



Harmonics Limited

Powerful Protection from Harmful Harmonics

POWER ANALYSIS REPORT

Report:

Date:	February, 2000	
Customer/Location:	Internet Data Center, Fort Lauderdale, FL	
<u>UPS/XFMR</u> Loading:	>70 % Non-Linear	
Type Of Loads: (Check all that apply)	<input type="checkbox"/> 1Ø Adjustable Speed Drives <input checked="" type="checkbox"/> 1Ø Personal Computers <input checked="" type="checkbox"/> 1Ø Printers <input type="checkbox"/> 1Ø Copy Machines <input type="checkbox"/> 1Ø Lighting Dimmers <input type="checkbox"/> 1Ø Misc. Office Loads	<input type="checkbox"/> 3Ø Adjustable Speed Drives <input type="checkbox"/> 3Ø UPS <input type="checkbox"/> 3Ø Medical Equipment <input type="checkbox"/> 3Ø Battery Chargers <input type="checkbox"/> 3Ø Electro Plating Devices
Facility:	Office Building	
Voltage:	208/120	




Data Readings:

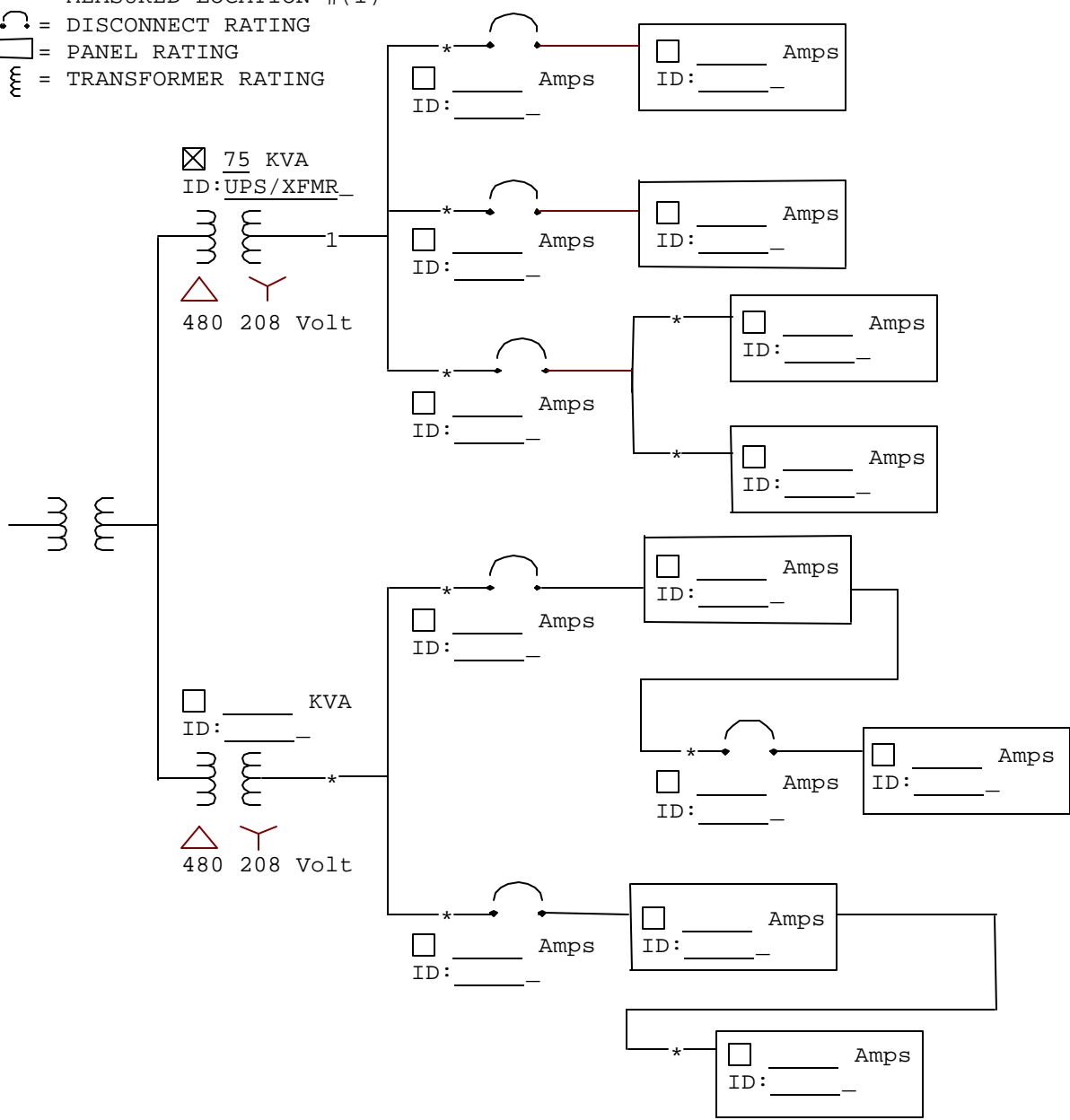
<u>No Filter:</u>		<u>Filter:</u>	
Date:	21-Oct-99	Date:	10-Feb-00
Instrument:	Fluke41	Instrument:	Fluke41

These are the problems being experienced:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Need More System Capacity | <input checked="" type="checkbox"/> High Neutral Harmonics |
| <input type="checkbox"/> Transformer Failure | <input checked="" type="checkbox"/> High Neutral Current |
| <input type="checkbox"/> Wire Overheating | <input checked="" type="checkbox"/> High Downtime Cost |
| <input type="checkbox"/> Transformer Overheating | <input type="checkbox"/> Tripping Circuit Breaker |
| <input type="checkbox"/> Other: | |

Location Of Readings (One-line):

- = CHECKED IF THIS LOCATION EXISTS
- * = MEASURED LOCATION #(1)
-  = DISCONNECT RATING
-  = PANEL RATING
-  = TRANSFORMER RATING

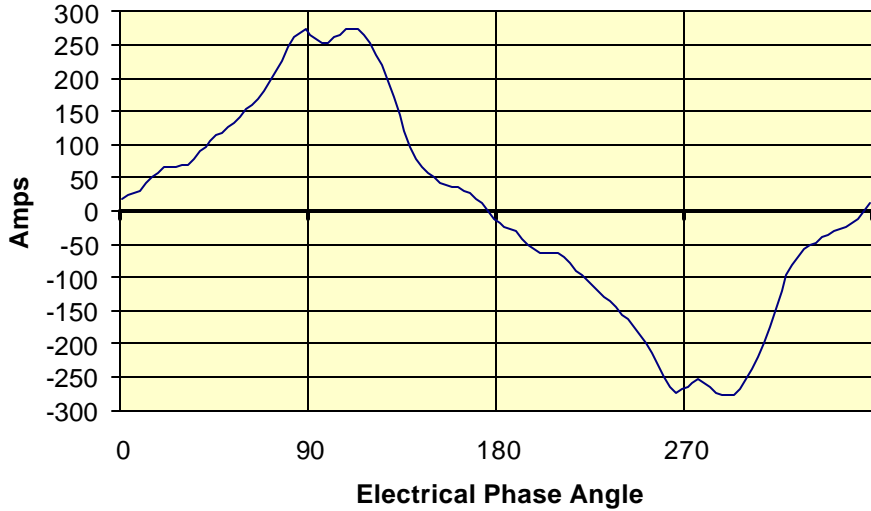


Special Notes On Application/Location Of Instrument:

75 KVA UPS Transformer. Report Phase A=Black, B=Blue, C=Red.

UPS/XFMR, PHASE A, CURRENT WAVEFORM:

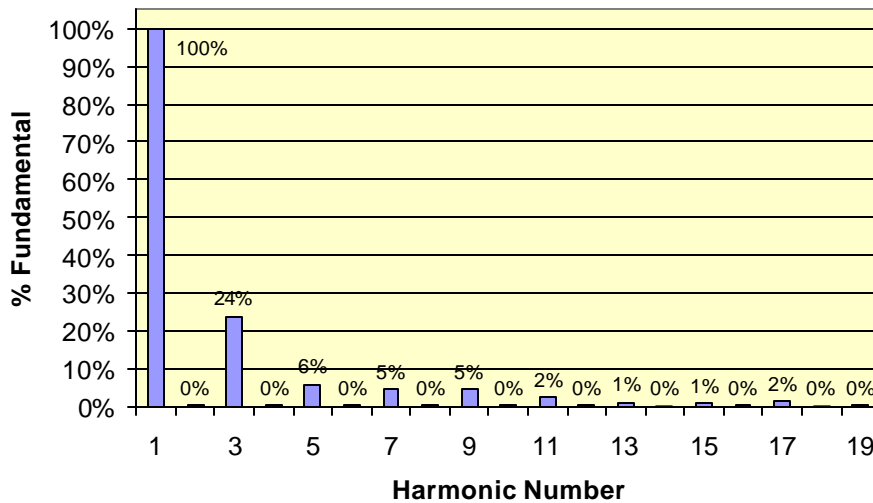
No Filter Current Waveform



Special Notes
During Readings:

UPS/XFMR, PHASE A, HARMONIC CURRENT SPECTRUM:

No Filter Harmonic Current Spectrum

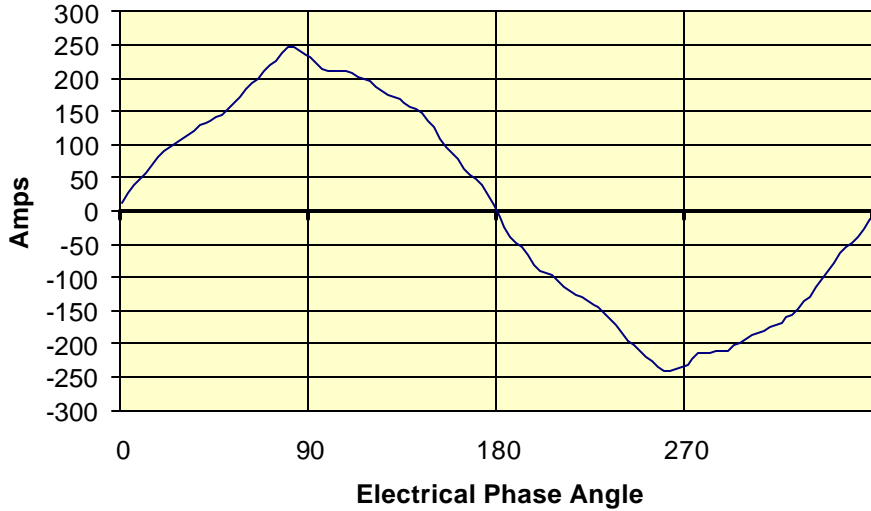


Special Notes
During Readings:

The 60 Hz Current = 161 amps. The rms current = 167 amps. The rms harmonic current = 41 amps; this is 26% of the fundamental current.

UPS/XFMR, PHASE A, CURRENT WAVEFORM:

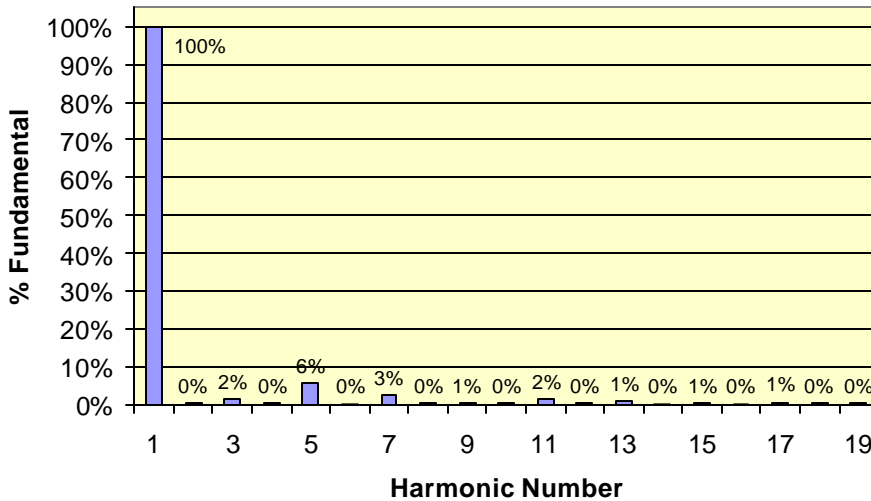
Filter Current Waveform



Special Notes During Readings:

UPS/XFMR, PHASE A, HARMONIC CURRENT SPECTRUM:

Filter Harmonic Current Spectrum

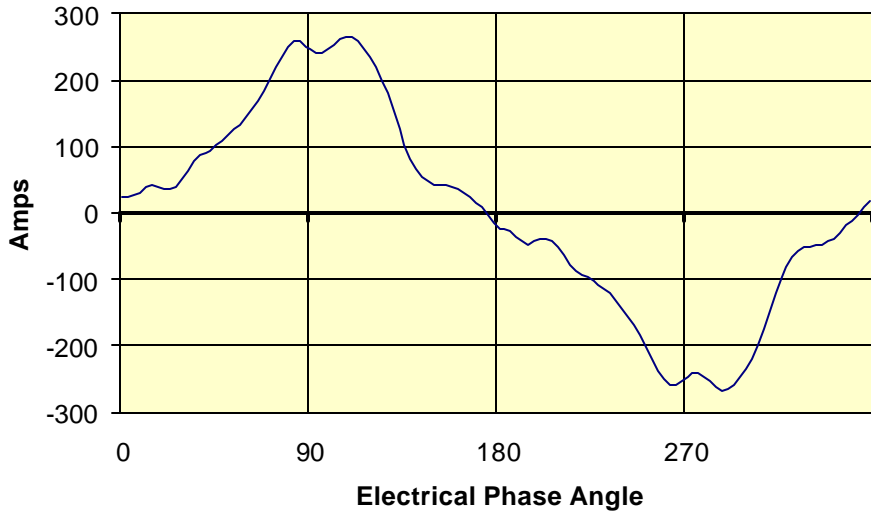


Special Notes During Readings:

The 60 Hz Current = 163 amps, more loads have been added since the original readings. The rms current = 163 amps, a reduction of 2%. The rms harmonic current = 11 amps; this is 7% of the fundamental current. Use of the filter results in a 74% reduction of the rms harmonic current.

UPS/XFMR, PHASE B, CURRENT WAVEFORM:

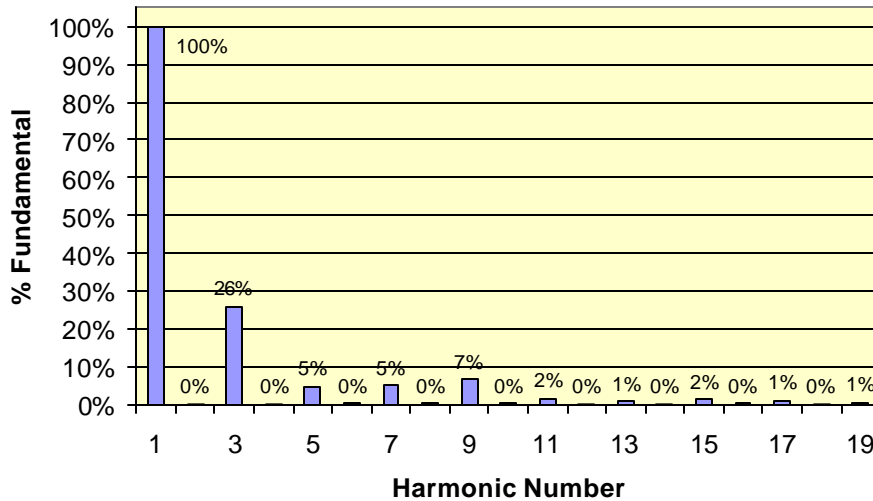
No Filter Current Waveform



Special Notes During Readings:

UPS/XFMR, PHASE B, HARMONIC CURRENT SPECTRUM:

No Filter Harmonic Current Spectrum

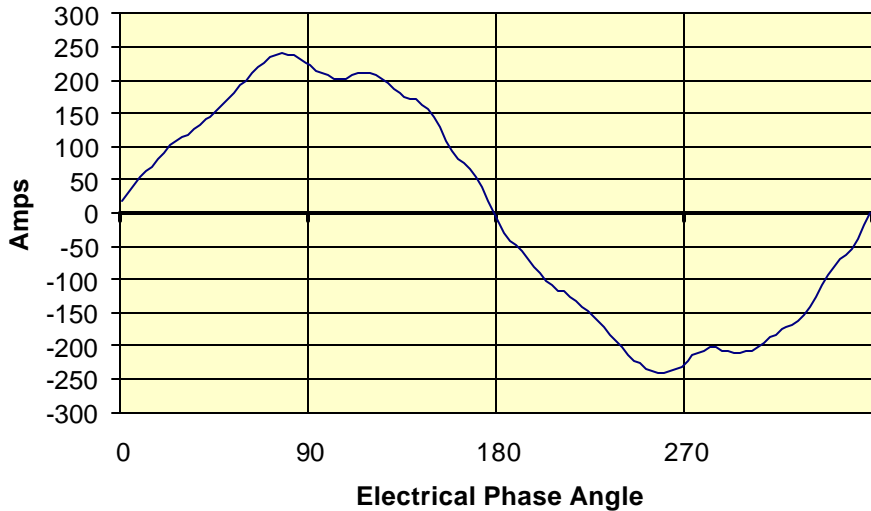


Special Notes During Readings:

The 60 Hz Current = 152 amps. The rms current = 158 amps. The rms harmonic current = 42 amps; this is 28% of the fundamental current.

UPS/XFMR, PHASE B, CURRENT WAVEFORM:

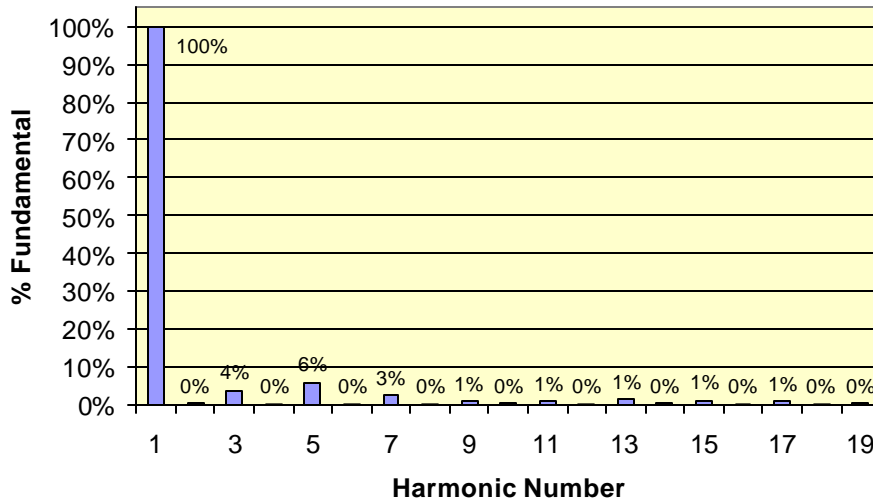
Filter Current Waveform



Special Notes During Readings:

UPS/XFMR, PHASE B, HARMONIC CURRENT SPECTRUM:

Filter Harmonic Current Spectrum

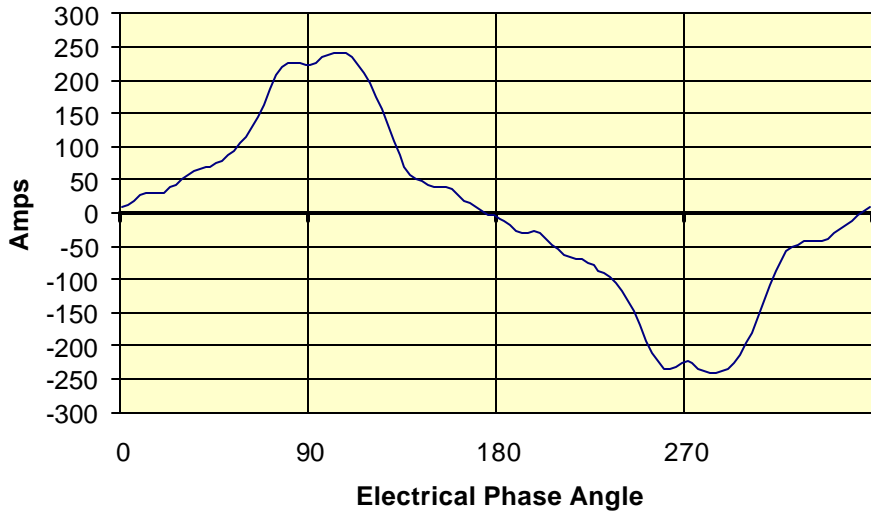


Special Notes During Readings:

The 60 Hz Current = 170 amps, more loads have been added since the original readings. The rms current = 170 amps. The rms harmonic current = 13 amps; this is 8% of the fundamental current. Use of the filter results in a 68% reduction of the rms harmonic current.

UPS/XFMR, PHASE C, CURRENT WAVEFORM:

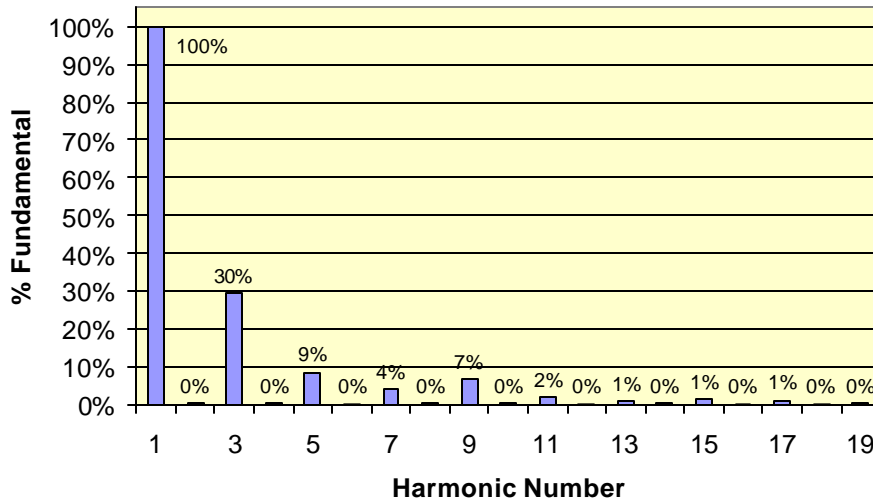
No Filter Current Waveform



Special Notes
During Readings:

UPS/XFMR, PHASE C, HARMONIC CURRENT SPECTRUM:

No Filter Harmonic Current Spectrum

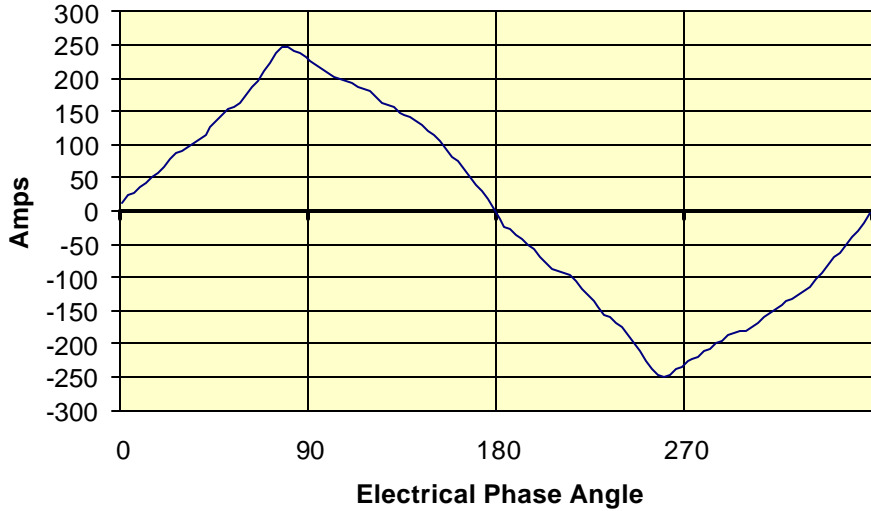


Special Notes
During Readings:

The 60 Hz Current = 133 amps. The rms current = 139 amps. The rms harmonic current = 42 amps; this is 32% of the fundamental current.

UPS/XFMR, PHASE C, CURRENT WAVEFORM:

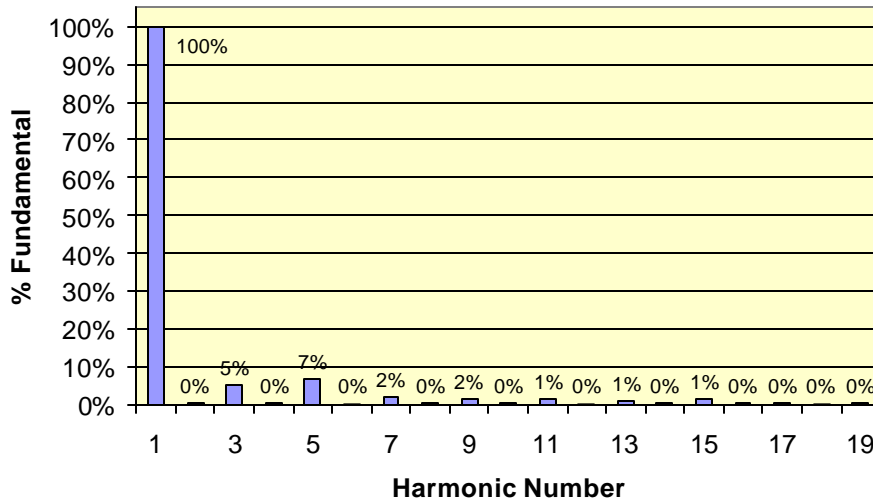
Filter Current Waveform



Special Notes During Readings:

UPS/XFMR, PHASE C, HARMONIC CURRENT SPECTRUM:

Filter Harmonic Current Spectrum

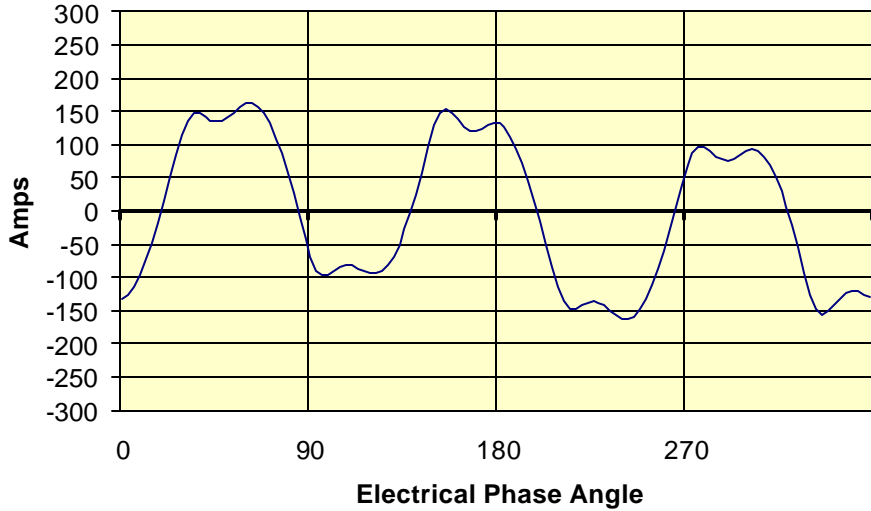


Special Notes During Readings:

The 60 Hz Current = 155 amps, more loads have been added since the original readings. The rms current = 156 amps. The rms harmonic current = 14 amps; this is 9% of the fundamental current. Use of the filter results in a 68% reduction of the rms harmonic current.

UPS/XFMR, NEUTRAL, CURRENT WAVEFORM:

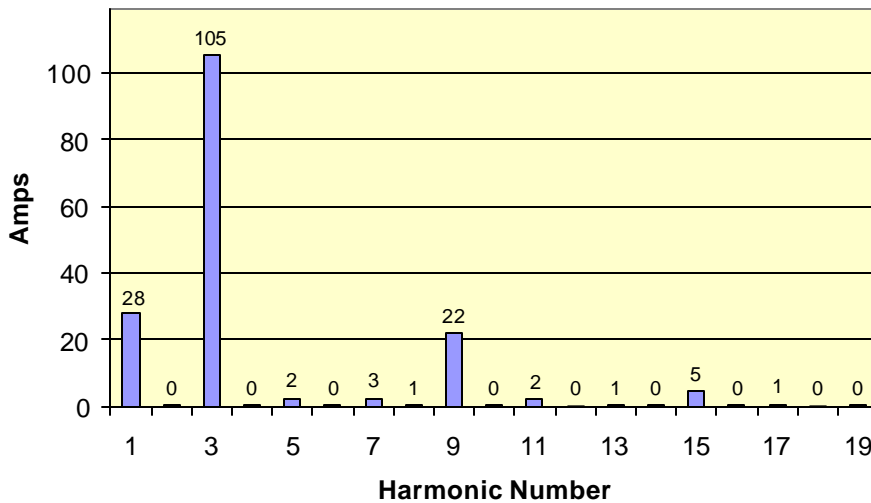
No Filter Current Waveform



Special Notes
During Readings:

UPS/XFMR, NEUTRAL, HARMONIC CURRENT SPECTRUM:

No Filter Harmonic Current Spectrum

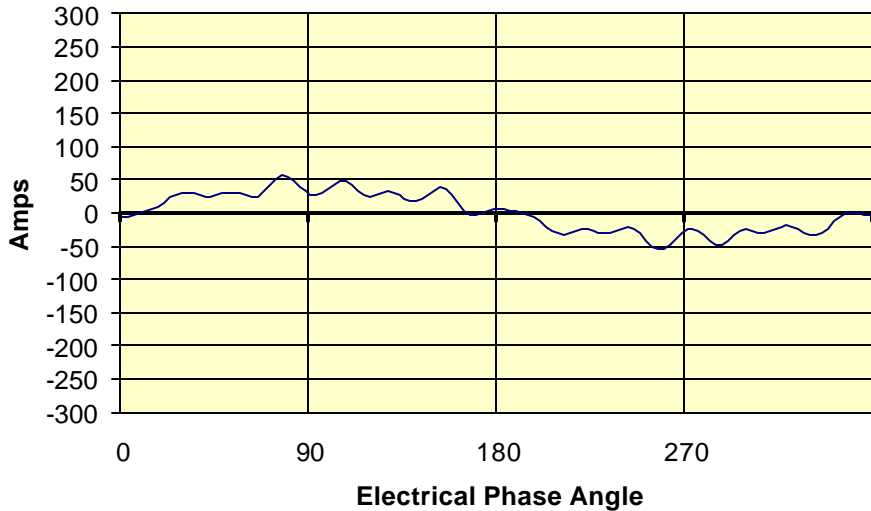


Special Notes
During Readings:

The 60 Hz Current = 28 amps. The rms current = 111 amps. The 3rd harmonic current = 105 amps. The rms harmonic current = 108 amps.

UPS/XFMR, NEUTRAL, CURRENT WAVEFORM:

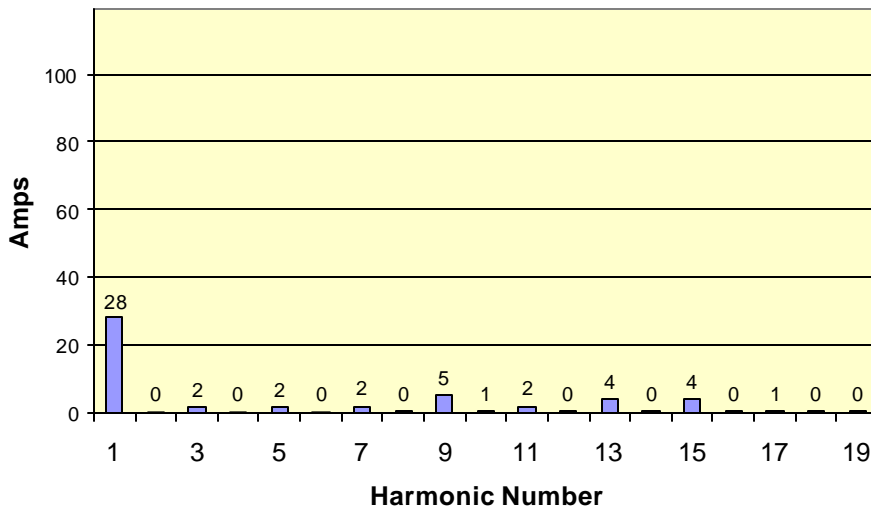
Filter Current Waveform



Special Notes
During Readings:

UPS/XFMR, NEUTRAL, HARMONIC CURRENT SPECTRUM:

Filter Harmonic Current Spectrum



Special Notes
During Readings:

The 60 Hz Current = 28 amps. The rms current = 30 amps. The 3rd harmonic current = 2 amps, this is a 99% reduction in the 3rd harmonic. The rms harmonic current = 9 amps. Use of the filter results in a 92% reduction of rms harmonic current.

The “No Filter” test results indicate the following areas of concern:

Typical high 3rd order harmonics, combining in the neutral, creating high neutral current.

Harmonics Limited makes the following recommendations:

The Harmonics Limited Neutralizer product will greatly reduce or remove 3rd harmonic current, resulting in neutral current being significantly reduced.

The “Filter” test results indicated the following improvements:

The neutral 3rd harmonic current went from 111 amps to 2 amps, a 99% reduction.