ENERGY SOLUTIONS PLUS, LLC

ElectroFlow™ System Operation Report

Presented to:

Pepsi Beverages Company
Pepsi Honolulu

99-1325 Halawa Valley Street, Aiea, HI 96701-3290

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Project #: 41001
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Executive Summary

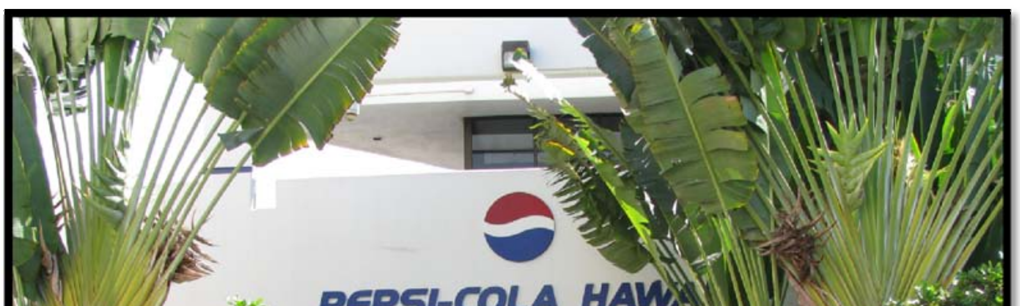
The purpose of this document is to quantify the impact of having ElectroFlow™ systems operational for a 9 month period at the Pepsi bottling facility in Honolulu, Hawaii. The original purpose of this installation was to show the potential for energy savings at Pepsi facilities worldwide. The surprising result was the amount of downtime reduction and repair cost savings.

ESP installed the ElectroFlow™ system on 10/10/2010 at 8 locations throughout the Aiea facility. These locations ranged from bottling line operations to the ammonia compressors.

Significant savings have been realized at the plant with a 94% drop in variable frequency drive replacements. This has saved and average of 5 maintenance hours per month which comes to 45 hours over the 9 month period the ElectroFlow system have been in place and increased the production potential by 45 hours.

On-off testing of the ElectroFlow equipment showed an average 18.5% of kW demand reduction plant wide due to a combination of savings and load fluctuations. This is a very significant number that we do not see often in this high range when doing installations of the ElectroFlow equipment.

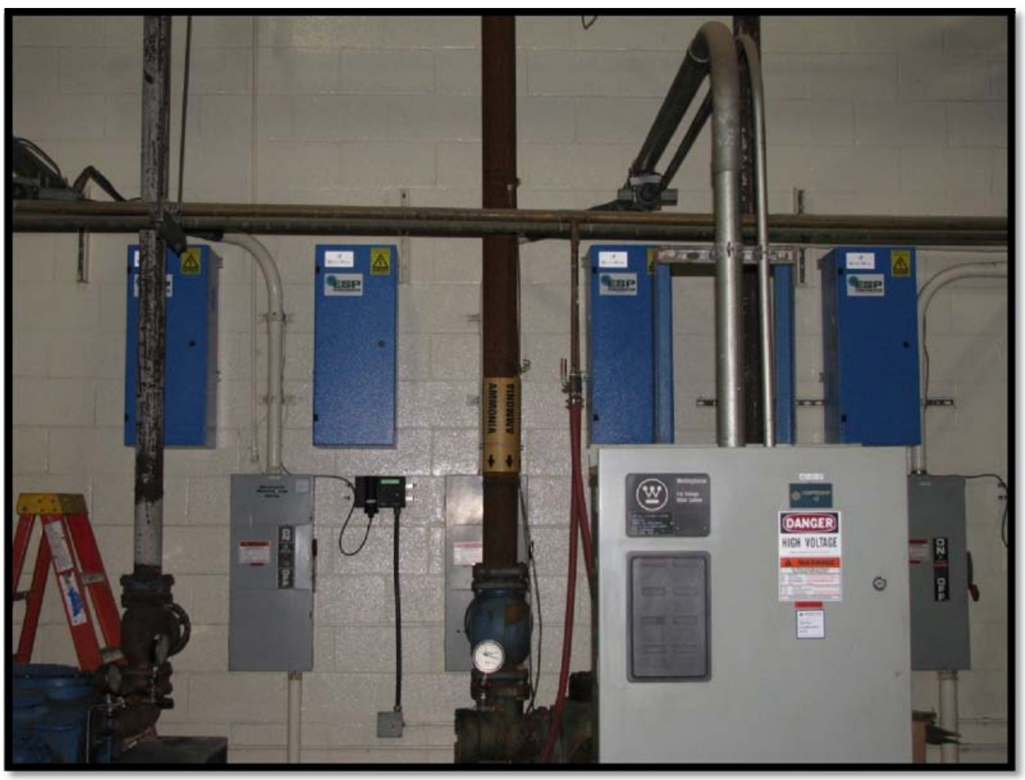
In summary we believe the ElectroFlow equipment is a wise investment for Pepsi and will pay off many times fold in future years.



Power Quality Facts

Power conditioning equipment consist of electromechanical and/or electronic components connected to an electrical system to provide stabilized electrical characteristics for the supply voltage and current to prevent utilization equipment from malfunction, and to reduce overall power consumption by reducing the line losses from distribution transformers, conductors, and distribution equipment. This paper will touch on the theory and function of our ElectroFlow power conditioning systems.

Power quality problems are most likely to be caused by the utilization equipment within the facility or a neighboring operation with utilization equipment that has no protection. In some cases, there may be deteriorating power distribution lines, transformers, and connections and may be part of a more serious problem. Only by testing the power supply to a facility can this be determined.



How Power Quality Equipment Works

By utilizing the poor power factor of the inductive and non-linear loads present in the distribution system, and with the use of today's enhanced tank circuit technology, the object is to draw into the tank circuits, the current flowing through the distribution system at a point closest to the utilization equipment as possible.

Although this is not a new concept, the inherent electrical properties will cause the magnetizing current of the motor or other equipment to flow in and out of the tank circuits and through the electro-mechanical and electronic components of the system, thereby allowing us to manipulate the waveform of the power and correct the unwanted harmonic distortion, and increase or decrease the voltage present on each phase of power until the perfect balance is attained. Electrical systems with very high power factor (above .92%) will save some energy with the filtering equipment, although not enough to accurately calculate and guarantee, and will have much reduced effects on the harmonic mitigating capacity of the filter technology.

In these instances, direct inline custom sized reactors, and harmonic mitigating transformers must be installed where high harmonic loads are present. Energy savings are still prevalent with this situation due to the fact that more savings are possible from harmonic mitigation than from power factor correction alone unless the utility charges a penalty for low power factor.

Passive systems such as ours are very cost effective and offer very low potential to disrupt operations because they are connected in parallel to the supply and can be readily disconnected from the system in the event of a major component failure until replacement parts are installed. Since the system components are modular, rarely does any equipment failure cause the system to be offline. The individual stage with a failure will simply go offline and another stage will come online to maintain the system's ability to function at designed capability. Series connected components such as our custom inline reactors and phase synthesizers are typically controlled with automatic bypass controls to reduce the likelihood of an equipment failure, causing loss of production or use of the affected circuit.

By way of reduction in flowing harmonic current, balanced voltage, near unity power factor, coupled with the reduction in I^2R (energy loss due to heating effect of conductors) energy savings can be substantial with today's rates. In addition to the energy savings, substantial additional significant power quality improvements are inherently affected upon the distribution system as well.

Pepsi Honolulu, HI Installation

A total of eight ElectroFlow devices were installed at the bottling plant. Three on what is defined as the "new main" which provides power to the bottling lines. And five on what is defined as the "old main" which provides power to the ammonia compressors. Installation details and diagrams can be found in appendix B. The ElectroFlow units went live on 10/10/2010 and have been in operation since that date.

Operating Data/ Results

February Site Visit

On 2/11/2011 ESP technicians visited the facility to check on the operation of the equipment. Normal operation of equipment was observed via voltage, amperage and temperature readings within each ElectroFlow™ enclosure. Recorded data can be found in appendix E.

ElectroFlow™ equipment on/off instantaneous testing results:

Old Main:

kW dropped 17% when the ElectroFlow™ equipment was engaged.

Voltage, Current and PF are much more stable with ElectroFlow on.

New Main:

kW dropped 20% when the ElectroFlow™ equipment was engaged. During the test the load suddenly reduced which likely means some equipment went offline during the test.

There is a degree of variability (in short testing) in plant equipment that will occur while the ElectroFlow™ equipment is engaged, so we can only compare Voltage and Current stability within the variability factor limitations within a short test. More comprehensive testing and analysis of kW/kWh reduction is contained within the separate, independent, long term energy reduction analysis and report which is being performed by Respecs.

Harmonic distortion is the change in the waveform of the supply voltage from the ideal sinusoidal waveform. It is caused by the interaction of distorting customer loads with the impedance of the supply network. Its major adverse effects are the heating of induction motors, transformers and capacitors and the overloading of neutrals. Power factor correction capacitors can amplify harmonics to unacceptable values in the presence of harmonic distortion. Standards specify the major harmonic voltages which can occur on the network, 5% total harmonic distortion being typical. A number of harmonic mitigation techniques are listed to be used where the limits in the standards are exceeded.

With that said here are on-off harmonics test conducted on 2/11:

Old Main:

Test 1
Off 6.3% Total Harmonic Distortion
On 0.9% Total Harmonic Distortion

Test 2
Off 5.8% Total Harmonic Distortion
On 0.6% Total Harmonic Distortion

New Main:

Test 1
Off 20.1% Total Harmonic Distortion
On 1.6% Total Harmonic Distortion

Test 2
Off 16.4% Total Harmonic Distortion
On 0.7% Total Harmonic Distortion

September 14 2011 Electrical Readings

We went back into the plant today to check on the current effectiveness of our systems. Here are the excellent readings we recorded.

Old Main

Unit Off 750 amps

Unit On 625 amps

Total Harmonic Distortion (THD) 1.6% volts 4.0% on current

New Main

Unit Off 773

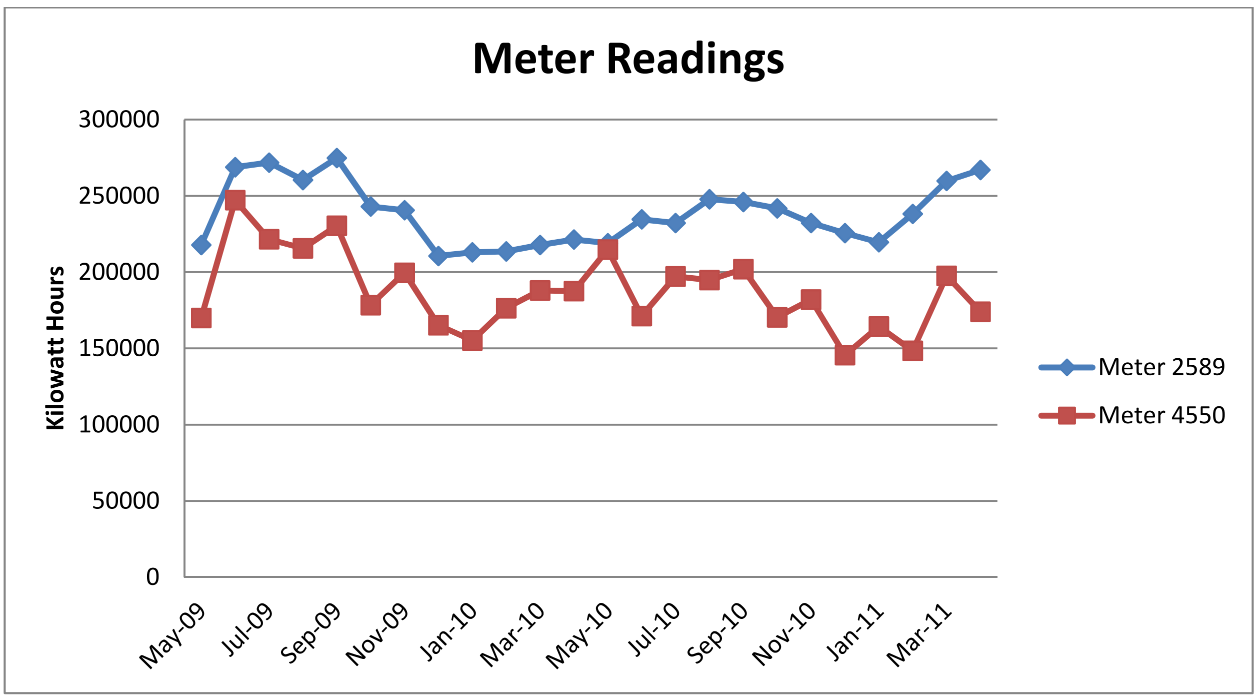
Unit On 637

Total Harmonic Distortion (THD) 1.8% volts and 8-17% on current

Electrical Usage

A years' worth of electrical bills were provided to us which include pre and post installation data. The chart below shows no savings thus far in kilowatt hours. This undoubtedly caused by the increased production time, since there is less downtime from trips to the system and for maintenance and repair of the failures. This presumption is being confirmed by a third party analysis of the plants electrical usage utilizing this billing data, production reports and weather data.

Utility Billing Structure: The current Hawaiian rate structure for PBG is based on both KWD and KWH. This is normal in most US utility service areas. However, Hawaii does deviate from the norm as it pertains to "how" delivery charge is determined. KWH are billed as power is consumed, but KWD is set at a "billed" rate vs. a "metered" rate. Pepsi's billed rate is determined by an average or pre-agreed upon level. This level is reset annually based upon the preceding year, or via contract agreement.



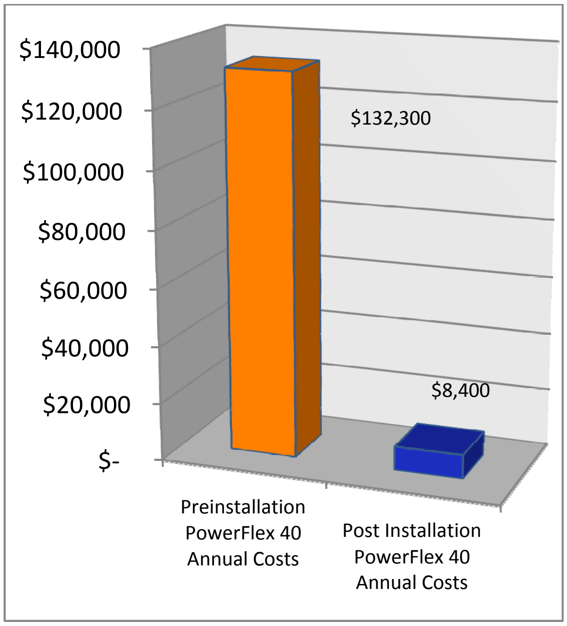
Performance Incidents

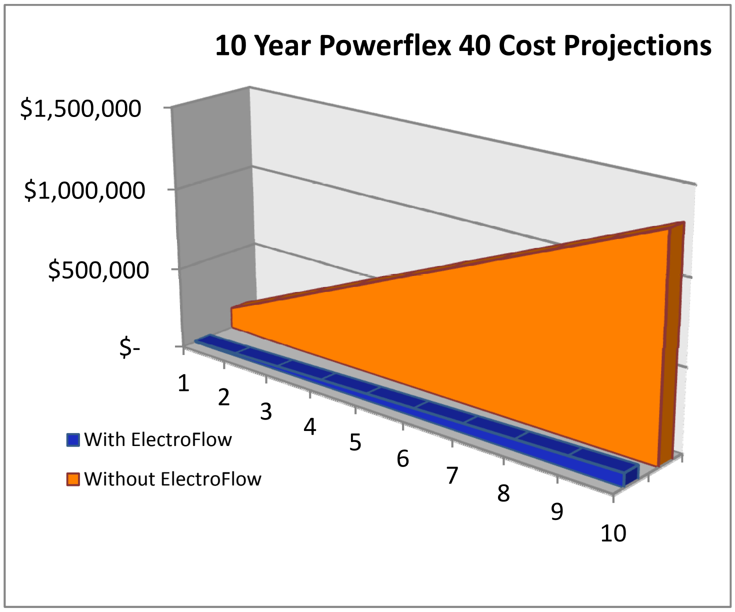
Performance incidents are events of note that happened during the course of using the ElectroFlow™ system.

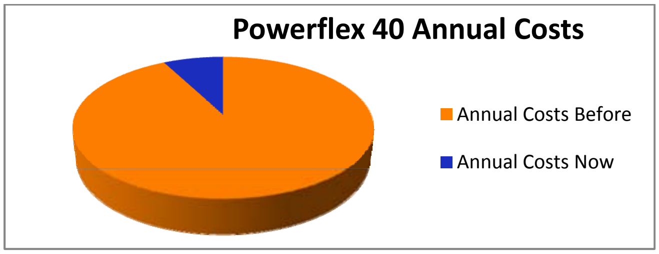
Bottling Line Powerflex 40 VFD's

Prior to the installation of EletroFlow,™ the bottling line experienced a consistent failure rate of Poweflex 40 VFD's of 2 to 5 failures per week. Post installation that number has dropped to 1 VFD failures per month. This means there is very substantial savings on equipment cost ($700 per VFD), maintenance cost, and downtime costs. It takes 20 minutes to change out a bad VFD and the entire bottling line is down during that period.

VFD's are one of the primary causes of dirty power as well as one of the primary victims of that dirty power. To do their job they chop up the incoming sine waves on the phases in order to run electric motors at various speeds or frequencies in order to be more efficient. So, systems containing many VFD's, such as on a bottling line, benefit greatly from ElectroFlow units restoring clean power. Multiple other areas of the plant and equipment, similarly are affected positively.







Powerflex 70 VFD’s

In addition to the Powerflex 40s being lost the plant also was losing a Powerflex 70 about every 2 months. This has dropped to losing a Powerflex 70 about every 5 months.

Acculinks 1 and 2 Tripping

The Acculinks controller has been having under voltage trips before and after the ElectroFlow installation. By its nature, ElectroFlow does not generate a voltage drop. Because the Acculink is on the blow molding distribution, we feel the transformer may be involved. Also, the transformer may be performing differently since we shut it down and installed the ElectroFlow unit. Maintenance has stated that they are planning on looking into the equipment panels to see if there's a setting that needs to be adjusted.

As a follow up during a recent interview with plant personnel the Acculinks tripping has improved in its frequency with the ElectroFlow installation.

500kVA Transformer Failure

Since our first site visit we found that the 500kVA transformer's operating temperature was abnormal. We were told it has been this way as long as anyone can remember. The voltage was stable and the current was balanced.

When we energized this transformer after the ElectroFlow install, we saw an arc-flash from the bottom of the transformer. This was mentioned to your maintenance crew and suggested to have the transformer looked at by the manufacturer. We also wanted to see how our equipment would affect the temperature, which was 236 deg the day before installation. Post installation the transformer had dropped by 30 degrees. The transformer was also inspected on 11/5/2010 by an electrician and found to be with its normal operating limits. The complete electricians report can be found in appendix F.

Last January the transformer failed on one if it's three phases. Immediately upon failure the ElectroFlow unit was able to make up for 90% of the loss on that phase by pulling power from the other two phases. The voltage readings at the blow molder main, down line from the ElectroFlow equipment, were 400/400/382 (400 because of European equipment). Next the voltage was measured inside the transformer and before the ElectroFlow equipment with readings of 400/398/230. This is one of the amazing capabilities of ElectroFlow technology. The installation of the system likely averted an expensive failure in that area of the plant. The transformer core as it turned out had been faulty and a new transformer is now in place.

Burned Out Transformer Core

Conclusion

At ESP we take a comprehensive, turn-key approach to Power Quality.

Our ElectroFlow equipment was designed with the goal of improving power quality by correcting common electrical anomalies that are prevalent in today's facilities. In doing so we are able to provide smooth power to the entire facility.

Benefits of clean power include; reduced maintenance costs, increase equipment longevity, reduced down-time, and to use less electricity to do the same amount of work.

Energy reduction is important; however, the ancillary savings of clean power often dwarf energy reduction.

Since the ESP-ElectroFlow installation 9 months ago, Pepsi Honolulu has garnered ancillary savings from improved power quality, of an estimated $96,165 and saved 45 hours in down-time for maintenance.

ESP would like to thank everyone at Pepsi for allowing us to install our equipment in your Hawaii bottling plant. We hope the value of our systems can be seen and appreciated through the observations by your plant personnel and the data put forth in this report.

Appendix A – Introduction to ElectroFlow

INTRODUCTION TO ELECTROFLOW ä

Benefits

ElectroFlow™ is a culmination of years of technological assessment and field testing, utilizing university level design and modeling to insure proper performance of each system. ElectroFlow™ is designed and engineered to achieve energy savings and a fast payback, normally less than three years. ElectroFlow™ enhances power quality, resulting in increased longevity of equipment and machinery and reduced downtime and maintenance. ElectroFlow™ is an energy saving and power conditioning system. It is an integrated system equipped with a microprocessor based Regulator (automatic model only, Figure 1), which monitors V, I, P.F., and Hr. at the rate of 3840-15360 samples per second. It consists of multi-stage LRC circuits which are activated, according to the preset designed parameters, and the Ladder Logic Principle. It can be designed for three-phase applications at Low, Medium, and High Voltages ranging from 208V to 345 kV, as well as various international line frequencies. It is equipped with a unique alarm-driven Self-Diagnostic Feature (SDF), which identifies status of each stage.

Technically:

- Internal parts & components: L, R, C, regulator, protective devices, contactors, SDF, cabinet
- Hybrid Configuration: Main and sub main (Figure 2)
- Installation in parallel
- Passive system: Actively switched
- Harmonics filtering: IEEE 519 standards
- Surge & transients filtering: 50 000 V to 300 000 V
- Power Factor: From 90% to 100%

Figure1 : Automatic System

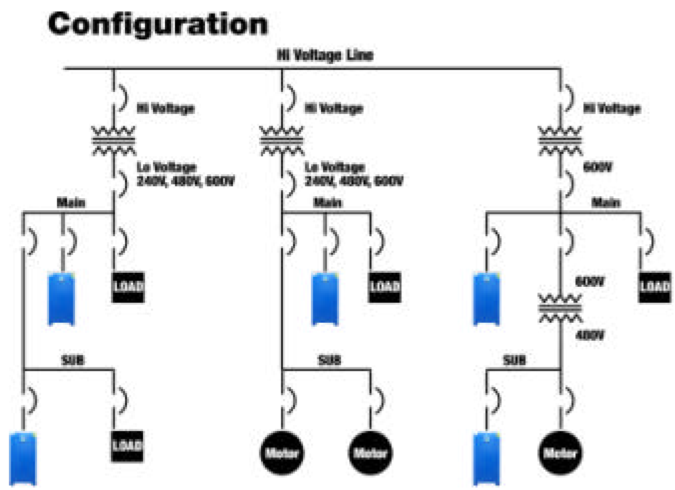
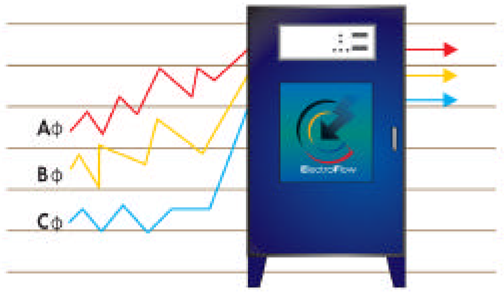


Figure 2 : Hybrid Configuration

Since ElectroFlow™ savings result from power quality enhancement. Major contributing factors are listed herein:

Standard Features

1) Voltage Improvement and Stability

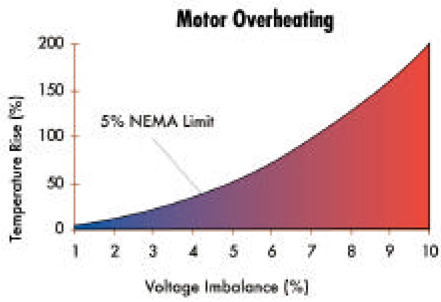


- Under Voltage, over voltage and voltage fluctuation have the following adverse effects:
  - Overheating of motors leads to insulation breakdown
  - Motor bearings failure
  - Speed variation in motors
  - Reduced motor efficiency
  - Reduced production quality
  - kW and kWh losses

✓ ElectroFlow offers real time voltage improvement and stability

2) Three-Phase Balancing

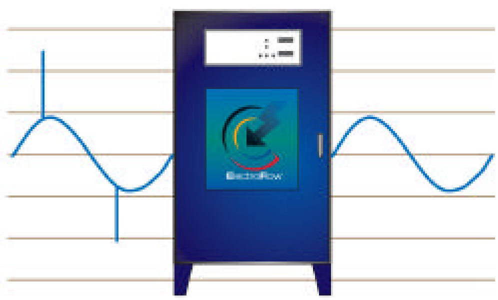
- Imbalanced currents have the following adverse effects:
  - Negative Voltage Sequence
  - Circulating currents
  - Increased current in neutral conductor
  - Overheating of motors - insulation breakdown
  - Reduced motor efficiency
  - Motor bearings failure
  - Increased maintenance of equipment and machinery
  - Wasted energy (KWD and KWH)



✓ *ElectroFlow* offers real time phase balancing, based on X/R

3) Surge and Transient Filtering

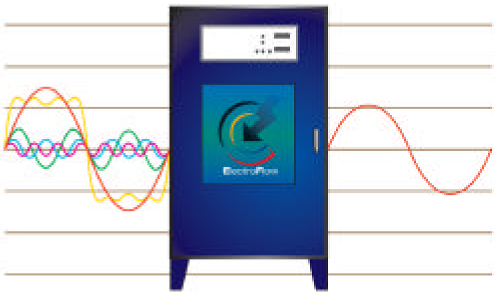
- Surges and transients have the following adverse effects:
  - Increase maintenance and downtime
  - Reduce lifetime of equipment
  - Cause computers to stop execution of programs
  - Resulting in hardware damage (PLC)
  - Cause damage to insulation in transformers and motors
  - Cause nuisance tripping of adjustable-speed drives



✓ ElectroFlow offers infinite response to Surges and Transients

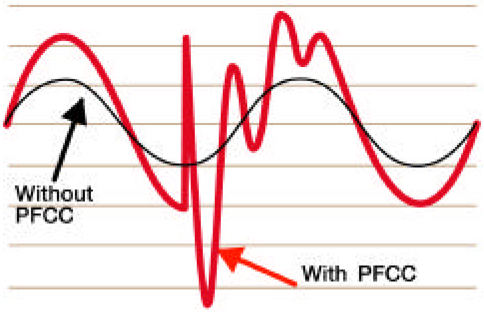
4) Broadband Harmonics Filtering

- Harmonics cause the following adverse effects:
  - Overheating of transformers (K-Factor), and rotating equipment
  - Distorted voltage and current waveforms
  - Failed capacitor banks
  - Breaker and fuse tripping
  - Unreliable operation of electronic equipment
  - Wasted energy (KW & KWH)
  - Wasted capacity - Inefficient distribution of power
  - Increased maintenance of equipment



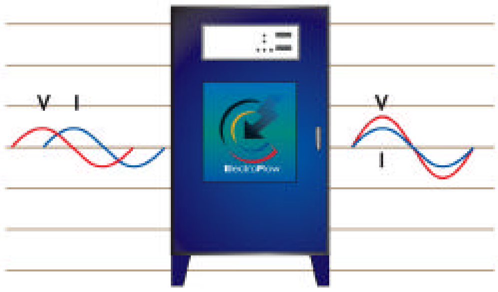
✓ ElectroFlow offers broadband harmonics filtering and eliminates associated wasted energy

5) Power Factor Improvement



- Low P.F. causes the following adverse effects:
  - Possible power factor penalties
  - Increased line losses - I^2R
  - Wasted distribution / transformer capacity (KVA)
  - Reduced system efficiency (KW)
  - Wasted investment and operation capital

- PFCC (capacitors) cause adverse side-effects:
  - Over-voltage, unregulated supply
  - Susceptibility to surges and transients, reduced Z
  - Harmonics magnification
  - Resonance and overheating,
  - Oscillation. Ringing effect during capacitor charging
  - Increased torque and KW, based on percent loading



✓ ElectroFlow offers power factor of +/- 95%, with no capacitors adverse side-effects

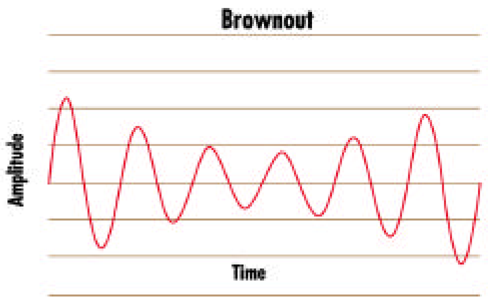
6) kVA Capacity Improvement

- Wasted KVA capacity has the following adverse effects:
  - Additional load requires an increase in supply size larger disconnects, higher rated protecting devices
  - Cable/bus ampacity must be rated higher
  - Unnecessary capital expenditure for such wasted KVA capacity

✓ ElectroFlow offers a balanced-capacity release in KVA, w/o adverse side effects.

Optional features (priced separately)

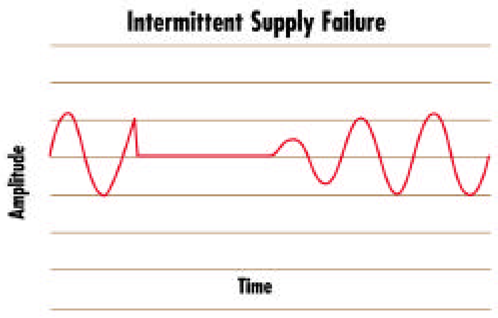
7) Brownout Protection



✓ As an option, ElectroFlow may be designed to also offer:

Protection against brownout

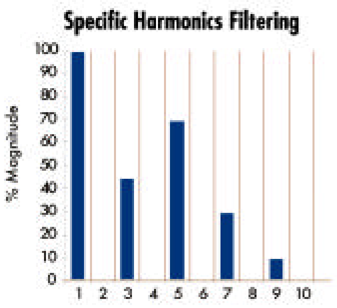
8) Intermittent Supply Failure Protection



✓ As an option, ElectroFlow may be designed to also offer:

Continuous voltage supply during short duration intermittent supply failure and H.V. line switching (up to one second)

9) Specific Harmonics Filtering



✓ As an option, ElectroFlow may be designed to also offer:

Specific harmonic filtering of any magnitude

Appendix B – Pepsi Honolulu Install Plans

Wiring diagram - ElectroFlow system
Old Main
Based on a capacity of 300 kVAR

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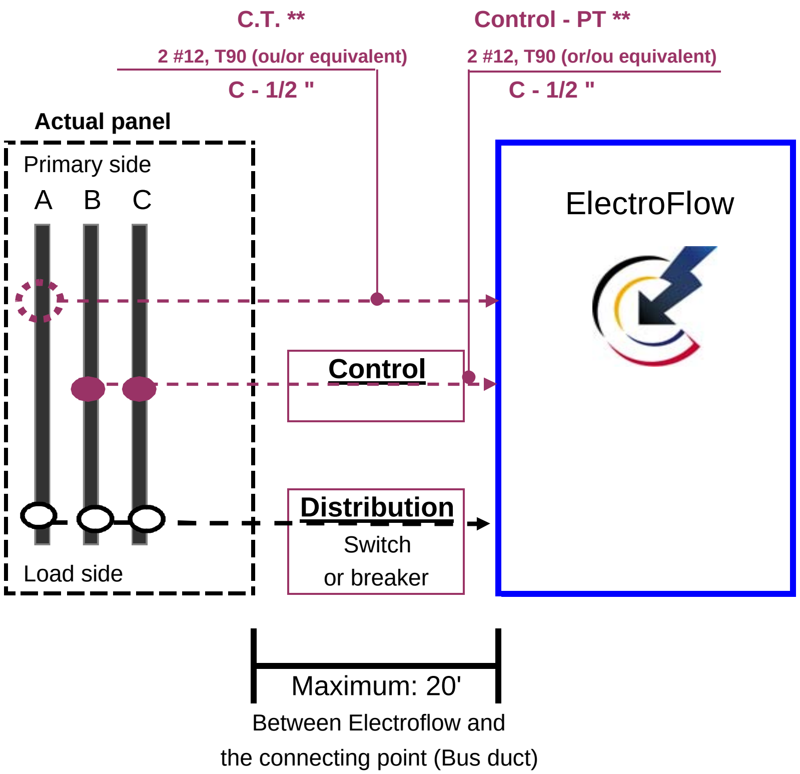
ELECTROFLOW SYSTEM

Location	**Old Main**	
Serial number	**41001-T1-1**	
Model	A56	
Capacity	300 kVAR	
Operation	Automatic	
Dimensions (Max.):	62"x30"x30"	(H x L x D)
Voltage (V)	480	



480V DISTRIBUTION (Not included)

Disconnect	600 Amps, 3Ph, 480V
Fuses	600 Amps, Type LPJ / AJT
	or 500 Amps breaker
Wires	2x300 MCM (90 deg. C.)

CONTROL SECTION (Not-included)

Disconnect	**30 Amps**	-
Fuses	**3 Amps**	-
	or 15 Amps breaker	
Wires	**# 12 thhn**	
CT	**1500:5**	

CT Connection	**C.T. goes on A phase. In the unit, your wire will replace the Orange wire named CT**
Voltage Reading	**Voltage wires to be installed on B and C phase and connected to the control trnasformer of the ElectroFlow unit**
PT and CT	**Both CT and Voltage wires must be connected as close as possible to the main switch and before Electroflow system, in order to read the overall plant's load.**

Wiring diagram - ElectroFlow system
Ammonia Comp. 1
Based on a capacity of 12.5 kVAR

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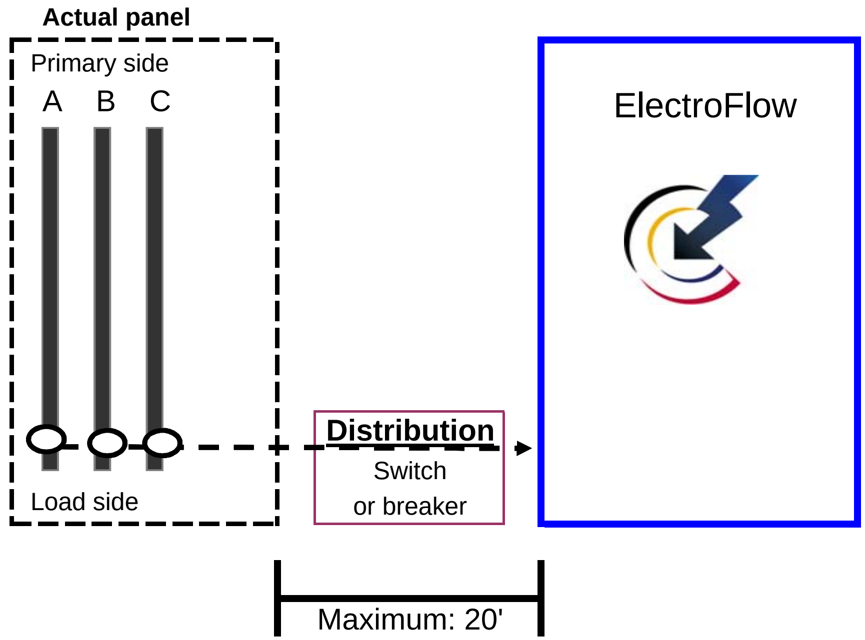
ELECTROFLOW SYSTEM

Location	**Ammonia Comp. 1**	
Serial number	**41001-T1-2**	
Model	M51	
Capacity	12.5 kVAR	
Operation	Manual	
Dimensions (Max):	32x13x11	(H x W x D)
Voltage (V)	480	

480V DISTRIBUTION (Not-included)

Disconnect	30 Amps, 3Ph, 480V
Fuses	20 Amps, Type LPJ / AJT
	or 20 Amps breaker
Wires	8 (90 deg. C.)



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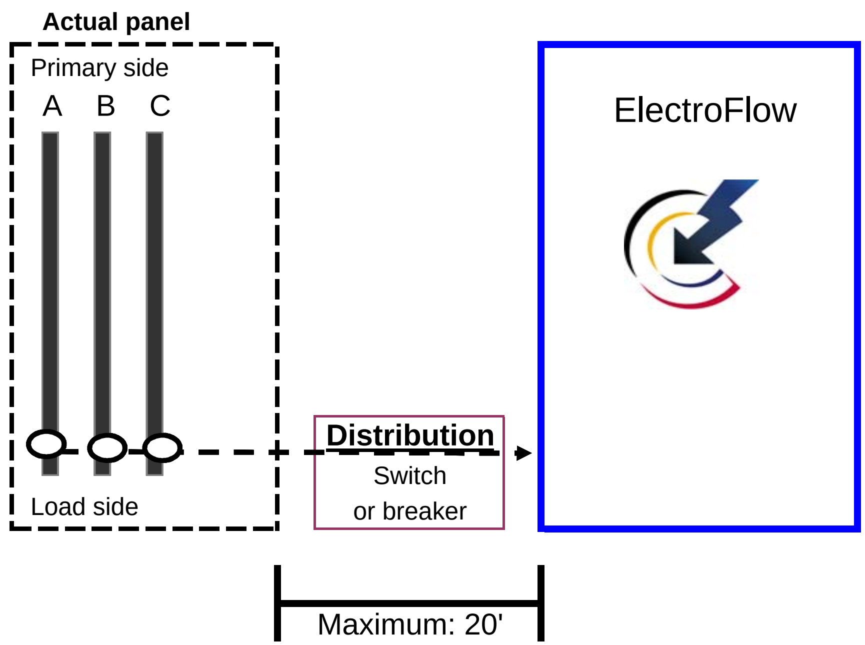
Wiring diagram - ElectroFlow system
Ammonia Comp. 2
Based on a capacity of 12.5 kVAR

ELECTROFLOW SYSTEM

Location	**Ammonia Comp. 2**	
Serial number	**41001-T1-3**	
Model	M51	
Capacity	12.5 kVAR	
Operation	Manual	
Dimensions (Max):	32x13x11	(H x W x D)
Voltage (V)	480	

480V DISTRIBUTION (Not-included)

Disconnect	30 Amps, 3Ph, 480V
Fuses	20 Amps, Type LPJ / AJT
	or 20 Amps breaker
Wires	8 (90 deg. C.)



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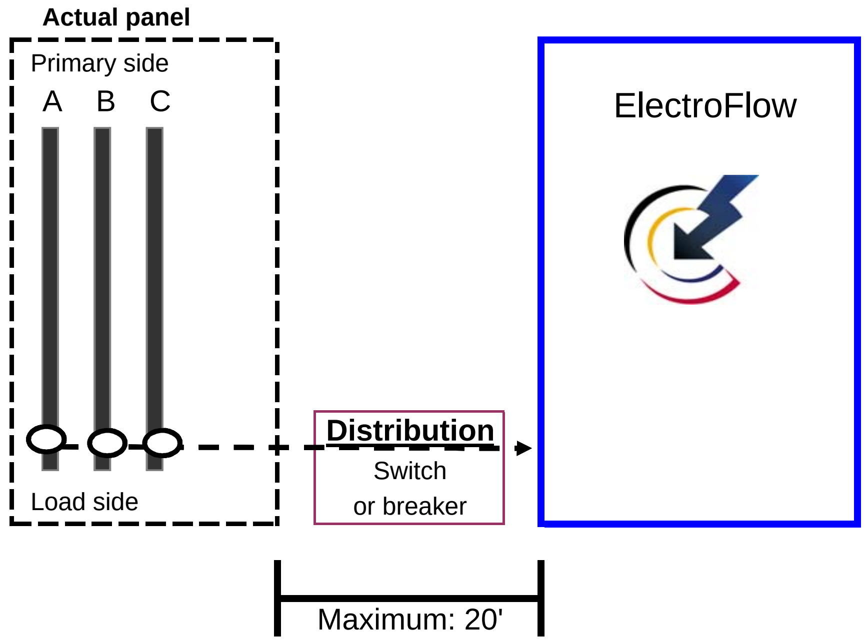
Wiring diagram - ElectroFlow system
Ammonia Comp. 3
Based on a capacity of 12.5 kVAR

ELECTROFLOW SYSTEM

Location	**Ammonia Comp. 3**	
Serial number	**41001-T1-4**	
Model	M51	
Capacity	12.5 kVAR	
Operation	Manual	
Dimensions (Max):	32x13x11	(H x W x D)
Voltage (V)	480	

480V DISTRIBUTION (Not-included)

Disconnect	30 Amps, 3Ph, 480V
Fuses	20 Amps, Type LPJ / AJT
	or 20 Amps breaker
Wires	8 (90 deg. C.)



Wiring diagram - ElectroFlow system
Ammonia Comp. 4
Based on a capacity of 12.5 kVAR

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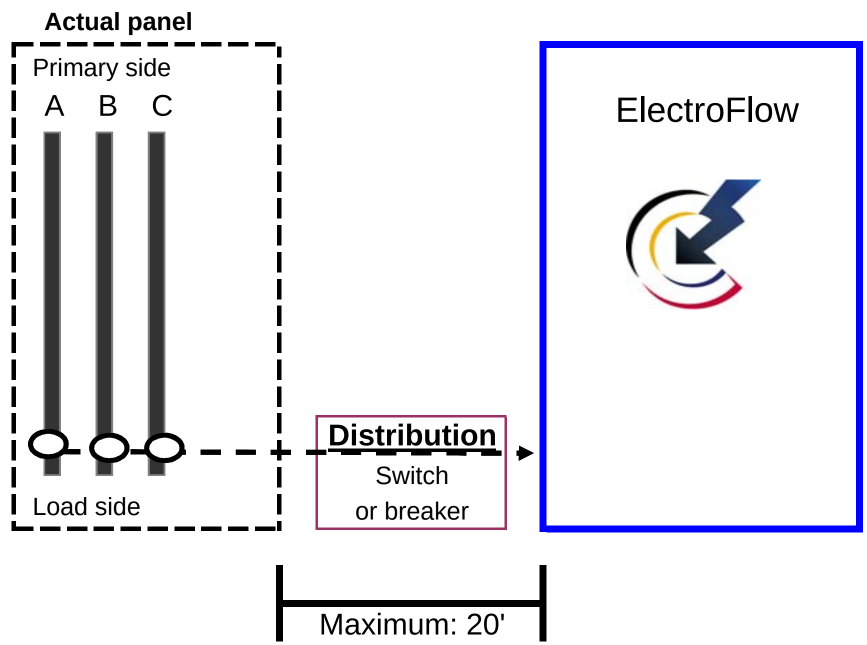
ELECTROFLOW SYSTEM

Location	**Ammonia Comp. 4**	
Serial number	**41001-T1-5**	
Model	M51	
Capacity	12.5 kVAR	
Operation	Manual	
Dimensions (Max):	32x13x11	(H x W x D)
Voltage (V)	480	

480V DISTRIBUTION (Not-included)

Disconnect	30 Amps, 3Ph, 480V
Fuses	20 Amps, Type LPJ / AJT
	or 20 Amps breaker
Wires	8 (90 deg. C.)



Wiring diagram - ElectroFlow system
New Main
Based on a capacity of 100 kVAR

01-07-10
23:11

ELECTROFLOW SYSTEM

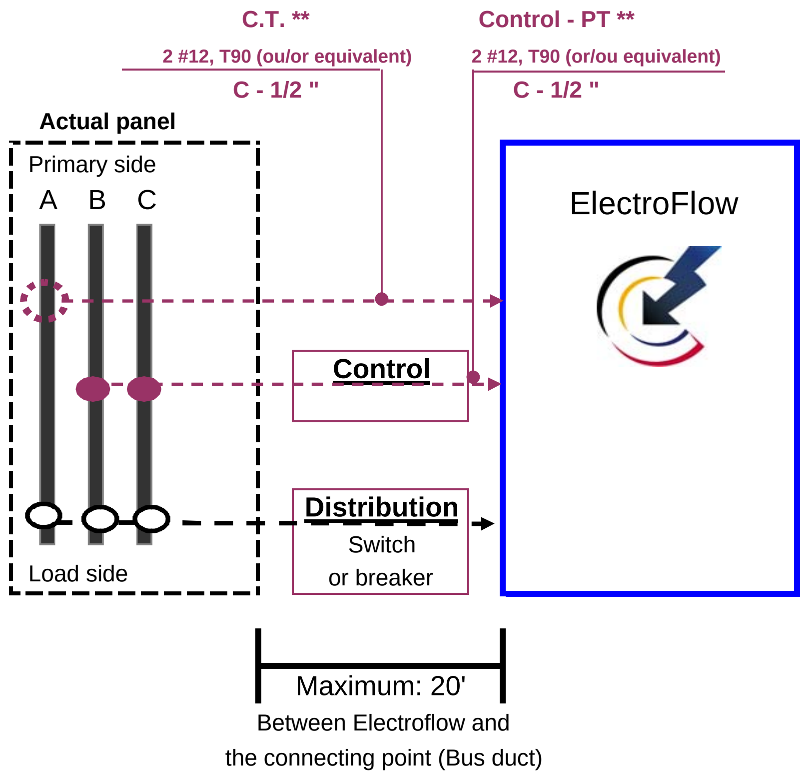
Location	New Main	
Serial number	41001-T2-1	
Model	A52	
Capacity	100 kVAR	
Operation	Automatic	
Dimensions (Max.):	36"x24"x14"	(H x L x D)
Voltage (V)	480	

480V DISTRIBUTION (Not included)

Disconnect	200 Amps, 3Ph, 480V
Fuses	200 Amps, Type LPJ / AJT or 200 Amps breaker
Wires	3/0 (90 deg. C.)

CONTROL SECTION (Not-included)

Disconnect	30 Amps	-
Fuses	3 Amps or 15 Amps breaker	-
Wires	# 12 thhn	
CT	1500:5	



CT Connection	C.T. goes on A phase. In the unit, your wire will replace the Orange wire named CT
Voltage Reading	Voltage wires to be installed on B and C phase and connected to the control trnasformer of the ElectroFlow unit
PT and CT	Both CT and Voltage wires must be connected as close as possible to the main switch and before Electroflow system, in order to read the overall plant's load.

Wiring diagram - ElectroFlow system
Utility Building
Based on a capacity of 100 kVAR

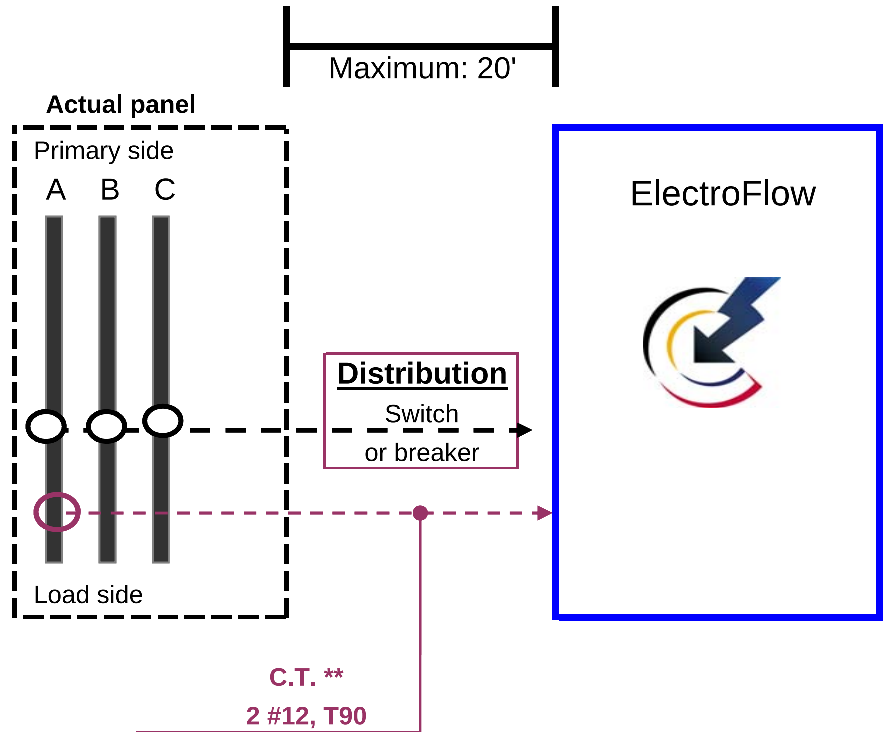
01-07-10
23:13

ELECTROFLOW SYSTEM

Location	**Utility Building**
Serial number	**41001-T2-2**
Model	S52, activated by a CT
Capacity	100 kVAR
Operation	Semi-Automatic
Dimensions (Max.):	36"x24"x14" (H x W x D)
Voltage (V)	480

480V DISTRIBUTION (Not-included)

Disconnect	200 Amps, 3Ph, 480V
Fuses	200 Amps, Type LPJ / AJT or 200 Amps breaker
Wires	3/0 (90 deg. C.)



CONTROL SECTION (Not-included)

Wires	**# 12 thhn**
CT	**300:5 Split core on Breaker feeding the Compressor**

CT Connection **C.T. goes on A phase. In the unit, your wire will replace the Orange wire named CT**
If possible, we recommend to connect CT on LOAD side of the Electroflow system.
If connected on a specific load, CT capacity may be adjusted accordingly.

Wiring diagram - ElectroFlow system
400V Blow Molding Transformer
Based on a capacity of 25 kVAR

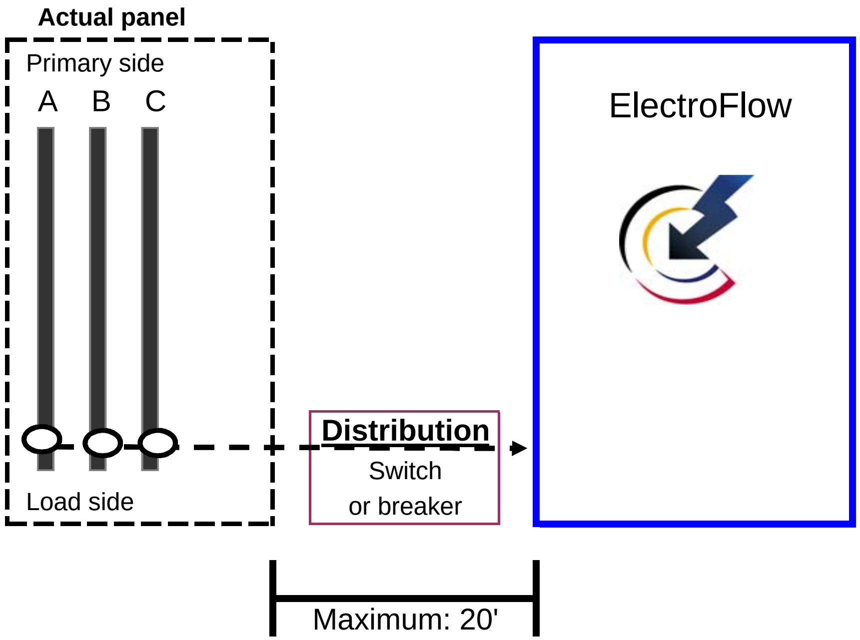
01-07-10
23:14

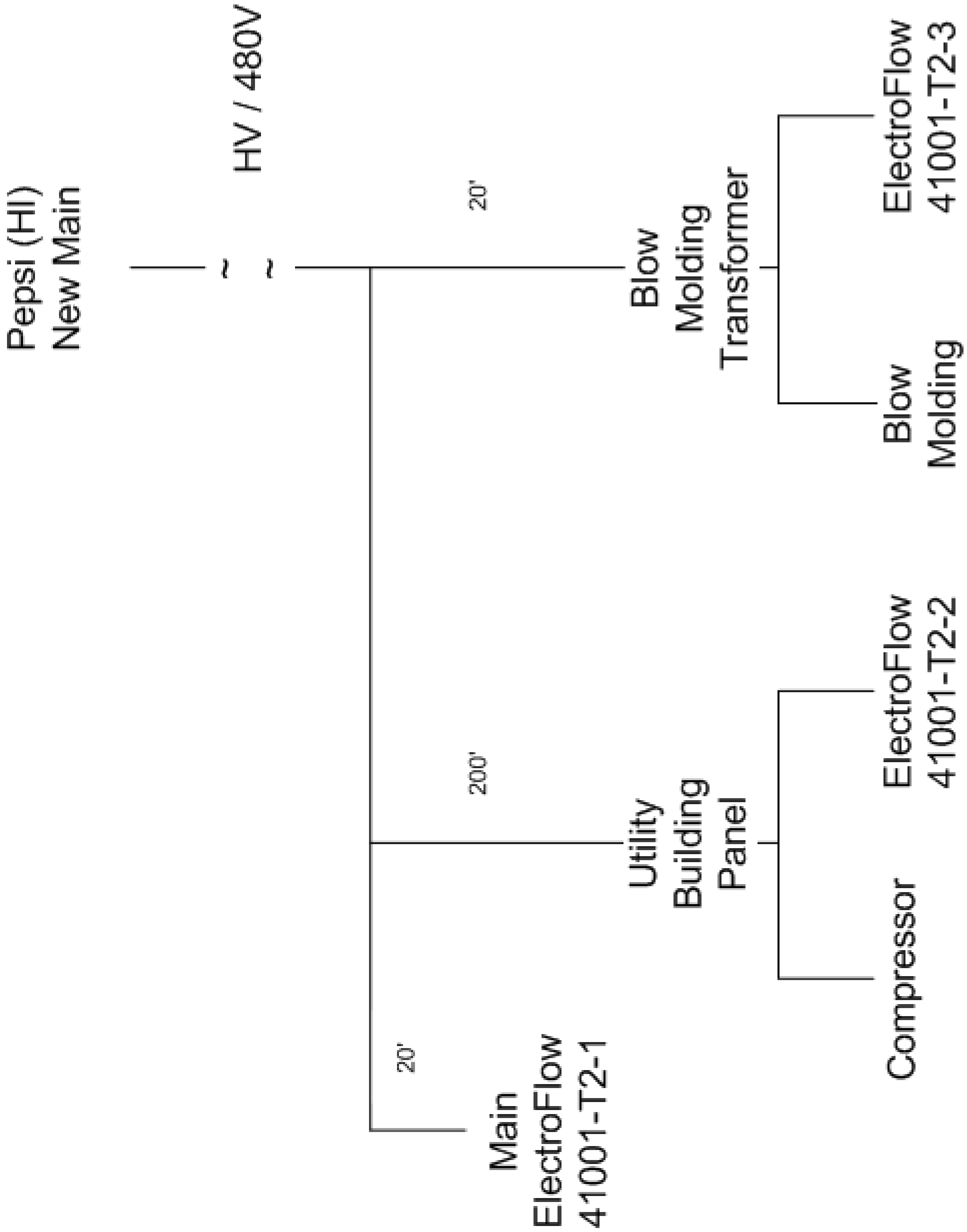
ELECTROFLOW SYSTEM

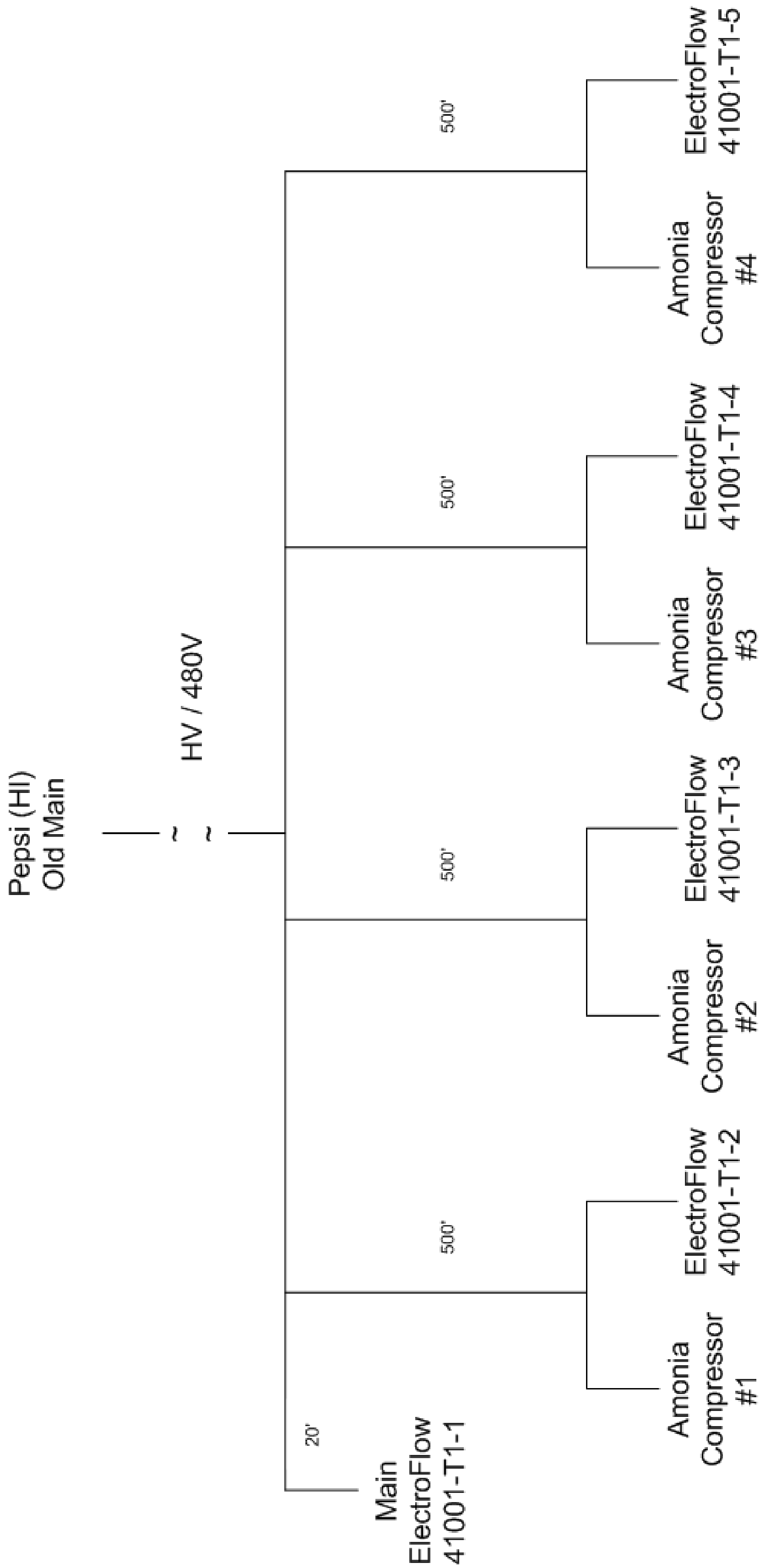
Location	**400V Blow Molding Transformer**	
Serial number	**41001-T2-3**	
Model	M51	
Capacity	25 kVAR	
Operation	Manual	
Dimensions (Max):	36"x24"x14"	(H x W x D)
Voltage (V)	480	

480V DISTRIBUTION (Not-included)

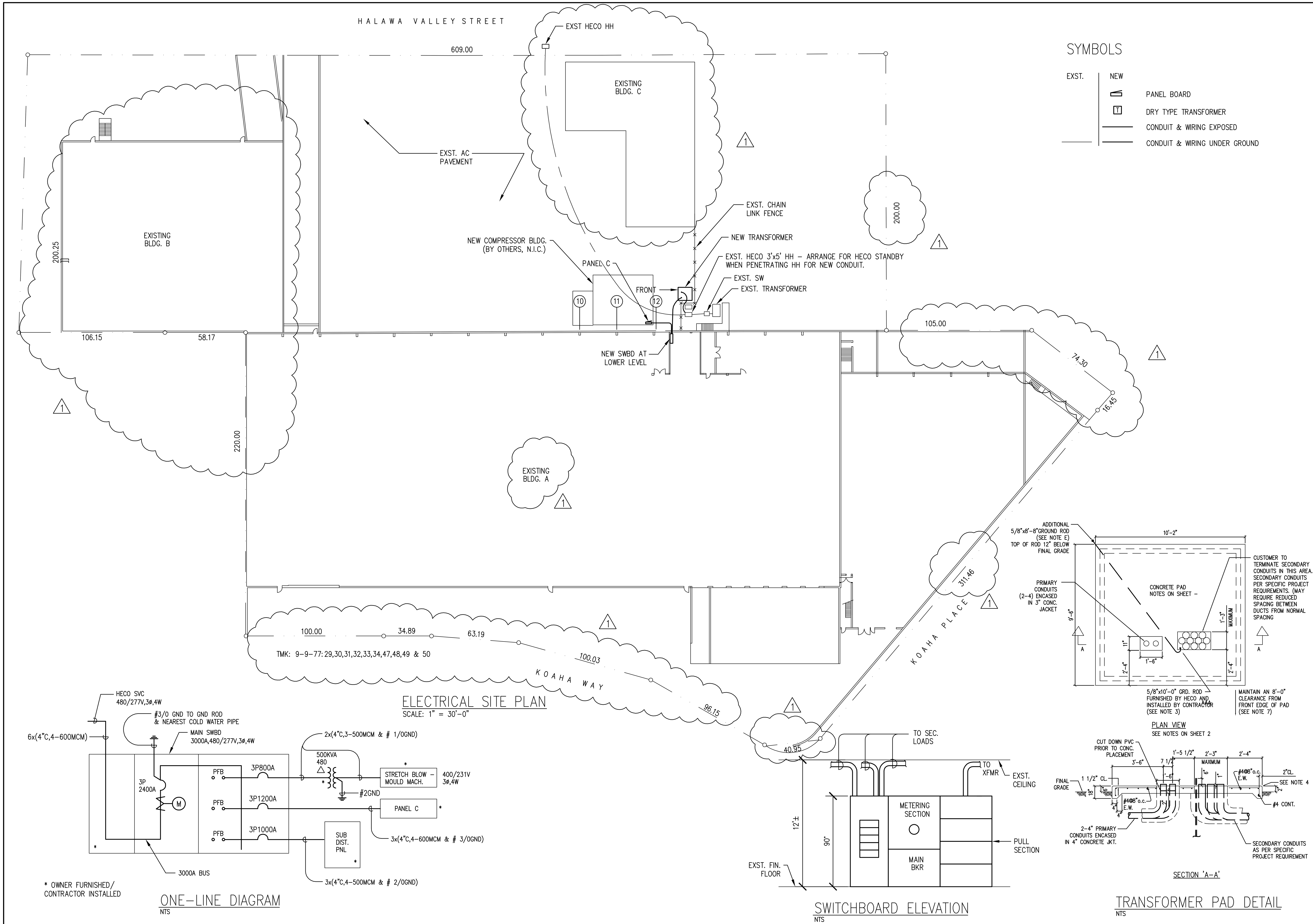
Disconnect	60 Amps, 3Ph, 480V
Fuses	50 Amps, Type LPJ / AJT
	or 50 Amps breaker
Wires	#6 (90 deg. C.)




Pepsi (HI)
New Main
HV / 480V
20'
Blow
Molding
Transformer
ElectroFlow
41001-T2-3
Blow
Molding
200'
Utility
Building
Panel
ElectroFlow
41001-T2-2
Compressor
20'
Main
ElectroFlow
41001-T2-1


Pepsi (HI)
Old Main
HV / 480V
500'
500'
500'
500'
20'
Main
ElectroFlow
41001-T1-1
Amonia
Compressor
#1
ElectroFlow
41001-T1-2
Amonia
Compressor
#2
ElectroFlow
41001-T1-3
Amonia
Compressor
#3
ElectroFlow
41001-T1-4
Amonia
Compressor
#4
ElectroFlow
41001-T1-5

Appendix C – Pepsi Honolulu Bottle Line One Line Diagram



REV. | DESCRIPTION | DATE

OKANO CONSULTING ELECTRICAL ENGINEERS
1481 S. KING ST., SUITE 314
HONOLULU, HAWAII 96814

PEPSI PLANT
99-1325 HALAWA STREET
AIEA, OAHU, HAWAII
TMK: 9-9-77:29,30,31,32,33,34,47,48,49 & 50

ELECTRICAL SITE PLAN, ELECTRICAL SYMBOLS, TRANSFORMER PAD DETAIL, ONE-LINE DIAGRAM

DATE:	–
REF. No.:	–
DRAWN:	HM
SHEET:	E-1

1 OF 2 SHEETS

Appendix D – Pepsi Honolulu Audit Results

Audit Information

5/13/2009 Project Name

A Volts		B Volts		C Volts	
Min	Max	Min	Max	Min	Max
468	482	468	482	469	484
VTHD		VTHD		VTHD	
1.70	2.03	1.73	2.01	1.74	2.08
A Amps		B Amps		C Amps	
Min	Max	Min	Max	Min	Max
475	1101	4270	4988	503	1116
ITHD		ITHD		ITHD	
6.9	14.6	14.5	26.6	6.8	13.6
387	**1028**	**-4211**	**4984**	**412**	**1037**
A PF		B PF		C PF	
Min	Max	Min	Max	Min	Max
0.82	0.93	-0.99	1.00	0.82	0.93

Average Volts	AKWD
475	8249.2
Average Amps	**AKWH**
2075	2181600
Highest ITHD%	**VTHD% of Highest ITHD**
26.6	2.01
Average PF	
0.59	

Panel Name? Main Switchboard

HE Transformer Size (KVA)	1500
Distance from Service Equip.	40
Impedance %	XXX
Size of Service Conductors	600MCM
Number of wires per Phase	6
Phase Rotation?	(ABC-CBA)

Clockwise -Counter Clockwise

159.6 % In Operation

61 Hours In Operation

% In operation should be at least 70%

Hours In Operation should be at least 80

FROM ACTUAL ELECTRIC BILL (NOT A SUMMARY)

	$ Per KW	$0.00				
Bill Date	**Demand**	**Demand $**	**KWH**	**Useage $**	**Total $**	**$/KWH**
Dec-09	747.6	$6,354.60	199600	$36,738.70	$43,093.30	$0.22
Nov-09	748.8	$6,364.80	178400	$33,682.90	$40,047.70	$0.22
Oct-09	749.4	$6,369.90	230400	$41,763.01	$48,132.91	$0.21
Sep-09	722.8	$6,143.80	215600	$36,552.68	$42,696.48	$0.20
Aug-09	748.2	$6,359.70	221600	$31,821.39	$38,181.09	$0.17
Jul-09	754.2	$6,410.70	247200	$33,305.49	$39,716.19	$0.16
Jun-09	754.8	$6,415.80	170000	$22,938.03	$29,353.83	$0.17
May-09	756.4	$6,429.40	188800	$25,391.08	$31,820.48	$0.17
Apr-09	754	$6,409.00	167200	$23,194.46	$29,603.46	$0.18
Mar-09	743.4	$6,318.90	178800	$26,376.59	$32,695.49	$0.18
Feb-09	769.6	$6,541.60	184000	$32,160.20	$38,701.80	$0.21
TOTALS	8249.2	**$70,118.20**	2181600	**$343,924.53**	**$414,042.73**	

Appendix E – Pepsi Honolulu On-Off Testing Data

Old Main - ElectroFlow OFF

Calcul des kVAR necessaires pour obtenir un FP rechercé

	Tension - Voltage (V)		Intensité - Current (A)		FP / PF (%)				kVA	kW
	Min	Max	Min	Max	Min	Max	TPF (%)		Moyen	Moyen
Phase A	**464**	472	**586**	826	**77**	85			572	464
Phase B	460	469	487	712	71	80			482	364
Phase C	463	472	517	741	77	84			509	410
Moyenne / A\`	467		645		79				521	413

Old Main - ElectroFlow ON

Calcul des kVAR necessaires pour obtenir un FP rechercé

	Tension - Voltage (V)		Intensité - Current (A)		FP / PF (%)				kVA	kW
	Min	Max	Min	Max	Min	Max	TPF (%)		Moyen	Moyen
Phase A	**477**	483	**450**	517	**99**	100			402	400
Phase B	474	479	335	403	97	99			305	298
Phase C	478	483	376	430	99	100			335	334
Moyenne / A\`	479		419		99				347	344
Variance									**-174**	**-69**
									-33%	**-17%**

New Main - ElectroFlow Off

Calcul des kVAR necessaires pour obtenir un FP recherc

	Tension - Voltage (V)		Intensité - Current (A)		FP / PF (%)			kVA	kW
	Min	Max	Min	Max	Min	Max	TPF (%)	Moyen	Moyen
Phase A	**468**	473	**758**	850	**98**	93		655	626
Phase B	464	468	750	808	90	94		629	578
Phase C	467	471	738	832	87	92		638	571
Moyenne / Av	469		789		92			641	592

New Main - ElectroFlow On

Calcul des kVAR necessaires pour obtenir un FP recherc

	Tension - Voltage (V)		Intensité - Current (A)		FP / PF (%)			kVA	kW
	Min	Max	Min	Max	Min	Max	TPF (%)	Moyen	Moyen
Phase A	**472**	480	**398**	797	**98**	100		493	488
Phase B	468	475	385	769	98	100		471	467
Phase C	471	478	392	769	97	99		477	468
Moyenne / Av	474		585		99			480	474

	kVA	kW
Variance	**-160**	**-118**
	-25%	**-20%**

Appendix F – Engineer Transformer Report

A -1 A - Lectrician, Inc.
2849 Kaihikapu Street
Honolulu, HI 96819
Bus: 839-2771
Fax: 839-7828

Electrical Inspection Report Sheet

Customer	Location
ETI	Pepsi Bottling Plant Halawa

Date	Equipment Type	Technician	Report #
11/05/2010	Transformer Secondary Main Breaker	Kent Fukuhara	1

Specifications	Value	Unit
Current Rating	800	Amps
Voltage Rating	480	Volts
Switchboard	GE Spectra Series Switchboard	

Equipment Variable	RMS	PEAK RMS
Voltage Phase A - B	401	
Voltage Phase B - C	405	
Voltage Phase C - A	404	
Voltage Phase A - N	243	
Voltage Phase B - N	245	
Voltage Phase C - N	244	
Current Phase A	156	221
Current Phase B	145	209
Current Phase C	145	229
Current Neutral	NA	Cannot Clamp Safely
Current Ground	NA	Cannot Clamp Safely

Condition & Recommendations

The voltages are at a lower than normal 480 range due to the type of equipment that is being powered up. They are required to have 400 volts phase to phase and the phase to phase voltage is in normal range. The current is not very high and do not pose as a problem.

A -1 A - Lectrician, Inc.
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Fax: 839-7828

Electrical Inspection Report Sheet

Customer	Location
ETI	Pepsi Bottling Plant Halawa

Date	Equipment Type	Technician	Report #
11/05/2010	Transformer Secondary Main	Kent Fukuhara	1

Specifications	Value	Unit
Current Rating	800	Amps
Voltage Rating	480	Volts
Breaker Type	GE Spectra Series HI Break Cat.# SKHA36AT0800	

Severity Criteria

Correct	Schedule to Correct	Critical to Correct
-	-	-

KVA	Horsepower	Current Rating	Current Draw	Voltage	Voltage Drop
NA	NA	800	156	401	NA
AIC	%Z	800	145	405	NA
50k	NA	800	145	404	NA

Problem Discription or Opinion

The breaker was found to be in good condition with no apparent problems. Upon opening the front cover, there was a screw found to be laying on the phase A wires which could of caused an arc flash and short circuit.

Recommendations For Repair

The screw was removed for safety reasons.

A -1 A - Lectrician, Inc.
2849 Kaihikapu Street
Honolulu, HI 96819
Bus: 839-2771
Fax: 839-7828

A - 1 A - Lectrician, inc.
Serving Hawaii Since 1957

Electrical Inspection Report Sheet

Customer	Location
ETI	Pepsi Bottling Plant Halawa

Date	Equipment Type	Technician	Report #
11/05/2010	Transformer	Kent Fukuhara	1

Specifications	Value	Unit
Current Rating	600 / 800	Amps
Voltage Rating	480v to 400v	Volts
Transformer Type	GE Type FCT Cat. # 9T30G0509 TransforMore FAC	

Severity Criteria

Correct	Schedule to Correct	Critical to Correct
-	-	-

KVA	Temp Rise	Current Rating	Current Draw	Voltage	Voltage Rating
500	150	800	156	401	NA
AIC	%Z	800	145	405	NA
NA	8.0	800	145	404	NA

Problem Discription or Opinion

This is the specialty transformer. It could not be opened due to critical process of equipment it is serving. This type of transformer does have a disconnect breaker built inside and is used as a part of a safety feature.

Recommendations For Repair

This type of transformer is a smaller design and is due to the addition of fans to cool the transformer as required.

A -1 A - Lectrician, Inc.
2849 Kaihikapu Street
Honolulu, HI 96819
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Fax: 839-7828

Electrical Inspection Report Sheet

Customer	Location
ETI	Pepsi Bottling Plant Halawa

Date	Equipment Type	Technician	Report #
11/05/2010	Transformer	Kent Fukuhara	1

Specifications	Value	Unit
Current Rating	600 / 800	Amps
Voltage Rating	480v to 400v	Volts
Transformer Type	GE Type FCT Cat. # 9T30G0509 TransforMore FAC	

Severity Criteria

Correct	Schedule to Correct	Critical to Correct
-	-	-

KVA	Temp Rise	Current Rating	Current Draw	Voltage	Voltage Rating
500	150	800	156	401	NA
AIC	%Z	800	145	405	NA
NA	8.0	800	145	404	NA

Problem Discription or Opinion

The transformer does list a safety feature which will shut off the transformer if the temperature does reach a specified temperature limit.

Recommendations For Repair

There has been no reports from the facility electrician that the transformer has turned off. If it did, then they would have to open the front cover and reset the disconnect switch breaker.

A -1 A - Lectrician, Inc.
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Honolulu, HI 96819
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Electrical Inspection Summary Page

After my initial investigation of the secondary voltages of the transformer in question, I have come to the conclusion that the voltages are ok and are in line with the nameplate data. The transformer is 500kVA rated for 480 volts primary, and 400 volts secondary. Since I could not open the transformer due to the type of facility and the type of work done, I could not do a visual inspection. But I was able to do an ultrasonic test and the transformer is a little noisy but not at a very critical state. The transformer installation is questionable since it should be installed 6 inches from the back wall and this is standard normal installation guidelines that electricians are to follow. This is also verified by the nameplate data which states the required spacing which plays a role in keeping the transformer running cooler. The temperature rise is rated at 150c rise which is 302 fahrenheit. The temperatures that I was made aware of was at 236 degrees fahrenheit which is well within specifications. As for further investigative work, it should be done during a scheduled maintenance window which may fall under a Sunday frame of work schedule. I have attached some transformer information to help understand what type of transformer is installed at the Pepsi Plant. It is not the normal type of transformer and cannot be judge the same way since there are safety features built in that does prevent overheating and the scenario for temperatures are based on factory set standards. Even though the transformer is installed too close to the wall for proper ventilaation, the transformer still did not reach temperatures to shut down the transformer in the past and if the temperature is an issue, then it would have shown up by now with this type of transformer.

Regards,
Kent Fukuhara
Service Engineer