

## HarmonicGuard™ K-Series

Drive-Applied Harmonic Filters



### PRODUCT SPECIFICATIONS

- UL-Listed (Industrial Control Panel)
- 3 Year Warranty
- Standard kVar: 3 through 300
- Standard Voltages: 208/240/480/575/600V
- Standard Frequencies: 50/60Hz
- Many enclosure options available
- **HG2™ Protection Monitor/ Harmonic-Power Factor meter** standard (above 20 kVar)
- Fuse lights (units 20kVar and below)
- Wall mountable (50kVar and below)
- Vertical aspect ratio (MCC Style) (120 kVar/below)
- **5% KLR Series Reactor** included as standard!

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Rev. Date: 3-98

## Applications

HarmonicGuard™ drive-applied harmonic filters are used where drives are or will be installed, and harmonic reduction is necessary. Prime candidates for filtering are installations of variable frequency drives or adjustable speed devices in facilities where those drives represent a significant portion of the load, or when specifications call for limited harmonics (like IEEE 519, 1992). Filtering would also benefit any application that utilizes sensitive electronic equipment that may be susceptible to harmonic distortion, such as capacitors, control devices, motors, etc. Some industrial examples include printers, extruders, machining and pulp and paper. Commercial applications include waste water treatment, pumping and cooling, and HVAC.

## Before HarmonicGuard™

When nonlinear loads like drives are present in electrical systems in significant percentages, harmonic currents will exist. Harmonic currents flowing through system impedances (i.e. transformers, wires, etc.) cause voltage distortion. In addition, harmonic currents will cause a poor total power factor. Problems such as utility penalties, transformer overheating, distribution equipment overheating, system interaction, sensitive equipment failure, power factor capacitor or fuse failure, motor cogging or overheating, and random breaker tripping may occur. Harmonic mitigation is necessary.

HarmonicGuard™ drive-applied filters have been proven the most effective harmonic distortion mitigation technique available for drives.



## After HarmonicGuard™

HarmonicGuard™ drive-applied harmonic filters (series LC passive filters), when applied at the load, provide a low impedance path for the major harmonic currents demanded by the drive. This greatly reduces the amount of harmonic current flowing through the distribution system and results in improved power factor, lower RMS currents, lower harmonic current distortion, lower harmonic voltage distortion, and increased system capacity.

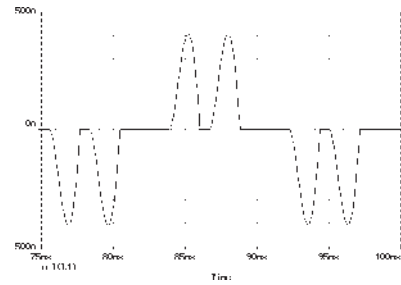
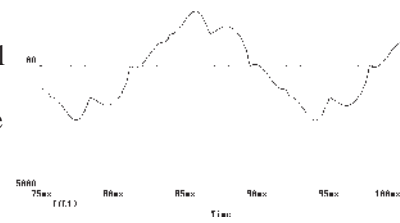


Figure 1 illustrates a typical current waveform and harmonic distortion at the input terminals of an AC-

PWM variable frequency drive. Figure 2 demonstrates the dramatic reduction of harmonic distortion when

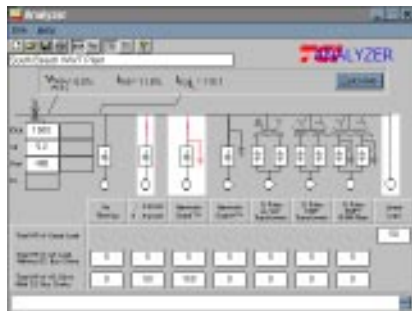
HarmonicGuard™ filters are installed. In a typical industrial facility, where one-half or more of the load may be drives, voltage distortion



may cause sensitive equipment to fail. In commercial/municipal buildings, IEEE-519, 1992 is often a critical requirement of drive systems. HarmonicGuard™ drive-applied harmonic filters allow you to accomplish both!

## Estimating Distortion Reduction

HarmonicGuard™ drive applied filters are commonly used in industrial applications where there are concerns about distortion effecting system integrity. In addition, they are often applied in commercial or municipal buildings where the electrical system must meet specified harmonic limits - like those in IEEE-519, 1992. To know whether your drive installation might require HarmonicGuard™ filters, and what the impact of filters will be, consider estimating the total harmonic distortion of your system using TCI's ANALYZER™ software. It is available on the Internet at [www.transcoil.com](http://www.transcoil.com) or by calling 800-824-8282. Once you have determined that filters are necessary, consider the following application notes:



## K-Series

K-Series filters represent a significant optimization of TCI's HarmonicGuard™ line up. K-series filters are smaller, lighter, and feature-packed. They are designed with a vertical profile, making installation in tight spaces easier. K-Series filters are the first to include the **HG2™ Protection Monitor/Harmonic-Power Factor meter** as standard (over 20kVar).

## Sizing

HarmonicGuard™ filters are applied in increments of kVar. A diode front-end VFD (AC drive) will require 30% of the horsepower in kVar, and an SCR drive (DC drive) will require 40% of its rated horsepower in kVar.

## Options

- Input series impedance improves filter performance, and *eliminates system interaction common to de-tuned power-factor banks*. Therefore, HarmonicGuard™ comes standard with KLR series 5% reactors. If a reactor or drive isolation transformer exists on-site already, option type "N" filters (without an integral reactor) are available.
- Filters come standard in NEMA 1 and are available in NEMA 3R, and in ventilated NEMA 12 enclosures. Open panel units can be designed for your cabinet or MCC. (Contact factory with your special dimensional requirements.)
- HarmonicGuard™ filters may be supplied in "kit" form. Kits include all primary filtering, control and safety components, and special mounting hardware and provisions. Kits do not include panels, enclosures, heating or cooling devices, wire or lugs.
- HarmonicGuard™ filters can be designed with

remote or internal switching of fractional sections of kVar. This may be appropriate when sizing filters to service more than one drive, operating independently. Please consult the factory on switched applications.

- HarmonicGuard™ "Classic" Series, which includes ANSI #61 grey industrial NEMA 1 enclosure and forced-air ventilation, is available. Units over 120 kVar come standard in this configuration. See TCI publication HG CAT, revision date: 9/96, for more information.

### Ratings

HarmonicGuard™ is available in voltages from 208 to 600V, for AC or DC drives, from 3 to 2000 kVar. (300kVar maximum, as standard.) Consult TCI for part number and dimensions for non-standard configurations.

### “+” Option

HarmonicGuard™+ filters provide additional distortion reduction, with an additional 3% KLR reactor, placed in series, between the primary filter and the drive that it services. ANALYZER™ software demonstrates the added benefit of "+" option filters.

### Performance Monitoring

HarmonicGuard™ filters above 20 kVar come standard with TCI's exclusive **HG2™ Protection Monitor/Harmonic-Power Factor meter**. HG2 displays operating information such as ITHD, VTHD, total filter Amps, true power factor, and a series of fault and protection codes including over-current, overvoltage and phase imbalance. It is also a programmable safety monitor, capable of bringing the filter off-line in a fault condition, or when the drive trips.

### Manufacturers Warranty

HarmonicGuard™ is warranted for 3 years from date of purchase.

## Tables

### 480V

Part Number*	480V		Drive Type	Field Terminal Phase Size *	Watts Loss	Standard** Dimensions		
	HP†	KVAR				Height	Width	Depth
KH003A6_5	7.5	3	DC	#4-#18	210	28	17	12
KH003A6_5	10	3	AC	#4-#18	210	28	17	12
KH005A6_5	15	5	AC	#4-#18	250	28	17	12
KH008A6_5	20	8	DC	#4-#18	350	28	17	12
KH008A6_5	25	8	AC	#4-#18	350	28	17	12
KH010A6_5	25	10	DC	#4-#18	370	28	17	12
KH010A6_5	30	10	AC	#4-#18	370	28	17	12
KH015A6_5	40	15	DC	#4-#18	420	28	17	12
KH015A6_5	50	15	AC	#4-#18	425	28	17	12
KH020A6_5	50	20	DC	1/0-#6	555	28	17	12
KH020A6_5	60	20	AC	1/0-#6	555	28	17	12
KH025A6_5	60	25	DC	2/0-#6	650	52	17	16
KH025A6_5	75	25	AC	2/0-#6	650	52	17	16
KH030A6_5	75	30	DC	2/0-#6	785	52	17	16
KH030A6_5	100	30	AC	2/0-#6	785	52	17	16
KH040A6_5	100	40	DC	250MCM-#6	865	52	17	16
KH040A6_5	125	40	AC	250MCM-#6	865	52	17	16
KH050A6_5	125	50	DC	250MCM-#6	920	52	17	16
KH050A6_5	150	50	AC	250MCM-#6	920	52	17	16
KH060A6_5	150	60	DC	600MCM-#4	1110	70	20	20
KH060A6_5	200	60	AC	600MCM-#4	1110	70	20	20
KH080A6_5	200	80	DC	600MCM-#4	1300	70	20	20
KH080A6_5	250	80	AC	600MCM-#4	1300	70	20	20
KH100A6_5	250	100	DC	2 of 250 MCM-#6	1480	70	20	20
KH100A6_5	300	100	AC	2 of 250 MCM-#6	1480	70	20	20
KH120A6_5	300	120	DC	2 of 600 MCM-#2	1620	70	20	20
KH120A6_5	350	120	AC	2 of 600 MCM-#2	1620	70	20	20
3H150A6_5	400	150	DC	SPECIFIED	1900	60	48	20
3H150A6_5	450	150	AC	SPECIFIED	1900	60	48	20
3H200A6_5	500	200	DC	SPECIFIED	1900	72	72	24
3H200A6_5	600	200	AC	SPECIFIED	2000	72	72	24
3H250A6_5	750	250	AC	SPECIFIED	2200	72	72	24
3H300A6_5	800	300	DC	SPECIFIED	3200	72	72	24
3H300A6_5	900	300	AC	SPECIFIED	3200	72	72	24

Tables

**240V**

Part Number*	240V		Drive Type	Field Terminal Wiring Range	Watts Loss	Standard** Dimensions		
	HP†	KVAR				Height	Width	Depth
KH003B6_5	7.5	3	DC	#4-#18	210	28	17	12
KH003B6_5	10	3	AC	#4-#18	210	28	17	12
KH005B6_5	15	5	AC	#4-#18	250	28	17	12
KH008B6_5	20	8	DC	#4-#18	350	28	17	12
KH008B6_5	25	8	AC	#4-#18	350	28	17	12
KH010B6_5	25	10	DC	#4-#18	370	28	17	12
KH010B6_5	30	10	AC	#4-#18	370	28	17	12
KH015B6_5	40	15	DC	#4-#18	420	52	17	16
KH015B6_5	50	15	AC	#4-#18	425	52	17	16
KH020B6_5	50	20	DC	1/0-#6	555	52	17	16
KH020B6_5	60	20	AC	1/0-#6	555	52	17	16
KH025B6_5	60	25	DC	2/0-#6	650	52	17	16
KH025B6_5	75	25	AC	2/0-#6	650	52	17	16
KH030B6_5	75	30	DC	2/0-#6	785	52	17	16
KH030B6_5	100	30	AC	2/0-#6	785	52	17	16
KH040B6_5	100	40	DC	250MCM-#6	865	70	20	20
KH040B6_5	125	40	AC	250MCM-#6	865	70	20	20
KH050B6_5	125	50	DC	250MCM-#6	920	70	20	20
KH050B6_5	150	50	AC	250MCM-#6	920	70	20	20
3H060B6_5	150	60	DC	600MCM-#4	1110			
3H060B6_5	200	60	AC	600MCM-#4	1110			
3H080B6_5	200	80	DC	600MCM-#4	1300			
3H080B6_5	250	80	AC	600MCM-#4	1300			
3H100B6_5	250	100	DC	2 of 250 MCM-#6	1480			
3H100B6_5	300	100	AC	2 of 250 MCM-#6	1480			

Contact factory for dimensional information

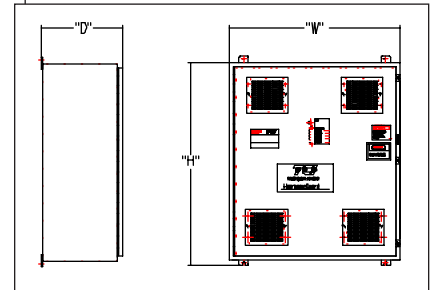
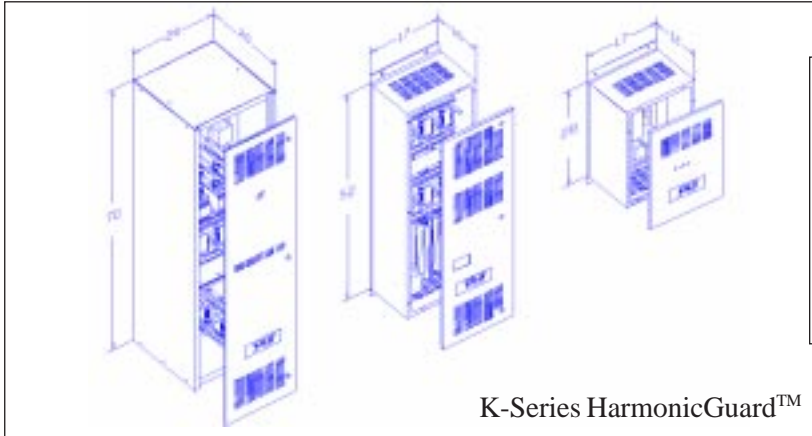
**575V**

Part Number*	575V		Drive Type	Field Terminal Phase Size *	Watts Loss	Standard** Dimensions		
	HP†	KVAR				Height	Width	Depth
KH003F6_5	7.5	3	DC	#4-#18	210	28	17	12
KH003F6_5	10	3	AC	#4-#18	210	28	17	12
KH005F6_5	15	5	AC	#4-#18	250	28	17	12
KH008F6_5	20	8	DC	#4-#18	350	28	17	12
KH008F6_5	25	8	AC	#4-#18	350	28	17	12
KH010F6_5	25	10	DC	#4-#18	370	28	17	12
KH010F6_5	30	10	AC	#4-#18	370	28	17	12
KH015F6_5	40	15	DC	#4-#18	420	28	17	12
KH015F6_5	50	15	AC	#4-#18	425	28	17	12
KH020F6_5	50	20	DC	1/0-#6	555	28	17	12
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KH025F6_5	60	25	DC	2/0-#6	650	52	17	16
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KH030F6_5	75	30	DC	2/0-#6	785	52	17	16
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KH040F6_5	100	40	DC	250MCM-#6	865	52	17	16
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KH050F6_5	150	50	AC	250MCM-#6	920	52	17	16
KH060F6_5	150	60	DC	600MCM-#4	1110	70	20	20
KH060F6_5	200	60	AC	600MCM-#4	1110	70	20	20
KH080F6_5	200	80	DC	600MCM-#4	1300	70	20	20
KH080F6_5	250	80	AC	600MCM-#4	1300	70	20	20
KH100F6_5	250	100	DC	2 of 250 MCM-#6	1480	70	20	20
KH100F6_5	300	100	AC	2 of 250 MCM-#6	1480	70	20	20
KH120F6_5	300	120	DC	2 of 600 MCM-#2	1620	70	20	20
KH120F6_5	350	120	AC	2 of 600 MCM-#2	1620	70	20	20
3H150F6_5	400	150	DC	SPECIFIED	1900	60	48	20
3H150F6_5	450	150	AC	SPECIFIED	1900	60	48	20
3H200F6_5	500	200	DC	SPECIFIED	1900	72	72	24
3H200F6_5	600	200	AC	SPECIFIED	2000	72	72	24
3H250F6_5	750	250	AC	SPECIFIED	2200	72	72	24
3H300F6_5	800	300	DC	SPECIFIED	3200	72	72	24
3H300F6_5	900	300	AC	SPECIFIED	3200	72	72	24

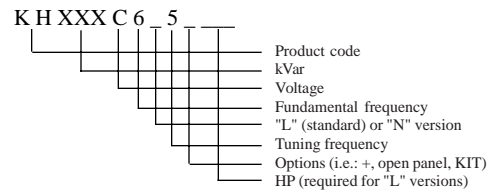
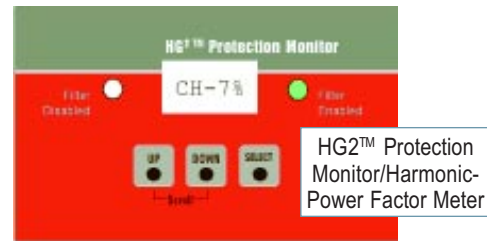
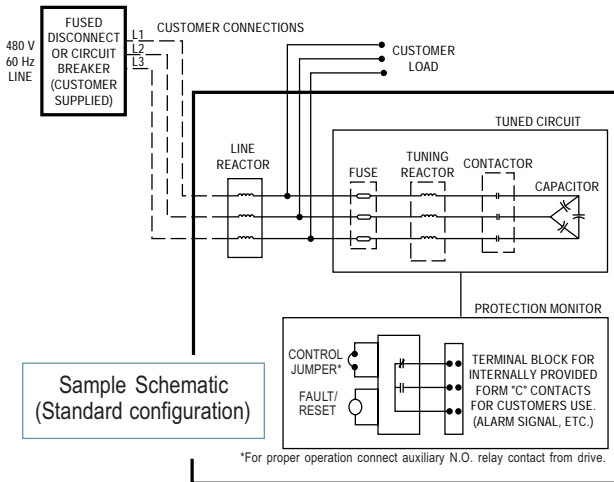
\*The information contained in this brochure is subject to change without notice.

\*\* Actual dimensions may vary. Please contact factory for certified dimensional drawings for submittal and system design purposes.

## Drawings/Codes



**HarmonicGuard™ Classic\***



## Options and Codes

### Product Code:

- K(H) = K Series
- 3(H) = Classic Series

### Voltage:

- A = 480 (standard)
- B = 240
- C = 600
- D = 208
- F = 575

### Fundamental Frequency:

- 6 = 60 Hz (standard)
- 5 = 50 Hz
- 4 = 400 Hz

### Reactor:

- L = Standard With Line Reactor (add HP to end of part number)
- N = Without Line Reactor (for applications with 5% Z reactor or transformer already in system)

### Cabinets:

- A = NEMA 1 (standard)
- B = Open Panel Construction
- C = NEMA 3R
- D = NEMA 12 (includes air conditioner)
- X = Stainless steel

### Protection Options:

- HG2 protection monitor >20kVar/fuse lights 20 kVar and under (standard)

### Additional Options:

- "+" option (additional KLR reactor included)
- Circuit Breaker or Disconnect Switch (filter or line side)
- Var Controlled
- Other Special Cabinet or Paint
- With heater for moisture control
- PLC Options (Programmable Control Logic)
- Others (consult TCI)

### Tuning Frequency Options:

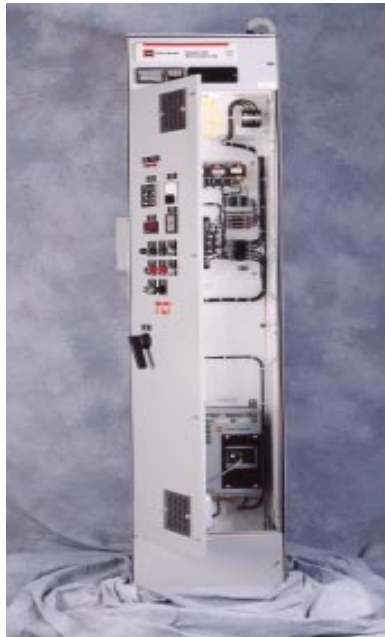
- 5 = Standard 5th-tuned filter
- 11 = Tuned filter for 12-pulse (kVar. = 0.1 HP)



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# HarmonicGuard™ K-Series Filters



\* HarmonicGuard™ "Classic"

The "K" is for knowledge,  
and these filters are just plain smart.

