

# Harmonic filters

## Type LPF low pass harmonic filters

### Choose wisely

When it comes to reducing harmonics for VFD, ASD and UPS applications, our LPF low pass harmonic filter design excels. Connect the LPF harmonic filter system ahead (upstream) of any 6-pulse drive/rectifier network, and it will demonstrate lower levels of harmonic distortion than that attainable using 12-pulse or 18-pulse front ends. *This also includes operation at less than full load and/or when line voltages are unbalanced.*

### Saves money

Twelve-pulse and 18-pulse drives are expensive; 6-pulse drives are the most cost-effective and most commonly applied design in the majority of North American power systems. In order to make 12- and 18-pulse drives achieve good performance, a phase shifting isolation transformer is commonly applied. Textbooks say you should also use inter-phase transformers in order to force current in each bridge rectifier equally in order to achieve the expected cancellation of certain harmonics. Use of a low cost 6-pulse drive with our low pass filter saves money while lowering harmonic distortion to acceptable levels.

### Highly efficient

Typical phase shifting isolation transformers, used to improve 12- and 18-pulse drive performance, have 3 to 4 percent losses at full load. *PSS's low pass harmonic filters are typically 60*

*to 75 percent more efficient than phase shifting transformers!* Low pass harmonic filters help achieve the lowest harmonic levels while gaining the highest system efficiency and lowest cost.

### Anti-resonance filters

Trouble-free, long life operation; that's what you get with PSS low pass harmonic filters. There's no need to worry about power system resonance as low pass filters are designed to prevent this. There's no need to perform costly power system harmonic analysis when you choose PSS low pass harmonic filters.

### Guaranteed results

PSS guarantees to meet your harmonic distortion objective! Simply provide your single line diagram and identify your harmonic distortion objectives. Then, install and connect our filter(s) according to our recommendation. You'll be assured the harmonic performance you requested and long equipment life.



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Three options to choose from:

- LPF within an enclosure
- Open panel version
- Individual components

### **Meets IEEE - 519!**

### **Reduce harmonic distortion**

Low pass harmonic filters reduce electrical system harmonic distortion to levels previously only attainable with expensive active filters or 18-pulse drives. Now you can achieve minimum harmonic distortion and maximum reliability and energy efficiency. How? LPF filters attenuate every harmonic frequency of concern to tolerable levels.

### **From 0 to 100 percent load**

Most UPS and adjustable speed drive installations actually operate well below their full load capacity. While multipulse schemes experience higher percentage of harmonic distortion at reduced loads, our low pass harmonic filters mitigate harmonics throughout the entire operating range, 0 to 100 percent load. Whether you apply one filter per load or connect multiple loads to a single filter, you get the low harmonics you need.

### **IEEE-519 compliant**

LPF make IEEE-519 compliance easy. Most 6-pulse rectifiers (drives or UPS) will comply with IEEE-519 and other international power quality standards when fitted with our low pass harmonic filter. Facility power will be cleaner, more reliable, and have more capacity to serve additional and future load.

### **Suitable for diodes or SCRs**

The special design of LPF harmonic filters make them suitable for virtually any type of three phase rectifier including:

- Silicon controlled rectifiers
- Diode rectifiers
- DC bus precharge rectifiers
- Combination diodes and SCRs
- Rectifiers with AC line reactor
- Rectifiers with DC bus chokes
- Single, two and three phases

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### Typical Applications

Adjustable speed drives  
Uninterruptible power supplies  
Elevators and escalators  
Fans and pumps  
Printing equipment  
Water pumping  
Waste water treatment  
Heating and air conditioning  
Wood and pulp processing  
Battery chargers  
Electronic welders  
Motor control centers  
Electronic power converters  
SCR rectifier controls  
Process controls  
Factory automation  
Painting and spraying  
Heavy-duty machinery  
Packaging equipment

### Why specify PSS low pass filters?

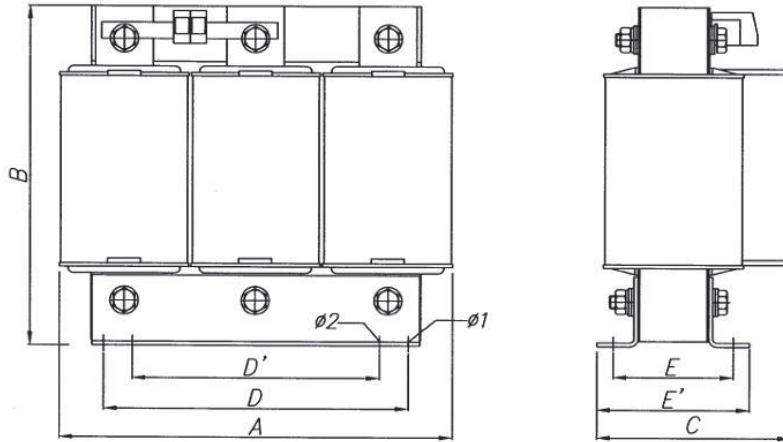
- Save energy
- Minimize harmonic distortion
- Reduce transformer heating
- Reduce equipment interference
- Increase electrical system reliability
- Meet IEEE - 519

### LPF increases productivity

In addition to controlling harmonics in your facility, our low pass filters can increase your power system reliability and extend electrical equipment life. They increase your productivity by maximizing your electrical equipment up-time and performance.

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## 480V, 60 HZ, Series reactor dimensions



480V, 60Hz HP	Reactor L1-	Width A (in)	Height B (in)	Depth C (in)	Mounting Width D	Mounting Width D'	Mounting Depth E	Mounting Depth E'	Weight lb.s	Watts Watts
2	1003	9.06	8.07	4.53	6.93	5.91	2.80	3.54	24	30
4	1006	9.06	8.07	4.53	6.93	5.91	2.80	3.54	24	50
5	1007	9.06	8.07	4.53	6.93	5.91	2.80	3.54	24	50
7.5	1008	9.06	8.07	4.53	6.93	5.91	2.80	3.54	26	70
10	1010	9.06	8.07	4.53	6.93	5.91	2.80	3.54	26	90
15	1011	9.06	8.07	4.53	6.93	5.91	2.80	3.54	31	100
20	1012	9.06	8.07	5.51	6.93	5.91	3.74	4.49	40	110
25	1013	9.45	8.27	5.51	7.28	5.91	3.66	4.45	42	140
30	1014	10.43	9.45	6.10	7.87	5.91	4.02	5.20	57	150
40	1016	10.43	9.45	6.10	7.87	5.91	4.02	5.20	62	160
50	1018	11.81	9.45	6.69	8.82	5.91	4.69	5.79	75	180
60	1019	11.81	10.63	6.69	8.82	5.91	4.69	5.79	84	200
75	1020	11.81	10.63	7.28	8.82	5.91	5.28	6.38	97	230
100	1021	11.81	11.81	7.28	8.82	5.91	5.28	6.38	110	290
125	1022	14.17	13.98	8.27	10.39	-	6.10	7.20	152	360
150	1023	16.54	14.96	9.45	12.44	-	6.93	8.11	198	440
200	1025	16.54	16.14	9.06	12.44	-	6.93	8.11	229	500
250	1026	16.54	16.14	10.63	12.44	-	8.11	9.29	293	550
300	1027	16.54	18.50	9.84	12.44	-	6.93	8.11	271	660
350	1028	16.54	18.50	11.02	12.44	-	8.11	9.29	345	710
400	1029	18.90	25.59	12.20	13.98	-	8.39	9.84	407	860

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### 480V, 60 HZ, Shunt reactor dimensions

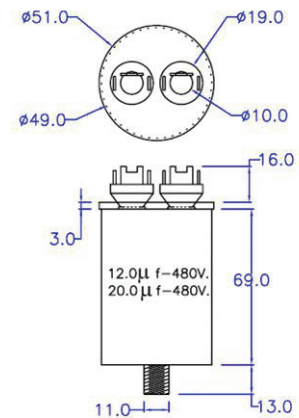
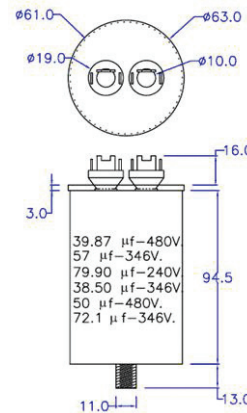
480V, 60Hz HP	Reactor L1-	Width A (in)	Height B (in)	Depth C (in)	Mounting D	Width D'	Mounting E	Depth E'	Weight lb.s	Watts Watts
2	3002	9.06	8.07	4.53	6.93	5.91	2.80	3.54	24	20
4	3005	9.06	8.07	4.53	6.93	5.91	2.80	3.54	24	30
5	3006	9.06	8.07	4.53	6.93	5.91	2.80	3.54	24	30
7.5	3008	9.06	8.07	4.53	6.93	5.91	2.80	3.54	24	50
10	3010	9.06	8.07	4.53	6.93	5.91	2.80	3.54	24	70
15	3011	9.06	8.07	4.53	6.93	5.91	2.80	3.54	24	80
20	3013	9.06	8.07	4.53	6.93	5.91	2.80	3.54	27	90
25	3015	9.06	6.69	5.51	6.93	5.91	3.74	4.49	33	90
30	3018	9.06	8.07	4.53	6.93	5.91	2.80	3.54	29	110
40	3021	9.06	8.07	5.51	6.93	5.91	3.74	4.49	40	130
50	3022	9.06	8.07	5.51	6.93	5.91	3.74	4.49	40	130
60	3025	9.45	8.27	5.51	7.28	5.91	3.66	4.45	42	150
75	3027	9.45	8.27	5.91	7.28	5.91	4.06	4.84	49	170
100	3029	10.43	9.45	6.10	7.87	5.91	4.02	5.20	60	210
125	3030	11.81	10.63	6.69	8.82	5.91	4.68	5.79	82	260
150	3032	11.81	10.63	7.28	8.82	5.91	5.28	6.38	95	280
200	3034	11.81	12.99	7.28	8.82	5.91	5.28	6.38	115	370
250	3035	11.81	12.99	7.28	8.82	5.91	5.28	6.38	121	370
300	3036	14.17	13.98	8.27	10.39	-	6.10	7.20	152	450
350	3038	16.54	16.14	9.06	12.44	-	6.93	8.11	211	560
400	3039	16.54	16.14	9.45	12.44	-	6.93	8.11	220	580
450	3040	16.54	14.96	10.63	12.44	-	8.11	9.29	264	660
500	3042	16.54	16.14	10.24	12.44	-	8.11	9.29	284	700

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### Capacitor, 480V, 60 Hz

i.D. No.	uF	Volts	Dimensions (inches)		
			Dia.	Height	Mtg. Stud
C1-1001	47.9	240	2.00	4.37	.433
C1-1002	79.9	240	2.50	4.37	.433
C1-2001	38.5	346	2.50	4.37	.433
C1-2002	46.1	346	2.50	4.37	.433
C1-2003	57.0	346	2.50	4.37	.433
C1-2004	72.1	346	2.50	4.37	.433
C1-3001	11.9	480	2.00	3.37	.433
C1-3002	19.9	480	2.00	3.37	.433
C1-3003	39.9	480	2.50	4.37	.433
C1-3004	49.9	480	2.50	4.37	.433



### Capacitor Cell Specifications

Capacitance tolerance	+4% / -4%
Maximum voltage	110% of rated AC voltage
Power loss	0.4 watts per KVAR
Dielectric strength	
Terminal to case	2 x rated AC voltage + 1000 volts, for one second
Terminal to terminal	1.75 x rated AC voltage for one second
Construction	Impregnated Metallized Polypropylene (MPP)
Operating temperature	- 40 degrees C to +85 degrees C
Life expectancy	Over 1,000,000 hours at 40 degrees C operation
Agency approval	UL Component Recognized (File # E71645) 39