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How Using Solid State Phase Conversion Saves Money and Runs Equipment Safely Without Risk of Overheating or Damage

PHASEPERFECT®
Digital Phase Converter

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Published October 10, 2019

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Introduction

In the summer of 1999 the founder of Phase Technologies was working in his machine shop and was plagued by equipment overload trips. Larry wasn't running the equipment anywhere near its design limitations. Upon analyzing his rotary phase converter he noticed that while the power was balanced when the converter was lightly loaded as power draw increased or fluctuated the converter was incapable of maintaining balanced power.

The answer to this power quality problem and the inefficiency that comes with this style of phase converter wasn't simple, but Phase Technologies was able to solve it with the invention of the Phase Perfect, the world's only solid state phase converter.

The Problem: Unbalanced Power As The Load Varies

Rotary converters function as three phase power generators, but can't react to changes in load. In figures one and two it can be observed that balance changes from a balance of +/- 3.3%, Figure 1, 20 amp load to +/- 53% 32 amp load.

Figure 1: 10 HP rotary, 20 A (3.2% unbalance)

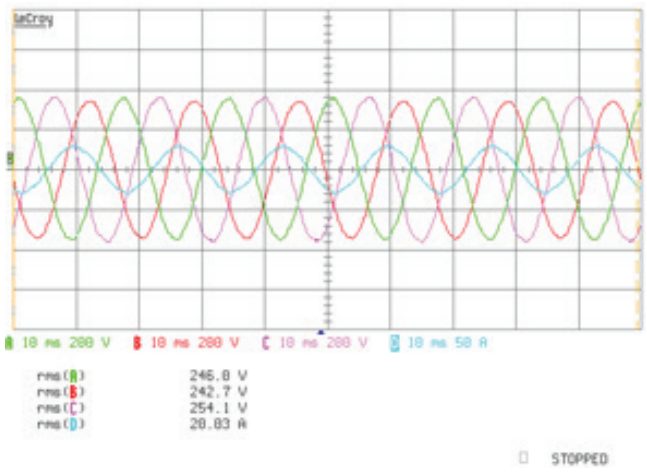
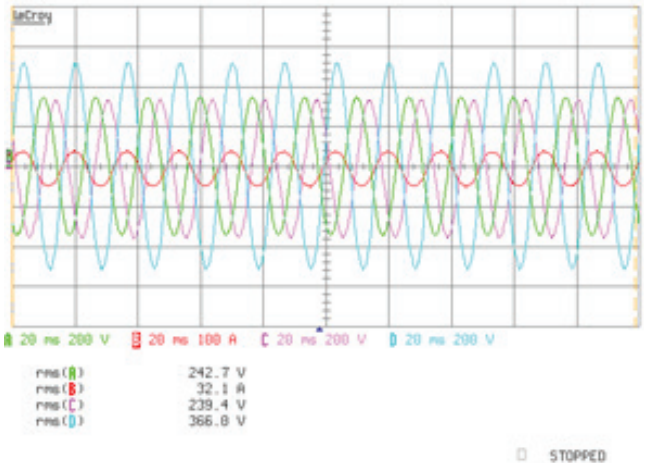


Figure 2: 10 HP rotary with 32 A (50.8% unbalance)



The Solution

The Phase Perfect® Digital Phase Converer can react in milliseconds to changes in demand and continuously rebalance power under all load conditions. With the same test scenario the results are clear.

Figure 3 demonstrates the Phase Perfect® PT007 system with a 20 amp load and Figure 4 demonstrates the voltage balance of the PT007 with a 32 amp load.

Figure 3: 7 HP Phase Perfect®, 20 A load (0.8% nbalance)

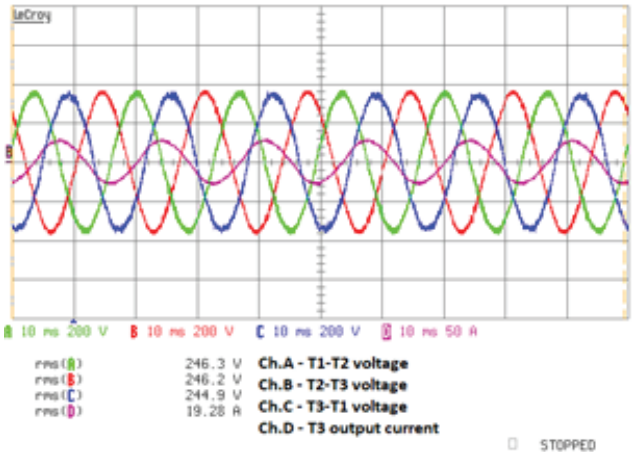
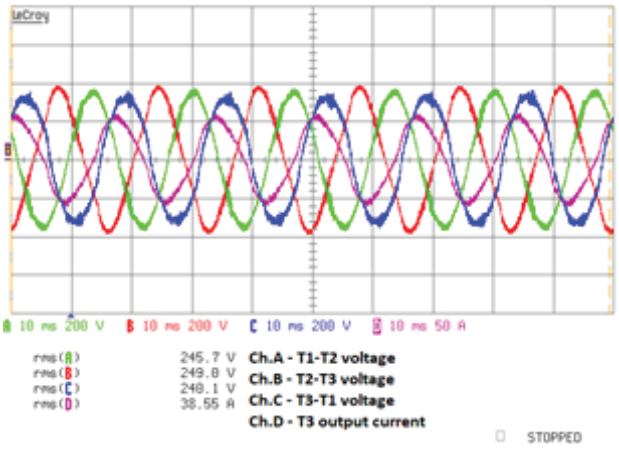


Figure 4: 7 HP Phase Perfect®, 38 A Load (2% unbalance)



Conclusion

Power quality is a requirement of most modern equipment to maintain the manufacturer's warranty and allow the equipment to operate as designed. In addition to unmatched power quality the Phase Perfect® operates at only 87 W of standby loss and is 98.7% efficient under load. Compared to a rotary converter, this equates to an estimated annual savings of $449/ year for a 20 HP system.

Figure 5: Phase Perfect® Digital Phase Converter versus rotary phase converter

Significant Cost Savings

Machine Shop Installation

The Phase Perfect® Savings vs. Rotary

$ 449 / year

Assumptions	PHASE PERFECT® Digital Phase Converter	Rotary Converter Equivalent
Starting Load Horsepower	20 HP	40 HP*
Power Requirement	240V | 49 A 3-ph Delta	240V | 49 A 3-ph Delta
Estimated Run Time	50 Weeks / Year 6 Hours / Day | 5 Days / Week	
Standby Time	4 Hours / Day	
Standby Power	87 W	1420 W
Efficiency	98.7%	87%
Cost Per kw/hr	$0.12	$0.12
Total Cost To Run	**$2,154**	**$2,603**

**Note: The Phase Perfect® does NOT require oversizing. This data is comparing a rotary converter capable of starting a 20 HP load.*

A rotary phase converter requires a 40 HP idler motor to start a 20 HP load.

HVAC / Elevator Installation

The Phase Perfect® Savings vs. Rotary

$1,447 / year

Assumptions	PHASE PERFECT® Digital Phase Converter	Rotary Converter Equivalent
Starting Load Horsepower	20 HP	40 HP*
Power Requirement	240V | 49 A 3-ph Delta	240V | 49 A 3-ph Delta
Estimated Run Time	52 Weeks / Year 4 Hours / Day | 7 Days / Week	
Standby Time	20 Hours / Day	
Standby Power	87 W	1420 W
Efficiency	98.7%	87%
Cost Per kw/hr	$0.12	$0.12
Total Cost To Run	**$2,163**	**$3,610**