installed in Enclosure | | | 510 [231] | |
| 450 | CS1K0515F | 515 | Open (F) | 3 | 22.0 [559] | 15.0 [381] | 22.0 [559] | 9.0 [226] | 3.5 [89] | 1 | 350 [159] | 1575 |
| | | | | | | | | 11.8 [301] | 4.6[117] | 3 | | |
| | CS1K0515C | | Type 3R | DH4 | 31.5 [800] | 29.5 [749] | 44.5 [1130] | Pre-Installed in Enclosure | | | 540 [245] | |
| 500 | CS1K0600F | 600 | Open (F) | 3 | 23.0 [584] | 17.0 [432] | 22.0 [559] | 11.8 [301] | 4.6 [117] | 1 | 500 [227] | 1600 |
| | | | | | | | | 11.8 [301] | 4.6 [117] | 3 | | |
| | CS1K0600C | | Type 3R | DH4 | 31.5 [800] | 29.5 [749] | 44.5 [1130] | Pre-Installed in Enclosure | | | 685 [311] | |

**Weight & dimensions are approximate*
*[1]Capacitors are supplied individually for open-style designs and come pre-installed within enclosed designs*
*[2]Please refer to figure G for capacitor drawing*

## 600V

| Motor Rating at 600V (HP) - Ref. ONLY | Catalog Number | Filter Current (A) | Encl. Style (F-Floor, W-Wall) | Filter Reactor Dimensions in Inches [mm] | | | | Filter Capacitor Dimensions in Inches [mm][1] | | Capacitor Qty[2] | Weight Lbs. [kg] | Watts Loss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Dimens. Fig. | Width | Depth | Height | H | D | | | |
| 5 | CS1P0007F | 7 | Open (F) | 1 | 7.12 [181]] | 4.70 [119] | 6.35 [162] | 6.5 [165] | 2.6 [66] | 1 | 16 [7] | 94 |
| | | | Open (W) | | 7.50 [190] | 5.60 [142] | 8.42 [214] | | | | | |
| | CS1P0007C | | Type 3R | DH1 | 16.9 [480] | 14.0 [356] | 17.6 [448] | Pre-Installed in Enclosure | | | 60 [27] | |
| 7.5 | CS1P0009F | 9 | Open (F) | 1 | 7.12 [181]] | 4.70 [119] | 6.35 [162] | 7.5 [191] | 3.5 [89] | 1 | 17 [8] | 95 |
| | | | Open (W) | | 7.50 [190] | 5.60 [142] | 8.42 [214] | | | | | |
| | CS1P0009C | | Type 3R | DH1 | 16.9 [480] | 14.0 [356] | 17.6 [448] | Pre-Installed in Enclosure | | | 60 [27] | |
| 10 | CS1P0012F | 12 | Open (F) | 1 | 7.12 [181] | 4.70 [119] | 6.35 [162] | 7.5 [191] | 3.5 [89] | 1 | 19 [9] | 102 |
| | | | Open (W) | | 7.50 [190] | 5.60 [142] | 8.42 [214] | | | | | |
| | CS1P0012C | | Type 3R | DH1 | 16.9 [480] | 14.0 [356] | 17.6 [448] | Pre-Installed in Enclosure | | | 65 [29] | |
| 15 | CS1P0018F | 18 | Open (F) | 1 | 9.25 [235] | 5.50 [140] | 7.50 [191] | 9.2 [235] | 3.5 [89] | 1 | 31 [14] | 165 |
| | | | Open (W) | | 9.25 [235] | 6.00 [152] | 9.60 [244] | | | | | |
| | CS1P0018C | | Type 3R | DH1 | 21.5 [546] | 20.1 [510] | 22.0 [559] | Pre-Installed in Enclosure | | | 85 [39] | |
| 20 | CS1P0023F | 23 | Open (F) | 1 | 9.25 [235] | 6.00 [152] | 7.50 [191] | 11.8 [301] | 3.5 [89] | 1 | 31 [14] | 175 |
| | | | Open (W) | | 9.25 [235] | 6.50 [165] | 9.60 [244] | | | | | |
| | CS1P0023C | | Type 3R | DH1 | 21.5 [546] | 20.1 [510] | 22.0 [559] | Pre-Installed in Enclosure | | | 85 [39] | |
| 25 | CS1P0027F | 27 | Open (F) | 1 | 9.25 [235] | 6.50 [165] | 7.50 [191] | 11.8 [301] | 3.5 [89] | 1 | 41 [19] | 200 |
| | | | Open (W) | | 9.25 [235] | 6.80 [173] | 9.60 [244] | | | | | |
| | CS1P0027C | | Type 3R | DH1 | 21.5 [546] | 20.1 [510] | 22.0 [559] | Pre-Installed in Enclosure | | | 100 [45] | |
| 30 | CS1P0035F | 35 | Open (F) | 1 | 9.25 [235] | 6.50 [165] | 7.50 [191] | 11.8 [301] | 3.5 [89] | 1 | 46 [21] | 220 |
| | | | Open (W) | | 9.25 [235] | 7.00 [178] | 9.60 [244] | | | | | |
| | CS1P0035C | | Type 3R | DH1 | 21.5 [546] | 20.1 [510] | 22.0 [559] | Pre-Installed in Enclosure | | | 105 [48] | |
| 40 | CS1P0045F | 45 | Open (F) | 2 | 10.6 [269] | 8.30 [211] | 10.0 [254] | 11.8 [301] | 3.5 [89] | 1 | 60 [27] | 330 |
| | | | Open (W) | | 11.5 [292] | 8.80 [224] | 12.0 [305] | | | | | |
| | CS1P0045C | | Type 3R | DH1 | 21.5 [546] | 20.1 [510] | 22.0 [559] | Pre-Installed in Enclosure | | | 115 [52] | |

**Weight & dimensions are approximate*
*[1]Capacitors are supplied individually for open-style designs and come pre-installed within enclosed designs*
*[2]Please refer to figure G for capacitor drawing*

# SELECTION TABLES

## 600V - Continued

| Motor Rating at 600V (HP) - Ref. ONLY | Catalog Number | Filter Current (A) | Encl. Style (F-Floor, W-Wall) | Filter Reactor Dimensions in Inches [mm] | | | | Filter Capacitor Dimensions in Inches [mm][1] | | Capacitor Qty[2] | Weight Lbs. [kg] | Watts Loss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Dimens. Fig. | Width | Depth | Height | H | D | | | |
| 50 | CS1P0055F | 55 | Open (F) | 2 | 11.5 [292] | 8.00 [203] | 14.5 [368] | 12.2 [310] | 3.5 [89] | 1 | 90 [41] | 370 |
| | | | Open (W) | | 11.5 [292] | 8.30 [211] | 16.4 [417] | | | | | |
| | CS1P0055C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 170 [77] | |
| 60 | CS1P0065F | 65 | Open (F) | 2 | 11.5 [292] | 8.50 [216] | 14.5 [368] | 14.8 [376] | 3.5 [89] | 1 | 100 [45] | 400 |
| | | | Open (W) | | 12.0 [305] | 8.80 [224] | 16.4 [417] | | | | | |
| | CS1P0065C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | | |
| 75 | CS1P0080F | 80 | Open (F) | 2 | 12.5 [318] | 8.50 [216] | 14.5 [368] | 10.4 [265] | 4.6 [117] | 1 | 110 [50] | 440 |
| | | | Open (W) | | 12.5 [318] | 8.80 [224] | 16.4 [417] | | | | | |
| | CS1P0080C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 180 [ 82] | |
| 100 | CS1P0110F | 110 | Open (F) | 2 | 12.5 [318] | 9.00 [229] | 14.5 [368] | 12.2 [310] | 3.5 [89] | 2 | 120 [54] | 550 |
| | | | Open (W) | | 12.5 [318] | 9.30 [236] | 16.4 [417] | | | | | |
| | CS1P0110C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 205 [93] | |
| 125 | CS1P0130F | 130 | Open (F) | 2 | 12.5 [318] | 9.00 [229] | 14.5 [368] | 14.8 [376] | 3.5 [89] | 2 | 130 [59] | 610 |
| | | | Open (W) | | 12.5 [318] | 9.50 [241] | 16.4 [417] | | | | | |
| | CS1P0130C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 210 [95] | |
| 150 | CS1P0160F | 160 | Open (F) | 2 | 13.5 [343] | 10.4 [264] | 14.5 [368] | 10.4 [265] | 4.6 [117] | 2 | 190 [86] | 690 |
| | | | Open (W) | | 13.5 [343] | 10.6 [269] | 16.4 [417] | | | | | |
| | CS1P0160C | | Type 3R | DH2 | 25.8 [655] | 23.8 [604] | 28.8 [731] | Pre-Installed in Enclosure | | | 270 [122] | |
| 200 | CS1P0200F | 200 | Open (F) | 2 | 13.5 [343] | 11.5 [292] | 14.5 [368] | 10.4 [265] | 5.4 [137] | 2 | 230 [104] | 825 |
| | | | Open (W) | | 13.5 [343] | 11.8 [300] | 16.4 [417] | | | | | |
| | CS1P0200C | | Type 3R | DH3 | 28.3 [719] | 27.0 [687] | 36.0 [914] | Pre-Installed in Enclosure | | | 360 [163] | |
| 250 | CS1P0250F | 250 | Open (F) | 2 | 14.5 [368] | 9.90 [251] | 18.5 [470] | 8.9 [226] | 5.4 [137] | 3 | 260 [118] | 975 |
| | CS1P0250C | | Type 3R | DH3 | 28.3 [719] | 27.0 [687] | 36.0 [914] | Pre-Installed in Enclosure | | | 400 [181] | |
| 300 | CS1P0305F | 305 | Open (F) | 2 | 15.0 [381] | 11.0 [279] | 18.5 [470] | 10.4 [265] | 5.4 [137] | 3 | 300 [136] | 1080 |
| | CS1P0305C | | Type 3R | DH3 | 28.3 [719] | 27.0 [687] | 36.0 [914] | Pre-Installed in Enclosure | | | 450 [204] | |
| 350 | CS1P0362F | 362 | Open (F) | 3 | 21.0 [534] | 15.0 [381] | 20.0 [508] | 8.9 [226] | 5.4 [ 137] | 4 | 370 [168] | 1390 |
| | CS1P0362C | | Type 3R | DH4 | 31.5 [800] | 29.5 [749] | 44.5 [1130] | Pre-Installed in Enclosure | | | 550 [249] | |
| 400 | CS1P0415F | 415 | Open (F) | 3 | 22.0 [559] | 15.0 [381] | 21.0 [533] | 10.4 [265] | 5.4 [137] | 4 | 400 [181] | 1460 |
| | CS1P0415C | | Type 3R | DH4 | 31.5 [800] | 29.5 [749] | 44.5 [1130] | Pre-Installed in Enclosure | | | 580 [263] | |
| 450 | CS1P0450F | 450 | Open (F) | 3 | 22.0 [559] | 16.0 [406] | 22.0 [559] | 10.4 [265] | 5.4 [137] | 5 | 415 [188] | 1480 |
| | CS1P0450C | | Type 3R | DH4 | 31.5 [800] | 29.5 [749] | 44.5 [1130] | Pre-Installed in Enclosure | | | 600 [272] | |
| 500 | CS1P0500F | 500 | Open (F) | 3 | 23.0 [584] | 17.0 [432] | 22.0 [559] | 14.8 [376] | 3.5 [89] | 7 | 530 [240] | 1520 |
| | CS1P0500C | | Type 3R | DH4 | 31.5 [800] | 29.5 [749] | 44.5 [1130] | Pre-Installed in Enclosure | | | 730 [331] | |

**Weight & dimensions are approximate*
*[1]Capacitors are supplied individually for open-style designs and come pre-installed within enclosed designs*
*[2]Please refer to figure G for capacitor drawing*

## DIAGRAMS

### SineWave Filter Drawing

**Figure #1**

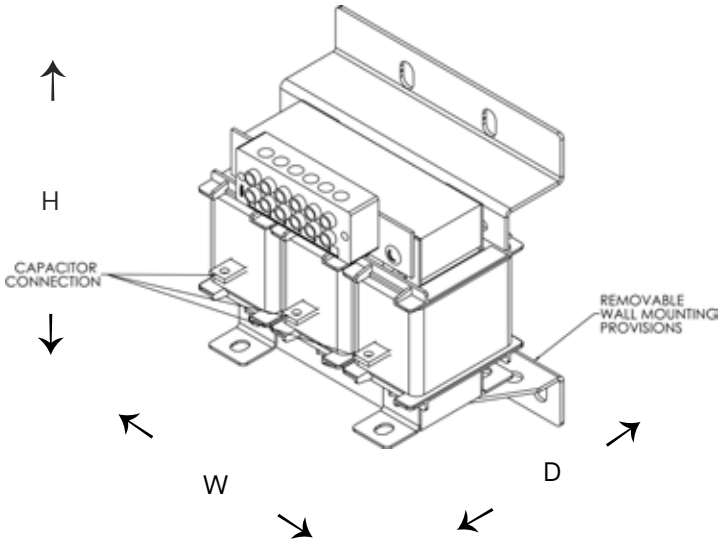



**Figure #2**

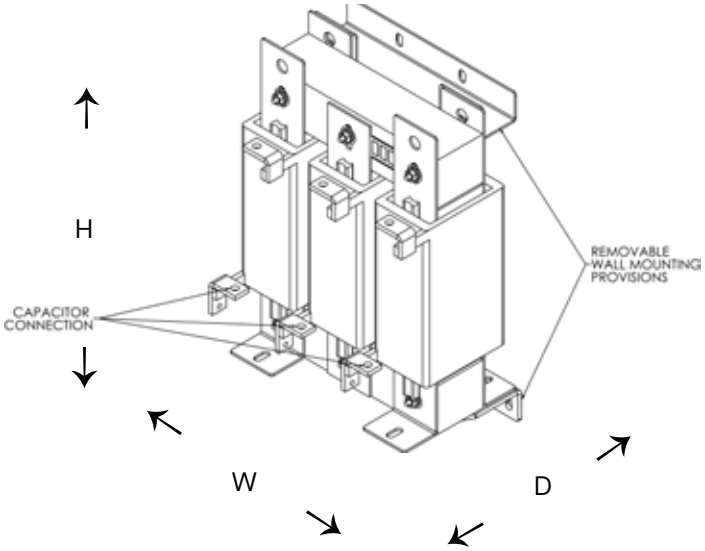
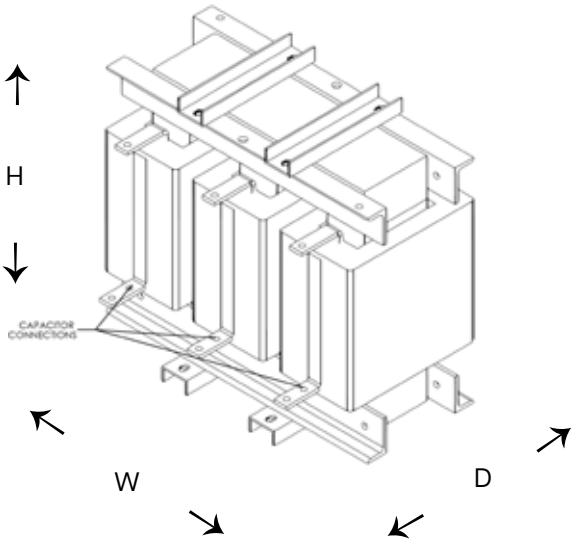
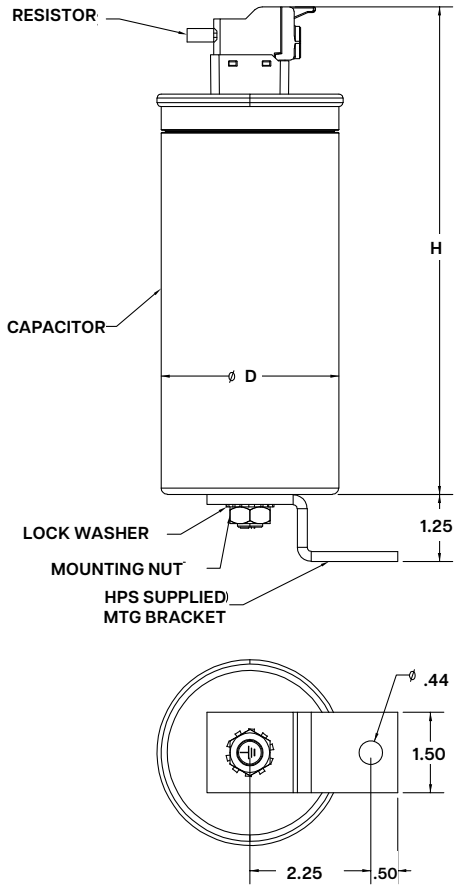
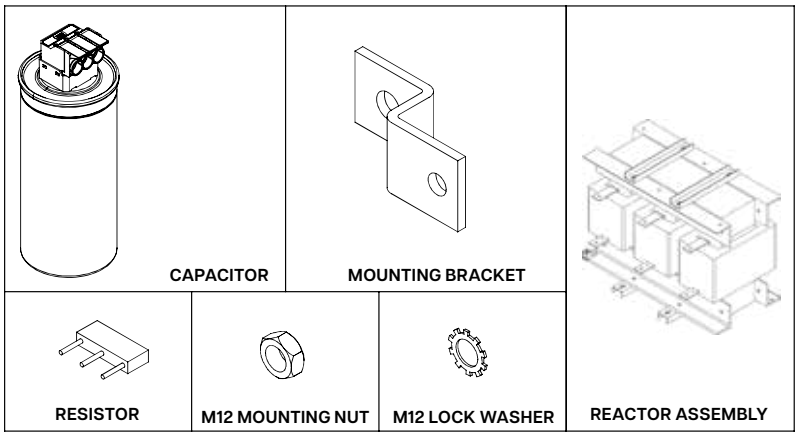



**Figure #3**



## Capacitor Drawing




1. *If the resistor is not installed in capacitor terminal block, install it.*
2. *Mount the capacitor using the nut and lock washer provided. Please refer to installation manual for further details.*

## Floor Reactor Mounting Dimensions

480V

| Current Ratings (A) @ 480V | Dimensional Figure | Open Style Floor (Mounting Dimensions) | | |
|---|---|---|---|---|
| | | MTG WIDTH | MTG DEPTH | MTG SLOT |
| 9 to 12 | 1 | 4.80 [122] | 3.27 [83] | 0.38 [10] x 0.50 [13] |
| 16 | | 4.80 [122] | 3.77 [96] | 0.38 [10] x 0.50 [13] |
| 22 | | 6.00 [152] | 3.20 [81] | 0.38 [10] x 0.50 [13] |
| 27 | | 6.00 [152] | 3.70 [94] | 0.44 [11] x 1.00 [25] |
| 35 | | 6.00 [152] | 4.20 [107] | 0.44 [11] x 1.00 [25] |
| 45 | | 7.20 [183] | 4.53 [115] | 0.44 [11] x 1.00 [25] |
| 55 | 2 | 7.20 [183] | 4.83 [123] | 0.44 [11] x 1.00 [25] |
| 65 | | 7.50 [190] | 5.43 [138] | 0.44 [11] x 1.00 [25] |
| 80 | | 8.00 [203] | | 0.44 [11] x 1.00 [25] |
| 110 | | 8.00 [203] | | 0.44 [11] x 1.00 [25] |
| 130 | | 8.00 [203] | 6.17 [157] | 0.44 [11] x 1.00 [25] |
| 160 | | 8.00 [203] | 6.67 [169] | 0.44 [11] x 1.00 [25] |
| 200 | | 9.00 [229] | 7.67 [195] | 0.44 [11] x 1.00 [25] |
| 250 | | 9.50 [241] | 6.42[163] | 0.44 [11] x 1.00 [25] |
| 305 | | 9.50 [241] | 7.17[182] | 0.44 [11] x 1.00 [25] |
| 362 | | 10.0 [254] | 8.17[208] | 0.44 [11] x 1.00 [25] |
| 415 | 3 | 7.00 [178] | 9.00 [229] | 0.44 [11] x 0.75 [19] |
| 480 to 515 | | 7.75 [197] | 9.50 [241] | 0.44 [11] x 0.75 [19] |
| 600 | | 7.75 [197] | 11.0 [279] | 0.44 [11] x 0.75 [19] |

600V

| Current Ratings (A) @ 600V | Dimensional Figure | Open Style Floor (Mounting Dimensions) | | |
|---|---|---|---|---|
| | | MTG WIDTH | MTG DEPTH | MTG SLOT |
| 7 to 12 | 1 | 4.80 [122] | 3.27 [83] | 0.38 [10] x 0.50 [13] |
| 18 to 23 | | 6.00 [152] | 3.96 [100] | 0.44 [11] x 1.00 [25] |
| 27 to 35 | | 6.00 [152] | 4.5 [115] | 0.44 [11] x 1.00 [25] |
| 45 | 2 | 7.20 [183] | 4.97 [126] | 0.44 [11] x 1.00 [25] |
| 55 | | 7.50 [190] | 5.93 [151] | 0.44 [11] x 1.00 [25] |
| 65 | | 7.50 [190] | 6.18 [157] | 0.44 [11] x 1.00 [25] |
| 80 | | 8.00 [203] | 6.18 [157] | 0.44 [11] x 1.00 [25] |
| 110 to 130 | | 8.00 [203] | 6.43 [163] | 0.44 [11] x 1.00 [25] |
| 160 | | 9.00 [229] | 7.68 [195] | 0.44 [11] x 1.00 [25] |
| 200 | | 9.00 [229] | 8.81 [224] | 0.44 [11] x 1.00 [25] |
| 250 | | 9.50 [241] | 7.17[182] | 0.44 [11] x 1.00 [25] |
| 305 | | 10.0 [254] | 7.68 [195] | 0.44 [11] x 1.00 [25] |
| 362 | 3 | 7.00 [178] | 10.0 [254] | 0.44 [11] x 0.75 [19] |
| 415 | | 7.00 [178] | 10.5 [267] | 0.44 [11] x 0.75 [19] |
| 450 | | 7.25 [184] | 10.5 [267] | 0.44 [11] x 0.75 [19] |
| 500 | | 7.50 [191] | 11.2 [286] | 0.44 [11] x 0.75 [19] |

## Wall Reactor Mounting Dimensions

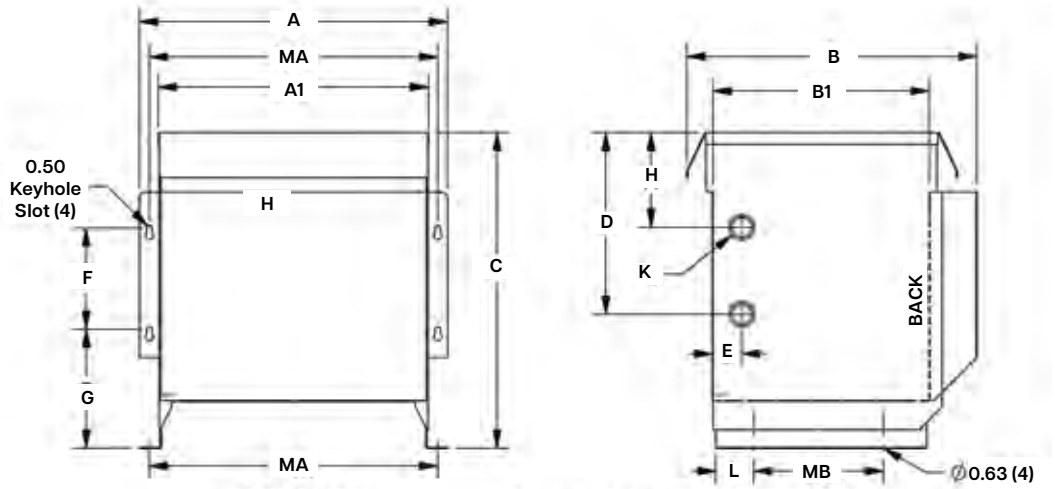
480V

| Current Ratings (A) @ 480V | Dimensional Figure | Dimensions in Inches [mm] | | | |
|---|---|---|---|---|---|
| | | MTG WIDTH BOT | MTG WIDTH TOP | MTG HGT | MTG SLOT |
| 9 to 16 | 1 | 6.13 [156] | 2.75 [70] | 6.80 [173] | 0.44 [11] x 0 .75 [19] |
| 22 to 35 | | 6.13 [156] | 2.75 [70] | 8.00 [203] | 0.44 [11] x 0 .75 [19] |
| 45 | | 10.20 [259] | 4.50 [114] | 10.10 [257] | 0.44 [11] x 0 .75 [19] |
| 55 | 2 | 10.20 [259] | 4.50 [114] | 10.10 [257] | 0.44 [11] x 0 .75 [19] |
| 65 to 160 | | 10.20 [259] | 4.50 [114] | 14.50 [368] | 0.44 [11] x 0 .75 [19] |
| 200 | | 11.44 [291] | 4.50 [114] | 14.50 [368] | 0.44 [11] x 0 .75 [19] |
| 250 | | 11.44 [291] | 4.50 [114] | 14.50 [368] | 0.44 [11] x 0 .75 [19] |

600V

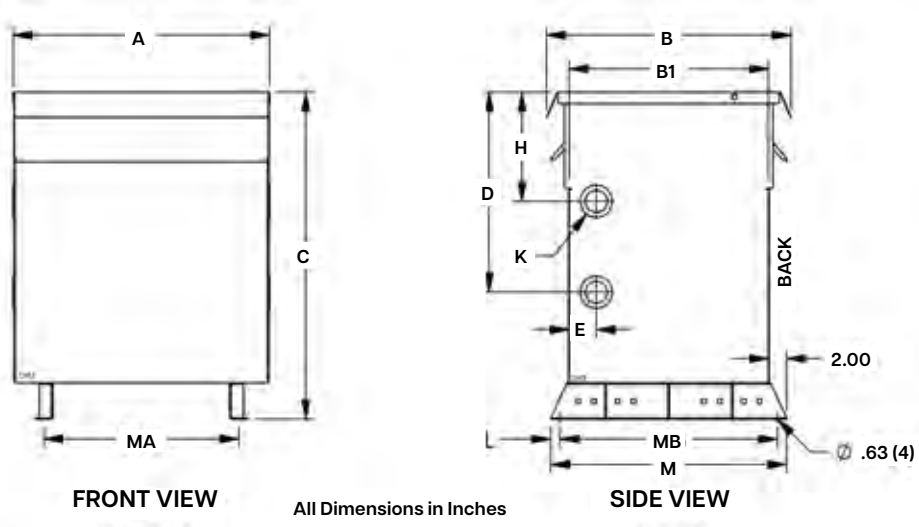
| Current Ratings (A) @ 600V | Dimensional Figure | Dimensions in Inches [mm] | | | |
|---|---|---|---|---|---|
| | | MTG WIDTH BOT | MTG WIDTH TOP | MTG HGT | MTG SLOT |
| 7 to 12 | 1 | 6.13 [156] | 2.75 [70] | 6.80 [173] | 0.44 [11] x 0 .75 [19] |
| 18 to 35 | | 6.13 [156] | 2.75 [70] | 8.00 [203] | 0.44 [11] x 0 .75 [19] |
| 45 | 2 | 10.20 [259] | 4.50 [114] | 10.10 [257] | 0.44 [11] x 0 .75 [19] |
| 55 to 200 | | 10.20 [259] | 4.50 [114] | 14.50 [368] | 0.44 [11] x 0 .75 [19] |

# ENCLOSURE DRAWINGS




| Case Style | Dimensions in Inches [mm] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | A1 | B | B1 | C | D | E | F | G | H | K | L | MA | MB |
| DH1 | 21.5 [546] | 18.8 [477] | 20.1 [510] | 15 [381] | 22 [559] | 12.6 [320] | 2 [51] | 7 [178] | 8.3 [211] | 6.6 [168] | 1.38 X 1.75 K.O. [35 x 44 K.O.] | 2.6 [66] | 20 [508] | 9 [229] |
| DH2 | 25.8 [655] | 23.3 [592] | 23.8 [604] | 18 [457] | 28.8 [731] | 17 [432] | 2 [51] | 8 [203] | 10.3 [262] | 8.6 [218] | 1.75 X 2.50 K.O. [44 X 63 K.O.] | 3.8 [96] | 24.6 [625] | 9 [229] |

[1] *Knockout (K) sizes are actual diameters of knockout, not conduit sizes.*

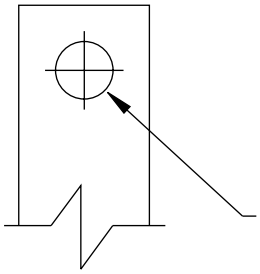



| Case Style | Dimensions in Inches [mm] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | B1 | C | D | E | H | K | L | M | MA | MB |
| DH3 | 28.3 [719] | 27 [687] | 22 [559] | 36 [914] | 22 [559] | 3 [76] | 12 [305] | 2.00 X 3.00 K.O [50 X 76 K.O.] | 1 [25] | 26 [660] | 21.5 [546] | 24 [610] |
| DH4 | 31.5 [800] | 29.5 [749] | 24.5 [622] | 44.5 [1130] | 27.5 [698] | 3 [76] | 14.5 [368] | 2.00 X 3.00 K.O. [50 X 76 K.O.] | 1 [25] | 28.5 [724] | 23.5 [597] | 26.5 [673] |

[1] *Knockout (K) sizes are actual diameters of knockout, not conduit sizes.*

## Termination Details

| HP | 480V Currrent (A) | 600V Current (A) |
|---|---|---|
| 5 | 18 - 14 AWG | 18 - 14 AWG |
| 7.5 | 18 - 14 AWG | 18 - 14 AWG |
| 10 | 13 - 10 AWG | 13 - 10 AWG |
| 15 | 14 - 8 AWG | 14 - 8 AWG |
| 20 | 14 - 8 AWG | 14 - 8 AWG |
| 25 | Dia. 1A | Dia. 1A |
| 30 | Dia. 1A | Dia. 1A |
| 40 | Dia. 1A | Dia. 1A |
| 50 | Dia. 1A | Dia. 1A |
| 60 | Dia. 1A | Dia. 1A |
| 75 | Dia. 1B | Dia. 1A |
| 100 | Dia. 1B | Dia. 1B |
| 125 | Dia. 1B | Dia. 1B |
| 150 | Dia. 1B | Dia. 1B |
| 200 | Dia. 1B | Dia. 1B |
| 350 | Dia. 1B | Dia. 1B |
| 300 | Dia. 1B | Dia. 1B |
| 350 | Dia. 1B | Dia. 1B |
| 400 | Dia. 1C | Dia. 1B |
| 450 | Dia. 1C | Dia. 1B |
| 500 | Dia. 1C | Dia. 1C |



1A = 0.28" Dia.
1B = 0.44" Dia.
1C = 0.56" Dia.

**DIAGRAM 1**

## Other HPS Power Quality Products

HPS has many power quality products which mitigate current and voltage harmonics caused by non-linear loads including rectifiers, variable frequency drives, DC power supplies and E.V. charging.

dV/dT Filter

Passive Harmonic Filter

Reactor

Drive Isolation Transformer

Energy Efficient Drive Isolation Transformer

Harmonic Mitigating Transformer

HPS TruWave
Active Harmonic Filter

Custom Iron Core Reactor

Multi-Pulse
Medium & Low Voltage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