hammond
POWER SOLUTIONS

SINEWAVE MOTOR PROTECTION FILTER

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

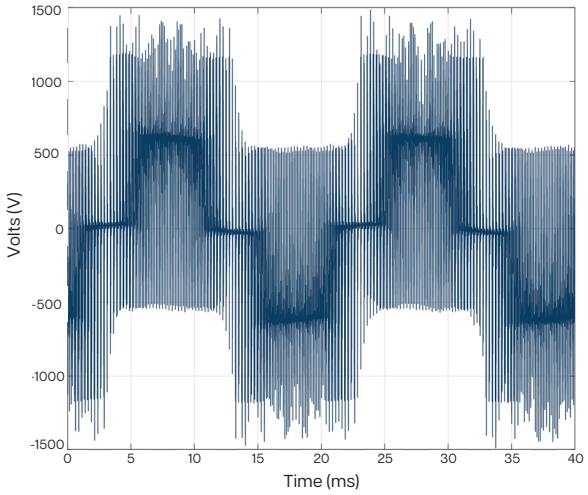
Ambient Operating Temperature:	Open Style: Up to 50°C Enclosed Style: Up to 40°C
Altitude:	Up to 1000m (about 3280.84 ft)
Cooling Method:	Natural Convection
Enclosure Style:	Open Style or Type 3R

Performance

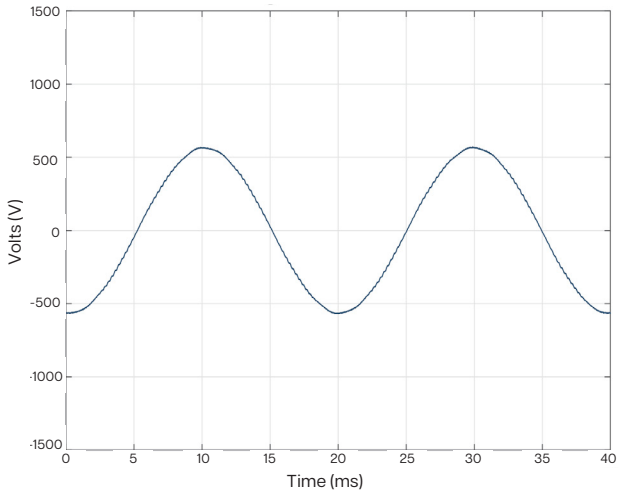
The design of the HPS SineWave Motor Protection Filter employs an LC topology, delivering superior performance and high attenuation across a broader frequency range, all while maintaining a low Total Harmonic Distortion of voltage (THDv) value.

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.

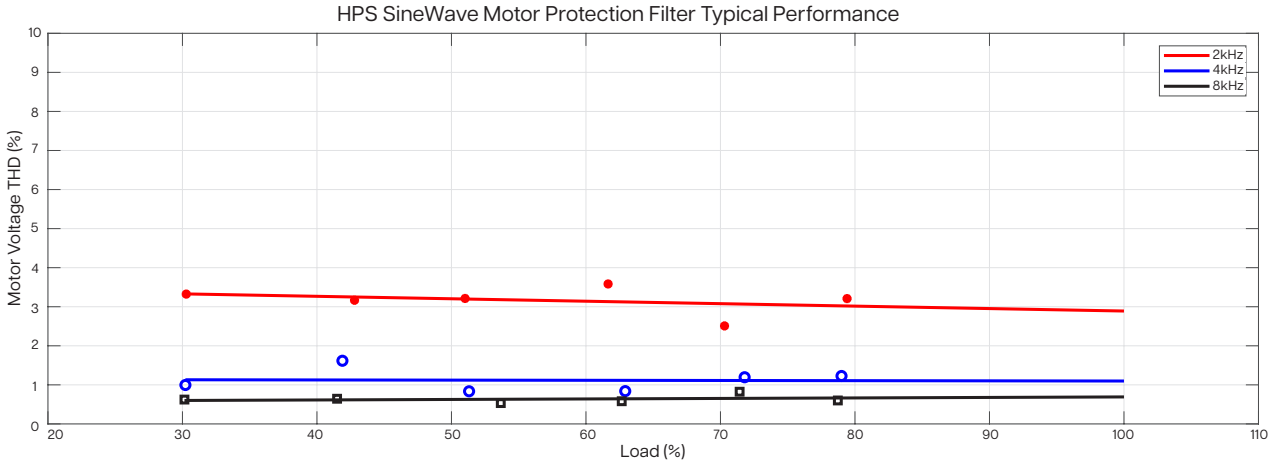
Motor Voltage
No Filter



Motor Voltage
With HPS SineWave Motor Protection Filter



Typical THDv Values

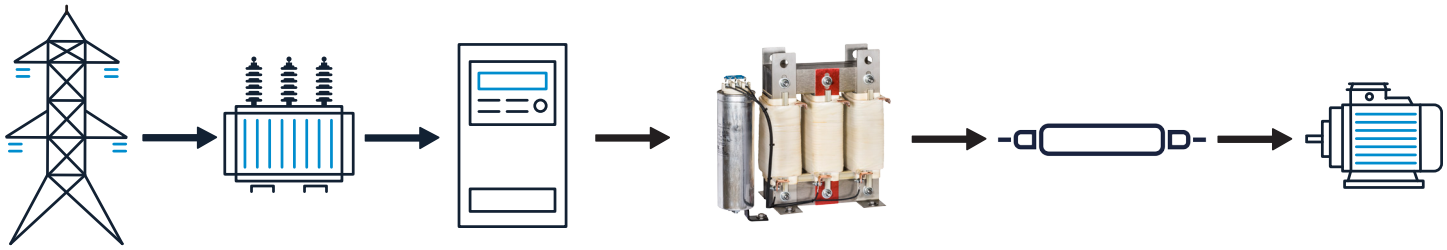


VFD With Long Cable Length To Motors

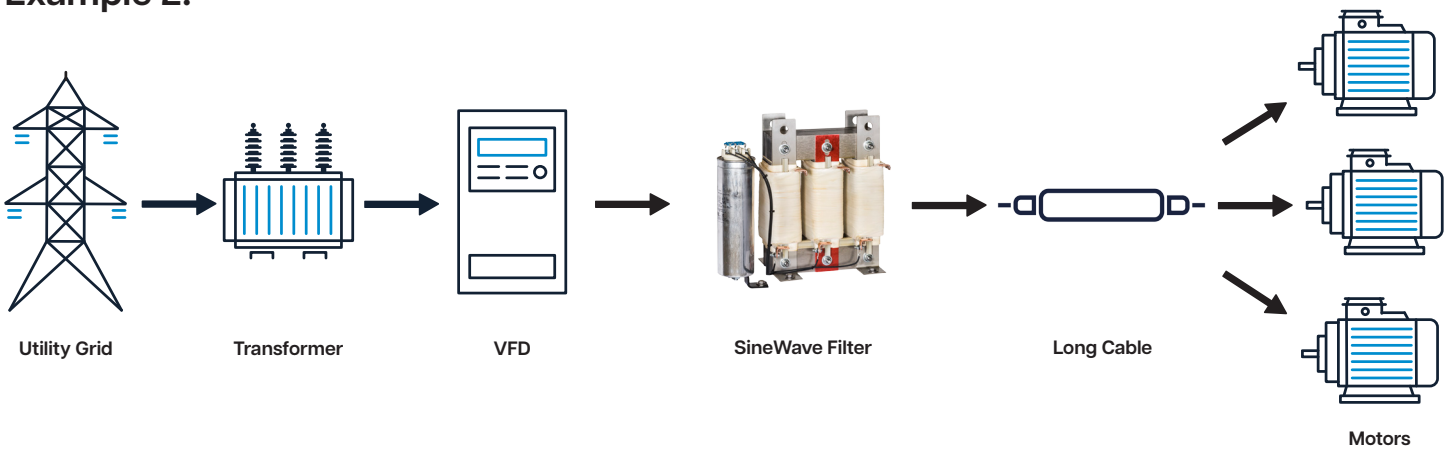
When there are lengthy cable connections between the Variable Frequency Drive (VFD) and the motor, it can cause an impedance mismatch between the cable and the motor. This mismatch leads to high voltage peaks (overshoot) at the motor input terminals due to the reflected wave phenomena. The magnitude 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.



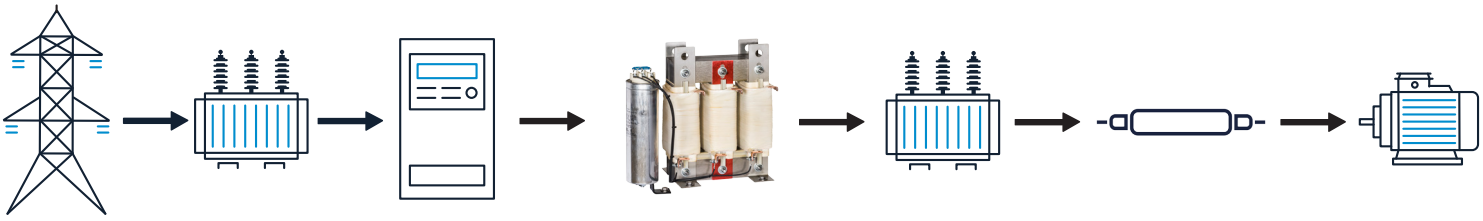
Example 2.



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 P 600V	9A to 600A		F - Open Frame C - Type 3R
			5A	0005	
			55A	0055	
			500A	0500	

**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

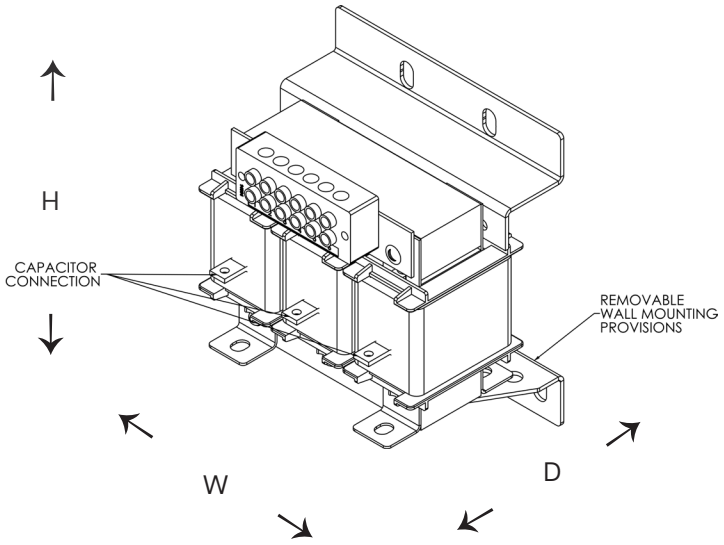


Figure #2

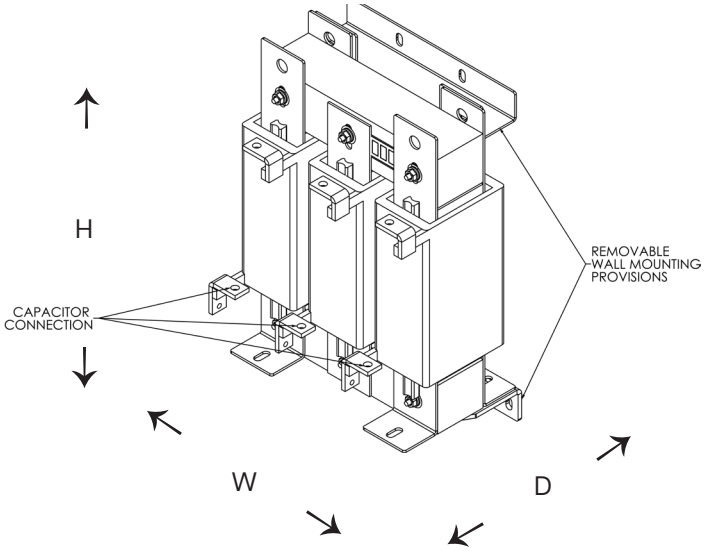
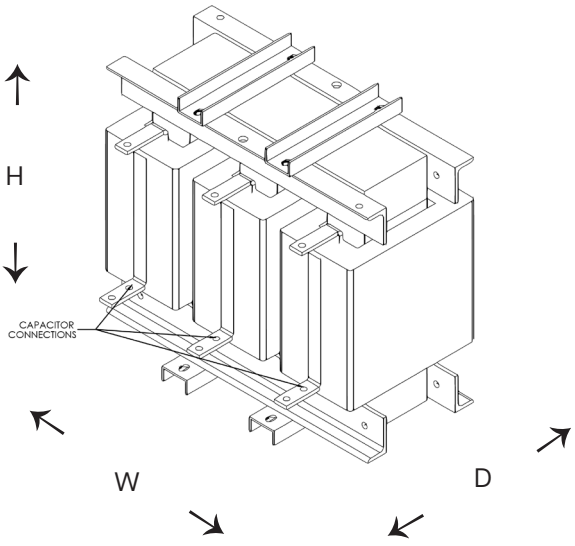
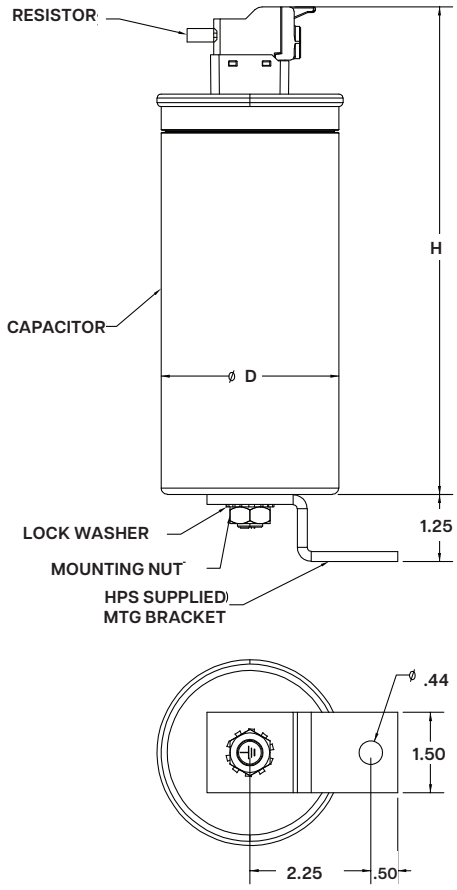
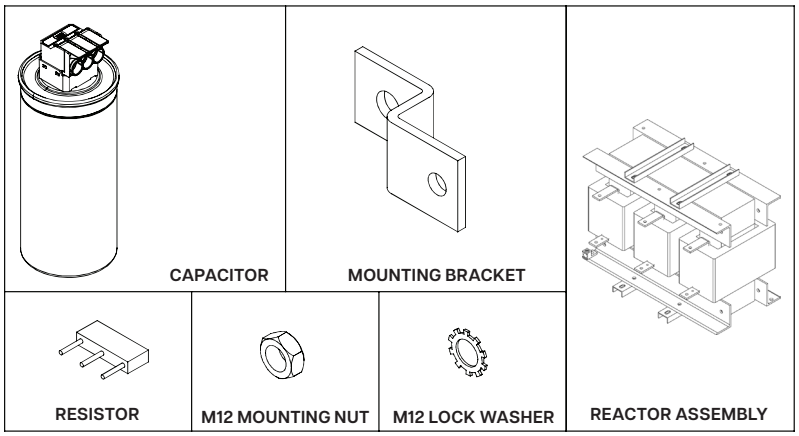


Figure #3



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]	6.33 [161]	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

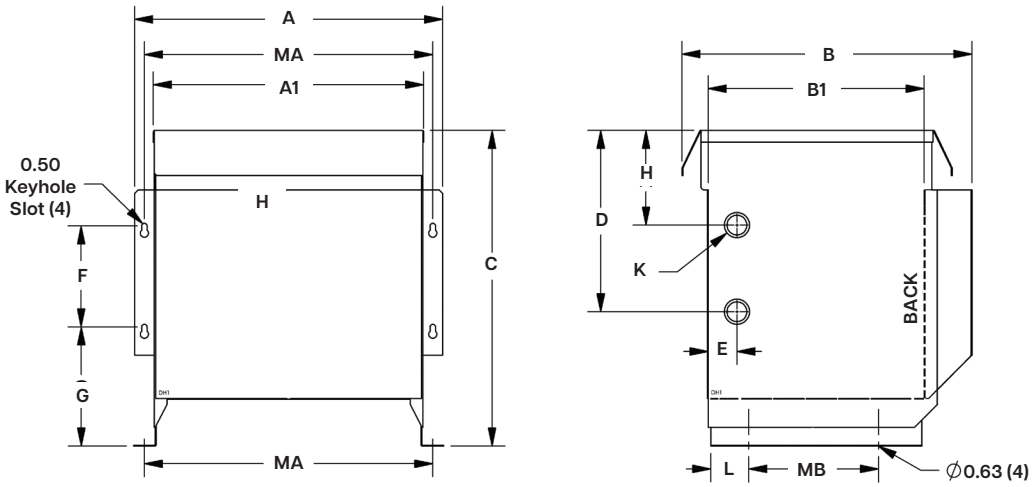
480V

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]

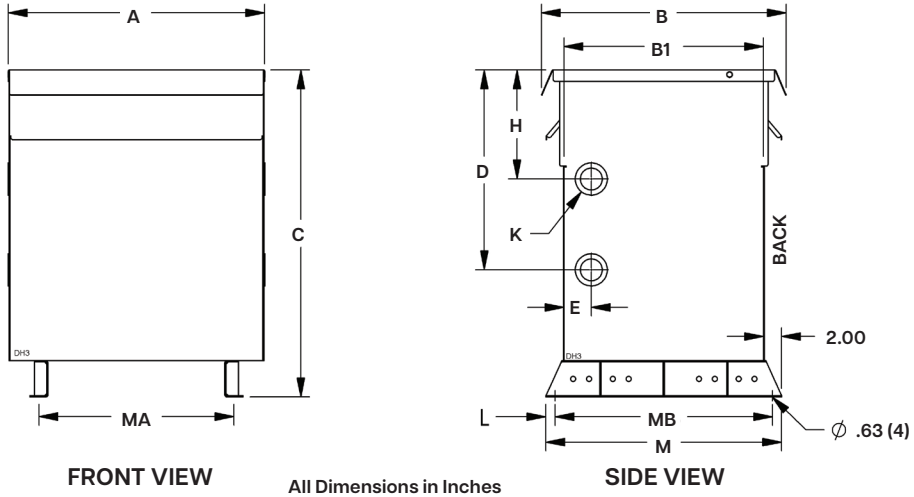
ENCLOSURE DRAWINGS



All Dimensions in Inches

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.*



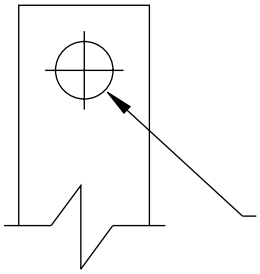
All Dimensions in Inches

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

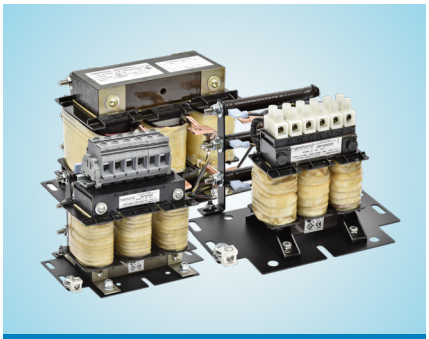


1A = 0.28" Dia.
1B = 0.44" Dia.
1C = 0.56" Dia.

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

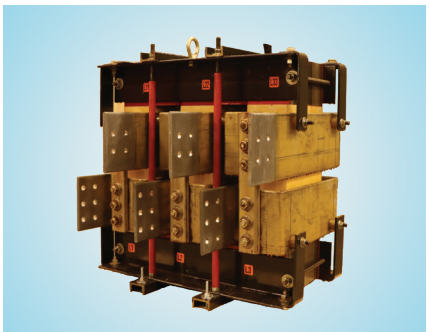
Reactor

Drive Isolation Transformer

Energy Efficient Drive Isolation Transformer

Harmonic Mitigating Transformer

HPS TruWave
Active Harmonic Filter



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