

## **Power Commander** **SERIES 900**

## **Power Commander "Plus"** **SERIES 900 / 200**

### **Electronic Line Voltage Regulators**

Precise Electrical Power For Critical Loads  
Automatic Correction Of Voltage Deviations  
Adjustable Output Voltage  
Low Harmonic Distortion  
High Fault Clearing Capability

"PLUS" Includes Computer Grade Isolation Transformer

#### Applications:

- Test Laboratories / Failure Testing / Burn-In
- Industrial / Commercial / Institutional Facilities
- Power Generation Authorities
- Instrumentation and Control Systems
- Regulated Bypass For Uninterruptible Power Systems
- All Highly-Accurate Line Voltage Regulation Needs





## CONTROLLED POWER COMPANY

Controlled Power Company engineers and manufactures the industry's highest quality power conditioning equipment, capitalizing on 4 decades of expertise. We have an enviable reputation for quality, which is reflected in the design, workmanship, and performance of our products.

We provide a wide range of performance-proven technologies for the regulation, conditioning, isolation, and distribution of clean and stable electrical power. This product range allows us to optimize solutions that best fit the performance characteristics of our customers' varied applications. As a result, we don't have to fit a "square peg" solution into a "round hole" problem! Our products protect sensitive electronic systems from erratic operation and failure due to power line transients, noise, brownouts, sags, surges, and total power outages.

### Voltage Regulation... And Its Importance

As the speeds and sophistication of automation and digital applications have increased, so has the sensitivity of their respective electronic / electrical systems. In other words, power line problems which had little effect in the past, now cause the malfunction and shutdown of your equipment. Power quality studies indicate that commercial and industrial electrical systems can expect over- or under-voltage conditions (10% threshold) as often as 14 times per month! The bottom line is that all electronic / electrical systems require clean, stable electrical power. Unstable or unreliable power translates into an undependable system and lost productivity.

Basic power conditioning isolates the critical load from the power source in a way that minimizes the line impedance effects, inhibits the common ground noise, and produces a known clean power source for the load.



In many cases, a multi-shielded transformer with low output impedance resolves most power quality problems. However, for more sensitive equipment, adding a fast-acting Controlled Power Company voltage regulator accompanied by high-frequency filtering resolves all power-related problems except power outages.

The **Series 900 Power Commander** and **Series 900 / 200 Power Commander Plus** electronic line voltage regulators deliver the most-accurately regulated line voltage available.

### Characteristics of a Voltage Regulation System

Look for the following features of a first-class voltage regulation system:

- +/- 1% voltage regulation with +10% to -20% input
- Computer-grade, multi-shielded isolation transformer
- 120 dB common mode noise attenuation
- Adjustable output voltage
- Remote sensing
- Fast response
- Low harmonic distortion
- High fault clearing capability
- Rugged design

# SERIES 900 POWER COMMANDER

## Product Function And Description

The overall function of both the **Series 900 Power Commander** and the **Series 900 / 200 Power Commander Plus** is to maintain the output line voltage to very tight tolerances when the input voltage varies over or under nominal voltage. Offered in a wide range of kVA sizes, both single- and three-phase configurations are designed and manufactured to assure maximum reliability, flexibility, serviceability, and performance. While the **Power Commander Plus** has the ability to step the voltage up or down by a large increment, the **Power Commander** does not. Instead, the output from the **Power Commander** is regulated continuously, and is adjustable over a +10% to -10% range.

## Performance Characteristics That Get The Job Done

### No Moving Parts

Electronically and magnetically regulated. Virtually no preventive maintenance is required. However some models are fan-cooled, which will require routine maintenance checks.

### Fast Response

Response starts immediately, with correction in under 5-9 cycles (worst case conditions).

### Remote Sensing

Voltage to be regulated is sensed at the load, and automatically compensates for line and wire losses to the load.

### Tight Output Voltage Regulation

Output is regulated to within +/- 1%, with input voltage variation of +10% to -20%, and from no load to full load.

### Harmonic Filtered Output

Reduces harmonic distortion, 5% THD linear load.\*

### Broad Product Line

Available in single- and three-phase configurations, 50 and 60 Hz models, and a wide range of kVA sizes.

### Highly Reliable

Exceeds 100,000 MTBF, and 20-year product lifespan.

## Product Applications

### Industrial / Commercial / Institutional Facilities

With expanded electrical power use in all sectors of the economy, brownouts and over-voltage conditions are becoming increasingly common. The **Power Commander** and **Power Commander Plus** automatically correct for these and other voltage deviations.

### Test Facilities: Pre-Market Product Test & Burn-In

Today's high expectations and standards for product quality, reliability, and maintainability require not only compliance to many government-endorsed standards, but also require a high degree of consumer-confidence. Many quality-conscious companies put their products through rigorous and long-term testing prior to releasing these products to the public. Such testing assures that weak elements in the product design are detected and corrected prior to product release.

Both the **Power Commander** and **Power Commander Plus** provide manufacturers and testing facilities with a controlled electrical environment in which to conduct their pre-market product testing. Companies can accurately test and evaluate their electrical products' performance in over-voltage, under-voltage, and nominal conditions. The **Power Commander** and **Power Commander Plus** are the only Controlled Power Company products equipped for this application.

### Regulated Bypass For Uninterruptible Power Systems

Many UPS require a regulated means of bypassing the system when direct line voltage is used. The high fault clearing capability of the **Power Commander** and **Power Commander Plus** makes it an excellent choice for this application.

\* May experience high harmonics in non-linear loads. Three phase unbalanced loads may exhibit line-to-line variations exceeding 1%.

# SERIES 900/200 POWER COMMANDER PLUS

The only difference between the **Power Commander** and the **Power Commander Plus** is that the latter includes a computer-grade isolation transformer.

## Buck-Boost Regulation System

The **Power Commander** uses an electro-magnetically regulated transformer that is buck-boost dry type, convection-cooled, and 600v class.

## Transformer Characteristics

The **Power Commander** and the **Power Commander Plus** use a Class N (200 degrees C) insulation system, with operating temperatures not to exceed 115 degrees C over a 40 degree C ambient temperature. Transformer cores are manufactured using M-6 grade, grain-oriented, stress-relieved silicon transformer steel. Interface terminals include input and output conductors. All leads, wires, and terminals are labeled to correspond with the circuit wiring diagram. The transformers are vacuum-impregnated with an epoxy resin.

## Computer-Grade Isolation Transformer

The isolation transformer provides a necessary neutral for the regulator in a delta-configured distribution system, thereby allowing the customer to change voltages throughout the system. For example, a 480 VAC input, with a 208 / 120Y output.

With the added benefits of isolation and an established new ground neutral bond, the **Power Commander Plus** has both impressive power conditioning and voltage regulation capabilities.

## “Plus” Input And Output Transformer Differences

Power configurations change with location, application, and power availability. The **Power Commander Plus** is a configurable system, placing the computer-grade isolation transformer either ahead of or behind the regulator. This approach provides the versatility for the best electrical configurations at the most-economical cost.



Typical **Power Commander** or **Power Commander Plus** Electronic Line Voltage Regulator.

# SPECIFICATIONS & ENCLOSURES

Specifications provided are for both the **Series 900 Power Commander** and the **Series 900 / 200 Power Commander Plus** products, unless otherwise indicated.

## Input Voltage

Single Phase: 208V, 480 standard. 120V, 240V, and 600V available.

Three Phase: 208 / 120V, 480 / 277V standard. 240V and 600V available.

## Output Voltage

Output voltage is the same as the Input Voltage. For step-up or step-down, use the **Power Commander Plus**, which includes the computer-grade isolation transformer.

## Regulation

+/- 1% at any combination of line variation, load variation, with +10% to -20% input variation.

## Audible Noise

<60 dBA.

## Remote Sensing

Available to compensate for the series voltage drops to the load.

## Overload

Extended overload capability for down-stream fault clearing.

## Frequency Range

60 Hz models: 57 - 63 Hz

50 Hz models: 48 - 52 Hz

## Output Voltage Adjustment Range

+10% to -10% adjustable with internally located potentiometer. This adjustment affects the input regulation range.

## Ambient Temperature

0° C. to 40° C. (32° F. to 104° F.)

## Efficiency

91 - 94% (Series 900); 89 - 92% (Series 900/200).

## Input Power Factor

Approximately 80% at full linear load.

## Cooling

Convection or forced air, depending on size.

## Harmonic Content

< 5% added THD under linear load.



Typical **Power Commander** or **Power Commander Plus** Electronic Line Voltage Regulator.

# SERIES 900 SELECTION GUIDE

All model numbers listed below are 60 Hz, and use Class N insulation. 50 Hz units are available upon request. Three phase delta units are also available; consult factory.

(1) All units are hard-wired to terminals at both the input and output.

(2) The input voltage range is based on the output voltage setting. The output voltage is adjustable +10%, -10% of the rated nominal output by means of an internal potentiometer. Adjustment of voltage from nominal affects the regulation voltage range.

Note: Cabinet "footprints" are included in the "Installation" section on the back cover. Refer to **A**, **B**, and **C**. Unit weights and "footprints" are approximate. They may vary based on configuration, and they are subject to change.

Note: All three phase systems require a neutral feeder conductor. If an input neutral is not available, an isolation transformer may be used to generate a neutral. Use Series 900/200.

SINGLE PHASE, 60 Hz — 15 kVA TO 150 kVA						
MODEL NUMBER	OUTPUT POWER RATING (kVA)	NOMINAL INPUT (1) & OUTPUT VOLTAGE	INPUT VOLTAGE RANGE (2)	OUTPUT VOLTAGE ADJUSTABILITY	WEIGHT (LBS.)	CABINET DIMENSIONS (W x D x H INCHES)
5BBX-15K-9	15	208	+10%, -25%	188 - 228	1000	35" x 25" x 39.5"
5DDX-15K-9	15	480	+10%, -25%	432 - 528	1000	35" x 25" x 39.5"
5BBX-25K-9	25	208	+10%, -25%	188 - 228	1400	41.5" x 27.5" x 39"
5DDX-25K-9	25	480	+10%, -25%	432 - 528	1400	41.5" x 27.5" x 39"
5BBX-37.5K-9	37.5	208	+10%, -25%	188 - 228	1800	56.5" x 32.5" x 48"
5DDX-37.5K-9	37.5	480	+10%, -25%	432 - 528	1800	56.5" x 32.5" x 48"
5BBX-50K-9	50	208	+10%, -25%	188 - 228	2000	56.5" x 32.5" x 48"
5DDX-50K-9	50	480	+10%, -25%	432 - 528	2000	56.5" x 32.5" x 48"
5BBX-75K-9	75	208	+10%, -25%	188 - 228	3100	56.5" x 32.5" x 48"
5DDX-75K-9	75	480	+10%, -25%	432 - 528	3100	56.5" x 32.5" x 48"
5BBX-100K-9	100	208	+10%, -25%	188 - 228	3680	56.5" x 32.5" x 48"
5DDX-100K-9	100	480	+10%, -25%	432 - 528	3680	56.5" x 32.5" x 48"
5DDX-150K-9	150	480	+10%, -25%	432 - 528	4200	79" x 41.5" x 48"

THREE PHASE, 60 Hz — 15 kVA TO 450 kVA						
MODEL NUMBER	OUTPUT POWER RATING (kVA)	NOMINAL INPUT (1) & OUTPUT VOLTAGE	INPUT VOLTAGE RANGE (2)	OUTPUT VOLTAGE ADJUSTABILITY	WEIGHT (LBS.)	CABINET DIMENSIONS (W x D x H INCHES)
8LLX-15K-9	15	208 / 120Y	+10%, -25%	108 - 132	1800	41.5" x 27.5" x 39"
8NNX-15K-9	15	480 / 277Y	+10%, -25%	250 - 304	1800	41.5" x 27.5" x 39"
8LLX-22.5K-9	22.5	208 / 120Y	+10%, -25%	108 - 132	2400	41.5" x 27.5" x 39"
8NNX-22.5K-9	22.5	480 / 277Y	+10%, -25%	250 - 304	2400	41.5" x 27.5" x 39"
8LLX-30K-9	30	208 / 120Y	+10%, -25%	108 - 132	2600	41.5" x 27.5" x 39"
8NNX-30K-9	30	480 / 277Y	+10%, -25%	250 - 304	2600	41.5" x 27.5" x 39"
8LLX-45K-9	45	208 / 120Y	+10%, -25%	108 - 132	3300	56.5" x 32.5" x 48"
8NNX-45K-9	45	480 / 277Y	+10%, -25%	250 - 304	3300	56.5" x 32.5" x 48"
8LLX-75K-9	75	208 / 120Y	+10%, -25%	108 - 132	4100	56.5" x 41.5" x 48"
8NNX-75K-9	75	480 / 277Y	+10%, -25%	250 - 304	4100	56.5" x 41.5" x 48"
8LLX-112.5K-9	112.5	208 / 120Y	+10%, -25%	108 - 132	5700	56.5" x 41.5" x 48"
8NNX-112.5K-9	112.5	480 / 277Y	+10%, -25%	250 - 304	5700	56.5" x 41.5" x 48"
8LLX-150K-9	150	208 / 120Y	+10%, -25%	108 - 132	6700	79" x 41.5" x 48"
8NNX-150K-9	150	480 / 277Y	+10%, -25%	250 - 304	6700	79" x 41.5" x 48"
8LLX-225K-9	225	208 / 120Y	+10%, -25%	108 - 132	8800	110" x 48" x 56"
8NNX-225K-9	225	480 / 277Y	+10%, -25%	250 - 304	8800	110" x 48" x 56"
8LLX-300K-9	300	208 / 120Y	+10%, -25%	108 - 132	9200	110" x 48" x 56"
8NNX-300K-9	300	480 / 277Y	+10%, -25%	250 - 304	9200	110" x 48" x 56"
8NNX-450K-9	450	480 / 277Y	+10%, -25%	250 - 304	9600	100" x 48" x 77"

# SERIES 900 / 200 SELECTION GUIDE

All model numbers listed below are 60 Hz, and use Class N insulation. 50 Hz units are available upon request. Three phase delta units are also available; consult factory.

(1) All units are hard-wired to terminals at both the input and output.

(2) The input voltage range is based on the output voltage setting. The output voltage is adjustable +10%, -10% of the rated nominal output by means of an internal potentiometer. Adjustment of voltage from nominal affects the regulation voltage range.

Note: Cabinet "footprints" are included in the "Installation" section on the back cover. Refer to **A**, **B**, and **C**. Unit weights and "footprints" are approximate. They may vary based on configuration, and they are subject to change.

\* 450 kVA requires 2 cabinets that sit side-by-side: isolation transformer in one, and the regulator in the other.

Transformer Cabinet = 5800 lbs. and is 79" W x 48" D x 77" H.

Regulator Cabinet = 9600 lbs. and is 100" W x 48" D x 77" H. Includes interconnecting cable.

SINGLE PHASE, 60 Hz — 15 kVA TO 150 kVA						
MODEL NUMBER	OUTPUT POWER RATING (kVA)	NOMINAL INPUT VOLTAGE (1)	NOMINAL OUTPUT VOLTAGE (2)	OUTPUT VOLTAGE ADJUSTABILITY	WEIGHT (LBS.)	CABINET DIMENSIONS (W x D x H INCHES)
5BGX-15K-9/2	15	208	120 / 240	108 - 132	1300	41.5" x 27.5" x 39"
5DGX-15K-9/2	15	480	120 / 240	108 - 132	1300	41.5" x 27.5" x 39"
5BGX-25K-9/2	25	208	120 / 240	108 - 132	1700	41.5" x 27.5" x 39"
5DGX-25K-9/2	25	480	120 / 240	108 - 132	1700	41.5" x 27.5" x 39"
5BGX-37.5K-9/2	37.5	208	120 / 240	108 - 132	2170	56.5" x 32.5" x 48"
5DGX-37.5K-9/2	37.5	480	120 / 240	108 - 132	2170	56.5" x 32.5" x 48"
5BGX-50K-9/2	50	208	120 / 240	108 - 132	2600	56.5" x 32.5" x 48"
5DGX-50K-9/2	50	480	120 / 240	108 - 132	2600	56.5" x 32.5" x 48"
5BGX-75K-9/2	75	208	120 / 240	108 - 132	3400	79" x 41.5" x 48"
5DGX-75K-9/2	75	480	120 / 240	108 - 132	3400	79" x 41.5" x 48"
5BGX-100K-9/2	100	208	120 / 240	108 - 132	3900	79" x 41.5" x 48"
5DGX-100K-9/2	100	480	120 / 240	108 - 132	3900	79" x 41.5" x 48"
5DGX-150K-9/2	150	480	120 / 240	108 - 132	4500	79" x 41.5" x 48"

THREE PHASE, 60 Hz — 15 kVA TO 450 kVA						
MODEL NUMBER	OUTPUT POWER RATING (kVA)	NOMINAL INPUT VOLTAGE (1)	NOMINAL OUTPUT VOLTAGE (2)	OUTPUT VOLTAGE ADJUSTABILITY	WEIGHT (LBS.)	CABINET DIMENSIONS (W x D x H INCHES)
8DLX-15K-9/2	15	480	208 / 120Y	108 - 132	2180	56.5" x 32.5" x 48"
8DNX-15K-9/2	15	480	480 / 277Y	250 - 304	2180	56.5" x 32.5" x 48"
8DLX-22.5K-9/2	22.5	480	208 / 120Y	108 - 132	2600	56.5" x 41.5" x 48"
8DNX-22.5K-9/2	22.5	480	480 / 277Y	250 - 304	2600	56.5" x 41.5" x 48"
8DLX-30K-9/2	30	480	208 / 120Y	108 - 132	2800	56.5" x 41.5" x 48"
8DNX-30K-9/2	30	480	480 / 277Y	250 - 304	2800	56.5" x 41.5" x 48"
8DLX-45K-9/2	45	480	208 / 120Y	108 - 132	3500	79" x 41.5" x 48"
8DNX-45K-9/2	45	480	480 / 277Y	250 - 304	3500	79" x 41.5" x 48"
8DLX-75K-9/2	75	480	208 / 120Y	108 - 132	4400	79" x 41.5" x 48"
8DNX-75K-9/2	75	480	480 / 277Y	250 - 304	4400	79" x 41.5" x 48"
8DLX-112.5K-9/2	112.5	480	208 / 120Y	108 - 132	6000	110" x 41.5" x 48"
8DNX-112.5K-9/2	112.5	480	480 / 277Y	250 - 304	6000	110" x 41.5" x 48"
8DLX-150K-9/2	150	480	208 / 120Y	108 - 132	7000	110" x 41.5" x 48"
8DNX-150K-9/2	150	480	480 / 277Y	250 - 304	7000	110" x 41.5" x 48"
8DLX-225K-9/2	225	480	208 / 120Y	108 - 132	8250	110" x 48" x 56"
8DNX-225K-9/2	225	480	480 / 277Y	250 - 304	8250	110" x 48" x 56"
8DLX-300K-9/2	300	480	208 / 120Y	108 - 132	9600	110" x 48" x 56"
8DNX-300K-9/2	300	480	480 / 277Y	250 - 304	9600	110" x 48" x 56"
8DLX-450K-9/2	450	480	208 / 120Y	108 - 132	*	*

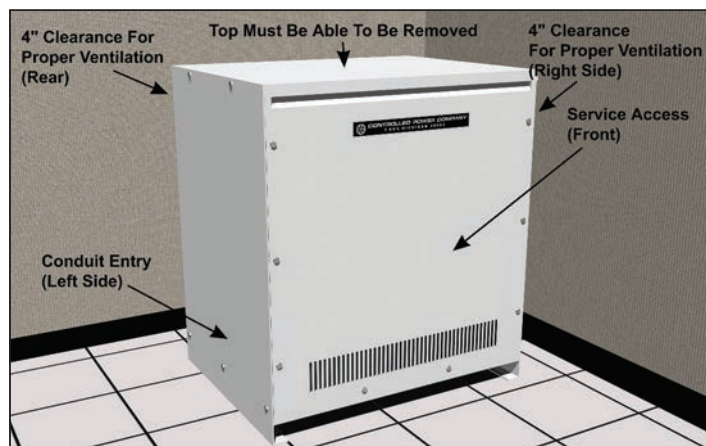
# INSTALLATION

The **Series 900 Power Commander** and the **Series 900 / 200A Power Commander Plus** are offered in the following "footprints". Cabinet dimensions are included in the "Selection Guide" on pages 6-7.

Note: Cabinet drawings may vary from actual unit. Drawings are for clearance illustration purposes only.

## Series 900 Power Commander

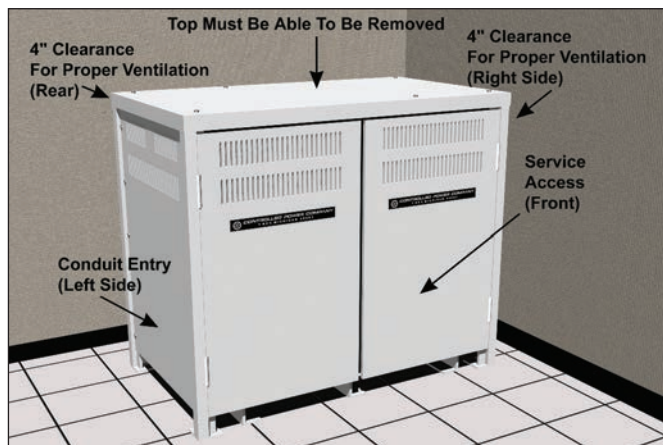
### 15 kVA - 150 kVA Single Phase



- A** 15 - 25 kVA Single Phase Series 900  
15 - 30 kVA Three Phase Series 900  
15 - 25 kVA Single Phase Series 900/200

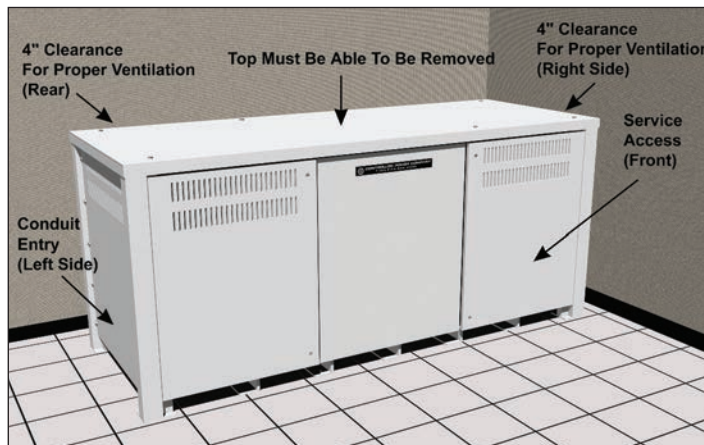
## Series 900 / 200 Power Commander Plus

### 15 kVA - 150 kVA Single Phase



- B** 37.5 - 150 kVA Single Phase Series 900  
45 - 150 kVA Three Phase Series 900  
15 - 75 kVA Three Phase Series 900/200  
37.5 - 150 kVA Single Phase Series 900/200

### 15 kVA - 450 kVA Three Phase



- C** 225 - 450 kVA Three Phase Series 900  
112.5 - 300 kVA Three Phase Series 900/200



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