100V to 1000V DC 100A to 5000A DC

SERIES 50
MODELS 506 & 5012

6 Pulse and 12 Pulse DC Power Supplies for Electrocoating and Industrial DC Powered Systems

Applications:

- Electrocoating
- Ion Nitriding
- Magnet Charging (Including Super Conducting)
- Anodizing

CONTROLLED POWER COMPANY

THE UNIQUE AND PROVEN SOLUTION

Experience, Quality, And Field Reliability

Controlled Power Company engineers and manufactures the industry's highest quality **industrial DC power supplies (rectifiers)**, capitalizing on over 40 years of expertise. This quality is reflected in the design, material, workmanship, and operating performance of each rectifier we build. The result is a rugged, reliable rectifier system that will stand up to the rigors of 24x7 operation, even in harsh industrial environments.

Our rectifiers' durability and performance maximize end-user productivity and minimize downtime. If / when field service is necessary, Controlled Power Company will provide available parts and service for the life of each rectifier we manufacture, which is often 20+ years!

Controlled Power Company is ISO 9001:2008 certified, assuring quality and customer satisfaction from order entry to system start up, and beyond.

OEM's And System Integrators

As a leading manufacturer of **industrial DC power supplies (rectifiers)**, Controlled Power Company understands and strictly adheres to each OEM's and system integrator's rectifier specifications. A custom rectifier design reflects job-specific requirements including voltage and current levels, NEMA ratings, monitoring and controls, dimensions / footprint, and product weight. OEM specific features often include air filters, 24VDC control circuitry, color coded wires, custom paint color, top or bottom entry of AC and DC power cables, and PLC control.

Each rectifier is designed and manufactured for simple installation, start-up, and service. Input and output terminations, component placement, and wiring connectivity are all configured to keep installation costs to a minimum, and to eliminate the need for any field customization during the installation process.

Many design methods are available to help the engineer integrate the high voltage rectifier into the production line, with proper personnel safety. This includes fail-safe emergency power off logic to DC disconnect switches for safe, quick, and convenient isolation of power from production areas.

Controlled Power Company's staff of design and application engineers work together to make sure job requirements are satisfied. In addition, expertise is always on-hand to assist with future expansions, and help implement control improvements or monitoring enhancements.

Customer Support And Field Service

All Controlled Power Company **industrial DC power supplies (rectifiers)** are designed and manufactured to have a low MTTR (mean time to repair). Components and sub-assemblies can be easily field-tested, removed, and serviced without excessive and costly hours of maintenance and downtime.

Each Controlled Power Company rectifier is backed by 24x7 customer support and service. Experienced, knowledgeable staff and technicians are familiar with e-coating and other metal finishing applications, and are ready to assist with service contracts, rectifier startup, training, and phone support. Replacement parts and components can be quickly and easily shipped to a customer's site. When requested, a factory technician is dispatched and can most-often be onsite within 24 hours.

SERIES 50 RECTIFIERS

Controlled Power Company's **"Series 50" Rectifier** reflects a single transformer, secondary thyristor design, and is the preferred choice for electrocoating and other metal finishing applications which require 100VDC or higher. The **"Series 50" Rectifier** is available in both 6- and 12-pulse standard models. Compatible with current advanced manufacturing processes, this rectifier is designed for optimum, reliable performance in harsh industrial environments.

Input Breaker Protection

Standard main input AC circuit breaker, complete with a door-interlocked safety mechanism.

Cabinet Design

Available in NEMA 1, NEMA 2, and NEMA 4X enclosures, each **"Series 50" Rectifier** is designed and constructed to endure the harsh industrial environments associated with e-coating and metal finishing processes. NEMA 1 and NEMA 2 enclosure designs are industrial-grade, welded steel construction, with a durable, scratch-resistant powder coat finish. Specially-formulated, corrosion-resistant paint is also available for caustic environments. NEMA 4X enclosure designs are constructed with high-grade stainless steel, and are available with or without a powder coat finish.

Transformers

Designed for high efficiency, low inrush current, durability, and dynamic loading, the **"Series 50" Rectifier** transformers are constructed from high-grade steel and copper to ensure maximum conductivity and minimal loss. These transformers have a low temperature rise, and are mechanically and electrically designed to withstand the stress that occurs under fault conditions.

Thyristor (SCR's)

In the **"Series 50" Rectifier**, fully synchronized, phase lock loop gating circuitry is used to control the thyristors, eliminate gate misfiring, and insure that all phases are present before gating commences. Thyristors in each phase are surge protected using MOV suppression and an RC snubber circuit. For maximum efficiency and reliability, thyristors are conservatively rated to operate at a current level much lower than their device rating. Additionally, each thyristor is cooled to minimize the junction temperature and increase component life.

Controls And Monitoring

Standard analog metering and local controls on every **"Series 50" Rectifier** include:

- Output Voltage and Current Meters
- AC Power On and DC On Lights
- Output Voltage and Current Control Potentiometers
- Voltage or Current Regulation Mode Switch
- Voltage or Current Limit Control Potentiometer
- Automatic DC Overload Shut Off

Optional local or remote controls are available to suit almost every application. See Page 4 for e-coat specific options.

Water cooled Model 506, shown with optional DC isolation switch.

Cooling

"Series 50" Rectifiers offer a choice of cooling methods to help minimize cost or increase longevity in harsh environments.

Air Cooled

Outside ambient air is drawn into the rectifier using a long-life fan, and directed over the semiconductor devices. The power transformer is convection cooled, but rectifiers with high power ratings also incorporate a fan in the transformer section to assist with heat removal from the enclosure. Replaceable air filters are available for all air inlets. With proper maintenance, long rectifier life will result in typical painting environments or protected electrical closets. Low power rectifiers are available with all-convection cooling to minimize dust/debris entry.

Water Cooled

Heated air from power semiconductors is drawn into an air-to-water heat exchanger. Thermal transfer effectively reduces the air temperature, and then circulates the cooled air back into the semiconductor area. This air circulation also removes heat from the power transformer. An internal thermostat is adjustable to maintain the water cycle for proper cooling, while minimizing internal condensation. Direct water-cooled semiconductor designs are also available and can help lower the component ratings to reduce costs. This method of cooling insures long rectifier life for extreme operating environments.

E-COAT RECTIFIER FEATURES AND BENEFITS

Having manufactured and installed thousands of e-coat rectifiers since the late 1960's, Controlled Power Company remains the leader into the 21st century. Automobile and truck cabs, tractors, major appliances, small metal parts and components ... all have been e-coated using a Controlled Power rectifier. In addition to a quality product, our staff of experienced design and application engineers is one of the very best reasons to choose a Controlled Power e-coat rectifier. Our expertise extends into software and PLC programming, which offers a significant benefit to the OEM and end user.

The **"Series 50" Rectifier's"** ***e-coat specific*** optional features and benefits are as follows:

Adjustable Voltage / Current Slope

Ramping or "Sloping" the DC output at a user-adjustable time rate to control the application of paint and prevent imperfections. In addition, this option relieves surge current stresses on the rectifier and prevents premature current limits from being reached.

Command Two-Level Control

Provides two (2) standard voltage levels at which the rectifier will operate. When a customer provided contact closes, the DC will fall to a low holding voltage. When the contact returns to its open state, the DC will rise to the maximum voltage setting. This feature is necessary for conveyor operations.

AACD (Automatic Average Current Density)

Automatically controls the DC voltage based upon the total current density of the tank. The AACD product optimizes paint usage by minimizing paint thickness deviation levels that would otherwise result from a large difference in surface area between various parts. Consult factory for additional AACD details.

Ripple Meter

An integral or remote digital meter which measures and displays the percentage of AC output ripple. This meter can be programmed to sound an alarm when the ripple voltage exceeds 5%, and also includes a DC voltage meter. DC voltage levels above or below the prescribed voltage can be monitored. The main benefit is to determine the "rectifier health" and annunciate an alarm that the e-coat process may be compromised.

Model 506 6-pulse system for automotive e-coat.

Amp-Hour Meter

Digital meter that counts the number of amp-hours pertaining to energy management and paint consumption.

Amp-Hour Meter With Pump-Stroke Control And Optional Counters

Digital amp-hour meter which measures accumulated amp-hours, and delivers a prescribed number of pump strokes for up to two (2) pumps. An option on this meter is the ability to receive confirming pump signals verifying that the stroke took place. Useful for 2-component paints.

Ripple Filtering

A standard component in e-coating and other metal finishing processes. Ripple filters for the **"Series 50" Rectifier** are available in 5% and 1% designs, and lower the AC ripple component of the DC output to the respective percentage from 25% - 100% of full voltage and current output ratings.

Anode Distribution And Monitoring

DC power distribution, as well as complete monitoring of each anode/cathode cell, is available with blocking diodes and current sensors. To insure safety, distribution enclosures remote from the e-coat tank incorporate fusing. Analog current signals are processed to integrate with any plant network or central workstation. This feature assists with anode maintenance, and can help with process debugging.

Job Design Specific Options

Air filters, 24VDC control circuitry, digital meters, color-coded wiring, safety switch and door interlocks, DC disconnect and transfer switches, Kirk key interlocking, NEMA 12 control cabinets, custom paint color, top or bottom entry of AC and DC power cables, and external or integrated PLC control, including touch-screen graphics are all available to meet specific needs.

SPECIFICATIONS

Controlled Power Company **"Series 50" Rectifiers"** include two (2) distinct product models: **Model 506** and **Model 5012**.

Model 506

The **Model 506** is a 6-pulse, secondary thyristor rectifier used in e-coating and other metal finishing applications that require DC power > 100VDC. Available in output voltages ranging from 100VDC to 1000VDC, and in current ratings ranging from 100A to 5000A, the **Model 506** incorporates a single transformer design, with thyristor semiconductors for rectification and regulation of DC power. In e-coating and other metal finishing applications where low ripple is required, the **Model 506** incorporates an L/C ripple filter to smooth the pulsating DC and to effectively reduce the AC RMS voltage ripple.

Model 5012

The **Model 5012** is a 12-pulse, secondary thyristor rectifier used in "low ripple, high current" e-coating and other metal finishing applications. Available with or without ripple filtering, the **Model 5012** brings the output percent ripple to < 1% with filtering. The **Model 5012** offers a significant advantage over the **Model 506**, in that it reduces input current harmonics, and delivers a smoother DC output. In large e-coating applications where the voltage is > 300V and the current is >1500A, the **Model 5012** is often the best solution. With building power coordination, this design meets IEEE 519 for 5% current THD (total harmonic distortion).

Performance Specifications

- Input Voltage: Standard 208V, 240V, or 480V; 3 phase. (Other voltages available. Consult factory.)
- Input Line Variation: ± 5% from nominal. (Optional wider ranges available. Consult factory.)
- Frequency: 60 Hz. Optional 50 Hz.
- Efficiency: 95% typical, size dependent.
- Power Factor: 90% typical at full output.
- % AC Output Ripple: **Model 506** — 5% (full voltage and current).
  Optional filter provides 5% when operating within 25% to 100% of full voltage and current.
  Model 5012 — 3% (full voltage and current).
  Optional filter provides 1% when operating within 25% to 100% of full voltage and current.
- Reliability: 65,000+ hours MTBF
- Voltage Regulation: ± 0.5%
- Current Regulation: ± 0.5%
- Ambient Temperature: 0° C (32° F) to 40° C (104° F) maximum.
- Humidity: 95% non-condensing.
- Elevation: Maximum elevation 1524 meters (5000 feet) without de-rating.
- Storage: -20° C (-4° F) to 50° C (122° F)

Model 5012 12-pulse system shown.

MODEL 506 CABINET DIMENSIONS

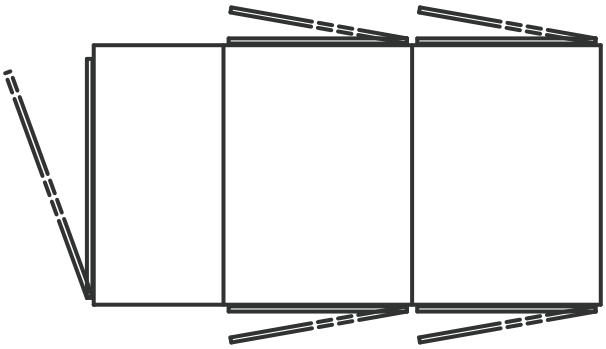
Consult factory for the dimensions and cabinet outlines of the higher-current Model 506, the 12-pulse Model 5012, and 1000 VDC power supplies.

MODEL 506 CABINET DIMENSIONS

Standard DC Voltages: 100 – 600

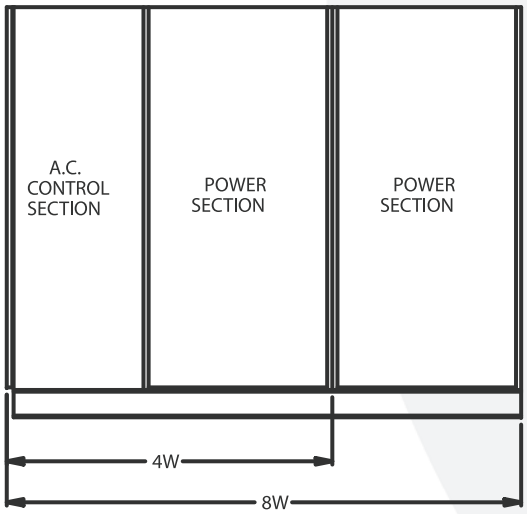
DC Output Current	Cabinet Number	Dimensions In Inches And Millimeters — W x D x H
100	4W	39" x 48" x 60" (990 mm x 1220 mm x 1525 mm)
200	4W	39" x 48" x 60" (990 mm x 1220 mm x 1525 mm)
300	4W	39" x 48" x 60" (990 mm x 1220 mm x 1525 mm)
400	4W	39" x 48" x 60" (990 mm x 1220 mm x 1525 mm)
500	8W	39" x 78" x 60" (990 mm x 1982 mm x 1525 mm)
600	8W	39" x 78" x 60" (990 mm x 1982 mm x 1525 mm)
700	8W	39" x 78" x 60" (990 mm x 1982 mm x 1525 mm)
800	8W	39" x 78" x 60" (990 mm x 1982 mm x 1525 mm)
900	8W	39" x 78" x 60" (990 mm x 1982 mm x 1525 mm)
1000	8W	39" x 78" x 60" (990 mm x 1982 mm x 1525 mm)
1100	8W	39" x 78" x 60" (990 mm x 1982 mm x 1525 mm)

CABINET OUTLINES



Top View

Front View



Warranty: Controlled Power Company guarantees the unit to be free from defects in material and workmanship for a period of (1) year following shipment from the factory. Consult factory for details.

CONTROLLED POWER COMPANY

"World's recognized authority in power treatment"

1955 Stephenson Hwy. Troy MI 48083
www.controlledpwr.com
email: info@controlledpwr.com
Phone: (248) 528-3700 Fax: (248) 528-0411
Call Toll Free: (800) 521-4792

Represented by: